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Value in the Presence of External
Financing Constraints?
Evidence from the 2007-2009
Financial Crisis**

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Abstract

We show that the value of corporate diversification increased during the 2007–2009 financial crisis. Diversification gave firms both financing and investment advantages. First, conglomerates became significantly more leveraged relative to comparable focused firms. Second, conglomerates' access to internal capital markets became more valuable not just because external capital markets became more costly, but also because the efficiency of internal capital allocation increased significantly during the crisis. Our analysis provides new evidence on how the diversification discount and its drivers vary with financial constraints and economic conditions, and suggests that corporate diversification can serve an important insurance function for investors.

The global financial crisis of 2007–2009 has led academics and practitioners to question many widely held beliefs about business and economics. One such belief relates to the value of corporate diversification. Popular views about diversification have swung like a pendulum over the past half-century, from a generally positive view in the 1960s and 1970s, when many large conglomerates were formed, to a generally negative view in the 1980s and early 1990s, when many such conglomerates were dismantled or at least fell out of the stock market’s favor. In the late 1990s and early 2000s, an active debate sparked off among financial economists about the so-called “diversification discount” or lack thereof.¹ In the wake of the global financial crisis, a new view seems to be emerging that conglomerates are ready for a comeback.²

In this paper we investigate whether the value of diversification has indeed changed as a result of the crisis, and if so, why. We are particularly interested in determining whether any changes in the relative value of diversified and focused firms around the crisis reflect real differences in corporate finance and investment as opposed to simple changes in investor sentiment or perceptions.

The broader question we seek to answer is whether the value of corporate diversification and its underlying drivers vary with external financing constraints and changing economic conditions, in such a way that diversification can provide insurance for investors against bad states of the world. If this is the case, then a “diversification discount” may be justified during stable periods, as a form of insurance premium that diversified firm investors are willing to pay.

¹ See Montgomery (1994), Martin and Sayrak (2003), Stein (2003), and Villalonga (2003) for reviews.

² See Tony Jackson, “Comeback beckons for the conglomerate,” *Financial Times*, August 23, 2009; Joseph Bower, Oliver Colling, Ian Harnett, and Glen Ponczak, “Is the time right for the return of the conglomerate?,” *Financial Times*, September 2, 2009; Liam Denning, “Companies must flex spending muscles,” *Wall Street Journal*, December 7, 2009.

Besides its recency and sheer magnitude, the 2007–2009 crisis is of particular interest to us for this purpose because, unlike other crises or recessions, this one had its origins in consumer finance (housing mortgages) rather than in corporate finance (credit or equity markets), or on demand-side factors (business or economic fundamentals). Thus, as Campello, Graham, and Harvey (2010) and Campello, Giambona, Graham, and Harvey (2010) suggest, the 2007 to 2009 financial crisis represents an ideal setting for studying the effects of corporate finance on investment because, while the crisis ultimately spilled over onto the corporate domain, the original shock can be considered exogenous to the system.

More specifically, the origins of the crisis can be traced back to the reversal in housing prices in 2006 and the wave of subprime mortgage defaults this triggered in early 2007 (Gorton (2008), Acharya, Philippon, Richardson, and Roubini (2009)). By August 2007, credit spreads on both short-term and long-term financing instruments had reached historical highs and new bond issues had reached historical lows (Almeida, Campello, Laranjeira, and Weisbenner (2010)), and started to spill over to the supply of bank credit (Ivashina and Scharfstein (2010a)). Furthermore, when Lehman Brothers filed for bankruptcy on September 15, 2008 and the Reserve Primary Fund fell to 97 cents the day after, equity markets experienced a sudden jolt. The result was a significant drop in stock performance and substantial market volatility during the fourth quarter of 2008 and first quarter of 2009; during this period, the S&P500 reached a 12-year low of 676.53 on March 9, and the Chicago Board Options Exchange Volatility Index (VIX) reached a record high of 80.86 on November 20 (see Figure 1). These extreme market conditions made it very difficult for corporations to obtain credit and access external capital during this time span. Ivashina and Scharfstein (2010a) document that new loans to large borrowers fell by 47% during

the peak period of the financial crisis (2008Q4) relative to the prior quarter and by 79% relative to the peak of the credit boom (2007Q2).

This sudden and severe capital rationing suggests two channels through which the financial crisis may have triggered an increase in the intrinsic value of corporate diversification. The first channel is what Stein (2003) labels the “more-money” effect arising from the debt coinsurance feature of conglomerates. As first noted by Lewellen (1971), the imperfect correlation among the cash flows of a conglomerate’s different businesses reduces default risk and thereby increases the group’s debt capacity relative to what a comparable portfolio of stand-alone firms could raise. In support of this argument, Berger and Ofek (1995) find that diversified corporations are significantly more leveraged than their focused counterparts in a statistical sense. Yet the low economic significance of their result and Comment and Jarrell’s (1995) finding of no association between leverage and diversification have cast doubt on the empirical validity of the argument.

However, the failure to find such an association cannot be interpreted as evidence against diversification’s coinsurance effect. First, the effect may manifest itself on prices, rather than quantities. Consistent with this hypothesis, Hann, Ogneva, and Ozbas (2010) find that diversified firms have a lower cost of capital than their single-segment counterparts. Second, to the extent that firms’ optimal capital structure depends on industry characteristics (Harris and Raviv (1991), conglomerates and their stand-alone peers should have the same leverage in equilibrium—which makes Lewellen’s theory difficult to test in a steady-state context. A more definitive test of the theory can thus be achieved by comparing how diversified and single-segment firms change their leverage in response to a generalized shortage of credit in the industry or the overall

economy—such as that provided by the recent financial crisis. When credit becomes rationed, banks and bondholders may prefer to lend their scarce funds to safer conglomerates than to riskier stand-alone firms. Stand-alone firms will thus have more difficulty than conglomerates reaching their optimal leverage and may become disadvantaged or even financially distressed before conglomerates do so. Therefore, the value of conglomerates relative to stand-alone firms may increase during the crisis as a result of the suboptimal capital structure behavior imposed by the crisis on stand-alone firms.

The second channel through which the financial crisis might have increased the intrinsic value of diversification is through firms' internal capital markets—Stein's (2003) "smarter money" effect. The literature has identified several potential benefits and costs of internal capital allocation (see Stein (2003) for a review). The main benefit is that, by engaging in "winner-picking," corporate headquarters can reallocate funds toward promising projects that might be capital-constrained if pursued within stand-alone firms (Stein, 1997). On the other hand, there is a risk that either the CEO or divisional managers may behave as rent-seeking agents and misallocate corporate resources (Rajan, Servaes, and Zingales (2000), Scharfstein and Stein, (2000)). Stein (1997) analyzes under what circumstances the benefits of internal capital allocation are most likely to exceed its costs and concludes that this is precisely when credit constraints are binding, which forces individual projects within the firm to compete for the scarce funding, and increases headquarters' incentives to choose the most deserving projects.

Whether internal capital allocation makes conglomerates more or less valuable than focused firms depends on the efficiency of such allocation relative to that provided by external capital markets. For instance, Khanna and Palepu (2000) and Fauver et al. (2004) find that

international differences in the value of diversification are related to the degree of development of external capital markets. Hubbard and Palia (1999) offer a similar explanation for the different market responses to diversifying acquisitions in the 1960s vs. later decades. It is therefore conceivable that, by making external financing more costly or even unavailable, the 2007 to 2009 crisis might have increased the relative value of internal capital markets and thereby the value of corporate diversification. Naturally, this “smarter-money” effect and the “more-money” effect described before are not mutually exclusive, and may have complemented each other in making diversification more valuable.

We examine a panel of firms from the first quarter of 2005 through the last quarter of 2009 and find that the diversification discount declined by a statistically and economically significant amount—to a half of its pre-crisis size during the early phase of the crisis (2007Q3–2008Q3), and even further to almost a third of its size during the later phase, 2008Q4–2009Q1. The reduction in the discount was entirely attributable to the unrelated diversified firms (i.e., the pure conglomerates) in our sample. We also find that both of the channels described above contributed to the change in the value of corporate diversification. Consistent with the more-money effect, we find a significant increase in conglomerates’ leverage relative to comparable portfolios of focused firms and to the pre-crisis period. Consistent with the smarter-money effect, we find that the efficiency of internal capital markets significantly increased during the crisis. The evidence that both channels played a role suggests that the change in the value of diversification triggered by the financial crisis reflects real differences in corporate finance and investment as opposed to a faddish change in investor sentiment or perceptions.

We also analyze how our results are affected by other firm characteristics that have been found to play a significant role during the crisis: cash holdings, credit ratings, and debt maturity structure. Conglomerates had significantly lower cash ratios than their single-segment peers throughout the entire sample period, but had ex-ante financing advantages in that they were more likely to have (better) credit ratings, and less likely to have a substantial fraction of their long-term debt maturing in the two quarters following Lehman's bankruptcy. Our results show that each of these features interacted with firms' diversification status to create significant heterogeneity in the value of diversification across firms, but in different ways. We find that, during the financial crisis, diversification was particularly valuable to those firms that were more financially constrained in the sense of having low cash or a high fraction of their debt maturing in 2008Q3–Q4. However, we find no similar substitution effect for credit ratings.

Our paper makes several contributions. First, it adds to our understanding of the real effects of the 2007 to 2009 financial crisis. A burgeoning literature has found significant decreases in corporate investment resulting from the crisis. Campello, Graham, and Harvey (2010) survey 1,050 CFOs around the world about their corporate investment plans as of December 2008 and find that more financially constrained firms planned deeper cuts in technology, employment, and capital expenditures. Duchin, Ozbas, and Sensoy (2010) find that the actual decrease in investment was greatest for firms that had low cash reserves or high net short-term debt, were financially constrained, or operated in industries dependent on external finance. Campello, Giambona, Graham, and Harvey (2010), who survey a sample of CFOs about their planned use of lines of credit during early 2009, find that investment not only depended on cash holdings and profits, but also on the interaction between the two, suggesting a substitution

effect between internal and external liquidity during the crisis. They also find that the deepest investment cuts were planned by firms with no access to credit lines. Gao and Yun (2009) and Ivashina and Scharfstein (2010b) complement this ex-ante evidence with evidence from actual investment and credit line drawdowns and reach a similar conclusion. Almeida et al. (2010) find that firms with a large fraction of their long-term debt maturing right after Lehman's bankruptcy cut their investment significantly more than other firms. However, none of these studies examine how the real effects of the crisis differed between conglomerates and single-segment firms. In this respect, our findings complement those of this group of studies, and can thus be of interest not only to academics but also to corporate managers, investors, and regulators.

Second, we also contribute to the academic literature by bringing new evidence to bear on the debate about the value of corporate diversification and internal capital markets. Earlier research suggests that there are benefits and costs to diversification (including, but not limited to, those of internal capital markets), with the average net effect being largely an empirical question.³ The answer to this question has proven to be highly contingent on the time period, geographic location, data, and statistical methods used to estimate it (Villalonga (2003)). It may thus be more useful, as Stein (2003) advocates, to pay more attention to the variance in the diversification discount or premium than to its mean value.

³ The potential benefits of diversification include: debt coinsurance (Lewellen, 1971); efficient internal capital markets (Alchian (1969), Weston (1970), Williamson (1975), Gertner et al. (1994), Stein (1997)); use of non-tradable resources (Penrose, 1959); economies of scope (Panzar and Willig (1979), Teece (1980, 1982)); and market power (Scott (1982), Tirole (1995)). The potential costs include inefficient investment (Scharfstein (1998), Scharfstein and Stein (2000), Rajan et al. (2000)) and agency behaviors such as the pursuit of managers' personal risk reduction (Amihud and Lev, 1981); empire-building (Jensen, 1986); or managerial entrenchment (Shleifer and Vishny, 1989).

Looking at the longitudinal variance in the discount around a financial and economic crisis like the 2007 to 2009 one is particularly interesting in that it allows us to analyze the insurance role that diversification can play for investors. Three other studies have looked at changes in diversified firms' investment behavior over the business cycle, but none has examined the repercussion of these changes on the value of diversification: Dimitrov and Tice (2006) compare the sales and inventory growth of conglomerates to those of focused firms but do not analyze the value of diversification or internal capital markets; Hund et al. (2008) look at annual changes in excess value but do not compare its levels before and after a crisis, and do not analyze the behavior of internal capital markets; Hovakimian (2010) looks at the efficiency of internal capital markets but does not show if and how that affects the diversification discount. As a result, these studies offer only limited evidence about the insurance benefits of diversification during crisis periods. Moreover, none of these studies include the 2007 to 2009 financial crisis, which represents a more exogenous and unanticipated shock than other downturns. This feature of the recent crisis is particularly valuable for a study of diversification, where endogeneity and self-selection biases have been shown to completely distort measured outcomes (Campa and Kedia (2002), Villalonga (2004a)).

Our longitudinal approach to the study of corporate diversification also yields stronger evidence in support of Lewellen's (1971) debt coinsurance theory than earlier studies have found—if they found any at all. As suggested by our arguments above, we believe that this theory is better tested in an out-of-equilibrium context than in steady-state situations where both conglomerates and focused firms are likely to be operating at their optimal (target) leverage

levels. The financial crisis of 2007 to 2009 provoked a major disruption in such equilibrium, which allows us to uncover new empirical support for the theory.

The rest of the paper is organized as follows. Section I describes our sample and measures. Sections II and III present the results of our empirical analysis of whether and why, respectively, diversification became more valuable during the crisis. Section IV concludes.

I. Data and Variables

A. Data and Sample

Following prior studies of the diversification discount (Lang and Stulz (1994), Berger and Ofek (1995)), we draw our sample from the Compustat Industry Segment database.⁴ Since 1977, U.S. publicly traded firms are required to report financial information for segments whose sales, assets, or profits exceed 10% of consolidated totals.⁵ More specifically, we select as our sample those firms that reported segment data for the last fiscal year ending before March 31st, 2005, and track their quarterly performance until December 31st, 2009, or until they are delisted, if that happens earlier. Thus, we do not require our sample firms to survive throughout our entire sample period, but we do not allow new firms to enter the sample after March 31st, 2005. Following Berger and Ofek (1995), we restrict the sample to those firms for which the sum of

⁴ Villalonga (2004b) shows that using establishment-level data from the U.S. Census Bureau can lead to very different results from those based on Compustat segment data regarding the existence of a diversification discount. Unfortunately, the process of accessing this type of Census data can take over a year, and the latest year of data available at this point is 2006, which is incompatible with this paper's goal of analyzing the impact of the 2007-2009 financial crisis on the value of diversification.

⁵ Until 1997, the Financial Accounting Standards Board's (FASB) Statement of Financial Accounting Standards (SFAS) 14 required companies to report such information both for business segments (defined based on industry classification) and for geographical segments, whenever such segments met the 10% threshold. Since 1998, segment reporting is regulated by SFAS 131, which instead requires companies to report only one set of segment data, based on however firms organize themselves internally for purposes of performance evaluation. Nevertheless, most companies reporting segment information after 1997 do so for business segments (Berger and Hann, 2003).

segment sales was within 1% of the firm's total sales in that year, and that had no financial segments during our sample period. For our analyses, all segments within a firm that share a common four-digit SIC code (e.g., because the firm in question reports geographical segment data) are aggregated into a common business segment. To ease the comparison of quarterly financial figures, we further restrict our sample to those firms whose fiscal year ended in March, June, September, or December. These firms represent more than 86% of all firms in Compustat during our sample period. The resulting sample contains 68,724 firm-quarter observations (from 4,370 firms), of which 15,303 observations come from firms that were diversified during that particular quarter, and 53,421 come from single-segment firms.

Table I provides descriptive statistics for the sample. As can be expected, diversified firms are significantly larger in terms of both book and market value of assets than single-segment firms. They also have significantly higher leverage and operating profits, and lower cash holdings relative to their asset size.⁶

B. Empirical Strategy and Measures

Our main empirical approach consists of regressions of a dependent variable on diversification, a measure of the crisis, and the interaction between the two, along with a number of control variables. We use three different dependent variables that have been introduced in prior studies. (1) For our analyses of the diversification discount, we use Berger and Ofek's (1995) measures of the excess value of diversified firms relative to single-segment firms. (2) For our tests of Lewellen's (1971) debt coinsurance hypothesis, we construct a measure of industry-

⁶ For consistency with our analyses of leverage and cash later in the paper, the summary statistics we report in Table I for these two variables exclude outliers (observations that are more than two standard deviations away from the mean).

adjusted leverage that has also been used by Berger and Ofek (1995) for the same purpose. (3) For our tests of the internal capital markets explanation to the value of diversification, we use the *Absolute Value Added by Internal Capital Allocation*, a measure of the efficiency of internal capital markets devised by Rajan et al. (2000).

We adapt these measures as required by the quarterly frequency of our data; namely, we use quarterly data when they are available, which is for those components of the measures that are at the firm level. The components that are at the segment-level need to be measured at the end of the last fiscal year, since there are no quarterly segment data available for them. In all of our regressions, we also exclude from the analysis those firm-quarter observations for which the dependent variable falls more than two standard deviations away from the mean and can therefore be considered outliers. For consistency, we also exclude these outliers from our univariate analyses of the same variables. A detailed description of each variable follows.

Excess Values. We compute excess values for both diversified and single-segment firms in each quarter as the natural logarithm of the ratio between a firm's market value and its imputed value at the end of the quarter. A firm's imputed value is the sum of its segments' imputed values, which are obtained by multiplying the segment's most recent annual sales or assets by the median market-to-sales or market-to-assets multiplier of single-segment firms in the same industry. The industry matching is carried out using the narrowest SIC grouping that includes at least five single-segment firms.

The sales multiplier for comparable single-segment firms is calculated by dividing the market value of a firm at the end of each quarter by its total sales during the last four quarters.

The asset multiplier is calculated by dividing the firm's market value at the end of each quarter by its total assets at the end of the last quarter.

Berger and Ofek (1995) note that segment assets may be subject to significant under-reporting in the Compustat segment files. Moreover, while sales tend to be fully allocated to the operating segments that generate those sales, assets such as corporate headquarters may be reported under a separate, non-operating segment. To address these issues, we follow their approach of excluding observations from the analyses based on asset multipliers whenever the sum of operating segment assets for a firm deviates from the firm's total assets by more than 25%. This elimination considerably reduces the sample size for those analyses that use asset-based excess values. If the sum of segment assets deviates from the firm's total asset base by less than 25%, imputed values are grossed up or down by that percentage deviation.

Industry-adjusted leverage. Industry-adjusted leverage is computed as the difference between a firm's actual leverage and its imputed leverage in each quarter. A firm's imputed leverage is the asset-weighted average of its segments' imputed leverage ratios, which are the product of the segment's most recent annual assets by the median leverage of single-segment firms in the same industry and quarter. In our leverage regressions, the leverage ratio of single-segment firms in the industry is defined as gross book leverage, which is the ratio of total debt to total book assets at the end of each quarter. In our univariate analyses, however, we also report industry-adjusted leverage ratios where the leverage of single-segment firms in the industry is defined alternatively as: (a) gross market leverage (the ratio of total debt to market value of assets at the end of each quarter); (b) net book leverage (the ratio of total debt minus cash and marketable securities to total book assets); or (c) net market leverage (the ratio of total debt

minus cash and marketable securities to market value of assets). In addition, to understand better what drives the net leverage estimates, we report industry-adjusted cash ratios, computed like industry-adjusted leverage but using the ratio of cash and marketable securities to total book assets at the end of each quarter instead of leverage. Like Berger and Ofek (1995), if either the imputed gross leverage or cash ratios or the resulting industry-adjusted measures are greater than one, we truncate them to one.

Absolute Value Added by Internal Capital Allocation (AVA). Following Rajan et al. (2000), this measure is computed as the asset-weighted sum across each firm's segments of the product of the segment's industry-adjusted investment rate by the difference between the median market-to-assets ratio of single-segment firms in the same industry and the number one. The investment rate of a segment is the ratio of the segment's capital expenditures to its total assets at the end of the last fiscal year. This ratio is adjusted for industry effects by subtracting the average investment rate of single-segment firms in the same industry and year. The market-to-assets ratio of single-segment firms is measured at the end of each quarter.

Diversification. Following prior studies of the diversification discount, we measure diversification by a dummy, *Diversified*, which equals one if the firm reported two or more business segments in different four-digit SIC codes at the end of its last fiscal year. In some of our analysis, we split diversified firms into two types: *Unrelated Diversified* (those that reported two or more business segments in different two-digit SIC codes at the end of their last fiscal year) and *Related Diversified* (all others).

Crisis Period Measures. In this paper, we measure the crisis period in four alternative ways. First, we use a set of dummy variables to divide our sample period into four distinct

subperiods: *Early Crisis* (2007Q3–2008Q3), *Late Crisis* (2008Q4–2009Q1), and *Post-Crisis* (2009Q2–2009Q4). The pre-crisis period of 2005Q1–2007Q2 thus serves as the baseline category. Our division of the actual crisis period into two distinct phases follows the approach and the cutoff date used in recent studies of the real effects of the financial crisis like Almeida et al. (2010) and Duchin et al. (2010). The rationale for the division is that, during the later stage of the crisis, it is difficult to discern the extent to which changes in firms' investment behavior are attributable to changes in external financing and the extent to which they are a response to changes in investment opportunities. (Even though the financial crisis as such peaked during 2008Q4 and 2009Q1 (Ivashina and Scharfstein, (2010a), Kahle and Stulz (2010)), by then the crisis had spilled over to the demand side). On the other hand, any changes in investment behavior and outcomes observed during the earlier phase of the crisis can more confidently be attributed to the exogenous shock in external financing, which is what makes the recent crisis a particularly interesting research laboratory for studying the real effects of financial contracting.

We also use three different continuous variables as alternative measures of the intensity of the crisis: the TED spread (difference between the three-month LIBOR and the yield on three-month treasury bills), the spread of three-month commercial paper over treasury bills of the same maturity, and the Chicago Board Options Exchange Volatility Index (VIX). As shown for example in Almeida et al. (2010), the TED and commercial paper spreads series are highly correlated during this period and yield very similar results for our analyses. Thus, we only report the results based on the commercial paper spread for our first (and main) analysis. For all subsequent analyses we report only the results based on the three other measures (crisis period dummies, TED spread, and VIX).

Control Variables. In addition to our measures of diversification, the crisis, and the interaction between them, our excess value and AVA regressions include the following control variables: the ratio of cash and marketable securities relative to the book value of assets; leverage (measured as total debt (short-term plus long-term) relative to the book value of assets); a dummy indicating whether the firm paid dividends; cash-flow volatility (measured as the standard deviation of the ratio of operating income after depreciation to assets over the four quarters ending in 2007Q2); CAPEX/sales; operating income after depreciation /sales; log of total assets; and a set of dummy variables indicating whether the firm's fiscal year ended in June, September, or December (March is the baseline category). Our industry-adjusted leverage regressions also use these control variables, with the exception of leverage (which is now built into the dependent variable) and with the addition of two dummy variables to indicate whether the firm's credit rating in any given quarter was investment-grade (S&P ratings of AAA to BBB-) or speculative-grade (BB+ to Selective Default (SD)), with ungraded firms serving as the baseline category.

All of these variables are at the firm level and are measured at the end of the same fiscal quarter as the dependent variable, when available, or else at the end of the last fiscal year. The exception is cash-flow volatility, which we measure prior to the beginning of the crisis because a contemporaneous measure can be considered as an outcome of diversification itself, rather than as a control variable whose effect we want to net out.

II. Did the Value of Diversification Increase during the 2007 to 2009 Financial Crisis?

Figure 2 shows the evolution of the discount at which diversified firms traded relative to single-segment firms during our sample period. The underlying data for the figure—the mean

excess values of diversified and single-segment firms and the difference between them in each quarter—are reported in the Internet Appendix, on Table IA.I. We note that excess values for single-segment firms do not average out to zero even in a given quarter due to the fact that our measures of excess value are based on median (as opposed to mean) multipliers for these firms and that these medians are computed at different SIC levels depending on the availability of data (we use the highest-resolution SIC category that includes at least five single-segment firms). The discount or premium at which diversified firms trade relative to single-segment firms can thus be computed as the difference in mean excess values between the two groups of firms.

Panels A and B of Figure 2 show results based on sales and asset multipliers, respectively. Both panels show a marked increase in the excess value of diversified firms relative to single-segment firms during the crisis period of 2007Q3–2009Q1, at which point the trend begins to revert to pre-crisis levels. When excess values are computed using sales multipliers, diversified firms trade at a discount during the entire sample period. The discount ranges between -24.7% in 2006Q2 and -10.3% in 2008Q2 (see Table IA.I, Panel A). The spike is more pronounced when excess values are computed using asset multipliers, with the discount disappearing altogether (0.1%) in 2008Q4, the peak period of the crisis (see Table IA.I, Panel B).⁷ In the remainder of the paper, we report only the results based on sales multipliers and relegate the asset-based results to the Internet Appendix as a robustness check.

⁷ Table IA.I also shows that the average discount over the entire sample period of 2005Q1–2009Q4 is -19.2% (-13.2%) when measured using sales (asset) multipliers. The sales-based discount is considerably larger than what Berger and Ofek (1995) report for the period 1986–1991 (10% for sales and 12% for assets). The main reason for this discrepancy is that, unlike Berger and Ofek, we do not require our sample firms to have minimum sales of \$20 million. Imposing this condition on our sample reduces our estimated discount by over a half, i.e. below Berger and Ofek’s estimates. This lower discount is consistent with other studies’ finding of a decrease in the raw

Figure 2 and Table IA.I provide *prima facie* evidence that diversified firms increased in value relative to single-segment firms during the financial crisis. In the remainder of this section we estimate more precisely the size and significance of this increase, and investigate whether it can indeed be attributed to diversification or is due to other factors.

A. Impact of the Crisis on the Value of Diversification: Multivariate OLS Regressions

Table II shows the results of Ordinary Least Squares (OLS) regressions of sales-based excess value on diversification, a measure of the crisis, and the interaction between the two, along with our set of control variables. All of these variables have been described in detail in the previous section. Each of the four columns in Table II show results based on a different measure of the crisis: the set of crisis period dummies, the TED spread, the commercial paper spread, and VIX. As can be expected from Figure 2, the coefficient of *Diversified* is negative and significant in all four regressions. Yet after controlling for other factors that influence excess values through a multivariate regression, the discount is reduced in size relative to the univariate statistics reported in Table IA.I: it now ranges between -14% and -17%, depending on the measure of the crisis used in the regression.

The effect of the crisis by itself on excess values also depends on how the crisis is measured: relative to the pre-crisis period, excess values *for all firms* are significantly lower during the *Early Crisis* period (2007Q3–2008Q3) by six percentage points, during the *Late Crisis* period (2008Q4–2009Q1) by eight percentage points, and specially after the crisis—by 30

diversification discount during the 1990s (e.g., Campa and Kedia (2002), Graham et al., (2002)), and suggests that much of the so-called diversification discount is in fact attributable to size. Despite the loss in comparability to earlier studies, we do not impose the \$20 million sales threshold on our sample because such a condition biases the sample so that diversified firms' segments are smaller than the stand-alone segments to which there are matched.

percentage points. Table IA.I helps understand what is driving these results: during the crisis, diversified firms' excess values increase while single-segment firms' excess values decrease. As soon as the crisis is over, however, there is a sharp decrease in excess values for both groups of firms. The combination of both trends accounts for the decrease in the discount—the difference in excess values between diversified and single-segment firms—during the crisis, and for the subsequent increase shown in Figure 2. But it also accounts for the decrease in excess values during the crisis implied by our regression coefficients in Table II: these excess values are essentially an unweighted average across all firms in the sample, in which single-segment firms outnumber diversified firms by a factor of 3.5 (53,421/15,303). The decrease in excess values of single-segment firms during the crisis is therefore what is driving the decrease for the sample as a whole. Excess values for all firms are also significantly lower when the intensity of the crisis is measured by VIX, but not when it is measured by the TED or commercial paper spreads.

In contrast to the effect on excess values of the crisis per se, the effect of interest to us—the interaction between diversification and the crisis—is positive and statistically significant in all four regressions, i.e., regardless of how the crisis is measured. The first column of Table II shows that the coefficients of *Diversified* \times *Early Crisis* and *Diversified* \times *Late Crisis* are 0.07 and 0.09, respectively, indicating that the discount at which diversified firms traded relative to single-segment firms during the pre-crisis period was reduced by seven percentage points during the purely financial crisis period and even further (by an additional two percentage points) once the crisis spilled over to the demand side of the economy. Columns two and three show that the *Diversified* \times *Credit Spread* coefficient is 0.05 for the TED spread or 0.08 for the commercial

paper spread, indicating that a one percentage-point increase in these spreads was associated with a reduction in the diversification discount of five and eight percentage points, respectively. Column four shows a 0.003 coefficient for the interaction term *Diversified* \times *VIX*, indicating that a ten-point increase in the index (which ranged between 9.89 and 80.86 during our sample period) was associated with a three percentage-point reduction in the diversification discount. Table IA.II in the Internet Appendix shows that the results in Table II are robust, when not stronger, to using asset multipliers in lieu of sales multipliers to compute excess values.

These results are significant not just statistically but also economically. The observed diversification discount is reduced to a half of its pre-crisis size during the early phase of the crisis, and even further to almost a third of its size during the later phase, 2008Q4–2009Q1. As shown in Figure 1, both the TED and VIX reached historically high levels after the Lehman collapse. Specifically, the TED spread reached a maximum of 4.58% on October 13, 2008, and VIX reached its 80.86 maximum on November 20, 2008. These figures are 3.79 percentage points and 59.40 points higher than the sample-period averages of 0.78% and 21.46, respectively. The TED spread maximum would imply a 21 percentage-point reduction on the diversification discount on the date the maximum was reached, or a net diversification premium of 6%, given the baseline discount of -15% implied by the *Diversified* coefficient of -0.15 in the TED spread regression. Likewise, the VIX maximum would imply a 19 percentage-point reduction on the diversification discount on date the maximum was reached, or a net diversification premium of 2% given the baseline discount of -17% implied by the VIX regression.

The results in Table II suggest that the value of diversification significantly increased during the crisis. It is possible, however, that the value increase of diversification may differ across different types of firms or that it may be driven by confounding factors that are correlated with being diversified, beyond those that we have included as control variables in our multivariate regressions. We examine these possibilities in the remainder of this section.

B. Impact of the Crisis on the Value of Related and Unrelated Diversification

In this subsection we examine how the value increase of diversification during the crisis varied across related and unrelated diversified firms. We can think about the relatedness among a diversified firm's segments as a proxy for either quantity or quality of the firm's diversification strategy. Pure conglomerates, i.e., unrelated diversifiers, are more diversified (or better so) than related diversifiers in that their businesses are more different from one another—in SIC codes, investment opportunities, cash flows, etc. Thus, if our finding that diversified firms increased in value relative to single-segment firms during the crisis is indeed attributable to diversification, we would expect to see a greater effect of the crisis on the value of conglomerates than on the value of related diversified firms.

More fundamentally, both of the theoretical explanations for such an increase that we advance in the introduction and test later in the paper are more likely to apply to pure conglomerates than to related diversifiers. First, conglomerates are likely to provide greater debt coinsurance than related diversifiers because the correlation among segment cash flows should increase with the degree of relatedness among them. Second, internal capital markets theories and evidence also suggest that both the benefits and the costs of internal capital allocation increase with diversity in segments' cash flow and/or investment opportunities (Rajan et al.,

(2000); Duchin (2010)). Since we expect the benefits of internal capital allocation to exceed its costs in the presence of external financing constraints, we expect the effect of the crisis to be greater for conglomerates than for related diversifiers for this reason as well.

Table III reports selected coefficients from OLS regressions similar to those in Table II, but where instead of one diversification dummy we have two—*Unrelated Diversified* and *Related Diversified*—each of which is interacted with each of our alternative measures of the crisis. All regressions include the same control variables as before, but for the sake of parsimony we only report the coefficients of the diversification dummies, the crisis, and their interactions.

As before, the first column of Table III shows the results of a model where the crisis is measured using period dummies. While all interaction terms have a positive sign, only the interactions of the two phases of the crisis with unrelated diversification are statistically significant. None of the interactions with related diversification are significant. Likewise, when VIX is used to proxy for the intensity of the crisis, only its interaction with unrelated diversification is significant. The only one of the three models where the interaction between the crisis and both related and unrelated diversification is statistically significant is the one based on the TED spread. Overall, the results seem consistent with our priors about conglomerates driving the results in Table II, and support the view that these results are attributable to diversification.

C. Impact of Cash Reserves on the Value of Diversification during the Crisis

In this subsection we analyze how the value increase of diversification during the crisis varied with firms' cash reserves. The gist of this paper is that diversification may have become more valuable during the global financial crisis because being diversified can help firms attenuate the external financing constraints that affected them as well as their focused peers. If

diversified firms happen to be less financially constrained ex-ante for reasons other than diversification itself, however, our inferences could be confounded. We note that our regressions include several control variables to mitigate this concern: cash reserves, leverage, and the dividend dummy. Nevertheless, some of these variables may interact with diversification itself in one direction or another, creating heterogeneity in the value of diversification across the sample. On the one hand, if diversified firms' lower financing constraints were driving our results, we would expect less constrained diversified firms to have higher excess values (a complementarity effect). On the other hand, the value of diversification may depend on whether firms have other means or not to ride out the liquidity or credit crunch, so that we might expect the more financially constrained diversified firms to have higher excess values (a substitution effect).

In the case of cash reserves, we know from Duchin (2010) that diversified firms have significantly lower cash ratios than single-segment firms, a fact that Table I shows is also true for our sample. Thus, one cannot argue that diversified firms had an ex-ante advantage in that regard. Yet the substitution hypothesis may be at play; namely, diversification is likely to be less valuable for firms that have substantial cash reserves than for those firms that are cash-strapped.

Panel C of Figure 2 shows the evolution of the discount of diversified firms relative to single-segment firms after splitting the sample into high-cash and low-cash firms. Firms are classified as high-cash or low-cash based on whether they were above or below the median ratio of cash and marketable securities to assets in 2007Q2, before the financial crisis started. The underlying data for Panel C are reported in the Internet Appendix Table IA.I, as they are for the rest of Figure 2. Both the figure and the summary statistics in Table IA.I show that, prior to the crisis, the discount was very comparable in size across high-cash and low-cash firms; in fact,

diversification was relatively more valuable for high-cash firms until 2006Q2, when it started to be more valuable for low-cash firms. The difference in the value of diversification across the two subsamples became noticeably wider after the financial crisis broke out in 2007Q3, which is consistent with our hypothesized impact of cash on the value of diversification during the crisis.

To analyze the role played by cash in a more rigorous way, we estimate regression models similar to those in Table II but where we also include our measure of firms' cash reserves at the outset of the crisis (the cash ratio in 2007Q2), and interact it with diversification, our crisis measures, and the interaction of diversification with the crisis measures.

Table IV reports selected coefficients from these regressions for our three alternative measures of the crisis. Of particular interest at this point are the triple-interaction terms. Consistent with the pattern shown in Figure 2, all such coefficients have a negative sign, suggesting that the value increase of diversification during the crisis was indeed attenuated by firms' cash reserves. The statistical significance of the coefficients varies across the different measures of the crisis, however: it is significant for the late crisis period dummy, the post-crisis period dummy, and VIX, but it is non-significant for the early crisis period dummy or the TED spread. The interaction of diversification with the crisis (and without cash) remains significant across all models and all measures of the crisis, and even in the post-crisis period.

To further analyze the heterogeneity in the value increase of diversification during the financial crisis, we investigate how our findings interact with two other measures of financial constraints that have been found to play an important role in the real effects of the crisis: credit ratings and debt maturity structures (Almeida et al. (2010)).

D. Impact of Credit Ratings on the Value of Diversification during the Crisis

The role of credit ratings in our results seems particularly important to ascertain for at least two reasons. First, the high-yield bond market closed down more completely than the investment-grade bond market during the financial crisis. Second, during our sample period, diversified firms were significantly more likely than single-segment firms to have (higher) credit ratings: Table IA.III in the Internet Appendix shows that 21.3% (19.5%) of the diversified firms in our sample have investment-grade (speculative-grade) debt, as compared to 7.8% (11.2%) of single-segment firms. Regardless of whether the superior credit ratings of diversified firms are attributable to diversification (for instance, because of the debt coinsurance they provide) or to the fact that they are larger and more established firms, it could be that the relative value increase experienced by these firms during the crisis might be explained, in whole or in part, by the financing advantage that their superior credit ratings gave them. In that case, we would expect the positive interaction coefficients of Table II to be driven by the firms with (higher) ratings—the complementarity hypothesis. On the other hand, to the extent that credit ratings measure financial constraints, one might expect diversification to be more valuable to the most constrained firms, i.e., those with lower or no ratings—the substitution hypothesis.

To test these alternative hypotheses about the role of credit ratings in our results, we estimate regression models similar to the previous ones where we divide each of the diversified and single-segment groups of firms into three categories based on their credit ratings—investment-grade, speculative-grade, or unrated. Unrated single-segment firms serve as the baseline category, and each of the other five categories is captured by a dummy variable.

Table V, in Panel A, shows the estimated coefficients for each of these five dummy variables. The results suggest that part, but not all, of the increase in the relative value of diversified firms during the financial crisis can be attributed to these firms' superior credit ratings. Firms with investment-grade debt saw a statistically significant increase in excess values during and after the crisis regardless of whether they were diversified or not, and regardless of how the crisis is measured. The exception is the category of single-segment firms during the early phase of the crisis, for which the increase was not significant. Still, the coefficients for diversified firms are about twice the size of those for single-segment firms. Moreover, the effects of credit ratings are non-monotonic across the ordinal categories of investment grade / speculative grade / unrated: the positive effect of the crisis on the relative value of diversified firms is more frequently significant and often higher for unrated diversified firms than it is for diversified firms with speculative-grade debt. This result could be interpreted as evidence that diversification was more valuable to firms that were more financially constrained as reflected by their lack of credit ratings, but the fact that diversification was most valuable to firms with investment-grade debt challenges this interpretation. Altogether, it seems that our results cannot be easily explained by credit ratings.

E. Impact of Debt Maturity Structure on the Value of Diversification during the Crisis

In their study of the real effects of the financial crisis, Almeida et al. (2010) find that firms that had more than 20% of their long-term debt maturing in the four months following Lehman's bankruptcy reduced their investment significantly more than other firms. Table IA.III in the Internet Appendix shows that, besides their superior credit ratings, diversified firms had an additional ex-ante financing advantage over single-segment firms in that, by choice or by

accident, they were less likely to have a substantial fraction of their long-term debt maturing in the two quarters following Lehman's bankruptcy (2008Q3 and 2008Q4). In light of these facts and of Almeida et al.'s findings, we also examine the role played by firms' debt maturity structures in our results.

To that end, we estimate regression models similar to the ones in Table III but where diversified and single-segment firms are divided into categories based on whether the firm had high or low debt maturity. Following Almeida et al., firms are classified as having high (low) debt maturity when more (less) than 20% of their long-term debt as of their fiscal year end between 2007Q3 and 2007Q4 was due in one year. The coefficients of interest are reported in Panel B of Table V.

This analysis shows that our results cannot be attributed to diversified firms' advantageous debt maturity structure. Rather, we find evidence of a substitution effect similar to the one we find for cash holdings. Other than when the TED spread is used to proxy for the intensity of the crisis, the excess values of single-segment firms with high debt maturity were not significantly lower than those of single-segment firms with low debt maturity (the baseline category), which suggests that maturity by itself did not play a significant role in our results. The interaction of the "diversified, low maturity" category with the crisis measures is positive and statistically significant across all measures of the crisis and even in the post-crisis period. However, so is the interaction of diversification with high maturity and with the early crisis and post-crisis dummies, and the coefficients are larger in magnitude than those of the low-maturity interaction terms. This finding is consistent with the notion that that diversification was all the

more valuable to those firms that had a higher exposure to the credit crunch, just as it was for firms that had lower cash reserves to begin with.

F. Controlling for Self-Selection

The analyses we have presented thus far provide evidence that the discount at which diversified firms traded relative to their focused peers was reduced by a significant amount—7% to 9%—during the 2007 to 2009 financial crisis. As Campa and Kedia (2002) and Villalonga (2004a) have shown, however, one needs to be wary of interpreting this so-called “diversification discount” as evidence of a discount to diversification itself, due to the fact that firms’ self-select into (or out of) the diversified status.

We use two different types of econometric models to analyze the robustness of our results to self-selection biases. As a preliminary step, we examine the impact of self-selection on the value of diversification during our sample period by estimating a treatment-effects model where the selection equation models firms’ propensity to be diversified and the performance equation models the effect of the diversification “treatment” on firms’ excess value. The model is similar to those in Campa and Kedia (2002) and Villalonga (2004a), and is estimated using Heckman’s two-step approach. Heckman’s approach requires the application of exclusion restrictions to at least one variable—which is included in the first-stage selection model but can legitimately be excluded from the second-stage regression because it is uncorrelated with the outcome.⁸ We

⁸ Treatment effects models can alternatively be estimated using propensity-score matching, as in Villalonga (2004a). Propensity-score matching estimators do not require exclusion restrictions but require selection on observables (the assumption that every possible predictor of diversification has been included in the selection equation). It is unclear (and untestable) whether this assumption is stronger or weaker than the conditions an instrumental variable needs to meet in this context. Moreover, propensity-score matching estimators are not as suitable for a treatment effects model where the treatment is interacted with another variable. We therefore estimate those interaction models using

apply this exclusion restriction to two variables that have been shown to meet such condition in prior studies of the diversification discount: the fraction of all firms in an industry that are diversified (Campa and Kedia (2002)); and an indicator for whether the firm reports a nonzero amount for minority interest on its balance sheet (Dimitrov and Tice (2006), Hund et al. (2010)).⁹ In addition, we include the three crisis period dummies and all the control variables from Table II as additional predictors of a firm's propensity to be diversified.

The results of this estimation are reported in Internet Appendix Table IA.IV. The key result of interest in this table is that, after correcting for self-selection, the diversification discount disappears. Using sales-based excess values as the second-stage dependent variable, the discount is reduced to 4% and becomes statistically non-significant. Using asset-based excess values, the discount in fact turns into a positive premium of 7%, although the premium is not statistically significant either. These results imply that diversification did not destroy value prior to the crisis, which is consistent with the findings of Campa and Kedia (2002) and Villalonga (2004a) for earlier periods.

The main focus of our paper, however, is not on whether an overall diversification discount existed or not, but on whether the discount was reduced around the time of the financial crisis. In other words, the coefficients of greatest interest for us in the regressions of Table II are

a switching regressions framework, and estimate the treatment effects models using Heckman's approach to maintain consistency in estimation methods throughout the paper. However, we obtain similar results to those reported in the Internet Appendix if we use propensity-score matching to estimate our treatment effects models.

⁹ The rationale for Campa and Kedia's (2002) instrument is that, because excess values are industry-adjusted, they are, by construction, independent of any observable characteristics that affect the value of all firms in a given industry and year in the same way. The rationale for using a minority interest indicator as an instrument is that it proxies for (possibly diversifying) acquisitions that happened in the past but need not be correlated with contemporaneous segment-level unobservables.

not those of the *Diversified* dummy per se but those of its interaction with the various measures of the crisis. These interaction terms are exogenous to the extent that the financial crisis represented an exogenous shock and that firms had no time during the crisis period to adjust their diversification status in response to the shock (only 47 firms, or 1% of the sample, became diversified between 2007Q2 and 2009Q1, and 31 firms became single-segment during the same period). Still, one could argue that some firms might have diversified in anticipation of a downturn. The lack of significance of the coefficient of the crisis indicators in the probit models of Table IA.IV suggests that this was not the case. Nevertheless, to correct for possible selection bias in our estimates of the effect of the financial crisis on the value of diversification, we use a switching regressions approach.

The probit model we use to estimate the selection equation in our switching regression models is the same one as in the treatment-effects models reported in Table IA.IV. The second stage involves estimating the effect of the financial crisis on excess values through separate regressions for the treatment and control groups (diversified and single-segment firms, respectively). This approach allows for the fact that the outcome regression coefficients may differ across the two groups (Hamilton and Nickerson (2003), Li and Prabhala (2007)). Given that our focus is on an interaction term whose individual components are also included in the regression, we believe it is important to incorporate this flexibility into our models. The effect of the financial crisis on the value of diversification in these switching regressions models is given by the difference between diversified and single-segment firms in the marginal effects of the crisis on excess value. The statistical significance of this effect is determined by a Wald test of the difference in coefficients between the two regressions.

Table VI reports these coefficients and the differences between them, along with other regression statistics from the second stage of our switching regression models. The dependent variable in these regressions is sales-based excess value. For robustness, we also report results based on asset multipliers, in Table IA.V of the Internet Appendix.

Table VI shows that the difference between diversified and single-segment firms in the effects that the crisis had on their excess values is positive and significant across all measures of the crisis. The effects are practically identical in size to the OLS estimates shown in Table II: a seven percentage-point increase for the early crisis period, a ten percentage-point increase for the late crisis period, a five percentage-point increase for the TED spread and 0.004 for VIX. The switching regressions coefficients also confirm the univariate results of Table IA.I: the decrease in the discount is driven by the decrease in the excess values of single-segment firms, not by the increase in excess values of diversified firms, which is not statistically significant. In fact, as Table IA.I also shows, diversified firms as well experienced a significant decrease in excess values after the crisis, but the increase for single-segment firms during the same period was even greater. An important difference with the OLS results is that the value increase of diversification now appears to persist beyond the crisis: the *Post-Crisis* effect is 11% and is statistically significant. Since, as we have just shown, diversification neither created nor destroyed value prior to the crisis (at least not in a statistically significant way), the positive and significant coefficients we find for the crisis and post-crisis periods can be interpreted as evidence that diversification in fact created value as a result of the crisis.

III. Why did Diversification Become More Valuable in the 2007 to 2009 Financial Crisis?

In this section we investigate two possible channels through which diversification may have become intrinsically more valuable during the financial crisis: the “more-money” effect (debt coinsurance provided by conglomerates), and the “smarter money” effect (internal capital allocation becoming more efficient when external financing is constrained).

A. The Role of Debt Coinsurance

Table I shows that diversified firms have significantly higher leverage than single-segment firms. This seems consistent with Lewellen’s (1971) hypothesis that conglomerates have higher debt capacity because the imperfect correlation among their diverse businesses reduces default risk. However, to test Lewellen’s hypothesis in a more precise way, diversified firms need to be compared to portfolios of single-segment firms in the same industries. We do this using the industry-adjusted leverage measures described in Section I.

Table VII reports differences in means between diversified and single-segment firms in various industry-adjusted measures of leverage and cash holdings. The table shows that diversified firms were significantly more leveraged than comparable portfolios of single-segment firms during the entire sample period in terms of net book leverage, gross market leverage, and net market leverage, and that the differences between the two groups of firms became much larger during and after the crisis. In terms of gross book leverage, the differences are only statistically significant since 2008Q4, when the financial crisis peaked and became a generalized economic crisis. The differences between diversified and single-segment firms in their industry-adjusted cash ratios stay relatively constant throughout the entire period, which suggests that the trends we find in net leverage are largely driven by the evolution of firms’ debt, not cash.

Moreover, since these differences are always negative, it is not surprising that the differences in leverage are much larger for net leverage than for gross leverage.

Figure 3 shows the evolution of these five measures for diversified and single-segment firms separately, to help us understand what is driving the differences in Table VII. The underlying data for the figure are shown in Table IA.VI of the Internet Appendix. The bottom panel of Figure 3 shows that the stability of the industry-adjusted cash ratios reported on Table VII comes from both the diversified and the single-segment firms. Other than in 2008Q1, both groups of firms were able to maintain a fairly steady industry-adjusted cash ratio throughout the sample period. This result may seem surprising in light of the findings in Ivashina and Scharfstein (2010b) and Kahle and Stulz's (2010) that firms significantly increased their cash holdings after Lehman's bankruptcy. In unreported analysis where we do not adjust for industry, we also find that firms' cash ratios increased after the peak of the financial crisis, although not by much. Our industry-adjusted statistics therefore suggest that firms' industry affiliation may have played an important role in the results reported in these studies.

Figure 3 further shows that the industry-adjusted leverage of single-segment firms also stayed relatively constant regardless of the measure of leverage used. In contrast, the figure shows a marked increase in the industry-adjusted leverage of diversified firms during the crisis. This result is consistent with our hypothesis that, relative to comparable single-segment firms, diversified firms had excess debt capacity that they were able and willing to exploit once credit became rationed in the economy.

To test more formally for the effect of the crisis on the leverage of diversified firms relative to comparable portfolios of single-segment firms, we estimate multivariate regressions

similar to those in Tables II–V, but using industry-adjusted gross book leverage as the dependent variable. The results are reported in Table VIII. As before, we only report the coefficients of our variables of interest—diversification, the crisis, and their interaction. We also report the coefficients of the credit rating dummies, which seem particularly important in this analysis.

The interaction coefficients are positive and statistically significant for the late phase of the crisis, the post-crisis period, the TED spread, and VIX. As can be expected from the univariate analysis of industry-adjusted gross book leverage in Table VII, the *Diversified* \times *Early Crisis* interaction term, while also positive, is not statistically significant.

The results are also economically significant. During the late phase of the crisis and even beyond it, diversified firms' gross book leverage was 4% greater than that of comparable single-segment firms, whereas before the crisis, this difference averaged -2% (as given by the diversification coefficient in Table VIII). It is also worth noting that these results are not driven by conglomerates' superior credit ratings. In fact, Table VIII shows that, while having speculative-grade debt increased firms' industry-adjusted leverage by 12%, having an investment-grade rating had no significant effect.

In the Internet Appendix, we examine the heterogeneity in these results across different types of diversified firms. Table IA.VII shows that, as is the case for excess values, the positive effect of the crisis on industry-adjusted leverage is entirely attributable to unrelated diversified firms (the pure conglomerates). We also examine the sensitivity of our results to controlling for firms' self-selection into the diversification status using switching regressions models. The results of these models, which are in Table IA.VIII, show that the interaction term coefficients are almost identical in size and significance to the OLS coefficients reported in Table VIII.

Altogether, the results are consistent with our hypothesis that the 2007 to 2009 financial crisis made the debt coinsurance feature of conglomerates more valuable to lenders who, by giving priority to diversified firms in the allocation of scarce credit, allowed them to gain a competitive advantage over their focused rivals.

B. The Role of Internal Capital Markets

To understand the role that internal capital markets may have played in the value increase of diversification during the financial crisis, we analyze whether these markets became more efficient during the crisis. Our hypothesis is that internal capital markets become more efficient because, as shown by Stein (1997), a credit-constrained setting is precisely the situation where corporate headquarters can add most value by actively reallocating scarce funds across projects. If this is the case, internal capital markets can play an insurance role which mirrors that of corporate diversification: diversified firms' shareholders may be willing to accept the costs of internal capital allocation during stable periods in exchange for the ability to reap its benefits when external capital becomes constrained. Hovakimian's (2010) evidence from economic recessions provides support for this hypothesis. On the other hand, when firms are financially constrained, they may have the incentive to reallocate capital towards segments with greater cash-production ability regardless of their investment opportunities. Peyer and Shivdasani (2001) show that this is exactly what happens in firms that undergo leveraged recapitalizations.

Prior empirical studies of internal capital markets have used one of two main approaches to gauge their efficiency. The first approach, which was introduced by Shin and Stulz (1998) building on the investment-cash flow sensitivity regression tradition started by Fazzari, Hubbard, and Petersen (1988), consists of comparing the sensitivity of a segment's investment to its own

cash flow across diversified and single-segment firms (either cross-sectionally or longitudinally, as Gertner, Powers, and Scharfstein (2002) do by comparing the diversified and single-segment phases of firms undergoing spinoffs). One variation of this approach that Shin and Stulz (1998) also introduced consists on testing the sensitivity of a segment's investment to the investment opportunities and cash flows of other segments in the firm as well as its own. While this is obviously a refinement of the basic approach, it has the limitation that it can only be applied to diversified firms. Thus, it does not allow for comparisons between diversified and single-segment firms or phases within a firm's history. Moreover, an important caveat to all the variations of this approach is that most if not all of the results based on it have been shown to be artifacts of measurement error in Tobin's q , the proxy for investment opportunities (see Erickson and Whited (2000); Whited (2001) and Colak and Whited (2007)).¹⁰ As a result, this approach has been considerably discredited.

The second approach, which was introduced by Rajan et al. (2000) and is not subject to Whited's measurement error critique, directly measures the efficiency of internal capital markets through one of two measures, *Absolute Value Added by Internal Capital Allocation (AVA)*, which is described in detail in Section I, or *Relative Value Added by Internal Capital Allocation (RVA)*, which is described in Rajan et al. (2000). This is the approach we follow in this paper. In essence, *AVA* measures the extent to which firms over- or under-allocate capital relative to the investment opportunities in their segments' industries. *RVA* measures capital allocation relative

¹⁰ Specifically, Erickson and Whited (2000) call into question the findings in Fazzari et al. (1988) and subsequent studies of investment-cash flow sensitivity across firms. Whited (2002) calls into question the findings in Shin and Stulz (1998) and subsequent studies of investment-cash flow sensitivity within firms, or comparisons between diversified and single-segment firms. Colak and Whited (2007) call into question the findings of Gertner, Power, and Scharfstein (2002) and subsequent studies of investment-cash flow sensitivity within firms undergoing spinoffs.

not just to the industry's investment opportunities but also to the firm's own investment opportunities. Similar to the refined version of the investment-cash flow sensitivity approach, while the comparison to the investment opportunities of other segments within the firm seems a desirable feature, it effectively means that the *RVA* measure can only be computed for diversified firms, since for single-segment firms it takes a value of zero by construction. As a result, the studies that use *RVA* restrict their samples for any analysis based on such measure to diversified firms only (e.g. Rajan et al. (2000), Peyer and Shivdanani (2001), Duchin (2010), or Hovakimian (2010)). Because the focus of our study is on differences in value between diversified and single-segment firms, we cannot impose this restriction on our sample, and therefore we choose to use the *AVA* measure instead. The measure also allows for the possibility that the crisis may have changed the relative growth opportunities across segments during our sample period.

As a preliminary analysis, in the Internet Appendix Table IA.IX we show the evolution of *AVA* for diversified and single-segment firms, and the difference between the two, over our sample period. The univariate results in this table suggest that diversified firms allocated capital more efficiently than single-segment firms in almost every quarter, and significantly so when all quarters are pooled together. The table also shows that this statistical significance is coming entirely from the crisis period (2007Q3–2009Q1), and disappears again after the crisis.

To test more directly how the crisis affected the efficiency of internal capital markets, we estimate multivariate regressions similar to those in Tables II–V using *AVA* as the dependent variable. Our approach is similar in spirit to Peyer and Shivdanani (2001) and Hovakimian (2010), who use the *RVA* measure to analyze how the efficiency of internal capital markets changes before and after leveraged recapitalizations, or over the business cycle, respectively.

Table IX reports the coefficients of interest from these regressions, which also include the same control variables shown in Table II. In contrast with the univariate results of Table IA.IX, the *Diversified* dummy by itself has a negative and statistically significant coefficient in all three models, suggesting that, prior to the crisis, the costs of internal capital allocation for diversified firms well exceeded its benefits. The interaction of diversification with the crisis is positive and significant for all measures of the crisis, including both the early and late subperiod dummies. However, the increase is not sufficiently large to overpower the negative effect that diversification seems to have in steady state after controlling for other factors. Only in the crisis period dummies model shown in the first column, the coefficient of *Diversified* \times *Early Crisis* (0.007) exactly offsets the *Diversified* coefficient, which is -0.007 in that regression. In the other two models, the coefficient of the interaction of diversification with either the TED spread or VIX are smaller than the diversification coefficients in their respective regressions.

Table IX also shows that, as the crisis waned, the efficiency of internal capital markets began to revert to its pre-crisis levels. These findings are consistent with the evidence in Hovakimian (2010) that the efficiency of these markets increases during recessions and decreases during boom periods. The reversal is also consistent with the OLS evidence from Table II that, while diversified firms increased in value relative to single-segment firms during the 2007 to 2009 financial crisis, the increase did not last beyond the crisis. As shown in Table VI, however, after controlling for self-selection, the increase in the value of diversification does last beyond the crisis. As a robustness check, we estimate switching regressions models of internal capital market efficiency similar to those shown in Table VI for excess values. The

results, which are reported in Table IA.X of the Internet Appendix, show that the sign, size, and significance of the coefficients in Table IX are robust to controlling for self-selection.

Overall, the results reported in this section are consistent with the existence of an internal capital market channel through which the value of diversification increased during the financial crisis. The sudden and severe shock experienced by both credit and equity markets during 2007 to 2009 made it difficult if not impossible for NPV-positive opportunities to find external finance. While diversified firms were able to tap into their internal capital markets to make sure these opportunities got sufficient funding, single-segment firms were not. Our results suggest that diversified firms indeed made efficient use of this option and were thus able to increase their value relative to their single-segment peers.

IV. Conclusion

In this paper we examine whether and why the value of corporate diversification changed during the 2007 to 2009 financial crisis. In support of an emergent popular view that conglomerates are ready for a comeback, we find that the value of diversified firms relative to single-segment firms significantly increased during the crisis. Using switching regressions models, we confirm that these results are not driven by firm's self-selection into the diversified status. In fact, after controlling for self-selection, we find that the value increase of diversification has persisted beyond the crisis. To the extent that the financial crisis represented an exogenous shock to external capital markets, our results cannot be attributed either to endogenous differences in firms' financing constraints.

We find that the increase did not simply reflect changes in investor sentiment or perceptions but real differences in corporate finance and investment. Specifically, we find

evidence of two channels through which the financial crisis increased the intrinsic value of corporate diversification: (1) better access to credit markets than single-segment firms had, as a result of the debt coinsurance provided by conglomerates; and (2) access to, and more efficient use of, internal capital markets. While these financing alternatives are always available to diversified firms, the evidence suggests that they became particularly valuable during the crisis. Our study provides evidence that corporate diversification can play an important insurance role for investors, by providing them with protection against bad states of the world.

A question open for future research is how long the value advantage gained by conglomerates during the crisis will last. Our results provide only limited evidence in this regard. On the one hand, we find that the efficiency of internal capital markets after 2009Q2 has practically reverted to its pre-crisis level—a result that can be expected as external capital markets return to their steady-state efficiency and availability, and also perhaps because of the reduced pressure to allocate internal funds efficiently. On the other hand, while one might also have expected the excess leverage of diversified firms relative to comparable single-segment firms to revert to its pre-crisis level after 2009Q2, as credit became cheaper and more broadly available, we find that this has not been the case, at least not yet. Moreover, the value of the financing advantage that conglomerates have enjoyed during the crisis may have allowed them to tackle unique investment opportunities that can give them a sustainable competitive advantage over their focused rivals—or even put some of those rivals out of business. While it is too early for us to be able to analyze in this study some of these long-term effects, the shift in the relative pricing of diversified and single-segment firms suggests that the stock market anticipates that the advantage gained by conglomerates will last well beyond the crisis.

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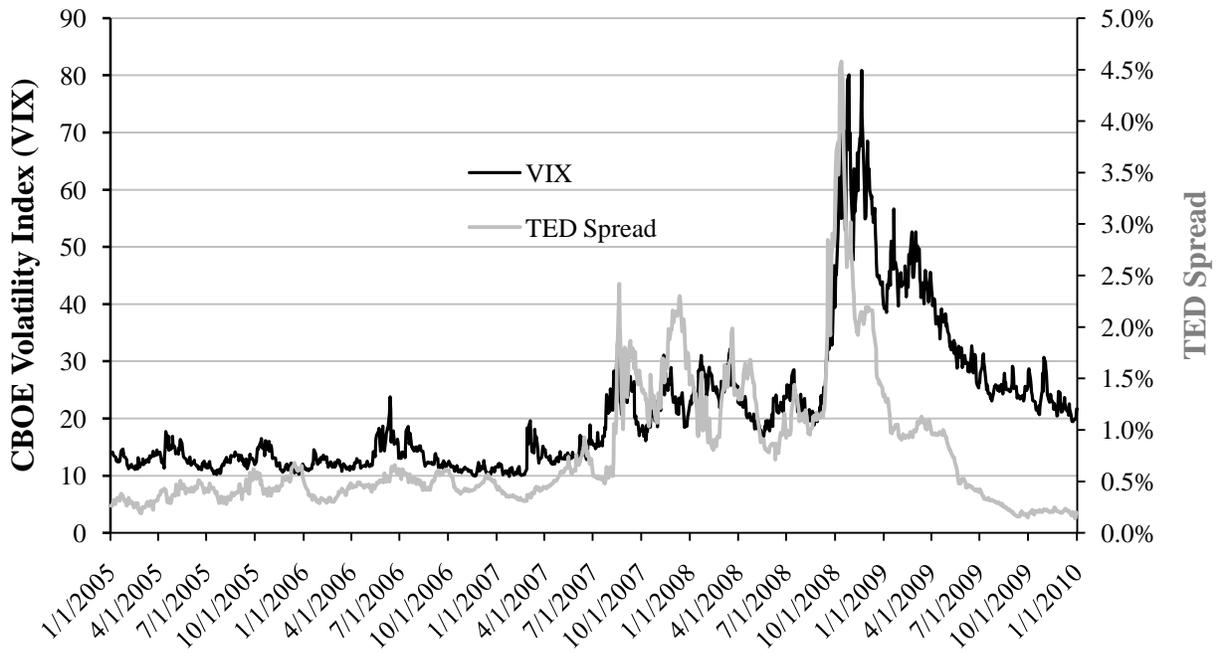


Figure 1. Evolution of the TED spread (difference between three-month LIBOR and three-month treasury bill yield) and the Chicago Board Options Exchange Volatility Index (VIX) from January 2005 until June 2009.

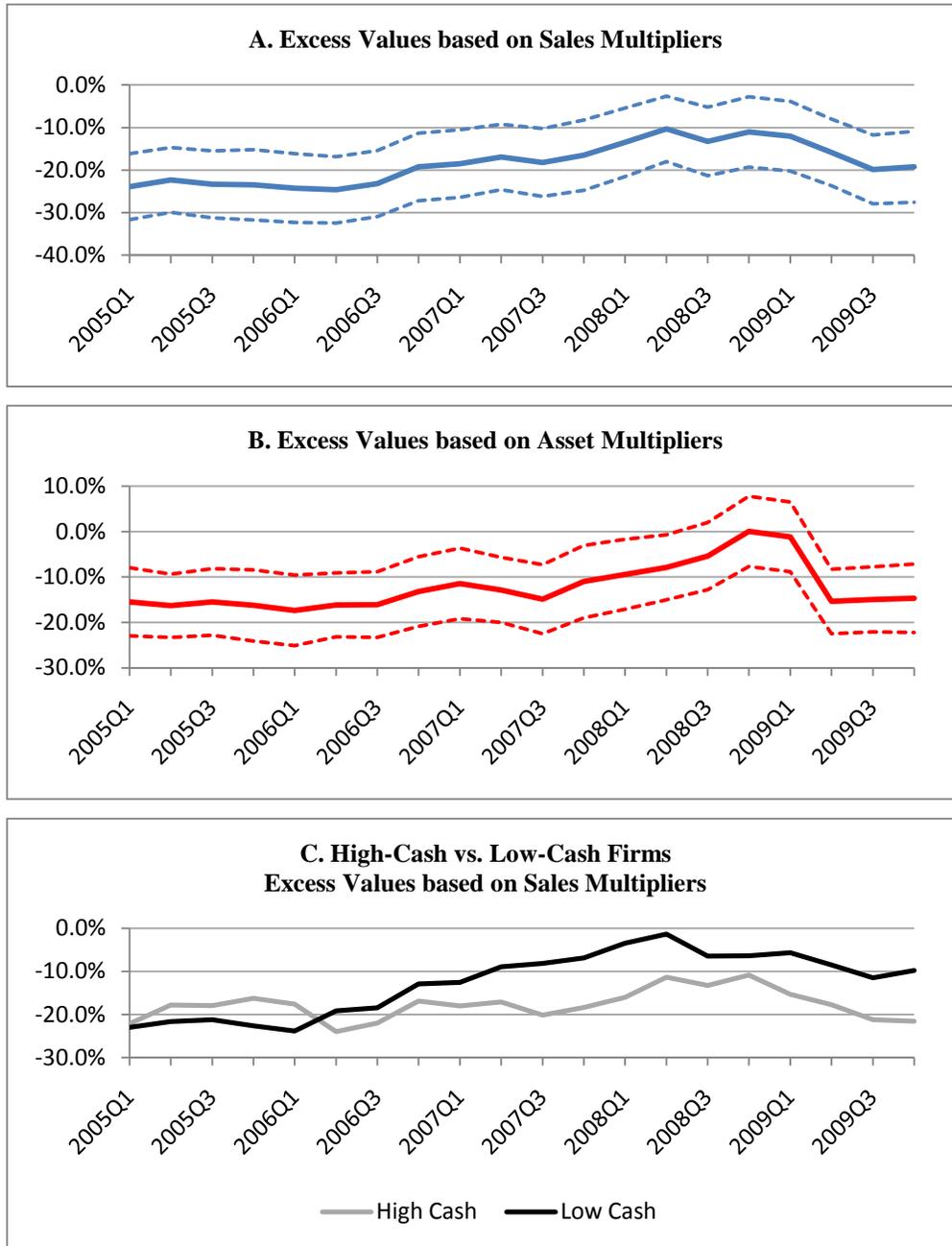


Figure 2. Discount of Diversified Firms Relative to Single-Segment Firms. Difference in mean excess values between diversified and single-segment firms in each quarter. The discontinuous lines in Panels A and B show 95% confidence intervals around the mean obtained from quarterly regressions of excess value on a diversification dummy. Diversified firms are those that have two or more segments in different four-digit SIC codes. Excess value is the natural logarithm of the ratio of a firm’s market value to its imputed value. A firm’s imputed value is the sum of its segments’ imputed values, which are the product of the segment’s most recent annual sales (assets) by the median market-to-sales (assets) ratio of single-segment firms in the same industry. Market-to-sales (assets) is the ratio of the firm’s market value at the end of each quarter to its total sales during the last four quarters (total assets at the end of the last fiscal year). Firms are classified as high- or low-cash based on whether they are above or below the median ratio of cash and marketable securities to assets as of 2007Q2 (before the financial crisis started). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005.

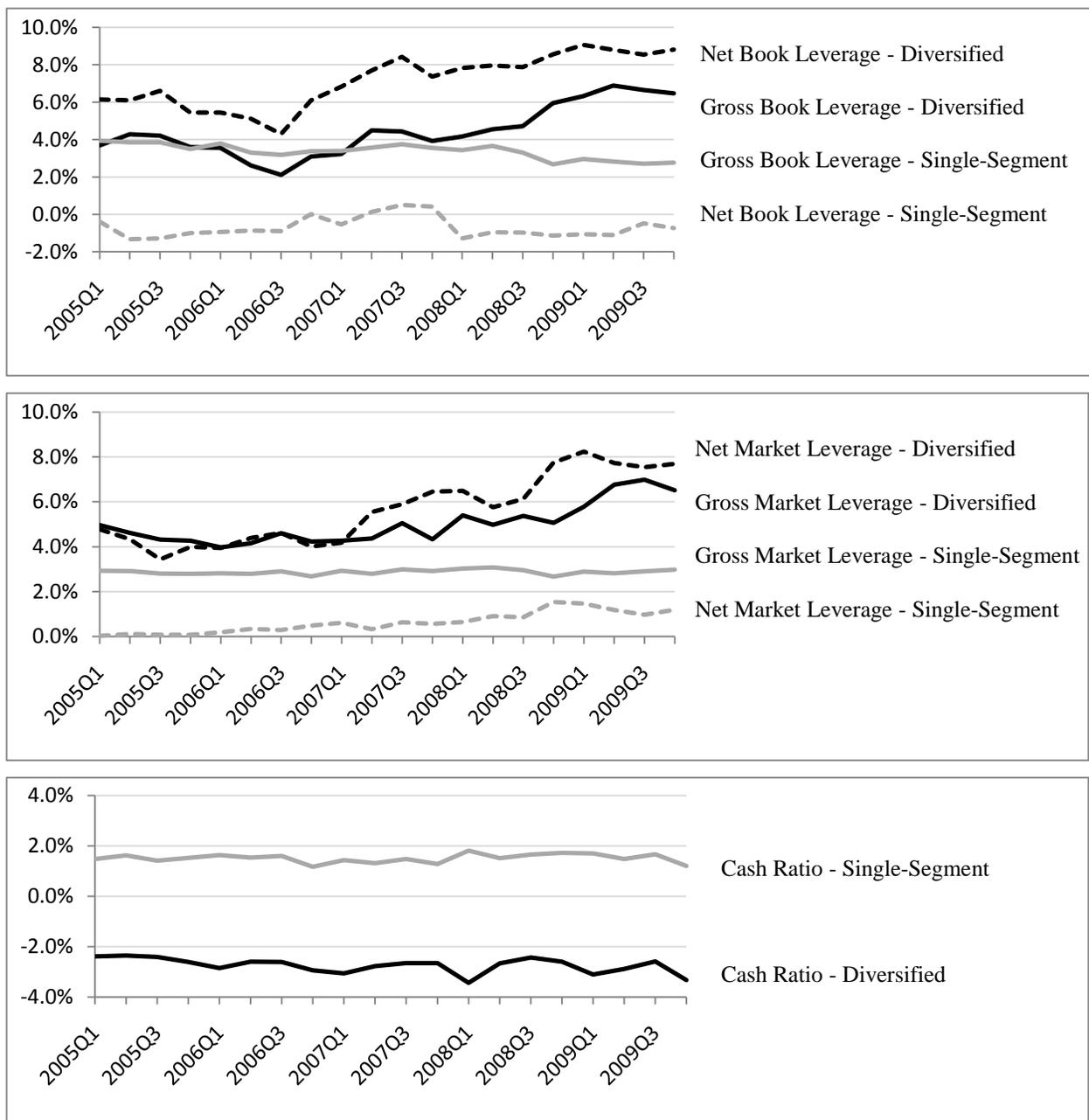


Figure 3. Industry-Adjusted Leverage and Cash Ratios of Diversified Firms and Single-Segment Firms. Industry-adjusted leverage (cash ratio) is the difference between a firm's actual leverage (cash ratio) and its imputed leverage (cash ratio). A firm's imputed leverage (cash ratio) is the sum of its segments' imputed leverage (cash ratios), which are the product of the segment's most recent annual assets by the median leverage (cash ratio) of single-segment firms in the same industry. Gross book (market) leverage is the ratio of total debt to total book assets (market value of assets) at the end of each quarter. Net book (market) leverage is the ratio of total debt minus cash and marketable securities to total book assets (market value of assets). The cash ratio is the ratio of cash and marketable securities to total book assets. The industry matching is carried out using the narrowest SIC grouping that includes at least five single-segment firms. The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005.

Table I
Descriptive Statistics

Summary statistics for diversified and single-segment firms in the sample. Diversified firms are those that have two or more segments in different four-digit SIC codes. The sample includes 68,724 firm-quarter observations from Compustat firms that (1) reported segment data for the last fiscal year ending before March 31st, 2005; (2) had segment sales whose sum was within 1% of the firm's total sales in that year; and (3) had their fiscal year ending in March, June, September, or December. The tests of differences in means (medians) between diversified and single-segment firms are based on univariate OLS (median) regressions where each firm characteristic is regressed on a diversification dummy, and standard errors are clustered by firm. Asterisks indicate statistical significance at the 1% (***) , 5% (**), or 10% (*) level.

	All Firms			Mean Diversified (1)	Mean Single- Segment (2)	Difference (1) - (2)	Median Diversified (3)	Median Single- Segment (4)	Difference (3) - (4)
	Mean	Median	Std. Dev.						
Market value of firm (\$ billion)	3.74	0.34	15.43	8.09	2.51	5.59 ***	1.19	0.24	0.95 ***
Total assets (\$ billion)	2.48	0.23	9.85	5.41	1.63	3.78 ***	0.84	0.15	0.69 ***
Leverage (Total debt / Assets)	0.20	0.15	0.20	0.23	0.19	0.04 ***	0.22	0.13	0.10 ***
Cash & marketable securities / Assets	0.18	0.10	0.19	0.12	0.20	-0.08 ***	0.07	0.12	-0.06 ***
Operating income after deprec./Sales	-1.99	0.01	48.45	-0.17	-2.53	2.37 ***	0.02	0.01	0.01 ***
Number of observations	68,724	68,724	68,724	15,303	53,421		15,303	53,421	

Table II
Impact of the Crisis on the Value of Diversification: OLS Regressions

Multivariate OLS regressions of excess value on the interaction of a diversification dummy with various measures of the crisis. The first model includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The remaining three models use credit spreads or VIX as continuous measures of the intensity of the crisis. The TED spread (commercial paper spread) is the difference between the three-month LIBOR (non-financial commercial paper yield) and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. Excess value is the natural logarithm of the ratio of a firm's market value to its imputed value. A firm's imputed value is the sum of its segments' imputed values, which are the product of the segment's most recent annual sales by the median market-to-sales ratio of single-segment firms in the same industry. Market-to-sales is the ratio of the firm's market value at the end of each quarter to its total sales during the last four quarters. All models also include dummies indicating whether the firm's fiscal year ended in June, September, or December (March is the baseline). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies	TED spread	Commercial Paper Spread	VIX
Diversified	-0.14 *** (-4.14)	-0.15 *** (-4.61)	-0.14 *** (-4.42)	-0.17 *** (-4.03)
Early crisis	-0.06 *** (-4.37)			
Late crisis	-0.08 *** (-3.82)			
Post-Crisis	-0.30 *** (-11.54)			
Diversified × Early crisis	0.07 ** (2.45)			
Diversified × Late crisis	0.09 ** (2.34)			
Diversified × Post-Crisis	0.03 (0.89)			
Credit Spread or VIX		0.01 (0.90)	0.02 (1.55)	-4.E-3 *** (-5.30)
Diversified × Credit Spread or VIX		0.05 *** (3.43)	0.08 *** (2.99)	3.E-3 ** (2.34)
Cash & Marketable Securities/ Assets	1.03 *** (16.07)	1.01 *** (15.80)	1.01 *** (15.81)	1.00 *** (15.74)
Leverage	0.55 *** (9.57)	0.55 *** (9.57)	0.55 *** (9.58)	0.56 *** (9.62)
Dividends Paid	0.06 ** (2.36)	-0.02 (-0.80)	-0.02 (-0.72)	-0.02 (-0.75)
Cash Flow Volatility	0.03 ** (2.08)	0.03 ** (2.14)	0.03 ** (2.14)	0.03 ** (2.09)
CAPX/Sales	8.E-5 (1.20)	-1.E-5 (-0.17)	-1.E-5 (-0.15)	-1.E-5 (-0.18)
OIAD/Sales	-3.E-3 *** (-3.61)	-3.E-3 *** (-3.57)	-3.E-3 *** (-3.57)	-3.E-3 *** (-3.62)
Log Assets	0.02 *** (3.43)	0.03 *** (3.72)	0.03 *** (3.71)	0.03 *** (3.82)
Constant	-0.50 *** (-6.99)	-0.55 *** (-7.59)	-0.55 *** (-7.65)	-0.47 *** (-6.40)
<i>N</i>	42,326	42,326	42,326	42,326
Adjusted <i>R</i> ²	0.10	0.09	0.09	0.09

Table III
Impact of the Crisis on the Value of Related and Unrelated Diversification

Multivariate OLS regressions of excess value on the interaction of related and unrelated diversification dummies with various measures of the crisis. Diversified firms are those that have two or more segments in different four-digit SIC codes; unrelated diversified are firms that have two or more segments in different two-digit SIC codes, the remaining diversified firms are related diversified. The first model includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The remaining models use TED spreads or VIX as continuous measures of the intensity of the crisis. The TED spread is the difference between the three-month LIBOR and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. Excess value is the natural logarithm of the ratio of a firm's market value to its imputed value. A firm's imputed value is the sum of its segments' imputed values, which are the product of the segment's most recent annual sales by the median market-to-sales ratio of single-segment firms in the same industry. Market-to-sales is the ratio of the firm's market value at the end of each quarter to its total sales during the last four quarters. The control variables are: cash and marketable securities /assets; leverage; a dummy indicating whether the firm paid dividends; cash-flow volatility (measured as the standard deviation of operating income after depreciation /assets over the four quarters ending in 2007Q2); CAPEX/sales; operating income after depreciation /sales; log of total assets; and a set of dummy variables indicating whether the firm's fiscal year ended in June, September, or December (March is the baseline category). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies		TED spread		VIX	
Unrelated Diversified	-0.15	(-4.02) ***	-0.16	(-4.35) ***	-0.19	(-4.02) ***
Related Diversified	-0.12	(-2.00) **	-0.14	(-2.45) **	-0.14	(-1.80) *
Early crisis	-0.06	(-4.37) ***				
Late crisis	-0.08	(-3.82) ***				
Post-Crisis	-0.30	(-11.54) ***				
Unrelated Diversified × Early crisis	0.07	(2.21) **				
Unrelated Diversified × Late crisis	0.10	(2.42) **				
Unrelated Diversified × Post-Crisis	0.04	(1.03)				
Related Diversified × Early crisis	0.07	(1.37)				
Related Diversified × Late crisis	0.05	(0.85)				
Related Diversified × Post-Crisis	0.01	(0.17)				
TED Spread or VIX			0.01	(0.90)	-4.E-3	(-5.30) ***
Unrelated Diversified × TED Spread or VIX			0.05	(2.98) ***	4.E-3	(2.38) **
Related Diversified × TED Spread or VIX			0.06	(2.19) **	2.E-3	(0.95)
Controls from prior models	Yes		Yes		Yes	
<i>N</i>	42,326		42,326		42,326	
Adjusted <i>R</i> ²	0.10		0.09		0.09	

Table IV
Impact of Cash Reserves on the Value of Diversification During the Crisis

Multivariate OLS regressions of excess value on interactions of a diversification dummy, cash reserves, and various measures of the crisis. The first model includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The remaining models use TED spreads or VIX as continuous measures of the intensity of the crisis. The TED spread is the difference between the three-month LIBOR and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. Excess value is the natural logarithm of the ratio of a firm’s market value to its imputed value. A firm’s imputed value is the sum of its segments’ imputed values, which are the product of the segment’s most recent annual sales by the median market-to-sales ratio of single-segment firms in the same industry. Market-to-sales is the ratio of the firm’s market value at the end of each quarter to its total sales during the last four quarters. Cash reserves are measured by the ratio of cash and marketable securities to assets as of 2007Q2 (before the financial crisis started). The control variables are: cash and marketable securities /assets; leverage; a dummy indicating whether the firm paid dividends; cash-flow volatility (measured as the standard deviation of operating income after depreciation /assets over the four quarters ending in 2007Q2); CAPEX/sales; operating income after depreciation /sales; log of total assets; and a set of dummy variables indicating whether the firm’s fiscal year ended in June, September, or December (March is the baseline category). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies		TED spread		VIX	
Diversified	-0.24	(-5.44) ***	-0.22	(-5.27) ***	-0.30	(-5.65) ***
Cash Reserves	0.92	(11.83) ***	0.95	(12.32) ***	0.93	(9.13) ***
Diversified × Cash Reserves	0.56	(2.84) ***	0.43	(2.35) **	0.80	(3.10) ***
Early crisis	-0.11	(-5.64) ***				
Late crisis	-0.09	(-3.57) ***				
Post-Crisis	-0.36	(-11.63) ***				
Diversified × Early crisis	0.12	(3.49) ***				
Early crisis × Cash Reserves	0.07	(1.01)				
Diversified × Early crisis × Cash	-0.25	(-1.19)				
Diversified × Late crisis	0.18	(3.83) ***				
Late crisis × Cash Reserves	-0.05	(-0.55)				
Diversified × Late crisis × Cash	-0.62	(-2.39) **				
Diversified × Post-Crisis	0.14	(2.94) ***				
Post-Crisis × Cash Reserves	0.14	(1.46)				
Diversified × Post-Crisis × Cash	-0.54	(-2.07) **				
Credit Spread			0.00	(-0.15)	-0.01	(-5.36) ***
Diversified × TED Spread or VIX			0.07	(3.54) ***	0.01	(4.01) ***
TED Spread or VIX × Cash Reserves			-0.03	(-0.61)	7.E-5	(0.02)
Diversified × Credit Spread or VIX × Cash			-0.11	(-0.90)	-0.02	(-2.27) **
Controls from prior models	Yes		Yes		Yes	
<i>N</i>	42,310		42,310		42,310	
Adjusted <i>R</i> ²	0.10		0.09		0.09	

Table V
Impact of the Financial Crisis on the Value of Diversification for Firms with Different Credit Ratings or Debt Maturity Structures

Interaction coefficients from multivariate OLS regressions of excess value on interactions of different categories of firms with various measures of the crisis. Firms in each of the categories indicated in the table are compared to the baseline categories of single-segment firms with single-segment firms with unrated credit (in Panel A) or single-segment firms with low debt maturity (in Panel B). Firms are considered to have high (low) debt maturity when more (less) than 20% of their long-term debt as of their fiscal year end between 2007Q3 and 2007Q4 was due in one year. Within each panel, the first three columns are from the same regression, which includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The other two models are each from a different regression that uses credit spreads or VIX as continuous measures of the intensity of the crisis. The TED spread (commercial paper spread) is the difference between the three-month LIBOR (non-financial commercial paper yield) and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. Excess value is the natural logarithm of the ratio of a firm's market value to its imputed value. A firm's imputed value is the sum of its segments' imputed values, which are the product of the segment's most recent annual sales by the median market-to-sales ratio of single-segment firms in the same industry. Market-to-sales is the ratio of the firm's market value at the end of each quarter to its total sales during the last four quarters. All models also include dummies indicating whether the firm's fiscal year ended in June, September, or December (March is the baseline). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies			TED spread	VIX
	Early crisis	Late crisis	Post-Crisis		
<i>A. Credit Rating</i>					
Single-segment and speculative grade	0.05 (1.39)	0.09 * (1.95)	-0.05 (-0.97)	0.07 *** (3.19)	3.E-3 (1.41)
Single-segment and investment grade	0.06 (1.40)	0.16 *** (3.09)	0.15 *** (2.80)	0.04 * (1.84)	5.E-3 *** (2.72)
Diversified and missing grade	0.08 ** (2.04)	0.05 (0.98)	0.00 (-0.04)	0.06 *** (2.90)	2.E-3 (1.20)
Diversified and speculative grade	0.04 (0.87)	0.08 (1.32)	0.01 (0.19)	0.05 * (1.73)	3.E-3 (1.16)
Diversified and investment grade	0.11 ** (2.37)	0.29 *** (5.67)	0.18 *** (2.99)	0.09 *** (3.71)	9.E-3 *** (4.55)
<i>B. Debt Maturity</i>					
Single-segment with high debt maturity	-0.02 (-0.56)	-0.07 (-1.19)	0.09 (1.49)	-0.06 ** (-2.24)	-2.E-3 (-0.77)
Diversified with high debt maturity	0.17 ** (2.14)	0.12 (1.28)	0.19 * (1.93)	0.06 (1.49)	6.E-3 (1.55)
Diversified with low debt maturity	0.10 *** (3.16)	0.17 *** (3.86)	0.13 *** (2.80)	0.06 *** (3.41)	6.E-3 *** (3.85)

Table VI
Impact of the Crisis on the Value of Diversification: Switching Regressions

Difference between diversified and single-segment firms in the marginal effects of various measures of the crisis on excess value, as estimated from switching regressions models. The first stage consists of probit models of firms' propensity to be diversified. The second stage consists of regressions, estimated separately for the diversified and single-segment firms in the sample, of excess value on measures of the crisis and on the control variables from prior models, which are: cash and marketable securities /assets; leverage; a dummy indicating whether the firm paid dividends; cash-flow volatility (measured as the standard deviation of operating income after depreciation /assets over the four quarters ending in 2007Q2); CAPEX/sales; operating income after depreciation /sales; log of total assets; and a set of dummy variables indicating whether the firm's fiscal year ended in June, September, or December (March is the baseline category). Excess value is the natural logarithm of the ratio of a firm's market value to its imputed value. A firm's imputed value is the sum of its segments' imputed values, which are the product of the segment's most recent annual sales by the median market-to-sales ratio of single-segment firms in the same industry. Market-to-sales is the ratio of the firm's market value at the end of each quarter to its total sales during the last four quarters. The first model includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The remaining models use TED spreads or VIX as continuous measures of the intensity of the crisis. The TED spread is the difference between the three-month LIBOR and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies			TED spread			VIX		
	Diversified (1)	Single- Segment (2)	Difference (1) - (2)	Diversified (1)	Single- Segment (2)	Difference (1) - (2)	Diversified (1)	Single- Segment (2)	Difference (1) - (2)
Early crisis	4.E-3 (0.15)	-0.07 *** (-4.36)	0.07 **						
Late crisis	0.01 (0.34)	-0.09 *** (-4.28)	0.10 **						
Post-Crisis	-0.22 *** (-5.33)	-0.33 *** (-10.48)	0.11 **						
Credit Spread				0.05 *** (3.27)	0.01 (0.66)	0.05 **	-5.E-4 (-0.42)	-4.E-3 *** (-5.61)	4.E-3 ***
Lambda	-0.01 (-0.07)	0.34 *** (2.76)		-0.01 (-0.07)	0.39 *** (3.15)		-0.01 (-0.09)	0.38 *** (-3.10)	
Controls from prior models	Yes	Yes		Yes	Yes		Yes	Yes	
<i>N</i>	8,475	30,728		8,475	30,728		8,475	30,728	
Adjusted <i>R</i> ²	0.13	0.09		0.12	0.08		0.12	0.09	

Table VII
Differences in Industry-Adjusted Leverage and Cash Ratios between Diversified Firms and Single-Segment Firms

Differences in means between diversified and single-segment firms in various measures of industry-adjusted leverage and industry-adjusted cash ratios. Industry-adjusted leverage (cash ratio) is the difference between a firm's actual leverage (cash ratio) and its imputed leverage (cash ratio). A firm's imputed leverage (cash ratio) is the sum of its segments' imputed leverage (cash ratios), which are the product of the segment's most recent annual assets by the median leverage (cash ratio) of single-segment firms in the same industry. Gross book (market) leverage is the ratio of total debt to total book assets (market value of assets) at the end of each quarter. Net book (market) leverage is the ratio of total debt minus cash and marketable securities to total book assets (market value of assets). The cash ratio is the ratio of cash and marketable securities to total book assets. The industry matching is carried out using the narrowest SIC grouping that includes at least five single-segment firms. The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. The tests of differences in means are based on univariate OLS regressions where each firm characteristic is regressed on a diversification dummy. For the last ("All") row, standard errors are clustered by firm. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

Quarter	Book Leverage		Market Leverage		Cash Ratio
	Gross Leverage	Net Leverage	Gross Leverage	Net Leverage	
2005Q1	-0.2%	6.5% ***	2.0% ***	4.7% ***	-3.9% ***
2005Q2	0.4%	7.4% ***	1.7% ***	4.2% ***	-4.0% ***
2005Q3	0.4%	7.9% ***	1.5% ***	3.4% ***	-3.8% ***
2005Q4	0.1%	6.4% ***	1.5% **	3.9% ***	-4.1% ***
2006Q1	-0.2%	6.4% ***	1.2% **	3.8% ***	-4.5% ***
2006Q2	-0.7%	6.0% ***	1.4% **	4.1% ***	-4.1% ***
2006Q3	-1.1%	5.2% ***	1.7% ***	4.3% ***	-4.2% ***
2006Q4	-0.3%	6.1% ***	1.5% **	3.5% ***	-4.1% ***
2007Q1	-0.2%	7.4% ***	1.3% **	3.6% ***	-4.5% ***
2007Q2	0.9%	7.6% ***	1.6% ***	5.2% ***	-4.1% ***
2007Q3	0.7%	7.9% ***	2.0% ***	5.3% ***	-4.1% ***
2007Q4	0.4%	6.9% ***	1.4% **	5.9% ***	-3.9% ***
2008Q1	0.7%	9.1% ***	2.4% ***	5.8% ***	-5.2% ***
2008Q2	0.9%	8.9% ***	1.9% ***	4.9% ***	-4.2% ***
2008Q3	1.4%	8.8% ***	2.4% ***	5.3% ***	-4.1% ***
2008Q4	3.3% ***	9.7% ***	2.4% ***	6.2% ***	-4.3% ***
2009Q1	3.4% ***	10.1% ***	2.9% ***	6.8% ***	-4.8% ***
2009Q2	4.1% ***	9.9% ***	3.9% ***	6.5% ***	-4.4% ***
2009Q3	3.9% ***	9.0% ***	4.1% ***	6.6% ***	-4.3% ***
2009Q4	3.7% ***	9.5% ***	3.5% ***	6.5% ***	-4.5% ***
All	1.0%	7.8% ***	2.1% ***	5.0% ***	-4.2% ***

Table VIII
Impact of the Crisis on the Industry-Adjusted Leverage of Diversified Firms
Relative to Single-Segment Firms

Multivariate OLS regressions of industry-adjusted leverage on the interaction of a diversification dummy with various measures of the crisis. The first model includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The remaining models use TED spreads or VIX as continuous measures of the intensity of the crisis. The TED spread is the difference between the three-month LIBOR and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. Industry-adjusted leverage is the difference between a firm’s actual leverage and its imputed leverage. A firm’s imputed leverage is the sum of its segments’ imputed leverage, which are the product of the segment’s most recent annual assets by the median leverage of single-segment firms in the same industry. Leverage in these regressions is gross book leverage, which is the ratio of total debt to total book assets at the end of each quarter. The control variables from prior models included here are: a dummy indicating whether the firm paid dividends; cash-flow volatility (measured as the standard deviation of operating income after depreciation /assets over the four quarters ending in 2007Q2); CAPEX/sales; operating income after depreciation /sales; log of total assets; and a set of dummy variables indicating whether the firm’s fiscal year ended in June, September, or December (March is the baseline category). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies	TED spread	VIX
Diversified	-0.02 ** (-2.35)	-0.01 (-1.04)	-0.03 *** (-3.27)
Early crisis	-2.E-3 (-0.70)		
Late crisis	-0.01 * (-1.80)		
Post-Crisis	3.E-3 (0.53)		
Diversified × Early crisis	0.01 (1.56)		
Diversified × Late crisis	0.04 *** (3.69)		
Diversified × Post-Crisis	0.04 *** (4.30)		
Credit Spread or VIX		-4.E-3 * (-1.69)	-2.E-4 (-1.44)
Diversified × Credit Spread or VIX		2.E-3 (0.37)	1.E-3 *** (-3.39)
Investment-Grade Credit Rating	0.02 (1.55)	0.01 (1.46)	0.01 (-1.46)
Speculative-Grade Credit Rating	0.12 *** (12.05)	0.12 *** (12.02)	0.12 *** (-12.04)
Controls from prior models	Yes	Yes	Yes
<i>N</i>	43,693	43,693	43,693
Adjusted <i>R</i> ²	0.07	0.07	0.07

Table IX
Impact of the Crisis on the Efficiency of Internal Capital Markets

Multivariate OLS regressions of absolute value added by internal capital allocation (AVA) on the interaction of a diversification dummy with various measures of the crisis. AVA is measured, following Rajan, Servaes, and Zingales (2000), as the asset-weighted sum across each firm's segments of the product of the segment's industry-adjusted investment rate by the difference between the median market-to-assets ratio of single-segment firms in the same industry and the number one. The investment rate of a segment is the ratio of segment capital expenditures to total segment assets, which is adjusted for industry effects by subtracting the average investment rate of single-segment firms in the same industry. The first model includes three crisis period dummies: early crisis (2007Q3–2008Q3), late crisis (2008Q4–2009Q1), and post-crisis (2009Q2–2009Q4). The remaining three models use credit spreads or VIX as continuous measures of the intensity of the crisis. The TED spread (commercial paper spread) is the difference between the three-month LIBOR (non-financial commercial paper yield) and three-month treasury bill yield. VIX is the Chicago Board Options Exchange Volatility Index. The control variables are: cash and marketable securities /assets; leverage; a dummy indicating whether the firm paid dividends; cash-flow volatility (measured as the standard deviation of operating income after depreciation /assets over the four quarters ending in 2007Q2); CAPEX/sales; operating income after depreciation /sales; log of total assets; and a set of dummy variables indicating whether the firm's fiscal year ended in June, September, or December (March is the baseline category). The sample includes 68,724 firm-quarter observations from firms that reported segment data for the last fiscal year ending before March 31st, 2005. *t*-statistics from standard errors clustered by firm are in parentheses. Asterisks indicate statistical significance at the 1% (***), 5% (**), or 10% (*) level.

	Crisis Period Dummies	TED spread	VIX
Diversified	-7.E-3 ** (-2.46)	-8.E-3 *** (-3.12)	-1.E-2 ** (-2.55)
Early crisis	-4.E-3 *** (-2.76)		
Late crisis	8.E-5 (0.06)		
Post-Crisis	1.E-4 (0.07)		
Diversified × Early crisis	7.E-3 ** (2.17)		
Diversified × Late crisis	6.E-3 * (1.90)		
Diversified × Post-Crisis	2.E-3 (0.76)		
Credit Spread or VIX		-2.E-3 *** (-2.88)	-5.E-5 (-0.93)
Diversified × Credit Spread or VIX		5.E-3 *** (2.63)	3.E-4 ** (-2.10)
Controls from prior models	Yes	Yes	Yes
<i>N</i>	44,544	44,544	44,544
Adjusted <i>R</i> ²	0.03	0.03	0.03