Survival and Pricing Puzzles

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Michela Altieri
VU Amsterdam

Giovanna Nicodano
University of Torino and ECGI

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Abstract

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Keywords: survivorship bias, asset pricing, market efficiency, diversiffication discount, parent company discount

JEL Classifications: G32, D23, K19

Michela Altieri*
Assistant Professor of Finance
VU Amsterdam, School of Business and Economics
De Boelelaan 1105
1081 HV Amsterdam, The Netherlands
e-mail: m.altieri@vu.nl

Giovanna Nicodano
Professor of Financial Economics
University of Torino, Collegio Carlo Alberto and Esomas
Corso Unione Sovietica 218/bis
10134 Torino, Italy
e-mail: giovanna.nicodano@unito.it

*Corresponding Author

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Michela Altieri* Giovanna Nicodano†

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*School of Business and Economics: Finance, VU, Amsterdam, The Netherlands. email: m.altieri@vu.nl

†Corresponding Author, Collegio Carlo Alberto and Esomas, University of Torino, Italy, and ECGI. email: giovanna.nicodano@unito.it

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1 Introduction

In a world without frictions or behavioral biases (as in Rubinstein (1975) and Grossman (1981)), stock price is a signal of company value reflecting the conditional expectation of future cash-flows. This paper assumes away such biases, so that price always reflects the conditional expectation. However, it argues that an unbiased inference of the value of company types based on prices is not straightforward, because of missing prices for defaulted companies. [1] This paper clarifies how limited availability of information concerning defaulted companies affects the informativeness of stock prices, leading to a "pricing puzzle" involving companies with different survival. Higher survival types will indeed display a discount relative to lower survival types. We clarify this counter-intuitive insight, building on company diversification theories investigating the survival-value nexus (Leland (2007), Banal-Estanol, Ottaviani and Winton (2013)). We then take it to the data on diversified conglomerates. This is an ideal laboratory since a vast empirical literature investigates the conglomerate discount (Maksimovic and Phillips (2007, 2013), Laeven and Levine (2007)), largely ignoring survival so far.

In our model, there is heterogeneous firm mortality of otherwise identical companies. Higher survival companies incur into lower expected bankruptcy costs and hence have higher *ex ante* expected value than lower survival ones. *Ex-ante*, before defaults, prices reflect their higher expected values because there are no frictions and thus the stock market is *ex-ante* informational efficient. *Ex-post*, after some defaults, the prices of defaulted companies are no longer available.

It is still possible that the prices of survivors correctly reflect their superior performance, provided that traders recall the past existence of all defaulted firms. Scholars and analysts, however, do not usually have such information.[2] They may thus be unable to cope with the sample selection bias, as first highlighted by Banz and Breen (1986). In this context, the average of stock prices overestimates the *ex-ante* value of companies due to the scholars' inability to address sample selection. The reason is that there are no prices for the worst performing companies that disappeared due to bankruptcy. Importantly, this problem affects the comparison across company types. The average price of better survivors will indeed be lower than the

[1] The set of defaulted companies is large, growing and often publicly unobservable. Restricting attention to the CRSP database of publicly listed companies, both de-listings and decade returns of -100% are frequent over 1926-2016. The median time that a common stock stays listed is seven and a half years (Bessembinder, 2018).

[2] There is no public register of defaulted companies. Some databases do keep track of public firm defaults but many companies only trade over the counter.

average price of worse survivors, because fewer among the latter survive to industry downturns.

Our model investigates the case when not only scholars but also traders have imperfect recall of defaulted companies. This will lead to the price of each company type exceeding its *ex-ante* expected value, the more so the higher is its default probability. Better survivor types will suffer from a discount, due to information limitations, when they instead save on expected bankruptcy costs. This insight contributes to our understanding of market efficiency showing that stock prices in *ex-ante* informational efficient markets may not *ex-post* reflect the higher value of company types that save on bankruptcy costs. It also cautions against basing both stability regulation and corporate restructurings on raw market data regarding companies with different mortality.

According to our theory, company types with higher survival probability should display a lower (average) price than other types, controlling for their other characteristics. We turn to the data to investigate whether this insight sheds light on the conglomerate discount. First, we ask whether company diversification increases survival. *A priori*, there is a coinsurance-contagion trade-off. On the one hand, diversification allows for coinsurance between operating units exposed to different industry shocks (as in Boot and Schmeits (2000) and Lewellen (1971)). On the other hand, unprofitable units may drag profitable ones into bankruptcy (as in Banal-Estanol et al. (2013) and Leland (2007). The estimates of default probabilities of US companies, based on the survival models of Campbell, Hilscher, and Szilagyi (2008), confirm that coinsurance dominates on average (in line with Borghesi, Houston, and Naranjo (2007)). The survival analysis confirms that a conglomerate has a 8% lower probability of default, compared to focused companies. We also construct a conglomerate ”‘excess default probability” measure in line with the ”‘excess value”’ measure used in the conglomerate discount literature. While its mean value is negative (-0.14), the value for the upper quartile turns positive indicating that contagion dominates over coinsurance in 25% of our sample. We then ask whether the differential survival explains the cross-sectional variation in the conglomerate discount.

Our empirical findings align with our insight. We find that the diversification discount is much lower (5.6%) for companies that are closest to distress than for companies belonging to the top quartile of survival probability (13.3%), after accounting for the standard controls in the literature. Adding the age of surviving companies as control reduces the conglomerate discount, but does not cancel it because sample selection remains both at the beginning and during the sample period. In other words, the age of companies that are currently alive cannot fully account for the number of dead focused companies in the corporate graveyard. Since we cannot use the unavailable prices of defaulted companies in order to eliminate the sample distortion, and following a similar methodology as in Banz and Breen (1986) and many others,[3] we exacerbate the bias by eliminating all companies that disappeared during the sample period. Consistent with our insight, the conglomerate discount increases. These results suggest that differences in market prices *across company types* with different mortality do not *ex-post* convey information about their expected value differences because of information limitation concerning defaulted companies.

This conclusion survives the following refinements. First, the implications of our analysis should carry over to models with endogenous leverage (e.g. Leland (2007) and Luciano and Nicodano (2014)) conditional on the level of debt, since coinsurance increases survival at any debt level. We therefore analyze the cross-section of company leverage, finding that the diversification discount is equal to 8.7% (12.3%) when companies belong to the top 75% (bottom 25%) of leverage. Second, we note that the diversification metric used in the theories of corporate diversification is cash flow correlation. The measure adopted in the conglomerate discount literature is instead based on the number of industries the company operates in. Our results are robust to the substitution of the conglomerate dummy with the measure of cash flow correlation across conglomerate units used in Kolasinski (2009). The estimates show that the diversification discount is lower with unit cash flow correlation than with uncorrelated units, confirming that the discount and differential survival probability display a positive association. These refinements are thus unable to challenge our hypothesis of a survival discount arising (either in market prices, or in the data alone, or both) because of sample selection.

Finally, we extend the model to another type of diversified firm, the business group, since our data sources do not distinguish them from conglomerates. We show that the discount for groups may be larger than for conglomerates as they avoid contagion, thanks to the separate incorporation of affiliates. Moreover, parent companies receive dividend support from all subsidiaries thus surviving more than both other affiliates and focused companies (as in Nicodano and Regis

[3] Several papers use the subsample of suvivors to study the ex- post-selection problem. Among others, Rohleder, Scholz, and Wilkens (2010), Carhart (2002), Wermers (1997).

(2019)). Thus, the model rationalizes the puzzle known as the parent company discount (see Cornell and Liu (2001)) with the same insight applying to the conglomerate discount.

The rest of the paper proceeds as follow. Section 1.1 reviews closely related literature. Section 2 determines company expected value at the *ex-ante* stage of firm creation. Section 3 determines market values and the diversification discount after some companies have defaulted. Section 4 investigates the empirical relation between the conglomerate discount and default probability. Conclusions follow. All proofs are in Appendix A.1., together with model extensions. Appendix A.2 provides details on variables included in the empirical analysis.

1.1 Related Literature

This paper connects to the known problem of the survivorship bias in empirical finance. Banz and Breen (1986) observe that there is an ex-post-selection bias disturbing the comparison of returns across companies, since databases exclude companies that ceased to exist. Kothari, Shanken and Sloan (1995) argue that ex-post selection overstates the excess return on high book-to-market portfolios. Brown, Goetzmann and Ross (1995) highlight that survival distorts the equity premium. We adapt this idea to diversified companies, arguing that the censoring of the data originates an *ex-post* diversification discount when there is no discount *ex-ante*.[4] We also show that the actual pricing of surviving companies displays a similar bias when the marginal trader suffers from the same information limitations as scholars and analysts. That is, we consider that bankruptcy shrinks the dimensionality of the price vector relative to the one of economies without bankruptcy (as in Grossman (1981)), and traders may be unable to recall all defaulted firms. In such a case, there is both an *ex-post* price-value wedge for each company type and an *ex-post* discount on company types with higher survival probability relative to types with worse survival skills. Thus due to data censoring and, possibly, informational limitations for traders, (average) stock prices in *ex-ante* informational efficient markets do not *ex-post* reflect the higher value of company types that save on bankruptcy costs.

Our paper provides a new, unifying rationale of both the conglomerate and the parent company discounts[5], centered on the survival ability of diversified companies and the associated

[4] Damodaran (2009) reaches the related insight that conventional discounted cash flow valuations, premised on companies being going concerns, will tend to overstate the value of distressed companies.

[5] Several papers (Cornell and Liu (2001), Lamont and Thaler (2003), Mitchell, Pulvino and Stafford (2002) wonder about the causes of the parent company discount.

survivorship bias. Most extant theories of the conglomerate discount focus instead on operational or financial aspects that affect the *ex-ante* value of conglomerates relative to focused firms. Our paper does not take a stand on such aspects. Our point is that any *ex-ante* premium or discount due to such motives[6] is upward (downward) biased *ex-post* by enhanced survival. We make this point clear in a robustness section, where coinsurance distorts effort incentives of conglomerate managers. Similarly, our argument holds true even if there is no *ex-post* conglomerate discount in some datasets (as in Villalonga (2004a)). In this case, our insight implies that conglomerates are *ex-ante* more valuable than focused companies.

While the focus of our model is on survival, the acquisition of distressed companies by conglomerates reinforces the self-selection we are pointing out since both bankrupt and acquired companies cease to have market prices. Past literature already considers a different kind of sample selection in relation to mergers, due to conglomerates acquiring already-discounted business units (see Graham, Lemmon and Wolf (2002) and Gomes and Livdan (2004)).

2 The Model

The model compares diversified companies, that combine operating units, to focused companies running one operating unit, only. Diversification affects survival by permitting coinsurance across units, but may give rise to contagion. In order to focus on survival, we will rule out all other differences (in unit's profitability, debt needs and bankruptcy costs) across diversified companies and their focused counterparts.

The next three sub-sections focus on pricing at the *ex-ante* stage of company creation. They will describe the coinsurance-contagion trade-offs and the associated credit spreads that contribute to determine the value of each organization. Proposition 1 shows that the *ex-ante* expected value of diversified and focused companies coincides unless there are bankruptcy costs. At this stage, the expected value is based on the unconditional cash flow distribution. Importantly, stock price always coincides with expected value since there are no frictions and all companies are alive.

[6] See reasons relating to the internal capital market (Almeida, Park, Subrahmanhyam and Wolfenzon (2011), Rajan, Servaes and Zingales (2000), Stein (2002)), employees' incentives (Fulghieri and Sevilir (2011)), production decisions (Alonso, Dessein and Matouschek (2015)), profit uncertainty and discounting (Hund, Monk and Tice (2010)), risk and the measurement of the discount (Mansi and Reeb (2002)), among others.

2.1 Organizational Structures and Cash Flows

Each unit, indexed by $i = (A, B)$, raises an amount of debt D_i to invest in a project at the stage of company creation ($t = 0$). Competitive lenders require a credit spread R_i. The operating profit of each unit is realized in $t = 1$ and is independently distributed across units. It will be High $\{H\}$, and equal to $X_i > 0$, with probability $p_i \in (0, 1)$, and it will be Low $\{L\}$, and equal to zero, with probability $(1 - p_i)$. Our choice of values implies that each unit generates insufficient operating profits in state L to honor its own debt obligations. Later, lenders observe a private and perfect signal of future cash flows and may decide to declare company bankruptcy. When a company defaults, the entrepreneur's future private benefit conditional on survival, $K_i \geq 0$, is lost. The trading of surviving companies will then take place in the stock market, before cash-flows are realized.

Entrepreneurs may choose to run focused companies (F), each containing one unit only. Their survival probability is equal to $p_i^{Sur} = p_i$, since each is independently liable to its own lenders. However, it is also possible to combine two units in a diversified conglomerate (C). Since, two units belong to the same company, they are jointly liable *vis-à-vis* lenders. Each profitable unit may therefore be able to help the insolvent one, or *viceversa* the latter may drag the former into bankruptcy. In order to represent this coinsurance-contagion trade-off (see Banal-Estanol et al.(2013), and Leland (2007)), we define four states of the world $\{HH, LL, HL, LH\}$ where the first (second) letter in each pair refers to the profit of unit A (B). We let the profit of unit A, in state $\{HL\}$, exceed the combined debt repayment of the two units, whereas the profit of unit B is lower than the combined service of debt.[7] Thus a conglomerate will default when lenders' signal is either $\{LL\}$ or $\{LH\}$, because of contagion. There are instead coinsurance benefits in state $\{HL\}$, because profits from A rescue B. The resulting survival probability of conglomerates is equal to $p_C^{Sur} = p_A$. Another type of diversified company is the business group (G), where the incorporation of affiliates is separate and each is therefore liable to its lenders. In a group, the parent company, B, owns its subsidiary, A, thus receiving dividends that will help the service of its debt in state $\{HL\}$. Despite this ownership link, the parent company enjoys corporate limited liability *vis-à-vis* the debt obligations of its subsidiary. This limit on liability implies that A selectively defaults when lenders observe a signal of state $\{LH\}$. Thus, the group organization

[7] We will assess that payoffs satisfy this restriction once credit spreads are determined.

allows for coinsurance, as in conglomerates, without incurring into contagion. The subsidiary A and the parent company B survive with probability $p_{A\in G}^{Sur} = p_A$ and $p_{B\in G}^{Sur} = p_B + p_A(1 - p_B)$, respectively.

In order to deliver straightforward value comparisons, this model relies on several simplifying assumptions for the determination of *ex-ante* expected value. First, the level of debt is exogenous in this model while, in general, debt and also bankruptcy costs respond to both coinsurance and contagion (as in Leland (2007) and Nicodano and Regis (2019)) in nonlinear ways. Insights on differential survival rates across organizations, and therefore on discounts, will carry over to these settings conditional on debt levels. Second, in the model coinsurance takes the form of a transfer from A to B, only. In a robustness section, we add an additional state in which B rescues A from bankruptcy without any substantial change in the insight. We also address the assumption of equal bankruptcy costs across units and of 100% parent ownership of its subsidiary. Throughout we will maintain the assumptions of a zero risk-free rate and risk-neutral pricing for the sake of simplicity. However, it will become clear that the critical assumption to get a conglomerate discount is that the conglomerate survives more often than focused companies ($p_C^{Sur} > p_A + p_B$), while the one ensuring a the parent company discount is that the parent survives more often than its focused counterpart ($p_{B\in G}^{Sur} > p_B$).

2.2 Coinsurance, Contagion, and the Credit Spread

This section determines the credit spread charged to each organization.

Lenders of focused companies, $i = A, B$, receive debt repayment in state $\{H\}$ and collect nothing in state $\{L\}$. It follows that the credit spread for unit i, R_i, satisfying the lenders' zero expected profit condition, $(1 - p_i) \times 0 + p_i R_i = D_i$, is equal to:

$$R_i = D_i p_i^{-1}\,. \tag{1}$$

In turn, the credit spread for the conglomerate is equal to:

$$R_C = [D_A + D_B - p_B(1 - p_A)X_B)]p_A^{-1}\,. \tag{2}$$

This spread solves the zero profit condition, which requires lenders' expected repayments to equal the loan provided at t=0, that is, $[p_A p_B + p_A(1-p_B)]R_C + p_B(1-p_A)X_B = D_A + D_B$. Lenders collect the interest payment when either both units are successful, an event that has probability $p_A p_B$, or unit A is profitable but B is not, with probability $p_A(1-p_B)$. Moreover, they recover profit, X_B, upon the conglomerate default when there is contagion, with probability $p_B(1-p_A)$.

Turning to the group, the subsidiary defaults in the same states of the world as the focused company does. Therefore lenders charge to the subsidiary, A, the same spread of the corresponding focused company defined by Equation (1), that is $R_{A \in G} = R_A$. Conversely, the cost of borrowing for the parent B is lower than the corresponding cost of unit B when it operates as a focused company:

$$R_{B \in G} = D_B[p_B + p_A(1-p_B)]^{-1} \,. \tag{3}$$

Indeed, the parent, B, defaults in state $\{LL\}$ only. The dividend it receives from A in state $\{HL\}$ is sufficient to avoid insolvency, and corporate limited liability insulates it from contagion in state $\{LH\}$. Therefore, lenders' zero expected profit condition for the parent is: $[p_B + p_A(1-p_B)]R_{B \in G} = D_B$.

The Lemma in the Appendix states the ranking of credit spreads across organizational structures, while making explicit the cash flow restrictions that support our state space and the derivations of Equations (1)-(3). It shows that:

$$R_C < R_G < R_A + R_B \,, \tag{4}$$

where $R_G = R_{A \in G} + R_{B \in G}$ is the overall credit spread for a group. Groups bear a lower credit spread compared to focused companies, thanks to the positive probability of the coinsurance state, in which subsidiary dividends allow the parent to survive. Conglomerates also enjoy better credit conditions due to coinsurance. On top, they pay an even lower interest rate compared to groups, since lenders anticipate recovering positive cash flow (X_B) when the profitable segment B defaults due to contagion. In other words, a reduction in the credit spread stems from either lower bankruptcy costs, thanks to coinsurance, or higher recovery upon default due to contagion.

2.3 The Value of Diversification at the Stage of Company Creation

This section determines the *ex-ante* expected value of companies, which will serve as benchmark to show the effect of the survivorship bias. The proposition below, where $\pi_i = p_i X_i - D_i$ for i=A,B denotes the expected profit after the service of debt, summarizes known results in the literature:

Proposition 1: *Assume costly bankruptcy ($K_i > 0$). Then, at the stage of company creation:*
a. Expected value, V_i, increases together with survival probability. It is equal to:

$$V_F = \pi_A + \pi_B + p_A^{Sur} K_A + p_B^{Sur} K_B \tag{5}$$

$$V_C = \pi_A + \pi_B + p_C^{Sur}(K_A + K_B) \tag{6}$$

$$V_G = \pi_A + \pi_B + p_{A \in G}^{Sur} K_A + p_{B \in G}^{Sur} K_B \tag{7}$$

for two focused companies, a conglomerate and a group, respectively;
b. The conglomerate expected excess value relative to focused companies is positive if, and only if, coinsurance probability exceeds the contagion one;
c. The group premium relative to conglomerates and focused companies represents the value of saved contagion costs and of coinsurance, respectively.

Expected value increases together with survival probability, in part (a) of the proposition, because the accrual of private benefits conditional on survival, K_i, depends on company's ability to keep operating. Part (b) and (c) stress the heterogeneous survival ability of company types.

Part (b) indicates that, at the stage of company creation, there is a conglomerates expected premium only if contagion problems are limited. This result reflects previous insight from to Banal-Estanol et al. (2013) without tax distortions and Leland (2007) with tax distortions. Part (b) of this proposition and the preceding Lemma also complete the reasoning in Hann, Ogneva, and Ozbas (2013), who argue that coinsurance reduces conglomerate risk based on a lower conglomerate cost of capital relative to focused companies. Our proposition clarifies that conglomerates do not necessarily create higher value than competing organizations, even when they pay the lowest credit spread. The reason for the lower spread is that lenders anticipate a larger recovery-upon-default due to the contagion of healthy segments. We thus highlight that contagion in diversified conglomerates may counter-intuitively reduce both their spread and value below those of focused companies.

Part (c) indicates that groups best protect company activity from bankruptcy, under the maintained assumption of no agency problems. It further traces back their excess value creation to both saved contagion costs, due to corporate limited liability, and coinsurance gains. There is some direct evidence of such a bankruptcy-cost-saving role played by business groups. Santioni, Schiantarelli and Strahan (2017) find that group affiliates survived more often than non-affiliates during the recent crisis, thanks to within-group transfers from high-cash-flow to low-cash-flow affiliates. Cestone et al. (2017) show how diversification helps with worker reallocation, reducing firing costs that would otherwise be associated with closures.

At this stage of company creation, all companies are alive. Let us therefore stress again that their market value coincides with their expected value defined in Propositon 1, since there are no frictions. The next section focuses on a later stage, after some bankruptcies have occurred.

3 The Survival Discount and Pricing Puzzles

This section determines market values in the stock market, when some companies may have defaulted and market participants exchange survivors. Since the market is *ex-ante* informational efficient, the stock price of a survivor will reflect an estimate of future cash flows given that the company is alive. We will first address the case when traders have imperfect recall of the companies that existed and no longer survive. With partial information on company defaults, the market value conditional on survival exceeds the *ex-ante* company value, that was presented in the previous proposition, for all company types. In other words, the ex-post market price is not informative of *ex-ante* values. This result qualifies the properties of efficient markets in Grossman (1981), by considering an economy with company mortality. As a consequence, a diversification discount arises: the market value of the focused companies exceeds the market value of diversified companies, conditional on survival. The reason is that traders know that the cash flows from a focused company is high, if it is alive. They similarly know that a diversified company may survive also during an industry downturn thanks to coinsurance.

We will then discuss the case when only scholars and analysts have partial information about corporate default. This is the case of the ex- post selection bias in Banz and Breen (1986), Kothari, Shanken and Sloan (1995) and Brown, Goetzmann and Ross (1995). Also in this case, a survivorship bias makes the average *ex-post* price exceed ex-ante values, originating a survivorship bias.

Importantly, such *ex-post* diversification discount appears also when diversification reduces expected bankruptcy costs. We will indeed show that the diversified organization with the highest *ex-ante* value displays the largest *ex-post* discount.

3.1 The Price-Value Wedge

In order to determine the market price of a surviving company, MV_i, we ask whether traders expect the state to be high or low when they trade its shares. This determines the chances of receiving a high or a low cash flow when it will be realized.

Let us start with focused units. The probability of state $\{H\}$, when a focused company is traded, is 1, because in other states it goes bankrupt. It follows that the stock price of a focused company, when it is alive, is equal to the high cash flow realizations net of the debt repayment; that is:

$$MV_i = X_i + K_i - R_i = \pi_i (p_i^{Sur})^{-1} + K_i \,. \tag{8}$$

In turn, the combined market value of two focused companies, when both are alive, is equal to

$$MV_F = \pi_A (p_A^{Sur})^{-1} + K_A + \pi_B (p_B^{Sur})^{-1} + K_B \,. \tag{9}$$

We similarly determine the *ex-ante* expected value of a conglomerate conditional on its survival. The probability of state $\{HH\}$ conditional on trading a conglomerate is lower than one, because of the conglomerate's ability to survive when A rescues B. Such probability is $Pr(HH)/[Pr(HH) + Pr(HL)] = p_A p_B [p_A p_B + (1 - p_B) p_A]^{-1}$, which simplifies to p_B. In turn, the probability of state $\{HL\}$, when trading a conglomerate (i.e., $Pr(HL)/[Pr(HH)+Pr(HL)]$), is equal to $(1-p_B)$. Thus, the market value of a surviving conglomerate is equal to:

$$\begin{aligned} MV_C &= p_B(X_A+K_A+X_B+K_B-R_C)+(1-p_B)(X_A+K_A+K_B-R_C)= \\ &= (\pi_A+\pi_B)(p_C^{Sur})^{-1}+K_A+K_B\,. \end{aligned} \tag{10}$$

Let us conclude with the group organization. The probability of state $\{H\}$, when the subsidiary A is alive, equals one because affiliation does not influence the default of the subsidiary. Hence, the stock price of the subsidiary is equal to that of the corresponding focused company ($MV_{A\in G}=MV_A$). In contrast, the state is $\{H\}$ with probability equal to $p_B[p_B+p_A(1-p_B)]^{-1}$, and $\{L\}$ with probability equal to $p_A(1-p_B)[p_B+p_A(1-p_B)]^{-1}$, when the parent company, B, is traded. This occurs because the parent survives in states with zero cash flows, thanks to its subsidiary support. The market value of a surviving parent company is thus equal to:

$$\begin{aligned} MV_{B\in G} &= [p_B(X_B+K_B-R_{B\in G})+p_A(1-p_B)(K_B-R_{B\in G})][p_B+p_A(1-p_B)]^{-1}= \\ &= \pi_B(p_{B\in G}^{Sur})^{-1}+K_B\,. \end{aligned} \tag{11}$$

Overall, the market price of a group, conditional on its survival, is equal to:

$$MV_G=\pi_A(p_{A\in G}^{Sur})^{-1}+K_A+\pi_B(p_{B\in G}^{Sur})^{-1}+K_B\,. \tag{12}$$

Equations (9), (10) and (12) show that higher levels of survival probability for a given company type result in lower market prices. We summarize our results as follows:

Proposition 2: *The market value of a company i, MV_i, conditional on survival, exceeds its ex-ante expected value, V_i for all i, when there is imperfect recall of company defaults:*

$$V_F=MV_A\times p_A^{Sur}+MV_B\times p_B^{Sur}\,, \tag{13}$$

$$V_C=MV_C\times p_C^{Sur}\,, \tag{14}$$

$$V_G=MV_{A\in G}\times p_{A\in G}^{Sur}+MV_{B\in G}\times p_{B\in G}^{Sur}\,. \tag{15}$$

In this proposition, market prices correctly signal the value of *surviving* companies, which is never lower - and sometimes it is higher - than the value of defaulted companies. Prices therefore exceeds the *ex-ante* expected value and such price-value wedge increases together with company exposure to bankruptcy. Importantly, this wedge does not depend on the existence of bankruptcy costs.

3.2 The Survival Discount and Diversification Puzzles

We are now ready to show the existence of a survival discount, which appears *ex-post* - after some company defaults. This provides a rationale for two known diversification puzzles. The first is the conglomerate discount - that is, the observation that the average stock price of diversified companies is lower than the average stock price of matched focused companies (Berger and Ofek, 1995). The second puzzle is the parent company discount, whereby the market value of a parent company is lower than the price of an equivalent portfolio of focused companies (Cornell and Liu, 2001). Let us stress that both puzzles appear in papers matching single-unit to multi-unit companies, when all of them are alive.

Let us start by comparing the market value of surviving conglomerates in Equation (10) to that of surviving focused companies in Equation (9). The former is lower if:

$$(\pi_A + \pi_B)(p_C^{Sur})^{-1} < \pi_A(p_A^{Sur})^{-1} + \pi_B(p_B^{Sur})^{-1}\,, \tag{16}$$

that is, if $p_B^{Sur} < p_C^{Sur}$ or, equivalently, $p_A > p_B$. Thus, a conglomerate discount appears when the probability of coinsurance exceeds the probability of contagion, or, equivalently, when the survival probability of conglomerates exceeds that of comparable focused companies.

Similarly, the difference between the market value of a surviving group in (12) and that of surviving focused units in (9) is negative if:

$$\pi_A(p_{A\in G}^{Sur})^{-1} + \pi_B(p_{B\in G}^{Sur})^{-1} < \pi_A(p_A^{Sur})^{-1} + \pi_B(p_B^{Sur})^{-1}\,, \tag{17}$$

or $p_B^{Sur} < p_{B\in G}^{Sur}$, or $p_B < 1$, which holds by assumption.

Finally, the market value of surviving groups is lower than that of surviving conglomerates, if:

$$\pi_A(p_{A\in G}^{Sur})^{-1} + \pi_B(p_{B\in G}^{Sur})^{-1} < (\pi_A + \pi_B)(p_C^{Sur})^{-1}\,, \tag{18}$$

that is, if $p_C^{Sur} < p_{B\in G}^{Sur}$, or $p_A < 1$, which always holds. It follows that groups always trade at a discount.

We summarize our results as follows:

Proposition 3: *When there is imperfect recall of past company defaults:*

a. there is a conglomerate discount if coinsurance probability exceeds contagion probability:

$$MV_C - MV_F = \pi_A[(p_C^{Sur})^{-1} - (p_A^{Sur})^{-1}] + \pi_B[(p_C^{Sur})^{-1} - (p_B^{Sur})^{-1}] < 0\,. \tag{19}$$

b. there is a parent company discount and a group discount with respect to both surviving focused companies and surviving conglomerates:

$$MV_G - MV_F = \pi_A[(p_{A\in G}^{Sur})^{-1} - (p_A^{Sur})^{-1}] + \pi_B[(p_{B\in G}^{Sur})^{-1} - (p_B^{Sur})^{-1}] < 0\,. \tag{20}$$

$$MV_G - MV_C = \pi_A[((p_{A\in G}^{Sur})^{-1} - p_C^{Sur})^{-1}] + \pi_B[(p_{B\in G}^{Sur})^{-1} - (p_C^{Sur})^{-1}] < 0\,. \tag{21}$$

c. with positive bankruptcy costs, the larger the ex-ante diversification premium at the stage of firm creation is, the larger the diversification discount will be.

Proposition 3.a and 3.b imply that a company discount increases in its relative survival ability. In Proposition 3b, groups and especially their parent companies have lower stock prices than their focused counterparts, because they survive industry downturns more often. Several papers document the lower valuation of groups with respect to non-group affiliates, relating it to tunneling and expropriation of resources by controlling shareholders (Joh (2003), Bae, Kang and Kim (2002), Johnson, Boone, Breach and Friedman (2000)). However, Masulis, Pham and Zein (2011) find that Tobin's Q is higher in subsidiaries of pyramidal groups, where the separation of ownership from control is higher, than in companies at the top, after controlling for endogeneity of group membership. Proposition 3b may contribute to explain the higher parent company discount with respect to subsidiaries. Finally, Proposition 3.c implies that survival impairs the *ex-post* signaling role of market prices, even when they are *ex-ante* efficient: comparing average market values of company types with different survival leads to the wrong inferences concerning their relative efficiency, when there are positive bankruptcy costs.

Proposition 2 assumes that stock price equals the expected value conditional on the survival of the firm. Let us now turn to the possibility that *traders* have perfect recall of the companies that existed in the past. Let us also assume that the marketplace is centralized, so that agents are able to condition not only on the prices of other companies, if they are alive, but also on the absence of their prices, if they are dead. In such a case, agents are able to separately identify the survival states HH and HL and prices of surviving companies will coincide with ex-ante expected values. There will still be an *ex-post* discount due to a survivorship bias, if *scholars* do not have perfect recall of defaults due to the censoring of the data - as highlighted by Banz and Breen (1986), Kothari, Shanken and Sloan (1995) and Brown, Goetzmann and Ross (1995). In this context, the average price will be higher for focused companies than for groups, because scholars cannot account for the higher number of missing prices among the former. For a similar reason, it will also be higher for focused companies than for conglomerates if coinsurance exceeds contagion probability. Thus, imperfect knowledge of realized defaults by scholars, even when the equity market perfectly exploits the information on all the defaulted companies, will still lead to an *ex-post* discount for companies that save on bankruptcy costs.

3.3 Model Extensions

This section qualifies previous results by relaxing some simplifying assumptions concerning the determination of *ex-ante* expected values in Proposition 1. The broad insight concerning *ex-post* deviations of market values from ex-ante expected values are unaltered. We first allow for different levels of bankruptcy costs across organizations. We then turn to partial ownership of the subsidiary by its parent, and subsequently study the impact of non-contractible managerial effort. We conclude with a setting in which both units of a diversified company are able to support the other.

3.3.1 Different Bankruptcy Costs across Organizations

Bankruptcy costs might differ across organizations. Hennessy and Whited (2007) indicate that the bankruptcy costs for smaller companies are almost double those of larger companies (15%

to 8% of capital). Since diversified companies are on average larger, then their bankruptcy costs might be lower than those of focused units. Against this background, Appendix A.1.1. shows that lower bankruptcy costs in diversified organizations increase their *ex-post* discount, when coinsurance exceeds contagion probability. However, they also imply a reduced role for diversification and therefore a lower expected *ex-ante* premium than in the case of equal bankruptcy costs across organizations.

3.3.2 Diversification Benefits in Pyramidal Groups

Previous sections deal with groups with fully owned subsidiaries, whereas this section investigates the consequences of partial subsidiary ownership for group diversification. A simple argument implies that partial ownership of affiliates does not generally improve, and in fact may worsen, group survival thereby reducing both its *ex-post* discount and its *ex-ante* expected value premium with respect to focused organizations.

Let the parent company own a percentage, γ, of subsidiary equity. Then the dividends it receives from the subsidiary reduce to γX_A, which may not be sufficient for honoring debt obligations in state LH. Lower dividends increase the cost of parent debt, if lenders anticipate a positive default probability in state LH. Let λ account for the bailout probability. Then, it will take two possible values, conditional on the realization of cash flow of units A and B:

$$\begin{aligned} \lambda = 1 \qquad & if \qquad \gamma X_A \geq (R_A + R_{B\in G})\,, \\ \lambda = 0 \qquad & if \qquad \gamma X_A < (R_A + R_{B\in G})\,. \end{aligned} \tag{22}$$

We can determine the threshold level of γ, which we indicate with γ^*, such that $\lambda = 1$:

$$\gamma > \gamma^* = (R_A + R_{B\in G})X_A^{-1} = \{D_A p_A^{-1} + D_B[p_B + p_A(1-p_B)]^{-1}\}X_A^{-1}\,. \tag{23}$$

since X_A is at least as large than $(R_A + R_{B\in G})$ according to the Lemma. This result indicates that coinsurance is no longer possible, if the parent ownership share falls short of γ^* in a pyramidal group. In such a case, both the cost of debt and company value are equal across group affiliates and focused companies. Consequently, the group no longer suffers from the survivorship bias. This result is able to rationalize the evidence that the market value of parent companies increases after a subsidiary carve-out or spin-off, which reduce parent's ownership of the subsidiary's equity.

3.3.3 Effort Provision, Contagion, and Outside Funding

The previous sections show that diversified companies suffer from an *ex-post* discount with respect to focused companies because of their superior survival skills. These results obtain provided coinsurance and contagion do not distort managerial incentives. When diversification distorts incentives, diversified companies survive less and their *ex-post* discount falls.

An Appendix, available upon request, makes this intuition precise letting the probability of success for unit A be endogenous and non-contractible. As in Boot and Schmeits (2000), we assume that managerial effort increases the success probability of unit A but imposes on it a monitoring cost. Lenders will exert monitoring, trying to detect the probability of success of the unit. Boot and Schmeits (2000) point out that the negative incentive effects due to coinsurance. Effort provision in diversified companies is thus lower than in focused companies for all levels of monitoring because the manager of unit A does not fully internalize the positive consequences of his effort provision on unit B. Our model for conglomerates reinforces this insight, because unit A may also contaminate unit B while enjoying lower funding cost. These agency costs diminish the survival skills of diversified companies, thereby reducing both their *ex-ante* expected value and their *ex-post* discount due to the adverse survivorshit bias.

3.3.4 The Discount with Mutual Coinsurance

While only the subsidiary unit provides support to the parent in our model, in reality parent companies often support their subsidiaries (see Santioni, Schiantarelli and Strahan, 2017). It is easy to add a state of nature where A, having profits in excess of the debts of both units, supports B, as in Boot and Schmeits (2000) and Luciano and Nicodano (2014). Appendix A.1.2. provides such an extension, displaying the necessary variation in the definitions of survival probabilities and cash flow restrictions.

4 The Value of Survival and the Conglomerate Discount

In this section we will investigate whether the market prices and the survival of US companies support our conjecture. In doing so, we will rely on methods from two strands of empirical literature, those on default risk and on the diversification discount. We first compute default probabilities, following the work of Campbell et al. (2008). We then investigate the relationship between such default probabilities and the diversification discount. Consistent with previous literature, we call all diversified companies "'conglomerates"' since the data do not separately identify groups. Below, we outline our method, before proceeding to its implementation.

We estimate the probability of default (PD) for each firm-year using the following hazard rate model:

$$P_{t-1}(Y_{i,t} = 1) = [1 + exp(-a - bx_{i,t-1})]^{-1} \tag{24}$$

where Y_{it} is an indicator variable equal to 1 when the company goes bankrupt at time t. The vector x includes the predictive variables from Campbell, et al. (2008).[8] In one specification, it also includes the "conglomerate" dummy. This allows to check whether their survival probability exceeds that of focused companies, which is a necessary condition for conglomerates to trade at a discount according to our theory. We experiment with two different dependent variables, a narrower one (default) and a broader one (failure), as alternative indicators of financial distress. Default events includes cases filed under both Chapter 7 and Chapter 11, while failure events also includes a default on a bond.

We then measure the conglomerate discount in the raw market data. Eliminating the survivorship by including in the sample defaulted companies is not possible, because both their prices and balance sheet items disappear once they are delisted. Following the approach in Wermers (1997) and many others,[9] we thus run the opposite experiment of eliminating from the beginning of the sample all the companies that disappeared during the sample period ("end-of-sample conditioning"). If our conjecture is correct, we should observe an increase in the conglomerate discount.

Since differential survival may derive from differential company characteristics other than

[8] The specifications of Shumway (2001), or Chava and Jarrow (2004) lead to similar results.

[9] Carhart (2002), Blake and Timmermann (1998), Otten and Bams (2004), and Deaves (2004) also follow this approach.

diversification, we proceed to a multivariate analysis of the diversification discount, following Villalonga (2004b), using the regression model:

$$ExcessValue_{i,t} = \alpha + \beta Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t \,, \tag{25}$$

where the dependent variable is conglomerate ”‘excess market value”’ as in Berger and Ofek (1995) and $X_{i,t-1}$ is a vector of controls including company characteristics and year fixed effects. The variable 'Conglomerate' is an indicator variable that is equal to one if the company engages in industry diversification. Its coefficient measures the benchmark discount of conglomerate companies. Again, we expect such benchmark discount to increase once we aggravate the survivorship bias by eliminating all defaulted companies from the beginning of the sample.

Equation (19) of our model shows that conglomerate ”‘excess value”’ increases together with its excess PD with respect to focused companies. We thus investigate whether they share the same determinants in a multivariate regression, after constructing a metric for such ”‘excess default probability”’. To further highlight the survival discount, we run a quantile regression relating the excess market value of conglomerates, within each survival probability quantile, to a conglomerate dummy along with other controls. We expect the conglomerate discount to be higher in quantiles including companies with higher survival probability. We thus conclude with some robustness tests to provide support to our main analysis.

4.1 Data and Sample

Our sample combines several data sources over the years 1980-2014. Firstly, we retrieve information on multi-segment companies from COMPUSTAT-Historical Segments. Previous studies associate each segment with a similar independent company in the same industry to compute the discount of conglomerate companies with respect to the focused ones. We follow a similar approach, applying the sample selection as in Lamont and Polk (2001) and Berger and Ofek (1995). We drop firms that have segments in the financial (SIC 6000-6999) and utilities (SIC 4900-4999) services, firms with total sales below 20$mil, and firms with aggregated firm segments sales above 1% of total firm sales in Compustat. We also drop segments with missing sales and SIC code, firm operating in other non-economic activities, such as membership organizations (SIC 8600), private households (SIC 8800), unclassified services (SIC 8900), and all segments that do not have at least five similar single-unit companies in the same industry.[10]

Information on company bankruptcy comes from three sources. The first is the COMPUSTAT North America database, which provides the indication of deletion of a company, as well as the motivation for such deletion. We keep only the deletions for bankruptcy filings. The second source is CRSP, which also gives information about all public companies delisted for a bankruptcy filing. The third source is the UCLA- LoPucki Bankruptcy Research Database (BRD), which reports the bankruptcy filings (both Chapter 7 and Chapter 11) in the United States Bankruptcy Courts of the major public companies since October 1st, 1979.[11]

After merging all these datasets, we have a total of 50,390 firm-year observations, for a total of 6,309 companies from 1983 to 2014, of which 11,633 are observations from multi-segment companies (2,358 active conglomerates). In all our analysis, we use the PDs as computed in Campbell et al. (2008). For robustness tests, we also retrieve the PDs from the Credit Research Initiative (CRI) of the University of Singapore (RMI-NUS). The CRI probabilities are built on the forward intensity model developed by Duan, Sun, and Wang (2012). This dataset provides the individual companies' PD for a subsample of 32,258 US companies. We are able to match 14,166 observations in our sample.[12]

Table 1 reports the number active firms, conglomerates, defaults and failures per year in our sample. It also reports the variation in the number of firms for each year. [13] Conglomerates represent 22% of active US companies in our sample, and the 42% of all assets in Compustat. As defined in Campbell et al. (2008), a default event is a bankruptcy filing under either Chapter 7 or Chapter 11 of the bankruptcy code. We are able to match 542 default events from 1983 to 2014, which represent 8.5% of the 6,309 active companies in our sample, for a correspondent yearly bankruptcy rate of 1.11%. Failures are defined more broadly to include bankruptcies, financially driven delistings (reported in CRSP), or D (default) ratings issued by a leading credit rating

[10] We match each segment to a focused companies according to 4, 3, and 2-digits SIC codes. We follow this procedure to obtain results that are comparable with prior ones. Such filtering, however, does impact the survival bias, as we are conditioning the measurement of the discount on surviving focused companies.

[11] We are grateful to UCLA-LoPucki for offering us free access to their database. A company is public according to this source if it filed an Annual Report (Form 10-K or Form 10) with the Securities and Exchange Commission in a year ending not less than three years before the filing of the bankruptcy case. A company is major if assets are worth $100 million or more, measured in 1980 dollars (about $280 million in current dollars).

[12] Data are available at www.rmicri.org.

[13] The variation in the firm number also depends on mergers. The acquisition of a distressed company may contribute to both reducing the expected unconditional value of conglomerates (as in Gomes and Livdan (2004) and Graham, Lemmon and Wolf (2002)) and increasing the survival discount, since low-valuation single-segment companies disappear.

agency. The total number of failures (579) therefore exceeds the total number of defaults (542, respectively).

4.2 Univariate Analysis

Our main dependent variables are the excess value and the excess default probability. The former subtracts from the company market value the one of a portfolio of non diversified firms. Following past works (Berger and Ofek (1995) and Villalonga (2004b)), the excess value is the natural logarithm of the ratio between market value and its imputed value. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The excess default probability also captures the difference in default probability between conglomerates and focused companies. We define it as the natural logarithm of the ratio between a company's PD and its imputed PD at the end of the year. The imputed PD is set equal to the one in the core industry, computed as the asset weighted median default probability of all focused companies, and attributed according to the SIC code of the segment reporting the highest sales within the firm.

In order to compute the firm default probability, we first estimate the survival model of Campbell et al. (2008), following equation (24), on the Compustat sample, and we report the results in Table 3. The model controls for a vector of explanatory variables, listed in Table 3 and explained in Appendix A.2. We also estimate a modified version of the model in columns (5) and (6), where we add the conglomerate dummy to the specification in order to test whether conglomerates have different survival skills. The coefficients of the control variables confirm the past findings of Campbell et al. (2008): higher income, size and stock returns are associated with lower default probabilities. On the contrary, higher leverage and stock volatility are associated with higher default risk. Columns (5)-(6) also show that conglomerates have lower default probabilities, when compared to focused firms. As far as the economic effect is concerned, conglomerates have an 8% lower default probability than focused companies.

From the estimation in column (3) we retrieve the survival odd ratios, and we are able to compute the probability of default for each company accordingly. Finally, for each industry

(SIC four, three, and two digits) in each year, we calculate the asset-weighted industry default probability, and we impute to each firm the corresponding core-industry default probability. Figure 1 portrays the excess PD for different intervals of the excess value of conglomerates and focused companies. It shows that excess conglomerate values are negative – and large in absolute values – along with excess default probabilities.

Our main independent variable is "conglomerate", which is an indicator variable equal to one when the firm is a multisegment firm. Given the relevance of diversification, we also construct the measure of the cash flow correlation across segment units (CFCORR) following Hann et al. (2013). We first compute the average of the EBITDA/Assets ratio for all focused companies for each quarter-year. Second, we compute the industry cash flows as the residuals from a regression of the average industry cash flow of standalone firms on the average cash flow of the market and Fama and French (1993) factors, for each year and industry.[14] Next, we estimate pairwise industry correlations using the prior five-year industry cash flows for each year in the sample, and we impute the industry pairwise correlation according to the segment units according to the segments' SIC code. The cross-segment cash flow correlation for firm "i" in year "t" with n number of segments is computed as follows:

$$CFCorr_{it(n)} = \sum_{p=1}^{N} \sum_{q=1}^{N} w_{ip(j)} w_{iq(k)} \times Corr_{jk}[t-10, t-1](j,k) \qquad (26)$$

where $w_{ip(j)}$ are the weights (sales of the segment over total firm sales) of segment "p" of firm "i" operating in industry "j," and $Corr\left([t-10, t-1](j,k)\right)$ is the correlation of industry cash flows between industries "j" and "k" over the 5-year period before year t. A high correlation of segment cash flows proxies for a lower coinsurance across segment units; at the maximum level are standalone firms, which have 0 coinsurance and a correlation equal to 1. Finally, Appendix A.2 provides their definition along with descriptive statistics (Table A.2.1) of the complete set of control variables used in the analysis.

Table 2 reports the univariate statistics of the main variables used in the analysis, and the differences in company characteristics between conglomerates and focused companies. The t-test differences are estimated with an OLS regression, clustered at firm level. Panel A uses the full

[14] Industry correlation is estimated at two-digit Standard Industry Classification (SIC) codes level and three digits SIC level, provided that exists a minimum number of five standalone firms in the same industry.

sample, including companies that enter or exit the database after the beginning of the sample. Consistent with past findings [Villalonga (2004a)], Panel A shows that conglomerates' mean value is 6% lower than their segments'. According to our theory, conglomerates that suffer from a survival discount have lower PD than their segments, because coinsurance exceeds contagion. Consistent with this view, the table shows that conglomerates' mean and median excess PDs from the CRI database are 12% lower than their segments', or 14% lower when looking at the estimated excess default probabilities as in Campbell at al. (2008).[15] This evidence suggests that conglomerates are in general able to move resources across their segments in order to offset industry-specific shocks. In line with past results, conglomerates have bigger size, leverage, and dividend ratio, but lower investments and sales-to-growth ratios. The average segments cash-flow correlation of conglomerates is 41%, which indicates considerable variation in cash flow correlation, ranging from a minimum of -99% to a maximum of 100%, as shown in Table A.2.1.

We are ready to turn to our experiment of eliminating all companies that do not survive until the end of our sample. This deletion should enhance the survivorship bias thereby increasing the diversification discount, according to our theory. In Panel B, the sample contains only companies surviving until 2014 in our sample. In fact, the table shows that the difference in the excess value of focused companies and conglomerate increases from 6% in Panel A to 13% in Panel B. Consistent with the insight of the model, firms with superior survival ability experience a more severe discount.

4.3 Multivariate Analysis

We now turn to the estimation of the benchmark diversification discount, as in Equation (25). Table 4 reports the results when the dependent variable is the excess value and the vector of company characteristics includes industry (3-digit SIC code) and year fixed effects. In all specifications, we cluster at the company level.[16] Column (1) shows that the diversification discount is equal to 14% after controlling for company and industry characteristics, confirming traditional findings. Column (2) includes company age among the controls. Consistent with our theory, its negative coefficient indicates that the stock price of all companies falls when their age increases, because older companies have gone through and survived to downturns. At the

[15] Table A.2.1. reports that in the upper quartile of the distribution contagion exceeds coinsurance.
[16] We also cluster at industry level in the robustness tests.

same time, the benchmark conglomerate discount decreases to 11%, since age helps to control for the lower mortality of diversified companies, thereby reducing the survival discount. [17]

The other source of the discount is the exit from databases of the most unprofitable companies, which are less likely to be diversified companies. Since we cannot correct this problem, we exacerbate it once again. Restricting the sample to companies that survive through the whole sample increases the benchmark conglomerate discount to 18.6% and 15.8% in Columns (3) and (4), respectively. We also run a seemingly unrelated regression (SUR) system in order to pool regressions in column (2) and (4), and test for the difference in the coefficients between the full and survivor sample. The test, reported in the table, rejects the hypothesis of equality of coefficients, and confirms that the diversification discount is exacerbated in the sample of surviving firms.

As a second step, we run a similar estimation on the excess default probability of conglomerates and standalone firms. Table 5 shows that similar control variables explain a considerable share of the variation of the excess PDs. This is consistent with our model that jointly determines market value and default probability of each organization. Estimates show that conglomerate default probability is, on average, 4.2% lower than the default probability of focused companies in the correspondent core industry. This result helps understanding the function of corporate diversification, which is hard to detect in the data (according to Khanna and Yafeh, 2007), despite being suggested by theories of corporate diversification.

So far we have showed that conglomerate firms have lower value and contemporary higher survival skills. In order to investigate the cross-section of company discount across companies with different survival rates, we estimate a quantile regression. In particular, we estimate equation (25) on the company excess value on four sub-samples, where the sample is divided according to 25%, 75%, and 100% percentiles of companies' survival probability. Therefore, companies in the lowest percentile are those with the highest default probability. We expect the latter having a lower value discount, according to our theory. Table 6 reports the results of this quantile regression. The diversification discount decreases to 5% when companies are closer to distress in the lower quantile of the survival probability, (column (1)), and increases with

[17] Borghesi, Houston, and Naranjo (2007) find a similar relationship between age and discount, which they attribute to a life-cycle for company growth opportunities (as in Matsusaka (2001)).

survival skills up to 13%.[18] The table also reports the t-test for the difference of the coefficient between column (1) and (3), which confirms that firms closer to distress have a significant lower discount when compared to the firms with better survival skills.

Company leverage is not usually included in the excess value regression. One may argue, however, that company value is jointly endogenous with the leverage level and default probability (as in Leland (2007)). The equations identifying both expected excess value and market discounts should then hold at the same level of debt for diversified and focused companies. For this reason, we estimate a quantile regression of the company discount, when the dependent variable is the excess value and samples are divided according to 25%, 75%, 100% percentiles of company leverage. Table 7 shows that the diversification discount falls to 8.7% when leverage takes the company closer to distress (column (3)). When companies are more likely to survive due to lower leverage (column (1)), the conglomerate discount increases to 12.3%.

In summary, the (average and median) survival ability of conglomerates exceeds that of focused companies. In other terms, conglomerates with better survival skills than their component segments suffer from higher market discounts, as implied by our model.

4.3.1 Robustness tests

We provide further tests of our baseline results. First, we replicate our quantile regression when we replace the survival probability estimated according to Campbell et al. (2008) with the survival probability as in Duan et al. (2012). The results, reported in Table 8, confirm that the discount increases with the firms survival skills.

So far, we have used the conglomerate dummy to capture industry diversification in order to benchmark our results to those in the conglomerate discount literature. However, the dummy indicates whether the company operates in more than one segment, whereas diversification is better captured by the number of segments, the number of industries, or the segment cash-flow correlation. We therefore estimate our main regression with those diversification measures: the number of segments, the segment cash-flow correlation, and the number of three digits SIC code industries in which the firm is operating. The variable CFCORR is the cross-segment cash flow correlations across segment units, computed in several steps as in Hann et al. (2013), according

[18]Recall that we do not examine both self-selection issues unrelated to survival and accounting distortions, which have been already covered in previous work.

to equation (26). Results are in Table 9. In columns (1)-(3), we estimate different specifications on the complete sample, while in columns (4)-(6) we estimate the same specification on the sample of surviviing companies. The results confirm the positive association between cash flow correlation and the excess value, and the negative correlation between the number of segments (or the number of industries) and the excess value.[19] Similarly, the results hold when using the number of industries as a proxy for firm diversification.

As a further robustness test, we estimate our main regression when using different clustering, and firm fixed effects, reported respectively in Tables 10 and 11. Again, we estimate those different specifications on the complete sample (columns (1)-(3)), and on the reduced sample of surviving firms (columns (4)-(6)). The tables show that all results are robust to those modifications.

5 Conclusion

The insight of this paper is simple: markets do not price companies that disappeared due to bankruptcy, whereas they do price the companies that survived. Thus, the average market values exceeds the average value of all companies in proportion to bankruptcy probability.

This insight is relevant when we compare prices across companies with different survival, such as focused and diversified companies. There is conflicting evidence regarding the performance of diversified organizations. Whereas owners tend to choose diversified organizations for their companies, they have lower price than focused ones. This paper proposes a resolution of this conundrum by going back to an old economic rationale for diversification: enhanced company survival.

Our empirical analysis shows that diversified companies display higher average survival probability than focused companies. Their excess survival probability correlates with their observed discount. When controlling for company age, which captures the differential mortality of the surviving companies, the discount shrinks but sample selection still distorts the comparison across focused and diversified companies. Thus, it seems that the economic function of diversification, consisting of limiting dissipative bankruptcy costs, is hard to detect in market prices.

[19] In earlier studies, companies engaging in unrelated diversification are subject to a higher discount compared to conglomerates operating in related business, irrespective of the accounting data used (as in Berger and Ofek (1995), Villalonga (2004a)).

Our model implies that the diversification discount may be even larger for groups than for conglomerates, because of their better survival skills when moral hazard is limited. An extensive body of literature considers such discount as reflecting inefficiencies. Our insight warns that the survivorship bias may generate a discount precisely when groups save on bankruptcy costs.

The implications of our insight go beyond the conglomerate and the parent company discounts. It may lead to a reconsideration of relative prices and relative returns in the cross section and in the time series, as defaults vary by industry, country and across business cycles. Moreover, we understand that scholars, regulators and investment bankers may form wrong beliefs about company expected values, if they do not account for the survivorship bias. Our model is silent as to the consequences, for the allocative efficiency of equity markets, of agents acting on such wrong beliefs, as we leave this important topic for further research.

A Appendices

A.1 Lemma and Proofs of All Propositions

Lemma: State Space and Borrowing Costs: Assume $D_B p_B^{-1} \leq X_B < (D_A + D_B)[p_A + p_B(1 - p_A)]^{-1}$; and $X_A \geq D_A p_A^{-1} + D_B[p_B + p_A(1 - p_B)]^{-1}$. Then:

a. the state space is $\{HH, LL, HL, LH\}$, as defined above;

b. the following ranking of borrowing costs holds across company types:

$$R_C < R_G < R_A + R_B \,, \tag{A.1}$$

where $R_G = R_{A \in G} + R_{B \in G}$ is the overall credit spread for a group.

Proof of the Lemma:

a. In state $\{H\}$, it must be the case that cash flow, X_i, exceeds the total debt repayment in each unit. For unit B, this requires that

$$X_B \geq max(R_{B \in G}, R_B) = D_B p_B^{-1} \tag{A.2}$$

since the credit spread of a focused company exceeds that of the parent company (by the ranking in Part(b)). In state $\{LH\}$, unit B is unable to rescue unit A since its cash flow falls short the combined credit spread, that is $X_B < min(R_C, R_A + R_{B \in G})$. Since conglomerate lenders require a lower interest rate than group lenders (by the ranking in Part(b)), the condition simplifies to $X_B < R_C$, that is:

$$X_B < [D_A + D_B - p_B(1 - p_A)X_B]p_A^{-1}$$

$$p_A X_B < D_A + D_B - p_B(1 - p_A)X_B$$

$$[p_A + p_B(1 - p_A)]X_B < D_A + D_B$$

which implies

$$X_B < (D_A + D_B)[p_A + p_B(1 - p_A)]^{-1} \,. \tag{A.3}$$

As for unit A, its profit in state $\{H\}$ must also exceed the combined service of debt for the two units, i.e. $X_A \geq max(R_C, R_A + R_{B\in G})$, that is:

$$X_A \geq D_A p_A^{-1} + D_B[p_B + p_A(1 - p_B)]^{-1} \,. \tag{A.4}$$

b. We first show that $R_G < R_A + R_B$. Since $R_{A\in G} = R_A$, the following must hold:

$$\begin{gathered} R_{B\in G} < R_B \\ D_B[p_B + p_A(1-p_B)]^{-1} < D_B p_B^{-1} \\ p_B + p_A(1-p_B) > p_B \\ p_A(1-p_B) > 0\,, \end{gathered}$$

that is $p_B < 1$, which is always satisfied. We then show that $R_C < R_A + R_{B\in G}$, that also implies $R_C < R_A + R_B$. The first inequality can be written as:

$$\begin{gathered} [D_A + D_B - p_B(1-p_A)X_B]p_A^{-1} < D_A p_A^{-1} + D_B[p_B + p_A(1-p_B)]^{-1} \\ [D_B - p_B(1-p_A)X_B]p_A^{-1} < D_B[p_B + p_A(1-p_B)]^{-1} \\ D_B - p_B(1-p_A)X_B < D_B p_A[p_B + p_A(1-p_B)]^{-1} \\ p_B(1-p_A)X_B > D_B\{1 - p_A[p_B + p_A(1-p_B)]^{-1}\} \\ p_B(1-p_A)X_B > D_B[p_B + p_A(1-p_B) - p_A][p_B + p_A(1-p_B)]^{-1} \\ p_B(1-p_A)X_B > D_B[p_B(1-p_A)][p_B + p_A(1-p_B)]^{-1} \\ X_B > D_B[p_B + p_A(1-p_B)]^{-1} \end{gathered}$$

i.e. $X_B > R_{B\in G}$. This last inequality is always satisfied by construction of the state space.

Proposition 1: company value

To prove Part (a), consider that value coincides with expected profit, thanks to the zero risk-free rate assumption. In the case of two focused, focused companies expected profit is equal to:

$$\begin{aligned} V_F &= p_A(X_A + K_A - R_A) + p_B(X_B + K_B - R_B) = \\ &= p_A X_A + p_A K_A - D_A + p_B X_B + p_B K_B - D_B = \\ &= \pi_A + \pi_B + p_A K_A + p_B K_B\,, \end{aligned} \tag{A.5}$$

which proves Equation (5) since $p_A^{Sur} = p_A$ and $p_B^{Sur} = p_B$. In turn, conglomerate expected profit is equal to

$$\begin{aligned} V_C &= p_A p_B(X_A + K_A + X_B + K_B - R_C) + p_A(1-p_B)(X_A + K_A + K_B - R_C) = \\ &= p_A(X_A + K_A + K_B - R_C) + p_A p_B X_B = \\ &= p_A X_A + p_A(K_A + K_B) + p_B X_B - D_A - D_B = \\ &= \pi_A + \pi_B + p_A(K_A + K_B)\,, \end{aligned} \tag{A.6}$$

Finally, group expected profit is equal to

$$\begin{aligned} V_G &= p_A p_B(X_A + K_A + X_B + K_B - R_A - R_{B\in G}) + \\ &+ p_A(1-p_B)(X_A + K_A + K_B - R_A - R_{B\in G}) + \\ &+ p_B(1-p_A)(X_B + K_B - R_{B\in G}) = \\ &= p_A(X_A + K_A - R_A) + p_B X_B + [p_B + p_A(1-p_B)](K_B - R_{B\in G}) = \\ &= p_A X_A + p_A K_A - D_A + p_B X_B + [p_B + p_A(1-p_B)]K_B - D_B = \\ &= \pi_A + \pi_B + p_A K_A + [p_B + p_A(1-p_B)]K_B\,, \end{aligned} \tag{A.7}$$

As for part (b) and (c), results derive directly from combinations of Equations (5)-(7). Alternatively, we can write group value in Equation (A.7) using Equation (A.5) as:

$$V_G = V_F + p_A(1-p_B)K_B\,, \tag{A.8}$$

and using Equation (A.6) as:

$$V_G = V_C + p_B(1-p_A)K_B\,. \tag{A.9}$$

Given that $p_{A\in G}^{Sur} = p_A$, $p_{B\in G}^{Sur} = p_B + p_A(1-p_B)$, and $p_C^{Sur} = p_A$:

$$V_G - V_C = (p^{Sur}_{A \in G} - p^{Sur}_C)K_A + (p^{Sur}_{B \in G} - p^{Sur}_C)K_B \tag{A.10}$$

$$V_G - V_F = (p^{Sur}_{A \in G} - p^{Sur}_A)K_A + (p^{Sur}_{B \in G} - p^{Sur}_B)K_B\,, \tag{A.11}$$

A group premium follows directly from the assumption of positive bankruptcy costs, $K_B > 0$. Moreover, the group premium relative to focused companies in (A.8) measures the added future private benefit, K_B, due to the rescue of the otherwise-insolvent unit B. This occurs with probability $p_A(1-p_B)$, which is the probability that B is insolvent but unit A generates enough profits to support it. A group premium relative to conglomerates in (A.9) highlights the savings of future private benefits (K_B) from contagion. This happens with probability $p_B(1-p_A)$, which is the probability that unit B in a conglomerate, while solvent by itself, is unable to provide support to the insolvent one. Finally, comparing (A.8) and (A.9) and re-arranging terms we find that conglomerate profits are higher than those of focused companies if the diversification effect prevails on the contagion effect:

$$p_B K_B < p_A K_B\,, \tag{A.12}$$

or $p_A > p_B$, with the conglomerate excess value relative to focused companies equal to

$$V_C - V_F = p_A(1-p_B)K_B - p_B(1-p_A)K_B. \tag{A.13}$$

Proposition 2: Value vs. Market Value conditional on Survival

Tedious but straightforward algebra delivers the result.

Proposition 3: Survivorship Bias and Diversification Discount

a. Subtracting (9) from (10) delivers the conglomerate discount relative to focused companies:

$$\begin{aligned} MV_C - MV_F &= (\pi_A + \pi_B)(p_C^{Sur})^{-1} + K_A + K_B + \\ &- \pi_A(p_A^{Sur})^{-1} - K_A - \pi_B(p_B^{Sur})^{-1} - K_B = \\ &= \pi_A[(p_C^{Sur})^{-1} - (p_A^{Sur})^{-1}] + \pi_B[(p_C^{Sur})^{-1} - (p_B^{Sur})^{-1}] = \\ &= (p_B X_B - D_B)[p_A^{-1} - p_B^{-1}] \,, \end{aligned} \tag{A.14}$$

since $p_C^{Sur} = p_A^{Sur}$.

b. Subtracting (9) from (12) delivers the group discount with respect to focused companies:

$$\begin{aligned} MV_G - MV_F &= \pi_A(p_{A\in G}^{Sur})^{-1} + K_A + \pi_B(p_{B\in G}^{Sur})^{-1} + K_B + \\ &- \pi_A(p_A^{Sur})^{-1} - K_A - \pi_B(p_B^{Sur})^{-1} - K_B = \\ &= \pi_A[(p_{A\in G}^{Sur})^{-1} - (p_A^{Sur})^{-1}] + \pi_B[(p_{B\in G}^{Sur})^{-1} - (p_B^{Sur})^{-1}] \\ &= (p_B X_B - D_B)\{[p_B + p_A(1-p_B)]^{-1} - p_B^{-1}\} \,, \end{aligned} \tag{A.15}$$

since $p_{A\in G}^{Sur} = p_A^{Sur}$. Subtracting (10) from (12) delivers the group discount relative to a conglomerate:

$$\begin{aligned} MV_G - MV_C &= \pi_A(p_{A\in G}^{Sur})^{-1} + K_A + \pi_B(p_{B\in G}^{Sur})^{-1} + K_B + \\ &- (\pi_A + \pi_B)(p_C^{Sur})^{-1} - K_A - K_B = \\ &= \pi_A[(p_{A\in G}^{Sur})^{-1} - p_C^{Sur})^{-1}] + \pi_B[(p_{B\in G}^{Sur})^{-1} - (p_C^{Sur})^{-1}] \\ &= (p_B X_B - D_B)\{[p_B + p_A(1-p_B)]^{-1} - p_A^{-1}\} \,, \end{aligned} \tag{A.16}$$

since $p_{A\in G}^{Sur} = p_C^{Sur}$.

c. We can define the differential values across organizations, by appropriately combining Equations (5), (6), and (7), as follows:

$$V_C - V_F = (p_C^{Sur} - p_B^{Sur})K_B \,, \tag{A.17}$$

$$V_G - V_F = (p_{B\in G}^{Sur} - p_B^{Sur})K_B \,, \tag{A.18}$$

$$V_G - V_C = (p_{B\in G}^{Sur} - p_C^{Sur})K_B \,, \tag{A.19}$$

since $p_A^{Sur} = p_C^{Sur} = p_{A \in G}^{Sur}$. Therefore, the diversification premium of an organization (Equations (A.17)-(A.19)) is a positive function of its relative survival ability, if bankruptcy costs, K_B, are positive. Likewise, the diversification discount of an organization (Equations (A.14)-(A.16)) increases in its relative survival ability. Therefore, the larger the true diversification premium of a company, the larger its "market" diversification discount.

A.1.1 Different Bankruptcy Costs across Organizations

Let us define the difference in bankruptcy costs as $\delta = K_C - K_A - K_B$, where $K_C = K_A^C + K_B^C$. Then the stock price of focused companies exceeds the one of conglomerates if:

$$\begin{aligned} MV_F - MV_C &= \pi_A (p_A^{Sur})^{-1} + \pi_B (p_B^{Sur})^{-1} - (\pi_A + \pi_B)(p_C^{Sur})^{-1} - \delta = \\ &= \pi_A [(p_A^{Sur})^{-1} - (p_C^{Sur})^{-1}] + \pi_B [(p_B^{Sur})^{-1} - (p_C^{Sur})^{-1}] - \delta = \\ &= (p_B X_B - D_B)[p_B^{-1} - p_A^{-1}] - \delta > 0, \end{aligned} \tag{A.20}$$

since $p_A^{Sur} = p_C^{Sur}$.

A conglomerate discount may now emerge either because conglomerates survive more often to industry downturns (positive first term), or because they have lower bankruptcy costs (positive second term), or both. So, lower bankruptcy costs in diversified organization increase their discount (or reduce their premium).

Bankruptcy costs in diversified organizations need not be lower, *a priori*, as segments with larger bankruptcy costs as stand-alone may self-select into diversified organizations if diversification helps survival. The differential bankruptcy cost δ must be bounded above by saved bankruptcy costs for Proposition 3.a to hold:

$$(p_B X_B - D_B)[p_B^{-1} - p_A^{-1}] > \delta \tag{A.21}$$

in which case the stock price of focused companies exceeds the conglomerates' if the coinsurance probability exceeds the contagion probability, that is $[p_B^{-1} > p_A^{-1}] > 0$. It is easy to derive an equivalent condition for the group discount, such that Proposition 3.b holds.

As for Proposition 3.c, lower bankruptcy costs for conglomerate organizations imply a reduced role for diversification and therefore a lower premium:

$$V_F - V_C = [(p_C^{Sur}) - (p_B^{Sur})]K_B + p_C^{Sur}\delta \tag{A.22}$$

A.1.2 The Discount with Partial Ownership

We now determine how the partial ownership affects the stock price of the parent company. For each level of the ownership γ, the probability of bailout λ is function of the cash flow of unit A, the probability of success of both units, and their amounts of debt, that is:

$$\lambda(X_A, p_A, p_B, D_A, D_B) = 1 \qquad \text{if} \qquad X_A \geq (R_A + R_{B\in G})/\gamma\,.$$

The stock price of the parent company, corrected by the probability of bailout of unit B equals

$$MV_{B\in G,\lambda} = [(X_B + K_B - R_{B\in G,\lambda})p_B + (K_B - R_{B\in G,\lambda})\lambda p_A(1-p_B)][p_B + \lambda p_A(1-p_B)]^{-1}\,, \tag{A.23}$$

where $R_{B\in G,\lambda} = D_B[p_B + \lambda p_A(1-p_B)]^{-1}$, which equals R_B if $\lambda = 0$ and $R_{B\in G}$ if $\lambda = 1$. Equation (A.23), then, reduces to MV_B if $\lambda = 0$, and to $MV_{B\in G}$ if $\lambda = 1$. Intuitively, if parent ownership share γ is lower than its threshold level, γ^*, the coinsurance between the parent and its subsidiary is not possible, and $\lambda = 0$. This also implies that the conditional probability of state $\{H\}$ when observing a parent in operation is the same as a focused company, equal to one, and the credit spreads of parents and focused companies align. It follows that the group will not suffer from the survivorship bias, and the stock price of parent companies equal the stock price of focused companies, ceteris paribus.

A.1.3 Model with Mutual Support

This section adds to the model in Section 2 the possibility that unit A rescues unit B. Each unit operating profit in $t = 1$ can therefore be medium, high or low. It will be medium $\{M\}$, and equal to $X_i^M > 0$, with probability $p_i^M \in (0,1)$, it will be high $\{H\}$, and equal to $X_i^H > X_i^M$, with probability $p_i^H \in (0,1)$, and it will be low and equal to zero with probability $p_i^L = (1 - p_i^M - p_i^H)$. Accordingly, we define nine states of the world, $\{LL, LM, ML, LH, HL, MM, MH, HM, HH\}$.

The key assumption of the general model is that the profit of each unit, in state $\{H\}$, exceeds the combined debt repayment of the two units, while, in state $\{M\}$, it is sufficient to honor its own debt obligations but not the combined service of debt. Consequently, not only unit A can rescue unit B in state $\{HL\}$ but also unit B can save unit A from bankruptcy in state $\{LH\}$, provided that they do not operate as independent entities. Setting $p_A^M = 0$, $p_A^H = p_A$, $p_B^M = p_B$, $p_B^H = 0$, $X_A^H = X_A$, $X_B^M = X_B$ leads to the original model where only unit A can rescue unit B in state $\{HL\}$.

Let us now consider, for each organization, survival probability, cost of debt and conditions on cash flows within this general setup. focused companies survive in states $\{M\}$ and $\{H\}$ with probability $p_i^{Sur} = (p_i^M + p_i^H)$ and default in state $\{L\}$. A conglomerate defaults in states $\{LL\}$, $\{LM\}$ and $\{ML\}$ when both units do not realize any profit, when unit A drags profitable unit B into bankruptcy and when unit B drags solvent unit A into bankruptcy, respectively. However, conglomerates survive when either their segments are both profitable, states $\{MM\}$, $\{MH\}$, $\{HM\}$ and $\{HH\}$, or one of their units can save the other from insolvency, states $\{LH\}$ and $\{HL\}$. Conglomerate survival probability is, therefore, equal to $p_C^{Sur} = (p_A^H + p_B^H - p_A^H p_B^H + p_A^M p_B^M)$. Finally, group affiliates benefit from both limited liability and coinsurance gains. Thus, the subsidiary A selectively defaults in state $\{LM\}$[20] while it is rescued by the parent B in state $\{LH\}$, then surviving with probability $p_{A\in G}^{Sur} = (p_A^M + p_A^H + p_A^L p_B^H)$. The parent company, in turn, goes bankrupt in state $\{ML\}$ without affecting its subsidiary, and receives funds from it to meet its debt obligations in state $\{HL\}$, staying alive with probability $p_{B\in G}^{Sur} = (p_B^M + p_B^H + p_A^H p_B^L)$.

Within this framework, the credit spread charged by the lenders, satisfying their zero expected profit condition, is equal to

$$R_i = D_i(p_i^M + p_i^H)^{-1} = D_i(p_i^{Sur})^{-1} \tag{A.24}$$

for a focused,

$$\begin{aligned} R_C &= (D_A + D_B - p_A^M p_B^L X_A^M - p_A^L p_B^M X_B^M)(p_A^H + p_B^H - p_A^H p_B^H + p_A^M p_B^M)^{-1} \\ &= (D_A + D_B - p_A^M p_B^L X_A^M - p_A^L p_B^M X_B^M)(p_C^{Sur})^{-1} \end{aligned} \tag{A.25}$$

[20]This is the situation when Indian groups fail to provide support to ailing subsidiaries (Gopalan, Nanda and Seru (2007)).

for a conglomerate,

$$R_{A\in G} = D_A(p_A^M + p_A^H + p_A^L p_B^H)^{-1} = D_A(p_{A\in G}^{Sur})^{-1}\,, \tag{A.26}$$

$$R_{B\in G} = D_B(p_B^M + p_B^H + p_A^H p_B^L)^{-1} = D_B(p_{B\in G}^{Sur})^{-1} \tag{A.27}$$

for a subsidiary and a parent company of a group, respectively. As before, we can show that the following inequality holds:

$$R_C < R_{A\in G} + R_{B\in G} < R_A + R_B\,. \tag{A.28}$$

Therefore, the assumption that profit in state $\{M\}$ exceeds the individual debt repayment implies that $X_i^M \geq max(R_i, R_{i\in G})$. Since focused companies have a higher cost of debt relative to groups, the following condition must hold:

$$X_i^M \geq D_i(p_i^M + p_i^H)^{-1}\,. \tag{A.29}$$

At the same time, cash flow in state {M} must fall short the combined credit spread, such that $X_i^M < min(R_C, R_{A\in G} + R_{B\in G})$, which requires

$$X_i^M < (D_i + D_j - p_i^L p_j^M X_j^M)(p_i^H + p_i^M + p_i^L p_j^H)^{-1} \tag{A.30}$$

since conglomerate credit spread is lower than that of groups. The additional assumption that each unit cash flow in state $\{H\}$ exceeds the cost of debt for the two units implies $X_i^H \geq max(R_C, R_{A\in G} + R_{B\in G})$ which requires, since R_C is lower than $R_{A\in G} + R_{B\in G}$, that

$$X_i^H \geq D_A(p_A^M + p_A^H + p_A^L p_B^H)^{-1} + D_B(p_B^M + p_B^H + p_A^H p_B^L)^{-1}\,. \tag{A.31}$$

Let us define $\pi_A = X_A^M p_A^M + X_A^H p_A^H - D_A$ and $\pi_B = X_B^M p_B^M + X_B^H p_B^H - D_B$ as the expected current profit after the service of debt for unit A and B, respectively. Therefore, it can be shown that the value definitions (Equations (5)-(7)), stock price definitions (Equations (8)-(12)), and Propositions 1, 2, and 3 hold for the general model as well, once the reader takes into account the new definitions of both π_i and the survival probability of each organization.

This extension confirms the main results of the restricted model. Provided that contagion is less likely than coinsurance, the stock price differential between diversified and focused companies may grow even larger, since all units have the ability to rescue the other from bankruptcy.

A.2 Construction of Variables

A.2.1 Dependent Variables

CONGLOMERATE is an indicator variable that is equal to one if the company engages in industry diversification.

EXCESS VALUE is computed as the natural logarithm of the ratio between a company's market value and its imputed value. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. The industry matching is done by using the narrower SIC including at least five single-segment companies.

EXCESS DEFAULT PROBABILITY is computed as the natural logarithm of the ratio between a company's probability of default (PD) and its imputed PD at the end of the year. The PD is computed following Campbell et al. (2008). The imputed PD is set equal to the one in the core industry, computed as the asset weighted median default probability of all focused companies, and attributed according to the SIC code of the segment reporting the highest sales within the firm. The industry matching uses the narrower SIC including at least five single-segment companies. For robustness tests, default probabilities are retrieved from the Credit Research Initiative (CRI) of the University of Singapore (RMI-NUS). The CRI probabilities are built on the forward intensity model developed by Duan et al. (2012).

A.2.2 Independent Variables - Multivariate Regressions

CALC is the ratio of company Current assets (ca) to company Current liabilities (cl).

CAPEX is the ratio of company Capital Expenditure to company Total Assets.

CFCORR is the cross-segment cash flow correlation. We first compute the average of the ebitda/assets (lag) for all focused companies for each quarter-year. In a second step, we compute for each year the correlation of this ratio across each segment-industry pair, by using rolling five-year windows. Next, we compute the average correlation across segments units in the conglomerate.

DIVIDENDS is the ratio of Dividends to Total Assets.

EBITDA is the ratio of company Earnings before Extraordinary Items to company Total Assets.

LEVERAGE is the ratio between total debt (dltt+dlc) and company total assets.

MB (market-to-book) is the ratio between the market value of company equity (computed by multiplying yearly closing price by the number of outstanding shares) and the book value of the equity (seq).

NITA is the ratio between company Net Income and company Total Assets.

SALES GROWTH is the yearly growth of the ratio of Sales and company Total Assets.

SIZE is the natural logarithm of company total assets.

A.2.3 Independent Variables - Survival Analysis

ADJSIZE is the logarithm of the total company assets adjusted by 10% of the difference between the market equity and the book equity of the company $[TA + 0.1(ME - BE)]$.

CASHMTA is the ration between company Cash and Short Term Investments and the sum of company Market Equity and the company Total Liabilities.

EBTA is the ratio between company Market Equity and the company Total Liabilities.

EXRET is the difference between the log gross company return in CRSP (ret), and the log gross return on the S& P Index.

MELT is the ratio between the Market Equity of the company and company Total Liabilities.

REAT is the ratio between company retained earnings and the total assets.

SIGMA is volatility of a company stock returns, computed as the annualized standard deviation of daily stock returns, averaged over 3 months:

$$SIGMA_{i,t-1,t-3} = \left(\frac{252 \times \sum_{t-1,t-2,t-3} r^2}{n-1} \right) .$$

NIMTA is the ratio between company Net Income (ni in compustat) and the sum of company Market Equity to Total Liabilities (net income/ME+assets).

TLMTA is the ratio of Total Liabilities, and the sum of company Market Equity to Total Liabilities.

TLTA is the ratio between company Total Liabilities and company Total Assets(adjusted).

RSIZE is the logarithm of the ratio of company Market Equity to the S& P500 Market Value.

WC is the company Working Capital over total assets.

A.2.1. Descriptive Statistics The table reports the summary statistics for all the variables used in the analysis. The sample consists of the intersection of the COMPUSTAT, CRSP, and the bankruptcy datasets over the years 1983 - December 2014. For each variable, column (1) reports the number of observations, columns (2)-(3) the mean and standard deviation, columns (4)-(10) the percentile distribution. Panel A refers to the main variables, Panel B to the control variables for the entire sample.

	Obs.	Mean	Std. Dev.	Min	1%	25%	Median	75%	90%	Max
Panel A: Main Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Excess Value	50,390	-0.072	0.671	-1.386	-1.386	-0.512	-0.041	0.351	1.137	1.386
Excess PD	50,390	-0.014	0.414	-1.284	-1.284	-0.232	-0.043	0.214	0.712	1.126
Excess PD (CRI)	14,166	-0.048	0.754	-1.399	-1.371	-0.684	0.000	0.577	1.169	1.400
PD (Estimated - Campbell et al. (2008))	50,390	0.051	0.026	0.000	0.009	0.038	0.046	0.058	0.092	0.558
PD (CRI)	28,624	0.008	0.031	0.000	0.000	0.000	0.001	0.005	0.034	0.883
Default (Y/N)	50,390	0.011	0.103	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Failure (Y/N)	50,390	0.011	0.106	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Numb. Segments	11,631	2.873	1.078	2.000	2.000	2.000	3.000	3.000	5.000	10.000
CFCORR	11,631	0.411	0.566	-0.992	-0.891	-0.022	0.511	1.000	1.000	1.000

A.2.1. Descriptive Statistics - continued.

Panel B: Control Variables	Obs. (1)	Mean (2)	Std. Dev. (3)	Min (4)	1% (5)	25% (6)	Median (7)	75% (8)	90% (9)	Max (10)
Size	50,390	5.329	1.586	2.240	2.604	4.128	5.119	6.308	8.298	11.363
Age	50,390	16.912	12.146	0.000	2.000	7.000	13.000	24.000	41.000	64.000
EBITDA	50,390	0.125	0.114	-0.723	-0.259	0.075	0.131	0.188	0.296	0.438
CAPEX	50,390	0.079	0.089	0.000	0.001	0.026	0.052	0.097	0.256	0.661
Sales growth (SG)	50,390	0.152	0.300	-0.631	-0.394	-0.002	0.098	0.238	0.694	2.929
Dividends (Y/N)	50,390	0.010	0.021	0.000	0.000	0.000	0.000	0.013	0.043	0.331
Leverage	50,390	0.203	0.182	0.000	0.000	0.031	0.174	0.325	0.549	0.788
LTAT	50,390	0.467	0.203	0.062	0.089	0.308	0.468	0.614	0.811	0.981
CACL	50,390	2.652	1.863	0.000	0.000	1.506	2.172	3.217	6.341	14.874
NITA	50,390	0.020	0.126	-2.254	-0.469	0.003	0.044	0.080	0.136	0.336
TLTA	50,390	0.443	0.204	0.039	0.073	0.279	0.440	0.592	0.789	0.969
EXRET	50,380	-0.008	0.123	-0.584	-0.358	-0.074	-0.004	0.065	0.185	0.602
NIMTA	50,390	0.006	0.108	-2.144	-0.387	0.002	0.030	0.048	0.081	0.331
TLMTA	50,390	0.356	0.229	0.007	0.024	0.162	0.320	0.520	0.785	0.978
EXRETAVG	48,401	-0.015	0.068	-0.484	-0.212	-0.051	-0.011	0.026	0.088	0.264
SIGMA	50,225	0.049	0.057	0.001	0.001	0.010	0.030	0.066	0.174	0.409
CASHMTA	50,390	0.093	0.113	0.000	0.000	0.017	0.053	0.127	0.320	1.016
Market-to-Book (MB)	50,390	2.523	2.536	0.089	0.307	1.097	1.778	2.982	6.964	33.108
PRICE	50,390	18.819	17.748	0.100	0.650	6.375	13.750	25.640	53.500	239.724

A.2.2. Pairwise Correlation The table reports the pairwise correlation for the main variables in the sample. For each variable, we report the pairwise correlation at 1% significance level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
PD	-0.3504*													
CRIPD	-0.2185*	0.2693*												
Default	0.0128*	0.1387*	0.0264*											
Failure	-0.0577*	0.0413*	0.0386*	0.01										
Conglomerate	-0.0595*	0.0446*	0.0444*	0.01	0.9672*									
CFCORR	-0.0375*	-0.1469*	-0.0619*	-0.6220*	0.00	0.00								
Numseg.	0.02	-0.1849*	-0.01	-0.1056*	0.00	1.00	-							
Age	-0.0659*	-0.2016*	0.00	-0.2670*	-0.01	0.00	0.2711*	0.1897*						
Size	0.2490*	-0.3536*	-0.1199*	-0.1660*	-0.0151*	-0.0123*	0.2060*	0.3410*	0.3373*					
Leverage	-0.0372*	0.1034*	0.1494*	-0.0772*	0.0696*	0.0704*	0.0735*	0.0370*	0.0454*	0.1517*				
EBITDA	0.2294*	-0.3285*	-0.1192*	-0.0247*	-0.0581*	-0.0611*	0.01	0.0468*	0.0342*	0.1418*	-0.0779*			
capex	0.1382*	-0.0241*	-0.0311*	0.0542*	-0.0262*	-0.0264*	-0.0788*	-0.02	-0.1731*	0.0485*	0.0721*	0.2476*		
Sales growth	0.1626*	-0.0275*	-0.0417*	0.0785*	-0.0287*	-0.0313*	-0.0811*	-0.0378*	-0.2726*	0.0123*	-0.0255*	0.1958*	0.2889*	
Dividends	0.1252*	-0.1882*	-0.0300*	-0.1124*	-0.0199*	-0.0189*	0.1075*	0.0951*	0.2172*	0.1306*	-0.1036*	0.2406*	-0.0208*	-0.0870*

* p<0.1

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Table 1: Number of companies per year

This table lists the total number of active companies, the number of active conglomerates (including groups), of defaults, failures, new entries and exits of firms, for every year. The sample consists of the intersection of the COMPUSTAT, CRSP and the UCLA- LoPucki Bankruptcy Research Database (BRD), over the years 1983 - December 2014.

Year	Active Firms	Conglomerates	Default	Default (%)	Failures	Entries	Exits
1983	1,155	492	7	0.61%	9	696	106
1984	1,268	510	7	0.55%	7	1,056	185
1985	1,475	515	8	0.54%	9	3,124	280
1986	1,547	515	11	0.71%	14	2,925	381
1987	1,629	488	10	0.61%	13	3,466	567
1988	1,659	457	19	1.15%	20	1,629	564
1989	1,668	421	17	1.02%	18	2,370	417
1990	1,708	429	16	0.94%	17	1,997	431
1991	1,768	455	9	0.51%	11	1,353	360
1992	1,913	461	6	0.31%	8	1,059	460
1993	2,054	456	15	0.73%	16	1,131	580
1994	2,275	461	8	0.35%	11	1,935	956
1995	2,444	473	21	0.86%	22	1,866	1,031
1996	2,585	466	19	0.74%	20	2,379	1,905
1997	2,663	422	38	1.43%	38	1,911	2,749
1998	2,445	717	33	1.35%	34	1,874	5,441
1999	1,790	465	42	2.35%	43	1,915	2,771
2000	1,510	306	42	2.78%	42	1,384	1,588
2001	1,475	291	49	3.32%	49	946	1,189
2002	1,477	270	13	0.88%	14	1,103	1,211
2003	1,402	261	22	1.57%	23	970	1,286
2004	1,356	257	19	1.40%	20	416	1,531
2005	1,301	254	20	1.54%	22	464	1,505
2006	1,253	232	7	0.56%	9	330	1,369
2007	1,235	219	14	1.13%	15	503	1,301
2008	1,198	207	10	0.83%	11	437	1,055
2009	1,160	196	16	1.38%	17	451	1,126
2010	1,087	198	14	1.29%	15	450	1,366
2011	1,018	194	7	0.69%	8	158	1,412
2012	969	184	5	0.52%	6	161	1,385
2013	944	173	9	0.95%	9	154	1,345
2014	962	188	9	0.94%	9	127	1,549
Total	50,390	11,633	542	34.53%	579	40,740	39,402

Table 2: Univariates

The table reports statistics for company value, default, and financial characteristics across company type (conglomerates vs. focused companies), and tests for univariate differences. The details of the variables are in Appendix A.2. The sample consists of the intersection of the COMPUSTAT, CRSP, and the bankruptcy datasets over the years 1983 - 2014. Panel A reports statistics for all companies in the sample. Panel B reports statistics for the surviving companies in the dataset (companies that do not drop out the sample) until 2014. Column (4) reports the univariate test difference between conglomerates and focused companies. The t-test differences are estimated with an OLS regression, clustered at firm level. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Panel A: All companies	Obs.	Focused	Conglomerates	Difference	t-stat
	(1)	(2)	(3)	(4)	(5)
Excess value	50,390	-0.058	-0.118	-0.060***	(-3.62)
Excess PD (estimated)	50,390	0.020	-0.125	-0.144***	(-12.107)
Excess PD (CRI)	14,166	-0.028	-0.152	-0.126***	(-5.41)
CFCORR	50,390	1	0.412	-0.569***	(-50.837)
Size	50,390	5.151	5.924	0.775**	(15.42)
Age	50,390	15.049	23.123	8.075***	(21.96)
EBITDA	50,390	0.125	0.127	0.002	(1.28)
Capex	50,390	0.083	0.066	-0.017***	(-10.76)
Sales Growth (SG)	50,390	0.165	0.108	-0.057***	(-16.24)
Dividend ratio	50,390	0.009	0.014	0.005***	(10.370)
Leverage	50,390	0.196	0.228	0.031***	(7.570)
Panel B: Surviving companies	Obs.	Focused	Conglomerates	Difference	t-stat
	(1)	(2)	(3)	(4)	(5)
Excess value	12,537	0.050	-0.086	-0.137***	(-3.97)
Excess PD (estimated)	12,537	-0.035	-0.161	-0.127***	(-4.397)
Excess PD (CRI)	4,710	-0.106	-0.212	-0.106***	(-2.697)
CFCORR	12,537	1	0.509	-0.470***	(-16.794)
Size	12,537	5.694	6.264	0.570***	(4.65)
Age	12,537	17.242	22.267	5.024***	(5.23)
EBITDA	12,537	0.130	0.128	-0.002	(0.33)
Capex	12,537	0.081	0.062	-0.018***	(-4.48)
Sales Growth (SG)	12,537	0.155	0.113	-0.041***	(-5.39)
Dividend ratio	12,537	0.010	0.013	0.003***	(2.09)
Leverage	12,537	0.164	0.188	0.025***	(2.31)

Table 3: Default Probability Estimation
The table reports the estimates of the default probabilities according to Campbell et al. (2008), where the dependent variable is an indicator variable equal to one when the company goes bankrupt in t, or fail in t, and X a vector of variables listed in the table. The column (1)-(4) report different versions of the survival model, while in columns (5) and (6) we add the dummy conglomerate to the baseline estimation. The estimates are computed with robust standard errors. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Survival Analysis [(Campbell et al. (2008)]	Default (1)	Failure (2)	Default (3)	Failure (4)	Default (5)	Failure (6)
Conglomerate					-0.248***	-0.252***
					(-6.600)	(-6.733)
NITA	-1.439***	-1.436***				
	(-19.143)	(-19.112)				
NIMTAAVG			-1.232***	-1.220***	-1.259***	-1.243***
			(-15.153)	(-15.022)	(-13.739)	(-13.596)
TLTA	0.873***	0.936***				
	(12.03)	(12.89)				
TLMTA			0.885***	0.950***	1.045***	1.100***
			(12.441)	(13.362)	(13.244)	(13.950)
EXRET	-0.540***	-0.536***				
	(-4.622)	(-4.601)				
EXRETAVG			-1.081***	-1.115***	-1.045***	-1.055***
			(-5.217)	(-5.397)	(-4.604)	(-4.663)
SIGMA	1.895***	1.930***	1.030***	1.037***	0.797***	0.798***
	(8.306)	(8.512)	(4.231)	(4.290)	(2.990)	(3.012)
RSIZE	-0.066***	-0.067***	-0.038***	-0.039***	-0.041***	-0.042***
	(-6.401)	(-6.439)	(-4.745)	(-4.759)	(-3.805)	(-3.817)
CASHMTA			0.282**	0.303**	0.394***	0.422***
			(2.093)	(2.252)	(2.755)	(2.969)
MB			0.029***	0.030***	0.029***	0.030***
			(5.535)	(5.734)	(4.933)	(5.141)
PRICE			-0.009***	-0.009***	-0.006***	-0.006***
			(-8.040)	(-8.034)	(-4.329)	(-4.300)
Constant	-3.339***	-3.361***	-3.218***	-3.242***	-3.208***	-3.228***
	(-78.033)	(-78.237)	(-61.763)	(-62.245)	(-56.135)	(-56.555)
N	95,250	95,250	91,152	91,152	71,031	71,031

Table 4: Excess value

The table reports the **results of the estimation** of the following equation:

$$y_{i,t} = \alpha + \beta\, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t\,,$$

where the dependent variable is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The model controls for a vector of company characteristics (listed in the table), including year and industry fixed effects. In all specifications, the standard errors are clustered at firm level. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess value	All sample		Surviving companies	
	(1)	(2)	(3)	(4)
Conglomerate	-0.144***	-0.108***	-0.186***	-0.158***
	(-9.322)	(-6.864)	(-6.488)	(-5.498)
Age		-0.139***		-0.145***
		(-13.086)		(-7.252)
Assets	0.109***	0.126***	0.111***	0.127***
	(22.31)	(24.66)	(12.94)	(14.05)
EBITDA	0.812***	0.837***	0.595***	0.641***
	(13.03)	(13.54)	(5.14)	(5.54)
CAPEX	0.621***	0.485***	0.496***	0.332***
	(9.801)	(7.722)	(4.344)	(2.950)
Sales growth	0.275***	0.209***	0.338***	0.265***
	(19.301)	(14.765)	(13.720)	(10.917)
Dividends	2.739***	3.268***	2.309***	2.821***
	(10.120)	(11.671)	(5.990)	(7.012)
Chi2 (4)-(2)				3.62
Prob > chi2				0.06
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.148	0.163	0.147	0.162
N	50,393	50,393	17,725	17,725

Table 5: Excess default probability
The table reports of the following equation:

$$y_{i,t} = \alpha + \beta \, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t \,,$$

where the dependent variable is the excess default probability over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's PD and its imputed PD at the end of the year. The imputed PD is set equal to the one in the core industry, computed as the asset weighted median default probability of all focused companies, and attributed according to the SIC code of the segment reporting the highest sales within the firm. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The model controls for a vector of firm characteristics (listed in the table), including year and industry fixed effects. In all specifications, the standard errors are clustered at firm level. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess PD	All sample		Surviving companies	
	(1)	(2)	(3)	(4)
Conglomerate	-0.042***	-0.031***	-0.046***	-0.035***
	(-5.094)	(-3.823)	(-3.320)	(-2.588)
Age		-0.040***		-0.059***
		(-8.044)		(-7.040)
Assets	-0.097***	-0.092***	-0.101***	-0.097***
	(-29.601)	(-28.140)	(-19.067)	(-18.355)
CAPEX	-0.057*	-0.099***	-0.048	-0.082
	(-1.722)	(-2.994)	(-0.798)	(-1.390)
Sales growth	0.022***	0.003	0.030**	0.003
	(2.881)	(0.415)	(2.397)	(0.251)
Dividends	-1.476***	-1.327***	-0.971***	-0.776***
	(-9.270)	(-8.524)	(-4.217)	(-3.567)
Leverage	0.393***	0.390***	0.342***	0.177***
	(20.981)	(20.940)	(10.940)	(3.601)
Nita	-0.661***	-0.648***	-0.717***	-0.671***
	(-29.352)	(-28.892)	(-18.804)	(-18.029)
Calc	-0.001	-0.002	-0.001	0.006*
	(-0.441)	(-1.243)	(-0.198)	(1.654)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.275	0.278	0.290	0.299
N	50,393	50,393	17,725	17,725

Table 6: Quantile regression: survival probability
The table reports **the estimates of the following equation:**

$$by\ percentile\ (Survival\ probability):\ y_{i,t} = \alpha + \beta\, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t\ ,$$

where the dependent variables is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The model is performed on four subsamples split according to the 25th, 75th, and 100th percentiles of the companies survival probability (defined as 1 minus one-year-ahead default probability computed according to Cambpell et al (2008)). The model controls for a vector of company characteristics (listed in the table), including year and industry fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess Value	Survival probability		
	p(25)	p(75)	p(100)
	(1)	(2)	(3)
Conglomerate	-0.056***	-0.078***	-0.133***
	(-2.583)	(-4.373)	(-4.716)
Age	-0.099***	-0.157***	-0.174***
	(-7.085)	(-13.111)	(-9.317)
Assets	0.124***	0.072***	0.070***
	(17.22)	(11.41)	(8.23)
EBITDA	-0.291***	0.129*	0.535***
	(-3.837)	(1.65)	(4.98)
CAPEX	0.602***	0.570***	0.091
	(7.03)	(7.83)	(0.75)
Sales growth	0.114***	0.223***	0.230***
	(5.57)	(12.50)	(8.19)
Dividends	1.619***	2.470***	3.223***
	(3.21)	(7.56)	(7.67)
Chi2			4.79
Prob > chi2			0.03
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.144	0.104	0.154
N	12,525	25,233	12,635

Table 7: Quantile regression: leverage
The table reports of the following equation:

$$\textit{by percentile (Leverage):}\ y_{i,t} = \alpha + \beta\, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t\ ,$$

where the dependent variables is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The model is performed on four sub-samples split according to the 25th, 50th, and 75th percentiles of the company leverage. The model controls for a vector of company characteristics (listed in the table), including year and industry fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess Value	Leverage		
	p(25)	p(75)	p(100)
	(1)	(2)	(3)
Conglomerate	-0.123***	-0.091***	-0.087***
	(-3.748)	(-4.844)	(-3.819)
Age	-0.162***	-0.136***	-0.093***
	(-8.199)	(-10.399)	(-6.484)
Assets	0.146***	0.131***	0.138***
	(13.79)	(21.08)	(19.40)
EBITDA	1.246***	0.742***	0.051
	(12.83)	(9.86)	(0.45)
CAPEX	0.373***	0.605***	0.476***
	(2.99)	(7.09)	(5.64)
Sales growth	0.226***	0.224***	0.116***
	(7.91)	(10.87)	(5.57)
Dividends	2.757***	3.245***	2.075***
	(6.39)	(10.08)	(3.15)
Chi2 (3)-(1)			1.64
Prob > chi2			0.20
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.206	0.175	0.163
N	11,004	26,795	12,594

Table 8: Quantile regression: CRI survival probability -robustness
The table reports of the following equation:

$$\textit{by percentile (Survival probability):}\ y_{i,t} = \alpha + \beta\, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t\,,$$

where the dependent variables is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The model is performed on four subsamples split according to the 25th, 75th, and 100th percentiles of the companies survival probability computed with CRI probabilities (Duan et al. (2012)). The model controls for a vector of company characteristics (listed in the table), including year and industry fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess Value	Survival probability		
	p(25)	p(75)	p(100)
	(1)	(2)	(3)
Conglomerate	-0.049*	-0.087***	-0.106***
	(-1.739)	(-3.850)	(-5.583)
Age	-0.080***	-0.166***	-0.127***
	(-4.280)	(-10.301)	(-10.217)
Assets	0.136***	0.113***	0.110***
	(15.59)	(14.65)	(18.45)
EBITDA	0.047	-0.148	1.247***
	(0.55)	(-1.637)	(16.62)
CAPEX	0.694***	0.497***	0.462***
	(5.63)	(5.37)	(5.80)
Sales growth	0.165***	0.280***	0.178***
	(6.30)	(12.87)	(9.14)
Dividends	1.365***	1.924***	3.309***
	(2.71)	(4.84)	(10.25)
Chi2 (3)-(1)			4.53
Prob > chi2			0.03
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
R-squared	0.199	0.148	0.184
N	7,147	14,852	28,954

Table 9: Excess value and measures of diversification - robustness
The table reports the **estimates** of the following equation:

$$y_{i,t} = \alpha + \beta\, DIV_{it} + \Gamma X_{i,t-1} + \varepsilon_t\,,$$

where the dependent variable is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. We use different proxies for the variable diversification: the number of segments, the segment cash-flow correlation, and the number of three digits SIC code industries in which the firm is operating. In columns (1)-(3), we estimate different specifications on the complete sample, while in columns (4)-(6) we estimate the same specification on the sample of surviviing companies. The variable CFCORR is the cross-segment cash flow correlations across segment units, computed in several steps as in Hann et al (2013), according to equation (26). The variable CFCORR is equal to one for all focused companies.The model controls for the vector of company characteristics used throughout, including year and industry fixed effects. In all specifications, the standard errors are clustered at firm level. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. Var.: Excess Value						
	All sample			Surviving Firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Num. segments	-0.168***			-0.227***		
	(-7.739)			(-5.322)		
CFCORR		0.050***			0.062**	
		(3.19)			(2.00)	
Num. Industries			-0.049***			-0.067***
			(-5.967)			(-3.672)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.149	0.146	0.148	0.137	0.130	0.133
N	50,393	50,393	50,393	17,725	17,725	17,725

Table 10: Excess value differences: industry clustering- robustness
The table reports **the results of the estimation** of the following equation:

$$y_{i,t} = \alpha + \beta\, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t\,,$$

where the dependent variable is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The model controls for a vector of company characteristics (listed in the table), including year and industry fixed effects. Columns (1)-(6) reports the estimations according to alternative clustering, estimated on the full and on the reduced sample of all firms surviving along the sample period. The table also reports the t-test for the differences in the coefficients between full and reduced sample estimations. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess Value	(1)	(2)	(3)	(4)	(5)	(6)
Conglomerate	-0.108***	-0.155***	-0.108***	-0.155***	-0.108***	-0.155***
	(15.205)	(11.912)	(4.052)	(6.742)	(12.447)	(12.985)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Firm-Year		Industry		Industry-Year	
Chi2	14.21		2.94		15.68	
prob >chi2	0.0002		0.086		0.0001	
Observations	50,390	17,725	50,390	17,725	50,390	17,725
R-squared	0.165	0.167	0.165	0.167	0.165	0.167

Table 11: Excess value differences: Firm FE- robustness
The table reports **the estimates** of the following equation:

$$y_{i,t} = \alpha + \beta\, Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t \,,$$

where the dependent variable is the excess value over the years 1983 - 2014, computed as the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. The variable "conglomerate" is an indicator variable equal to one if the company is multisegment. The model controls for a vector of company characteristics (listed in the table), including year and industry fixed effects. Columns (1)-(6) reports the estimations according to alternative clustering, including firm fixed effects, estimated on the full and on the reduced sample of all firms surviving along the sample period. The table also reports the t-test for the differences in the coefficients between full and reduced sample estimations. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Dep. var.: Excess Value	(1)	(2)	(3)	(4)	(5)	(6)
Conglomerate	-0.100***	-0.157***	-0.100***	-0.157***	-0.100***	-0.157***
	(10.268)	(8.687)	(5.414)	(4.476)	(9.347)	(10.311)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustering	Firm-Year		Industry		Industry-Year	
Chi2	14.21		2.94		15.68	
prob >chi2	0.0002		0.086		0.0001	
Observations	50,390	17,725	50,390	17,725	50,390	17,725
R-squared	0.687	0.715	0.687	0.715	0.687	0.715

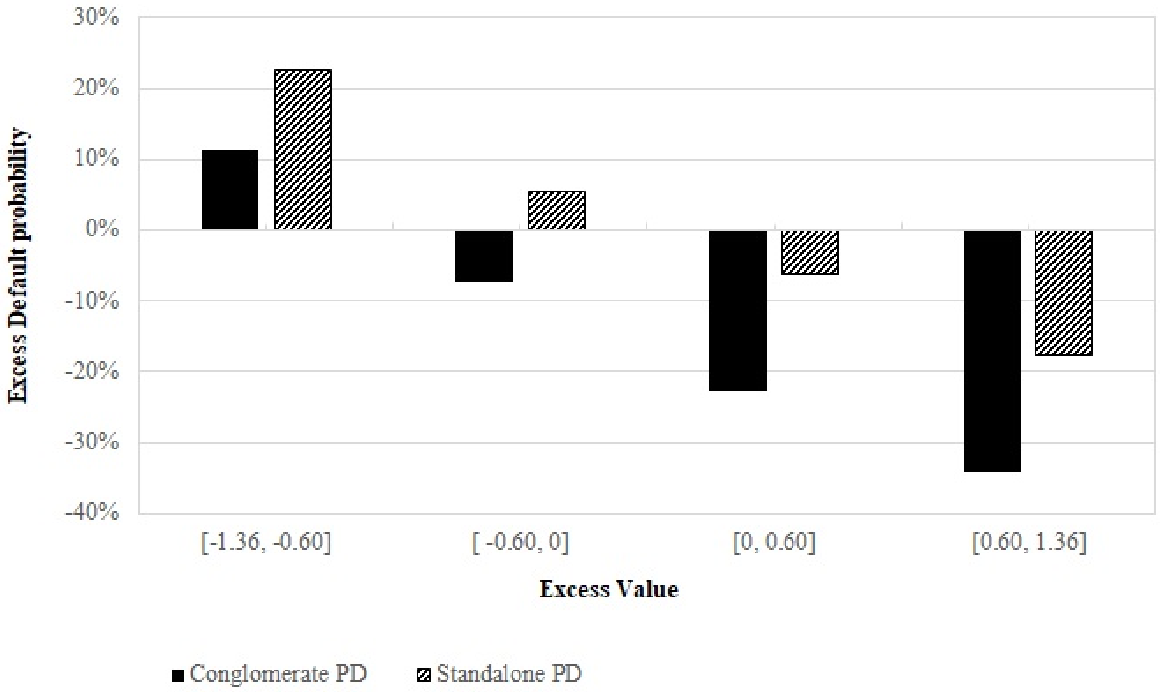

Figure 1: Excess default probability by excess values categories
This figure reports the excess probability of default of conglomerates and focused companies for different intervals of the excess value. The excess value is the natural logarithm of the ratio between a company's market value and its imputed value at the end of the year. The imputed value is the average of the market values of the segment units of the conglomerates, the latter computed by multiplying the segments sales to the median market-to-sales multiplier of the focused companies in the same industry of the segment unit. We implement the industry matching using the narrower SIC including at least five single-segment companies. For each interval of the computed excess value, we report the value of the excess probability of default, computed as the natural logarithm of the ratio between a company PD and its imputed PD at the end of the year. The imputed value is the default probability in the correspondent core industry of the conglomerate (or standalone) firm.

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