On the Contagion Premium of Conglomerate Firms

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Abstract

This paper investigates the relationship between the survival probability and the value of conglomerate firms relative to their focused industry peers. We find that the conglomerate discount drops by 40%, from 15% to 8.5%, as conglomerate default probability increases. We argue that this is due to a survivorship bias, that distorts upwards the value of surviving companies with higher default probability. We label the "conglomerate contagion premium" the lower discount on surviving conglomerates characterized by higher default probability.

JEL Classification: G1, G14, G3.

Keywords: survivorship bias, default, coinsurance, contagion, conglomerate discount.

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1 Introduction

A vast literature debates whether conglomeration reduces (increases) firm efficiency, thereby lowering (increasing) the ex-ante value of conglomerates below that of standalone ones (Berger and Ofek (1995) and many others). Others question the causal link between the observed conglomerate discount and inefficiency, showing that the discount disappears once accounting for the endogeneity of conglomerate formation in the analysis.[1] In this paper, we provide a different angle on the diversification discount by investigating the relationship between survival probability and conglomerates' equity value.

Our analysis explains some puzzling empirical evidence concerning the conglomerate discount: conglomerates with higher survival probabilities have higher discounts than conglomerates with lower survival probabilities, controlling for the usual determinants. We explain this counter-intuitive evidence allowing for a difference between the population of companies and the set of surviving companies, which generates a survivoship bias in the sample of conglomerates.

We build a reduced-form model based on the model of optimal conglomeration by Boot and Schmeits (2000), to show that surviving firms with higher survival probability appear to be more discounted due to sample selection whenever the delisting due to bankruptcies are not controlled for. Our conjecture is as follows.

Consider two types of firms with different survival skills, conglomerates and equivalent (portfolios of) standalone firms, and let them have the same expected values at t0. Then, at t1, the two sets of companies will have the same average price only if they have the same default probability. If instead, conglomerates have lower default probability than focused firms, as assumed in Lewellen (1971), then fewer of them will have disappeared during downturns. As a consequence, the sample of surviving conglomerates will display a lower average price than the sample of their standalone peers at time t1. This occurs even if they would have had the same average values

[1] For the early debate on conglomerate efficiency, see Alchian (1969), Williamson (1985), and Stein (1997); Rajan, Servaes, and Zingales (2000) among others. A summary of the early, but ongoing, debate on the diversification discount appears in Maksimovic and Phillips (2013). We use the terms "conglomerates," "diversified firm" and "multiple-segment firm" interchangeably to refer to companies that report multiple operating segments in the 10-K. Similarly, we use the terms "single-segment firm" and "standalone firm" interchangeably to refer to a firm that does not report multiple operating segments. Similarly, we use the terms "segment units," "segments," "business units," and "operating units" interchangeably to refer to a business unit with separate financial reporting in the 10-K.

if the sample could include all the defaulted firms.

Our reasoning implies that there should be a lower discount for those surviving conglomerates that have higher default probabilities. Such higher default probability for the conglomerates stems from contagion between conglomerate units, which occurs, according to Leland (2007) and Banal Estanol and Winton (2013), when an unprofitable unit brings a profitable one into default. We label the "conglomerate contagion premium" the lower discount on surviving conglomerates characterized by higher default probability.

The model also predicts that the conglomerate discount due to sample selection bias differently affects the conglomerate discount at t0 or t1. Because our argument concerns an ex-post selection bias problem due to firm disappearance, it applies at t1 whether the population of conglomerates is more efficient relative to the population of focused peers or not. Then, the ex-post bias will result either in an increase of any ex-ante conglomerate discount or in a reduction of any ex-ante conglomerate premium in the sample of surviving firms. Furthermore, there should be no sample selection bias associated with survival probability affecting the conglomerate discount at t0, the stage of conglomerate formation.

We bring our hypothesis to the data on a sample of US firms starting from 1980 until 2014. First, the estimates of the default probability of US companies confirm that conglomerates survive on average more often than a similar portfolio of standalone firms.[2] Second, we investigate the relationship between survival probability and conglomerate discount. Specifically, we introduce a new variable that we label as the "excess-default probability," which measures, for each firm, the excess default probability relative to its industry peers. Next, we examine the covariation between the excess value and the excess default probability in the cross section of conglomerates and focused companies.

Consistent with our hypothesis, we find that the diversification discount is lower (8.5%) for companies that are closest to distress than for companies belonging to the top quintile of survival probability (15%), after controlling for the standard explanatory variables in the literature. In other terms, correcting for the survivorship bias implies a reduction in the conglomerate discount

[2] In accord with the early evidence in Borghesi, Houston, and Naranjo (2007). The survival analysis follows Campbell, Hilscher, and Szilagyi (2008).

equal to 40% in a sample of surviving firms. This is the main result of the paper and it is not explained by any of the past theories modeling conglomerates' value. While, according to some past theories, the value discount might be due to idiosyncratic differences between conglomerates and focused companies, none of them can explain why lower survival conglomerates have 40% lower discount than the higher survival conglomerates.

These results survive to several refinements. We also control for the age of surviving companies, in order to account for better growth opportunities of smaller and younger firms.[3] The results hold when using different measures for conglomeration, when adding firm fixed effects to the model, and when using different proxies for the excess survival probability of firms.

One concern of the empirical analysis is the endogeneity of conglomerate formation. Gomes and Livdan (2004) model the endogenous creation of conglomerates, which our set up takes as given. They thus highlight the possibility that the conglomerate discount in the data is due to the acquisition of already discounted units, or an ex-ante idiosyncratic characteristic of the multi-segment firms. To consider this concern, we apply the longitudinal approach of Lang and Stulz (1994), and Graham et al. (2002). Specifically, we first identify a set of standalone firms at the time of the switching from single to multi-segment firms. Because we assume that the discount is given by survival in the sample, we should not observe a different value between those new conglomerates and standalone firms at the time of their formation. Consistent with this prediction, we show that the *ex-ante* discount is not statistically different from zero and is also insensitive to variation in survival probability across newly formed conglomerates. This confirms the discount being an ex-post problem in the data.

Our contribution is two-folds. On the one hand we highlight that the ex-post bias produces a discount for surviving companies that have lower default probability relative to surviving companies with higher default probability. On the other hand, we empirically show that survival-enhancing conglomeration paradoxically results in a (apparent) lower average stock price relative to standalone peers. We thus provide new light on the covariation between excess survival and excess value of diversified firms due to a survivorship bias, which is not considered by any

[3]The age of companies currently alive cannot fully account for the higher number of dead focused companies in the corporate graveyard. The set of defaulted firm is indeed large, even restricting attention to the CRSP database: the median time that a common stock stays listed is seven and a half years (Bessembinder, 2018).

previous theoretical or empirical framework.

The rest of the paper proceeds as follow. Section 1.1 reviews closely related literature. Section 2 presents our model of expected firm value. Section 3 determines market values and examines the robustness of our results. Section 4 investigates the empirical relation between value and default probability. Conclusions follow. All proofs are in the online Appendix, which also contains some model extensions.

1.1 Related Literature

This paper connects two known problems in empirical finance, namely the survivorship bias and the conglomerate discount (see, for example, Lang and Stulz (1994); Berger and Ofek (1995); Rajan, Servaes, and Zingales (2000); Whited (2001); Campa and Kedia (2002); Villalonga (2006)). Since the early work of Banz and Breen (1986), scholars have been aware of the ex-post-selection bias disturbing the comparison of prices and returns across companies.

Banz and Breen (1986) observe that the survivorship bias induces an ex-post-selection bias that disturbs the comparison of returns between firms displaying different price/earnings ratios. 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 return predictability and the equity premium. This paper argues that there will be a sample selection bias affecting the relative values of companies with heterogeneous survival probability.[4]

Our model builds on company diversification theories in investigating the coinsurance-contagion trade-off in conglomerate firms and its effect on the ex-ante conglomerate value. 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). Our results provide a comprehensive analysis of the contrasting effects of such trade-off on the ex-post conglomerate value, after sample selection due to default occurs.

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

Specifically, we show that the contagion effects result in an apparent premium of surviving conglomerates with lower survival skills both among conglomerates and relative to focused industry peers. Similarly, Hund, Monk and Tice (2010) build on the idea that diversified firms face less uncertainty about future mean profitability compared with focused firms. They show that diversified firms will trade at a discount relative to single-segment firms due to the convexity of the discounting function. In our one-period model, we show that the conglomerate discount may exclusively derive from a sample selection bias.

Graham, Lemmon and Wolf (2002) also consider the possibility of sample selection in relation to mergers. At least half of the reduction in excess market value occurs because more efficient conglomerates acquire less efficient business units, and not because combining firms destroys value. In a similar vein, Gomes and Livdan (2004) argue that the conglomerate discount reflects the endogenous, efficient selection of less productive firms into diversified conglomerates. Our model does not consider operational inefficiencies but instead focuses on sample selection due to bankruptcy.

In other words, the ex-post discount this paper points out is an artifact of the data. It does not require assumptions about operational (in)efficiency in conglomerates stemming from the internal capital market (Almeida et al. (2011), Rajan, Servaes and Zingales (2000), Stein (2002)), employees' incentives (Fulghieri and Sevilir (2011)), or production decisions (Alonso, Dessein and Matouschek (2015)). Our general point is that any discount (or premium) due to such operational-efficiency is upward (downward) biased by enhanced survival due to the survivorship bias. Otherwise, we sidestep agency costs, which figure prominently in the early literature focusing on the diversification discount.

Some prior papers highlight the role of bankruptcy risk in generating the conglomerate discount. Mansi and Reeb (2002) also argue that diversification brings about a default risk reduction, which they measure using the market value of debt. [5] They show that this measure better captures the wealth transfer from stockholders to bondholders, leaving the total firm value unchanged. However, the reason why shareholders would accept a systematic wealth transfer at the benefit of the lenders in diversified firms is unclear. In addition, we do not find an effect of

[5] Glaser and Muller (2010) find a similar result on a sample of all CDAX German firms from 2000 to 2006.

differential conglomerate survival at the time of conglomerate formation.

The survivorship bias might also contribute to explain why companies in some industries display higher value than firms in so-called ”boring” industries, as in Chen, Hou and Stulz (2015). Because they cannot find a rational explanation for this apparent mispricing, they resort to a behavioral one to explain why firms in some more old and mature industries have lower values. They also show that firms in less boring industries have lower realized returns. Their evidence appears consistent with our survivorship bias story.

2 The Model

The model builds on the setup of Boot and Schmeits (2000) without incentive problems and examines a population of firms composed, in equal proportion, by diversified conglomerates and focused companies. It matches conglomerates, that combine operating units, to a combination of focused companies running only one operating unit. The next two sub-sections focus on pricing at the *ex-ante* stage, when all companies are alive. Since the prices of all companies are available and there are no frictions, the (average sample) market price of each type at the *ex-ante* stage coincides with the respective *ex-ante* expected value. Then, in section 3, we will determine the (average sample) market price at a later stage, after some companies of the two types may have defaulted. At that stage, we will measure the survivorship bias due to missing (prices for) defaulted companies. One metric for the survivorship bias is the difference between the average sample market value, that is the expected value conditional on survival, and the *ex-ante* value of the population, for each company type. Another metric is the difference between the average sample market values of the two company types.

In order to focus on the differential survival of the two company types, we will rule out other differences such as a unit's profitability, debt needs, and bankruptcy costs, in line with the literature on mergers motivated by purely financial synergies. Moreover, we match units of conglomerates to units of focused companies in a static context. The next section describes the coinsurance-contagion trade-off in conglomerates. Diversification affects survival by permitting coinsurance across units, thereby lowering default probability, but may result in contagion, thereby increasing default probability. After determining the risk-adjusted credit spreads of each company type, Proposition 1 shows that the *ex-ante* unconditional expected value of diversified and focused companies coincides unless there are bankruptcy costs. If such costs are present, expected value increases in survival probability.

Since there is no friction and there is no survivorship bias because all companies are alive, average sample stock price will coincide with the *ex-ante* expected value. This feature will allow to focus on the role of corporate diversification in hedging bankruptcy risk and its pricing consequences, which have so far been neglected in the conglomerate discount literature.

2.1 Company Types 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 earn a credit spread R_i, which is determined at $t = 0$ together with the *ex-ante* expected value. 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 a probability of $p_i \in (0, 1)$, and it will be Low $\{L\}$ and equal to zero with a probability of $(1 - p_i)$. Our choice of values will imply that each unit generates insufficient operating profits in state L to honor its own debt obligations. At ($t = 0$), we determine the *ex-ante* value of each company type.

At the interim stage, lenders observe a private and perfect signal of future cash flows and may decide to declare bankruptcy. When a company defaults, its future profit conditional on survival, $K_i \geq 0$, is lost. Moreover, the (prices of) defaulted companies no longer exist. At this stage, after some companies may have defaulted, we will determine both the average market value of survivors and the survivorship bias.

Entrepreneurs may choose to run focused companies (F), where each unit is independently liable to its own lenders and has survival probability equal to $p_i^{Sur} = p_i$. Alternatively, diversified conglomerate (C) combine two units and pool their cash flows, so that they are jointly liable *vis-à-vis* lenders. A profitable unit may therefore be able to help the insolvent one, or *vice versa* an unprofitable unit may drag a profitable one into bankruptcy. To represent this coinsurance-contagion trade-off, 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. [6] Thus, a conglomerate will default when a lender's signal is either $\{LL\}$ or $\{LH\}$, the latter being a contagion state because A's losses drag B into bankruptcy. The conglomerate will survive when the signal is either $\{HH\}$ or $\{HL\}$, the latter being a coinsurance state because profits from A rescue B. The resulting survival probability of conglomerates, p_C^{Sur}, is equal to p_A because the conglomerate survives if and only if unit A survives. [7]

2.2 The Credit Spread and the *Ex-ante* Expected Values

In this section, we first determine the credit spread charged to each company type. Paradoxically, contagion across units helps reduce the conglomerate credit spread. We then determine the *ex-ante* expected value of companies, before any default occurs, which will serve as a benchmark to show the effect of the survivorship bias.

Lenders of unit i, $i = A, B$, 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,[8] the credit spread for the conglomerate is equal to:

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

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

[7] So far, we are following the setup of Boot and Schmeits (2000) without incentive problems, adding instead the assumption of asymmetric profits. This assumption makes contagion possible, a feature that is prominent in other studies of conglomerate mergers such as Banal, Ottaviani and Winton (2013) and Leland (2007). In the online Appendix we also allow unit B to coinsure and contaminate unit A.

[8] Conglomerate lenders receive the debt repayment in states $\{HH\}$ and $\{HL\}$. They also recover the cash flow X_B in state $\{LH\}$, when unit A drags the profitable unit B into bankruptcy

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 a probability of $p_A p_B$, or unit A is profitable but B is not, with a probability of $p_A(1-p_B)$. Moreover, they recover profit, X_B, upon the conglomerate default when there is contagion, with a probability of $p_B(1-p_A)$.

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

$$R_C < R_A + R_B\,, \tag{3}$$

Conglomerates thus always enjoy better credit conditions than focused companies. This is due in part to coinsurance, which reduces the chances of default, but also to contagion, which delivers a higher recovery upon default to lenders.

Let us now turn to the value of the population of companies at $t = 0$, before any default occurs. Let F denote the sum of two focused units and let $\pi_i = p_i X_i - D_i$, for i=A,B, denote the expected profit after the service of debt. Recall that $p_i^{Sur} = p_i$ for focused units, and $p_C^{Sur} = p_A$ for conglomerate firms. In line with the past literature, we find that:

Proposition 1: *Assume costly bankruptcy. Then, at t=0:*

a. Expected value, V, increases in survival probability and is equal to:

$$V_F = \pi_A + \pi_B + p_A^{Sur} K_A + p_B^{Sur} K_B \tag{4}$$

$$V_C = \pi_A + \pi_B + p_C^{Sur}(K_A + K_B). \tag{5}$$

for a focused company and a conglomerate, respectively.

b. The conglomerate expected excess value relative to the focused company, $V_C - V_F$, is positive if, and only if, the coinsurance probability exceeds the probability of contagion.

The expected value of all firm types increases in survival probability in part (a) of the proposition because higher survival probability saves on bankruptcy costs. Part (b) indicates that there is an expected conglomerate premium only if conglomerates survive more often than focused firms. This result is a toy replica of previous insight from Banal-Estanol et al. (2013), without tax-distortions, and Leland (2007), with tax distortions.

The expected value of the population of companies is usually unobservable because of sample selection bias. However, in the empirical section we will measure the *ex-ante* value difference between conglomerates and focused companies in an experiment focusing on newly-formed conglomerates. At that time, we expect no differential sample selection bias between focused units that just became conglomerates and focused units that did not. The sample price difference therefore coincides with *ex-ante* value difference. We will also examine whether all high survival firms (both newly-formed conglomerates and focused ones) display positive *ex-ante* excess value relative to low survival ones.

3 The Survivorship Bias

We now determine the average market values of companies that survive into the sample at the interim stage. At this time, the sample of listed companies no longer coincides with the population of listed companies at $t = 0$, because some companies may have defaulted. We therefore compute the average market values conditional on company survival. We then measure the survivorship bias as the difference between such average (observed) market values conditional on company survival and the *ex-ante* equity value for each company type.

The following proposition summarizes our next finding, concerning the relationship between the average market value of each company type and their survival probabilities, $p_i^{Sur} = p_i$ for focused units and $p_C^{Sur} = p_A$ for conglomerate firms:

Proposition 2: *At the interim stage, the average market value of companies of a given type that survive into the sample, MV, exceeds the ex-ante expected value, V, of companies of that* *type:*

$$V_F = MV_A \times p_A^{Sur} + MV_B \times p_B^{Sur} \,, \tag{6}$$

$$V_C = MV_C \times p_C^{Sur} \,. \tag{7}$$

Proposition 2 implies that the sample price of any given company type overestimates the *ex-ante* expected value of that type in the population, when all individual surviving companies are correctly priced. Therefore, a measure of the survivorship bias for a type-j firm is $MV_j - V_j$, which is equal to $V_j \times (1 - p_j^{(Sur)})/p_j^{(Sur)}$, for $j = A, B, C$.[9] The survivorship bias is larger the lower is the type-specific survival probability, because the number of worst performers is smaller the higher is their survival probability.

We now bring this result to bear on the cross-sectional difference in sample market values between conglomerates and standalone firms. This result directly implies that a conglomerate survival discount appears in the sample when conglomerates display excess survival relative to focused companies. When the converse is true, a conglomerate contagion premium appears in the data. These sample differences in market values are a measure of the survivorship bias in the cross section of company types. We can therefore state the following proposition:

Proposition 3: *At the interim stage, the survivorship bias implies that:*

a. There is a survival discount in the sample of conglomerate survivors if, and only if, the conglomerate survival probability exceeds the survival probability of focused units:

$$MV_C - MV_F = \pi_A[(p_C^{Sur})^{-1} - (p_A^{Sur})^{-1}] + \pi_B[(p_C^{Sur})^{-1} - (p_B^{Sur})^{-1}] < 0 \,. \tag{8}$$

b. With positive bankruptcy costs, the larger the ex-ante conglomerate premium is, the larger the survival discount on surviving conglomerate will be.

[9] This expression is the exact counterpart of the spurious equity return premium in Brown et al. (1995, p.861). While Brown et al. (1995) relate the presence of the equity return premium to the probability of a market breakdown, we relate the equity premium to the idiosyncratic survival probabilities of different company types.

Proposition 3a states that a necessary and sufficient condition for observing in the data a conglomerate discount, brought about by the survivorship bias, is a conglomerate excess survival. According to Proposition 1b, the pattern should be opposite in the population, in that excess survival is associated with an *ex-ante* premium. Proposition 3a also implies a positive correlation between the sample conglomerate discount, due to the survivorship bias, and the conglomerate excess survival probability. On the contrary, the correlation implied by Proposition 1 between the ex-ante excess value and the excess survival of the conglomerate population is negative. These opposite patterns will help us identify the survival discount generated by the survivorship bias in the data.

This result also connects us to the results of Tang, Wu, and Zhang (2014). They calculate the *ex-ante* expected return as the implied rate of return that equates the present value of expected future residual incomes to the stock price under the residual income model. They show that such accounting-based *ex-ante* expected return estimates have opposite signs to the average realized returns for the high-minus-low quintiles. More precisely, they show that the high-minus-low failure probability quintile has an average return of -7.7%. However, its *ex-ante* expected return is significantly positive at 3.8% consistent with economic intuition - and with Propositon 1. Proposition 3b offers a rationale for their results. It highlights an inverse relationship between the *ex-ante* price premium and the survival discount in the sample. Proposition 3b therefore implies that an *ex-ante* return premium on low versus high survival firms will be associated with a sample return discount.

3.1 From the Model to the Data: Caveat

In our model, markets are perfect and the prices of surviving companies reflect their future cash flows. However, there is a wedge between the expected value of the population of companies and the sample average prices. Such survivorship bias, that is at the root of both the contagion premium and the survival discount, derives from a sample truncation because there are no prices for the defaulted companies. To deliver this insight straightforwardly, we have relied on simplifying assumptions concerning the determinants of *ex-ante* values. This section addresses some maintained assumptions before turning to the data.

First, the model rules out both differences in operating profits across company types, and firm entry and exits unrelated to bankruptcy. In the empirical section, we will control for firm characteristics that are associated to profitability in the conglomerate discount literature. We will also examine the robustness of our results when we control for firm entry and exits motivated by reasons different from bankruptcy.

A second observation is that the level of debt is exogenous in our model while debt is endogenous when there is a tax-bankruptcy trade-off (as in Leland [2007] and Luciano and Nicodano [2014]). Insights into differential survival rates between company types, and therefore into discounts, carry over to these settings conditional on debt levels. A robustness check will investigate the covariation between the debt levels and the survivorship bias.

Another simplification in the model is that coinsurance between conglomerates' units takes the form of a transfer from A to B only. It is easy to add a state of nature where unit B supports A, as in Boot and Schmeits (2000). The online Appendix provides such an extension, displaying the necessary variations in the definitions of both survival probabilities and cash flow restrictions. The relationship between survival probability differences and sample market value differences in Proposition 3, which we use in order to identify the survivorship bias, is unaltered.

Finally, bankruptcy costs might differ across company types. 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. We control for size and many observable firm characteristics, together with the use of firm fixed effects, to take into account this effect.

4 Measuring the Survival Discount and the Contagion Premium

In this section, we measure the survivorship bias in US equity market data, exploiting the previous insights into the relationship between differences in default probabilities and survival discounts. We rely on methods from three strands of empirical literature, respectively concerning the survivorship bias, default risk and the conglomerate discount. In the next section, we outline two ingredients of our method. We then present the sample and the variable construction before implementing the method.

4.1 Empirical Strategy

The ideal experiment to test our model would be to regress the excess default probability on the excess firms value, on the sample of surviving firms. Because these are both estimated and simultaneous variables, driven by the same covariates, this method would generate a set of biased coefficients.

A way to address such an endogeneity concern would be to instrument the default probability with a proxy that does not affect the firm value. An exclusion restriction is considered valid as long as the independent variables do not directly affect the dependent variable in an equation. We could not find any variable respecting such a restriction: all variables that affect the default probability of firms also affect their value.

For this reason, we test for the excess default probability – excess value relationship in different ways. First we study how excess value and excess default relate to similar explanatory variables. Then we resort to percentile regressions, to investigate the covariation between the conglomerate discount and the conglomerate excess default probability. Finally we control for an indicator variable associated to low survival conglomerates, to show that the latter display a premium when compared to similar standalone firms. In the robustness section, we make use of firm fixed effects to control for firm heterogeneity.

We start to build our measure of default probability (PD) for each firm-year, which is based on the following hazard rate model:

$$P_{t-1}(Y_{i,t} = 1) = [1 + exp(-a - bx_{i,t-1})]^{-1} \tag{9}$$

where Y_{it} is an indicator variable equal to one when the company goes bankrupt at time t. The vector x includes the predictive variables from Campbell et al. (2008), who elaborate on previous work on survival probability by Shumway (2001) and Chava and Jarrow (2004). We also estimate an additional specification of the survival model that includes the "conglomerate dummy", which is an indicator variable that is equal to one if the company engages in industry diversification. This allows us to determine whether conglomerates' survival probability exceeds that of focused companies, which is a necessary condition for conglomerates to display an average sample discount according to our model of the survivorship bias. As in Campbell et al. (2008), we experiment with two different dependent variables, a narrower one (default) and a broader one (failure), as alternative indicators of financial distress. Default events include cases filed under both Chapter 7 and Chapter 11 while failure events also include default on a bond.

Next, we analyze the sample price differences and survival probability differences. While in the model we match conglomerates to focused companies, in the data we match both conglomerates and focused companies to their industry focused peers. We therefore use as dependent variables, in a vector $y_{i,t}$, both firm Excess Values and Firm Excess Default relative to industry peers in the following regression model:

$$y_{i,t} = \alpha + \beta Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t \, , \tag{10}$$

where $X_{i,t-1}$ is a vector of controls including company characteristics and year fixed effects (as in Villalonga [2004b] and many others). The coefficients of the conglomerate dummy measures the benchmark discount and the benchmark excess default probability of conglomerate companies. In line with Proposition 3a, we expect to see both coefficients to be negative because of a survivorship bias.

We will then proceed to analyze the covariation of excess value and excess default probability in the cross section. We will therefore run a quantile regression relating the excess market value (and the excess default probability) of conglomerates, within each survival probability quantile, to a conglomerate dummy along with other controls. We expect the sample conglomerate discount to be higher in quantiles where conglomerates display higher excess survival probability, in line with Proposition 3a. After some robustness tests, we will examine both the level and the covariation of the discount at the stage of conglomerate creation, when there is no survivorship bias. At that stage we will be able to check the implications of Proposition 1a and 1b.

4.2 Data and Sample

Our sample combines several data sources from the years 1980-2014. Firstly, we retrieve information on multi-segment companies from Compustat-Historical Segments. Previous studies associate each conglomerate segment with similar single-segment companies in the same industry in order to compute excess values. We follow a similar approach, applying both the matching and the sample selection as in Lamont and Polk (2001) and Berger and Ofek (1995). We drop firms that have segments in financial services (SIC 6000-6999) and utilities (SIC 4900-4999), firms with total sales below $20 million, and firms with aggregated firm segments sales above 1% of total firm sales in Compustat. We also drop segments with missing sales and SIC codes; firms operating in other non-economic activities, such as membership organizations (SIC 8600), private households (SIC 8800), or unclassified services (SIC 8900); and all segments that do not have at least five similar single-unit companies in the same industry. After those modifications, we have a total of 87,427 firm-year observations (for a total of 11,438 companies) from 1980 to 2014, of which 26,484 (30%) are observations from multi-segment companies.

To estimate the survival probability, we retrieve information on company bankruptcy from three sources. The first is the Compustat North America database, which indicates if a company was delisted and provides the motivation for the delisting. We keep only those delistings attributed to bankruptcy filings and liquidations. The second source is CRSP, which also provides information about all public companies delisted due to a distress event. We keep delistings for liquidation (code 04), bankruptcy (code 574), and stocks that were delisted when the price fell below an acceptable level or for insufficient capital (codes 552 and 560, respectively). The third source is the UCLA-LoPucki Bankruptcy Research Database (BRD), which reports bankruptcy filings (both Chapter 7 and Chapter 11) in the United States bankruptcy courts of the major public companies since October 1, 1979.[10] After combining those sources, we have 1,599 default events from 1980 to 2014, which represent 1.82% of total observations and 13.9 of the firms in the sample.

[10] We are grateful to UCLA-LoPucki for offering us free access to their database until 2014. 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 2020 dollars).

In all our analyses, we use the PDs as computed in Campbell et al. (2008). For robustness, 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' PDs for a subsample of 32,258 US public and private companies. We can match 18,651 observations for a total of 4,280 companies in our sample.[11] Finally, we retrieve firm characteristics from Compustat North America dataset. Specifically, we keep all firms that have information available on their size, leverage, EBITDA, sales, and capital expenditures. Appendix A.1 defines the complete set of variables used in the analysis, along with descriptive statistics (Table A.1).

Table 1 reports the number of active firms, conglomerates, defaults, and failures per year after applying these modifications. The cumulative distress column captures the the number of cumulative events of failure from the beginning of the sample. The table also reports the variation in the number of firms for each year due to mergers, new entries (as in Ramey and Shapiro [1998]), and firms that drop from the sample for unspecified reasons (other exits).[12]

Conglomerates represent 30% of active US companies in our sample and 42% of all assets in Compustat. The average yearly number of default events from 1980 to 2014 is 1.6%, consistent with past results (Campbell et al., 2008). Failures are defined more broadly to include bankruptcies, financially-driven delisting (reported in CRSP), or D (default) ratings issued by a leading credit rating agency. The total number of failures therefore exceeds the total number of defaults. A raw indicator of sample selection is the comparison between the number of active firms surviving into the sample as of 2014 (1,783) and the number of defunct companies over the sample years (1,599).

4.2.1 Variables

Following the conglomerate discount literature (see, among others, Berger and Ofek [1995] and Villalonga [2004b]), the firm's excess value is computed as the natural logarithm of the ratio

[11] Data are available at https://nuscri.org/en/.

[12] We identify such variations for robustness checks. The acquisition of a distressed company may not only affect the *ex-ante* expected value of conglomerates (as in Gomes and Livdan [2004] and Graham, Lemmon and Wolf [2002]) but may also increase the survival discount since low-valuation single-segment companies disappear from the database.

between its market value and its imputed value. The imputed value is the average of the market values of the firms' segment units, the latter being computed by multiplying the segments' sales to the median market-to-sales multiplier of the single-segment companies in the same industry as the segment unit. We implement industry matching using the narrower SIC, including at least five single-segment companies.

In equation (8) of the model, we show that higher survival firms display a discount with respect to lower survival firms due to sample selection. For this reason, we construct the variable "excess default probability" 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 the average of the values of the segments' PD, the latter being computed by multiplying the segments' sales to the median PD-to-sales multiplier of the single-segment companies in the same industry as the segment unit. A negative value of this variable implies a higher survival ability of the firm relative to the average firm in the industry. Based on equation (8), we expect the excess value to be negative when the excess PD is also negative - controlling for firm characteristics. We also expect the excess value and the excess PD to converge to zero together.

Given the relevance of diversification for conglomerate survival probability, we also measure the cash flow correlation across segment units ($CFCORR$). This indicator may capture conglomerate diversification better than the number of conglomerate segments. 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 focused firms using the average cash flow of the market and the Fama and French (1993) factors for each year and industry. Next, we estimate pairwise industry correlations using the previous five-year industry cash flows for each year in the sample, and we impute the industry pairwise correlation according to the segment units and the segments' SIC codes. The cross-segment cash flow correlation for firm i in year t with n number of segments is computed as follows:

$$CFCorr_{it(n)} = \sum_{p=1}^{N} \sum_{q=1}^{N} w_{ip(j)} w_{iq(k)} \times Corr_{jk}[t-10, t-1](j, k) \tag{11}$$

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 five-year period before year t. A high correlation coefficient between segment cash flows is a proxy for lower coinsurance across divisions with focused firms, at the maximum level having a correlation equal to one and zero coinsurance.

4.2.2 Excess Default Probability

This section computes the (excess) default probabilities. We estimate the survival model following Equation (9) on the Compustat sample, and we report the results in Table 2. The model controls for the vector of explanatory variables of Campbell et al. (2008), listed in Table 2 and explained (for brevity) in Appendix A.1. We also estimate a modified version of the model in columns (5) and (6), where we add the conglomerate dummy to the specification to test whether conglomerates have different survival probabilities.

The coefficients of the control variables confirm the findings of Campbell et al. (2008). Larger size, higher income, and higher stock returns are associated with lower default probabilities, while higher leverage and stock volatility are associated with higher default risk. Columns (5)-(6) also show that conglomerates have lower default probabilities compared to focused firms. We compute the economic effect from the probit estimation and find that conglomerates have an 8% lower default probability than focused companies. This suggests that, on average, the coinsurance function dominates over contagion in conglomerates.

From the estimation in column (3), we retrieve the survival odds ratios, and we can compute the probability of default for each company year accordingly. Finally, for each industry (four-, three-, and two-digit SIC codes) in each year, we calculate the sales-weighted industry default probability, and we impute to each firm the corresponding sales-weighted average industry default probability. Figure 1 portrays the excess PD for different intervals of the excess value of conglomerates and focused companies. On the x-axis, it reports the excess value from -1.386 to 1.386, as in Villalonga (2004b). On the y-axis, it reports the excess default probability of conglomerates and focused companies. This figure indicates that conglomerate firms with a severe value discount (left side of the distribution) have a much lower excess default probability than focused firms. This descriptive evidence is not inconsistent with the presence of a survival discount for conglomerates, induced by a survivorship bias.

Table 3, panel A, reports the univariate statistics of the main variables used in the analysis and the differences in characteristics between conglomerates and focused companies. The t-test differences are estimated with an OLS regression, clustered at the firm level. Panel A uses the full sample, including companies that enter or exit the database after the sample began. Consistent with past findings (Villalonga [2004a]), the table shows that conglomerates' mean value is 6% lower than that of their focused industry peers (segments for brevity). According to our model, if there is a survivorship bias then those conglomerates displaying discounts relative to segments will have lower PD than those of their segments. Consistent with this view, the table shows that conglomerates' mean excess PDs from the CRI database are 7% lower than their segments' or 19% lower when looking at the estimated excess default probabilities as in Campbell at al. (2008). [13]

In line with past results, conglomerates are larger and have both greater leverage and dividend ratios, but both fewer investments and lower sales-to-growth ratios. The average segments cash-flow correlation of conglomerates is 43%, with considerable variation in the cash flow correlation coefficient, ranging from a minimum of -99% to a maximum of 100%, as shown in Table A.1.

Table A.1 also shows that the (unmatched) estimated default probability has little variability below the 50$^{\text{th}}$ percentile. Therefore, we mostly explore the top half of the distribution of the survival probability in our percentile regressions where the sample is divided according to 10$^{\text{th}}$, 25$^{\text{th}}$, 50$^{\text{th}}$, and 100$^{\text{th}}$ percentiles of companies' survival probability. Table 3, panel B reports the univariate statistics of the main variables used in the analysis according to the 10$^{\text{th}}$, 25$^{\text{th}}$, and 50$^{\text{th}}$ percentiles of companies' survival probability and the statistical t-test of average differences between conglomerates and focused firms for each subsample, estimated with an OLS regression clustered at the firm level. Panel B shows that conglomerates with lower survival probabilities

[13]The coinsurance function of conglomerates is not evident in the raw data. The raw survival probability is not statistically different between conglomerates and focused firms in the Compustat sample if one does not control for firms' observable characteristics as in Equation (9) and in Table 2.

trade at a premium in the raw data relative to their focused industry peers.

4.3 Empirical Analysis

We now turn to the estimation of the "benchmark discount" and "benchmark excess default probability" using Equation (C.2) to control for a vector of company characteristics that includes industry (two-digit SIC code) and year-fixed effects. Following the traditional conglomerate discount literature, Columns (1) and (2) of Table 4 report the results when the firm excess value is the dependent variable. In all specifications, we cluster at the company level.[14] Column (1) shows that the conglomerate discount is equal to 15% after controlling for company and industry characteristics, confirming traditional findings. Column (2) also includes company age among the controls, following the life-cycle hypothesis for company growth opportunities in Borghesi, Houston, and Naranjo [2007] and Matsusaka [2001]. This control reduces the benchmark conglomerate discount (from 15% to 12%).

In Columns (3) and (4) of Table 4 we address the survivorship bias hypothesis by estimating a similar specification for the excess default probability. According to equation (8) of our model, the conglomerate discount is the mirror image of the excess default probability if there is a survivorship bias. In line with equation (8), the estimates show that conglomerate default probability is, on average, 9.2% lower than the default probability of focused companies. When age is added to the set of controls in Column (4), the conglomerate excess default probability falls to -8%, in line with the lower conglomerate discount in Column (2). It is also evident that the common control variables drawn from the conglomerate discount literature (Leverage, Assets, CAPEX, Sales Growth and Dividends) explain the variation in the excess value and in the excess PD regressions with an opposite sign. The opposite patterns in Columns (3),(4) with respect to Columns (1),(2) are a symptom of a survivorship bias. When the coinsurance function of corporate diversification dominates over contagion, we should indeed observe a conglomerate premium instead of a discount - if there is no survivorship bias (see Banal, Ottaviani and Winton [2007]).

However, we take a further step and explicitly examine the covariation between excess value

[14] We also cluster at the industry level in the robustness tests.

and excess survival probability in the cross section. Some relevant patterns are already visible in univariate statistics. Panel C of Table 3 reports the distribution of both the excess default probability and the excess value for firms with below- and above-median survival skills. In the sub-sample with below-median survival skills, the statistics in column (1) show that conglomerate firms with lower survival abilities (positive excess default probability) do not display any difference in value with respect to their focused industry peers (-.229 versus -.222). Conglomerates also show a slightly lower excess default probability (0.57) with respect to the focused companies (0.61). On the contrary, conglomerates in the pool of firms with superior ability to survive (above-median survival skills) show a severe value discount when compared to their focused industry peers (0.12 versus 0.23). At the same time, the difference in excess default probability widens (-1.24 versus -0.83). In other terms, conglomerates show no discount (a large discount) with respect to the focused firm when there is no difference (a large difference) in excess default probability, holding fixed the survival skill quintile.

These patterns hold when we control for company characteristics. We regress company excess value on four sub-samples divided according to 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of company excess default probability, as in Equation (C.2). We control for the heterogeneity in each group in survival skills with the indicator variable “low survival”, which is equal to one when the firm survival probability is below the median of the year. We expect this control to have a negative coefficient, since lower survival is associated with lower ex-ante value for all companies, as in equations (4) and (5) of our model. Table 5 reports the results of this quantile regression. Conglomerates in the highest quintile of excess default probability show half of a discount (8.5% - Column [4]) then conglomerates with low excess default probability (the ones with higher survival skills compared to their industry peers), as in column (1) (15%).

Table 6 turns to the estimation of the contagion premium in our sample, controlling for other covariates. The regression also includes the dummy “conglomerate×low survival,” whose (positive) coefficient (15%) is a proxy for the contagion premium within the sample of surviving conglomerates. The results in column (2) show that the diversification discount decreases to 3% (18% minus 15%), from the 12% in column (1), when conglomerate firms have lower survival probability. In other terms, the reduction in the conglomerate discount due to lower conglomerate survival is equal to 75%. In column (3), we report additional controls related to different firm events (mergers, new entries, exits for unspecified reasons) which may confound to our results. The magnitude of the contagion premium within the conglomerate sample is however unchanged. Conglomerates with higher (lower) survival probabilities than their focused industry peers show higher (no) market discounts, in line with Proposition 3a.

The evidence of a contagion premium on low-survival conglomerates also addresses two concerns. We know that the conglomerate discount appears in Compustat segment data, whereas it turns into a premium in the Census BITS database. This difference suggests that the sample discount in Compustat may be due to inaccurate segment reporting with respect to Bits (Villalonga, 2004a), rather than a survivorship bias as this paper argues. We also know that the excess value may artificially increase the conglomerate discount if conglomerates are more acquisitive than focused firms and they use purchase accounting (Custodio, 2014). However, the 15% change in the discount across conglomerates with different survival, that Table 6 points out, obtains holding both segment measurement and inclination to acquisition fixed.

Let us go back to Panel C of Table 6 . Consider first the subsample of focused companies with below-median survival skills. Within this subsample, their excess value varies from -1.51 to 2.77 as their excess default probability varies between - 1.39 to +1.39. A similar pattern holds in the subsample of focused companies with above-median survival skills, where the excess value varies between -1.36 to 1.39 as the excess default probability varies from -3.45 to 2.77. Let us turn to the sub0sample of conglomerates with below-median (above-median) survival skills. The excess values grow from -1.39 to +1.39 (-1.39 to +1.39) as their excess default probabilities grow from -1.65 to 2.77 (-3.45 to +2.77). To our knowledge, no other theory is able to provide a rationale for these patterns.

4.3.1 Ex-ante or Ex-post Discount? Newly Formed Conglomerates

The survivorship bias may thus provide an explanation for both the contagion premium and the conglomerate discount. Even if our theory indicates that the co-movements in conglomerate discounts and excess default probabilities in the previous tables are due to a sample selection bias, we cannot rule out the possibility that these results capture, at least in part, an *ex-ante* effect on conglomerate firm value due to different reasons. In this section, we measure the discount on a sample of newly-established conglomerates whose value is unlikely to be affected by a survivorship bias within a short time span such as one year.

To assess the existence of an *ex-ante* discount driven by higher conglomerate survival, we rely on a method originally devised to address the concern that both conglomerate formation and the *ex-ante* discount are jointly endogenous. This method, used by Lang and Stulz (1994), Graham et al. (2002), Hyland and Diltz (2002), and Villalonga (2004b), applies a longitudinal approach to the conglomerate discount estimation. Their idea is that, for the discount to be interpreted as evidence of value destruction, the cross-section evidence of a discount is insufficient, and one needs to look at changes in the diversification status. In their experiments, firms that switch from focused to conglomerate, accounting for their propensity to diversify, should display an ex-ante discount if diversification is expected to decrease ex-ante value. We employ this type of experiment to determine whether newly- formed conglomerates display a contagion premium in the year after their formation, that is whether firms that become conglomerates and display low survival have higher valuations. We expect to find no ex-ante contagion premium because of the absence of a differential survivorship bias.

We begin the experiment by identifying 381 firms that transitioned from being a focused firm to a conglomerate firm.[15] We also restrict our sample to those firms and to focused firms that never change their status. The subsample includes the 381 diversifying firms with data from one year before until one year after diversification plus the 30,173 single-segment firm-years with data one year before and after the change. We estimate a difference-in-difference propensity score matching, where the treated firms are those that switch from focused to conglomerate, and the control firms are focused firms that never change their status. The details of the estimation of the propensity to diversity by using different models (baseline and enhanced) are in the online appendix. Columns (1)-(4) of Table 7 report the difference in difference estimation on the treated firms that start to diversify.

Each estimation is performed according to two propensity score models: the reduced model

[15] Villalonga (2004b) finds 150 firms in a sample from 1978–1997.

and the enhanced model. To illustrate, column (1) reports the difference-in-difference estimation according to the propensity score reduced model, while column (2) reports the difference-in-difference estimation according to the propensity score enhanced model. In columns (3) and (4), we estimate a triple difference propensity score matching where our interaction variable is "low survival," an indicator variable equal to one if the firm has a default probability above the median in the year before the change of status from focused to conglomerate. The results confirm that there is no premium associated with low survival conglomerates at the stage of conglomerate formation. In columns (3) and (4), we see that firms becoming conglomerates have the same value in the year after the switch (first row). This also holds true for high-survival conglomerates that have a similar value after (second row) and before (third row) the switch. Consistent with Proposition 1(a), all firms with lower survival probabilities display lower values.

In more detail, the coefficient of "switch status×after" shows that the excess value of focused firms that become conglomerates relative to firms that remain focused does not change after the switch. In turn, the coefficient of "switch status×after×low survival" measures whether the excess value is any lower for firms that switch with a low prior survival probability relative to their focused peers that also have low survival probabilities. The coefficient is negative (-0.004) but is not statistically different from zero. The coefficient of "switch status×low survival" also indicates that the excess value for low-survival focused companies that switch is no higher than for low-survival focused companies that do not switch. The coefficient "low survival×after" shows the excess value changes after the event for low-survival firms, in general. This coefficient is, again, not statistically different from zero. Finally, the coefficient of "low survival" shows a discount of 34% for all low-survival firms (both before/after and switching/not switching), consistent with Proposition 1(a). The coefficient of "treated" indicates the excess value gain from shifting status relative to the value of the control group of focused firms that did not switch. Companies that switched lost some value relative to the value they would have had as focused companies, but the change is not statistically significant.

These results support the hypothesis that the conglomerate discount and the contagion premium found in previous sections are due to the survivorship bias, and suggest that the effect of the survivorship bias is far from negligible in equity markets, as maintained by both Brown, Goetzmann, and Ross (1995) and Samuelson (in Ross, 1997). [16]

4.4 Robustness Tests

We provide further tests of our baseline results. First, to additionally control for unobserved heterogeneity in firms' characteristics, we run our baseline regression with the addition of firm fixed-effects. Results in Table 8 confirm that the discount of firms closer to distress is 2.5% lower than the discount of firms with higher survival abilities. Second, we replicate our quantile regression by replacing the survival probability estimated according to Campbell et al. (2008) with the survival probability found in Duan et al. (2012). The results are in Table 9.

Second, since default probability increases in leverage (as in Leland [2007] and Luciano and Nicodano (2014)), the relationship between price and default probability differences should then carry over to leverage differences. For this reason, we estimate quantile regressions of the company discount where the dependent variable are both the excess value and the excess default probability, and the samples are divided according to 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of company leverage. Table 10 shows that the conglomerate discount falls to 9% (column [4]) when leverage increases, bringing the company closer to distress, in a quantile where the excess default probability of conglomerates is positive (column[8]). When companies have lower leverage (column [1]), the conglomerate discount increases to 14%, and the conglomerates display better survival skills (column [5]). This refinement confirms that both the (average and median) leverage and default probability of focused industry peers exceed that of conglomerates, and that this is associated with a contagion premium. In the online appendix we report an estimate of our main regression with different proxies of the dependent variable. Finally, our results hold when using different clustering (not reported in the tables), including industry (three-digit SIC codes), industry-year, and firm-year clustering. Overall, the robustness section confirms the existence of a survivorship bias that reduces the excess value of conglomerate firms relative to focused industry peers, consistent with Proposition 3a.

[16]The finding of no discount at the stage of conglomerate creation together with a discount later on has earlier been interpreted as evidence that conglomerates acquire already discounted focused firms and for this reason they appear to be discounted (Gomes and Livdan [2004], Graham, Lemmon, and Wolf [2002]). Three results let us think that those findings are evidence of the presence of a survivorship bias. A more cautious assessment attributes to the survivorship bias a half of the conglomerate discount, since Graham, Lemmon and Wolf (2002) ascribe a half to the alternative mechanism.

5 Summary and Conclusion

In this paper, we point out that the conglomerate discount may artificially arise in empirical analyses because of the adverse survivorship bias affecting diversified organizations with higher survival skills. Our model builds on company diversification theories, which investigate the coinsurance-contagion trade-off in conglomerate project financing, to show how the ability to survive of conglomerate firms results in an apparent discount whenever the delisting due to bankruptcies are not controlled for.

This pricing paradox is due to a known problem of existing databases, namely the ex- post selection bias. Because databases do not contain price information on the focused firms that disappeared in a downturn due to defaults, while they do include both the diversified affiliates and their focused peers that survived, the ex-post relative average price does not reflect the ex-ante value of the population of firms.

We test this prediction in a sample of US companies from 1980 to 2014. We exploit the idiosyncratic difference in survival probability between conglomerates and focused industry peers to study the sign of the correlation between the differences in both firms' survival probability and firms' equity values. Consistent with the survivorship bias hypothesis, this correlation is negative: the higher is the difference in survival probability, the higher the sample discount of firms, after controlling for observable characteristics.

Our empirical analysis shows that the sample survival discount relative to firms with lower idiosyncratic survival probability is sizable (between 50% and 70%). Our robustness checks show that the results do not depend on the details of either the model or the diversification indicator, firm idiosyncratic characteristics, or on the endogeneity of conglomerate formation.

Our analysis has implications over and beyond the conglomerate contagion premium and the conglomerate discount. Our investigation follows the original insight of Brown, Goetzman and Ross (1995), but looks at the cumulative effects of many individual company defaults rather than market crashes. Using this logic, the survivorship bias in the equity premium may then appear larger than currently assessed. We leave this challenging extension for further research.

References

Almeida, H., and T. Philippon, 2007, The Risk-Adjusted Cost of Financial Distress, *Journal of Finance* 62(6), 2557-2586.

Banal-Estañol, A., Ottaviani, M., and A. Winton, 2013, The Flip Side of Financial Synergies: Coinsurance versus Risk Contamination, *Review of Financial Studies* 26 (12), 3142-3181.

Banz, R.W., and W.J. Breen, 1986, Sample-Dependent Results Using Accounting and Market Data: Some Evidence, *Journal of Finance* 41(4), 779-793.

Berger, P.G., and E. Ofek, 1995, Diversification's Effect On Firm Value, *Journal of Financial Economics* 37, 39-65.

Bessembinder, H., 2018, Do Stocks Outperform Treasury Bills?, *Journal of Financial Economics* 129, 440-457

Blake, D., and A. Timmermann, 1998, Mutual Fund Performance: Evidence from the UK, *Review of Finance* 2(1), 57–77.

Boot, A.W.A., and A. Schmeits, 2000, Market Discipline and Incentive Problems in Conglomerate companies with Application to Banking, *Journal of Financial Intermediation* 9, 240-273.

Borghesi, R., Houston, J., and A. Naranjo, 2007, Value, Survival, and the Evolution of Firm Organizational Structure, *Financial Management* 36, 5-31.

Brown, S.J., Goetzmann, W.N., and S.A. Ross, 1995, Survival, *Journal of Finance* 50(3), 853-873.

Campbell, J.Y., Hilscher, J., and J. Szilagyi, 2008, In Search of Distress Risk, *Journal of Finance* 63, 2898-2939.

Carhart, M.M., 2002, On Persistence in Mutual Fund Performance *Journal of Finance* 52, 57 - 82.

Chava, S., and R.A. Jarrow, 2004, Bankruptcy Prediction with Industry Effects, *Review of Finance* 8, 537-569.

Chava, S., and A.K. Purnanandam, 2010, Is Default Risk Negatively Related to Stock Returns? *The Review of Financial Studies*, 23(6), 2523-2559

Custodio, C., 2014, Mergers and acquisitions accounting and the diversification discount, *The Journal of Finance* 69(1), 219-240.

R. Deaves, 2004, Data-conditioning biases, performance, persistence and flows: The case of Canadian equity funds, *Journal of Banking & Finance* 28(3), 673-694.

Dimitrov, V., and S.,Tice, 2006, Corporate Diversification and Credit Constraints: Real Effects across the Business Cycle, *The Review of Financial Studies* 19(4), 1465-1498.

Duan, J-C., J. Sun, and T. Wang, 2012, Multiperiod Corporate Default Prediction: A Forward Intensity Approach, *Journal of Econometrics* 170(1), 191-209.

Fulghieri, P., and M. Sevilir, 2011, Mergers, Spin-Offs and Employee Incentives, *Review of Financial Studies* 24, 2207-2241.

Gomes, J.F., and D. Livdan, 2004, Optimal Diversification: Reconciling Theory and Evidence, *Journal of Finance* 59(2), 507-535.

Graham, J.R., Lemmon M., and J. G. Wolf, 2002, Does Corporate Diversification Destroy Value?, *Journal of Finance* 57, 695-720.

Hann, R.N., Ogneva, M., and O. Ozbas, 2013, Corporate Diversification and the Cost of Capital, *Journal of Finance* 54, 778-885.

Hendricks D., Patel,J., and R. Zeckhauser,1997, The J-Shape of Performance Persistence Given Survivorship Bias,*The Review of Economics and Statistics* 79(2), 161-166.

Hund, J., Monk, D., and S. Tice, 2010, Uncertainty about average profitability and the diversification discount, *Journal of Financial Economics* 96, 463-484.

Inderst, R., and H.M. Müller, 2003, Internal versus External Financing: An Optimal Contracting Approach, *The Journal of Finance* 58, 1033-1062.

Johnson, S., Boone, P., Breach, A., and E. Friedman, 2000, Corporate governance in the Asian financial crisis, *Journal of Financial Economics* 58, 141-186.

Julliard,C., and A. Ghosh, 2012, Can Rare Events Explain the Equity Premium Puzzle?, *The Review of Financial Studies* 25(10), 3037-3076.

Kolasinski, A.C., 2009, Subsidiary debt, capital structure and internal capital markets, *Journal of Financial Economics* 94, 327-343.

Kothari, S.P., Shanken, J., and R.G. Sloan, 1995, Another Look at the Cross-Section of Expected Stock Returns, *Journal of Finance* 50, 185-224.

Kuppuswamy, V., and B. Villalonga, 2015, Does Diversification Create Value in the Presence of External Financing Constraints? Evidence from the 2007-2009 Financial Crisis, *Management Science* 62(4), 905-923.

Lee, B. S. and M.Y. Li, 2012, Diversification and risk-adjusted performance: A quantile regression approach, *Journal of Banking and Finance* 36(7), 2157-2173.

Leland, H.E., 2007, Purely Financial Synergies and the Optimal Scope of the Firm: Implications for Mergers, Spin-offs and Structured Finance, *Journal of Finance* 62, 765-807.

Lewellen, W.G., 1971, A pure financial rationale for the conglomerate merger, *Journal of Finance* 26, 521-537.

Li, H.,and Y. Xu, 2002, Survival Bias and the Equity Premium Puzzle, *The Journal of Finance*, 57(5), 1981-1995

Luciano, E., and G. Nicodano, 2014, Guarantees, Leverage, and Taxes, *Review of Financial Studies* 27(9), 2736-2772.

Maksimovic,V., and G. Phillips, 2013, Conglomerate Firms, Internal Capital Markets, and the Theory of the Firm, *Annual Review of Financial Economics*, 5(1), 225-244

Mansi, S.A., and D.M. Reeb, 2002, Corporate Diversification: What Gets Discounted?, *Journal of Finance* 57, 2167-2183.

Matsusaka, J.G., 2001, Corporate Diversification, Value Maximization, and Organizational Capabilities, *Journal of Business* 74, 409-431.

Otten, R., and D. Bams, 2004, How to measure mutual fund performance: economic versus statistical relevance, *Accounting and Finance* 44(2), 203-222.

Rajan, R.G., Servaes, H., and L. Zingales, 2000, The Cost of Diversity: The Diversification Discount and Inefficient Investment, *Journal of Finance* 50, 35-80.

Ramey, V., and M. Shapiro, 1998, Capital churning. *Unpublished Working Paper*, University of California, San Diego.

Rohleder, M., Scholz, M., and M. Wilkens, 2010, Survivorship Bias and Mutual Fund Performance: Relevance, Significance, and Methodical Differences, *Review of Finance* 15(2), 441-474.

Ross, P., 1997, History, as written by the winners, *Forbes*, June 16, 206-214.

Santioni, R., Schiantarelli, F., and P.E. Strahan, 2020, Internal Capital Markets In Times Of Crisis: The Benefit of Group Affiliation In Italy, *Review of Finance*, 24(4), 773-811.

Schoar, A., 2002, Effects of Corporate Diversification on Productivity, *The Journal of Finance*, 57, 2379-2403.

Shumway, T., 2001, Forecasting Bankruptcy More Accurately: A Simple Hazard Model, *Journal of Business* 74, 101-124.

Stein, J., 2002, Information Production and Capital Allocation: Decentralized versus Hierarchical companies, *Journal of Finance* 57, 1891-1921.

Tang,Y., Wu,J., and L. Zhang, 2014, Do Anomalies Exist Ex Ante?, *Review of Finance*, 18(3), 843-87.

Villalonga, B., 2004a, Diversification Discount or Premium? New Evidence from the Business Information Tracking Series, *Journal of Finance* 59, 479-506.

Villalonga, B., 2004b, Does Diversification Cause the "Diversification Discount?", *Financial Management* 33, 5-27.

Wermers, R., 1997, Momentum Investment Strategies of Mutual Funds, Performance Persistence, and Survivorship Bias. Unpublished Working Paper, University of Colorado.

A Appendix: Variables

This section reports the details of the variables construction, the complete distribution and the correlation matrix.

A.1 Construction of Variables

A.1.1 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 the average of the values of the segments' PD, the latter being computed by multiplying the segments' sales to the median PD-to-sales multiplier of the single-segment companies in the same industry as the segment unit. 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.1.2 Independent Variables - Multivariate Regressions

AFTER is an indicator variable equal to one for the year following the switch of a firm from focused to diversified.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.

HIGH SURVIVAL is an indicator variable equal to one when the firm has a survival probability (1-PD) higher than the sample median of the year.

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.1.3 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, as follows:

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

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.

Table A.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 UCLA-LoPucki Bankruptcy Research Database, over the years 1980-2014. For each variable, column (1) reports the number of observations (firm-year), columns (2)-(3) the mean and standard deviation, columns (4)-(10) the percentile distribution. Panel A refers to the main variables used in our analysis, 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	87,427	-0.072	0.671	-1.386	-1.386	-0.512	-0.041	0.351	1.137	1.386
Excess PD	87,427	-0.014	0.414	-1.284	-1.284	-0.232	-0.043	0.214	0.712	1.126
Excess PD (CRI)	27,327	-0.048	0.754	-1.399	-1.371	-0.684	0.000	0.577	1.169	1.400
PD (Estimated - Campbell et al. (2008))	87,427	0.051	0.026	0.000	0.009	0.038	0.046	0.058	0.092	0.558
PD (CRI)	27,327	0.008	0.031	0.000	0.000	0.000	0.001	0.005	0.034	0.883
Default (Y/N)	87,427	0.011	0.103	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Failure (Y/N)	87,427	0.011	0.106	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Numb. Segments	26,484	2.873	1.078	2.000	2.000	2.000	3.000	3.000	5.000	10.000
CFCORR	87,427	0.411	0.566	-0.992	-0.891	-0.022	0.511	1.000	1.000	1.000
Panel B: Control Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Size	87,427	5.329	1.586	2.240	2.604	4.128	5.119	6.308	8.298	11.363
Age	87,427	16.912	12.146	0.000	2.000	7.000	13.000	24.000	41.000	64.000
EBITDA	87,427	0.125	0.114	-0.723	-0.259	0.075	0.131	0.188	0.296	0.438
CAPEX	87,427	0.079	0.089	0.000	0.001	0.026	0.052	0.097	0.256	0.661
Sales growth (SG)	87,427	0.152	0.300	-0.631	-0.394	-0.002	0.098	0.238	0.694	2.929
Dividends (Y/N)	87,427	0.010	0.021	0.000	0.000	0.000	0.000	0.013	0.043	0.331
Leverage	87,427	0.203	0.182	0.000	0.000	0.031	0.174	0.325	0.549	0.788
LTAT	87,427	0.467	0.203	0.062	0.089	0.308	0.468	0.614	0.811	0.981
CACL	87,427	2.652	1.863	0.000	0.000	1.506	2.172	3.217	6.341	14.874
NITA	87,427	0.020	0.126	-2.254	-0.469	0.003	0.044	0.080	0.136	0.336
TLTA	87,427	0.443	0.204	0.039	0.073	0.279	0.440	0.592	0.789	0.969
EXRET	87,427	-0.008	0.123	-0.584	-0.358	-0.074	-0.004	0.065	0.185	0.602
NIMTA	87,427	0.006	0.108	-2.144	-0.387	0.002	0.030	0.048	0.081	0.331
TLMTA	87,427	0.356	0.229	0.007	0.024	0.162	0.320	0.520	0.785	0.978
EXRETAVG	87,427	-0.015	0.068	-0.484	-0.212	-0.051	-0.011	0.026	0.088	0.264
SIGMA	87,427	0.049	0.057	0.001	0.001	0.010	0.030	0.066	0.174	0.409
CASHMTA	87,427	0.093	0.113	0.000	0.000	0.017	0.053	0.127	0.320	1.016
Market-to-Book (MB)	87,427	2.523	2.536	0.089	0.307	1.097	1.778	2.982	6.964	33.108
PRICE	87,427	18.819	17.748	0.100	0.650	6.375	13.750	25.640	53.500	239.724

Table A.2: Pairwise Correlation

The table reports the pairwise correlation for the main variables of our analysis. The sample consists of the intersection of the Compustat, CRSP, and the UCLA-LoPucki Bankruptcy Research Database, over the years 1980-2014. The symbols * denote statistical significance at the 1% 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*	0.008										
Conglomerate	-0.0595*	0.0446*	0.0444*	0.008	0.9672*									
CFCORR	-0.0375*	-0.1469*	-0.0619*	-0.6220*	-0.005	-0.004								
Numseg.	0.020	-0.1849*	-0.012	-0.1056*	0.001	- 0.003	-0.6186*							
Age	-0.0659*	-0.2016*	0.00	-0.2670*	-0.007	-0.004	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*	0.006	0.0468*	0.0342*	0.1418*	-0.0779*			
CAPEX	0.1382*	-0.0241*	-0.0311*	0.0542*	-0.0262*	-0.0264*	-0.0788*	-0.019	-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

Table 1: Number of companies per year

This table lists the total number of active companies, the number of active conglomerates, defaults, failures, new entries and exits of firms. One observation is at firm-year level. We define default an indicator variable equal to one if the firms defaults in a specific year, while failure is an indicator variable equal to one if the firm defaults or has a D rating on its bonds. We retrieve default information from Compustat North America (delisted, bankruptcy filings and liquidations), CRSP (delisted due to a distress event), and from the UCLA-LoPucki Bankruptcy Research Database (Chapter 7 and Chapter 11). The cumulative distress column captures the the number of cumulative events of failure from the beginning of the sample. We define new entries as companies with end of period gross capital not bigger than 20% of the end of period net capital during the company's first year in the data set (as in Ramey and Shapiro [1998]). We define other exits as firms that exit the sample for unknown reasons, different from default, liquidation, or mergers. The sample period includes all non-financial and non-utility firms in the US, over the years 1980 - 2014.

Year	Active firms	Conglomerates	Default	Failures	Cum. distress	Mergers	New entries	Other exists
1980	2,093	1,128	24	24	24	184	0	113
1981	2,129	1,119	21	21	45	182	120	114
1982	2,168	1,073	22	22	67	203	176	112
1983	2,255	1,043	23	23	90	249	289	181
1984	2,388	1,013	31	31	121	259	422	200
1985	2,391	950	25	25	146	290	395	194
1986	2,442	897	25	25	171	270	511	175
1987	2,607	855	33	33	204	305	675	240
1988	2,572	788	44	44	248	252	680	212
1989	2,502	749	56	57	305	469	660	136
1990	2,509	741	52	53	358	409	711	112
1991	2,594	736	44	46	404	473	737	95
1992	2,804	768	30	33	437	561	882	103
1993	3,126	779	27	27	464	725	1,057	168
1994	3,428	784	48	49	513	886	1,214	237
1995	3,729	789	47	48	561	1,044	1,368	239
1996	4,077	786	67	69	630	1,287	1,478	352
1997	4,128	768	108	109	739	1,371	1,524	461
1998	3,772	1,187	140	147	886	1,231	1,360	452
1999	2,979	954	118	120	1,006	874	1,164	359
2000	2,740	707	92	99	1,105	665	1,128	359
2001	2,438	674	70	76	1,181	565	838	214
2002	2,249	612	34	41	1,222	547	714	185
2003	2,138	594	18	24	1,246	596	702	162
2004	2,147	590	23	26	1,272	620	820	195
2005	2,141	596	23	24	1,296	650	847	194
2006	2,103	596	34	35	1,331	615	893	214
2007	2,106	568	46	49	1,380	523	904	207
2008	1,952	546	40	43	1,423	431	713	145
2009	1,830	516	29	30	1,453	461	619	150
2010	1,844	511	33	35	1,488	481	705	148
2011	1,796	527	28	29	1,517	529	736	133
2012	1,736	514	25	27	1,544	513	722	132
2013	1,731	507	27	30	1,574	529	742	117
2014	1,783	519	24	25	1,599	512	728	157
Total	87,427	26,484	1,531	1,599	1,599	19,761	27,234	6,967

Table 2: Default Probability Estimation

The table reports the estimates of the default probabilities according to the model of Campbell, Hilscher, and Szileghyi (2008), where the dependent variable is an indicator variable equal to one when the company goes bankrupt, or fail, in t, and X a vector of variables listed in the table. Columns (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.

Dep. Var.:	Default (1)	Failure (2)	Default (3)	Failure (4)	Default (5)	Failure (6)
Conglomerate					-0.302***	-0.298***
					(-4.798)	(-4.859)
NITA	-1.893***	-1.881***				
	(-18.352)	(-18.244)				
NIMTAAVG			-1.639***	-1.621***	-1.638***	-1.619***
			(-13.141)	(-13.176)	(-13.053)	(-13.083)
TLTA	4.289***	4.417***				
	(29.48)	(30.48)				
TLMTA			3.251***	3.410***	3.321***	3.479***
			(27.46)	(28.88)	(27.73)	(29.16)
EXRET	-1.331***	-1.356***				
	(-7.268)	(-7.536)				
EXRETAVG			-3.315***	-3.255***	-3.307***	-3.248***
			(-8.966)	(-8.868)	(-8.958)	(-8.860)
SIGMA	2.937***	2.954***	1.437***	1.451***	1.391***	1.405***
	(8.56)	(8.76)	(4.26)	(4.38)	(4.12)	(4.25)
RSIZE	-0.204***	-0.196***	(0.028)	(0.023)	(0.022)	(0.018)
	(-4.399)	(-4.332)	(-1.083)	(-0.953)	(-0.889)	(-0.751)
CASHMTA			-1.968***	-1.857***	-1.959***	-1.849***
			(-6.836)	(-6.773)	(-6.854)	(-6.790)
MB			0.059***	0.059***	0.058***	0.057***
			(7.90)	(7.85)	(7.69)	(7.65)
PRICE			-0.035***	-0.035***	-0.033***	-0.033***
			(-8.000)	(-8.266)	(-7.704)	(-7.953)
Constant	-6.521***	-6.564***	-5.431***	-5.497***	-5.404***	-5.471***
	(-62.541)	(-62.963)	(-51.946)	(-53.091)	(-51.771)	(-52.922)
N	87,427	87,427	87,427	87,427	87,427	87,427

Table 3: Univariates

The table reports statistics for all variables used in the sample. Panel A reports the statistics for company value, default, and financial characteristics across company type (conglomerates vs. focused companies), and tests for univariate differences. Panel B reports the univariate statistics of the main variables used in the regressions according to 10^{th}, 25^{th}, and 50^{th} percentiles of companies' survival probability, and the statistical t-test of average differences between conglomerates and focused firms for each group. The details of the variables are in Appendix A.2. The sample consists of the intersection of the Compustat, CRSP, and the UCLA- LoPucki Bankruptcy Research Database (BRD) over the years 1980 - 2014. The test difference between conglomerates and focused companies are estimated with an OLS regression, clustered at firm level. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Focused		Conglomerates			
	Mean	Sd	Mean	Sd	Difference	t-stat
	(1)	(2)	(3)	(4)	(5)	(6)
Excess value	0.016	0.674	-0.064	0.651	-0.079***	(-7.026)
Excess PD (estimated)	-0.121	1.217	-0.312	1.358	-0.192***	(-8.169)
Excess PD (CRI)	-0.044	0.728	-0.117	0.771	-0.074***	(-4.741)
Default (Y)	0.019	0.136	0.014	0.119	-0.005***	(-3.552)
Mergers (Y)	0.236	0.425	0.204	0.403	-0.032***	(-6.950)
Survival probability	98.30	3.147	98.34	2.895	0.040	(1.09)
New entries	0.353	0.478	0.216	0.412	-0.137***	(-23.225)
CFCORR	1	0	0.430	0.578	-0.570***	(-73.333)
Leverage	0.210	0.196	0.244	0.175	0.034***	(10.84)
Size	5.198	1.625	6.023	1.935	0.826***	(21.00)
Age	12.929	10.832	20.188	13.163	7.259***	(26.35)
EBITDA	0.116	0.130	0.124	0.099	0.008***	(4.79)
Capex	0.073	0.091	0.069	0.072	-0.003***	(-2.820)
Sales Growth (SG)	0.151	0.273	0.112	0.247	-0.038***	(-16.034)
N	60,943		26,484			

Table 3: Univariates - continued

Panel B: Survival skills quintiles	10%			25%			50%		
	Mean	Sd	Diff	Mean	Sd	Diff.	Mean	Sd	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Excess value	-0.287	0.605	0.020	-0.283	0.600	0.063***	-0.171	0.606	-0.045***
Size	5.191	1.695	0.713***	5.204	1.755	0.573***	5.184	1.666	0.630***
Age	14.617	10.534	4.439***	15.081	11.071	3.596***	15.577	11.423	5.889***
EBITDA	0.034	0.129	0.016***	0.074	0.111	0.021***	0.103	0.113	0.012***
Capex	0.059	0.081	-0.005***	0.067	0.086	-0.004*	0.071	0.086	-0.004**
Sales Growth (SG)	0.049	0.275	-0.011**	0.104	0.269	-0.001	0.130	0.261	-0.024***
Dividend ratio	0.004	0.014	0.003***	0.006	0.017	0.001**	0.009	0.021	0.003***
Leverage	0.431	0.195	0.005	0.341	0.181	-0.004	0.247	0.171	0.020***
N	8,651			13,035			21,851		
Panel C: Excess PD and Value distribution									
	mean	median	sd	p1	p10	p25	p50	max	N
Below median Survival Skills (<p50)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Conglomerate Excess PD	0.574	0.532	0.973	-1.650	-0.624	-0.098	0.532	2.770	13,550
Conglomerate Excess Value	-0.229	-0.244	0.590	-1.390	-0.976	-0.610	-0.244	1.390	13,550
Focused Excess PD	0.612	0.538	0.951	-1.510	-0.544	-0.004	0.538	2.770	30,006
Focused Excess Value	-0.222	-0.189	0.563	-1.390	-0.978	-0.575	-0.189	1.390	30,006
	mean	median	sd	p1	p10	p25	p50	max	N
Above median Survival Skills (>p50)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Conglomerate Excess PD	-1.240	-1.140	1.050	-3.450	-2.760	-1.910	-1.140	2.770	12,934
Conglomerate Excess Value	0.102	0.089	0.581	-1.390	-0.617	-0.256	0.089	1.390	12,934
Focused Excess PD	-0.831	-0.753	1.010	-3.450	-2.190	-1.470	-0.753	2.770	30,937
Focused Excess Value	0.233	0.191	0.609	-1.360	-0.523	-0.125	0.191	1.390	30,937

Table 4: Excess value and default probability: multivariate regression
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 are the excess value and the excess default probability, over the years 1980 - 2014, of conglomerates and focused firms. The excess value is 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 code, for industries including at least five single-segment companies in the year of the analysis. The excess default probability is 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 the average of the values of the segments' PD, the latter being computed by multiplying the segments' sales to the median PD-to-sales multiplier of the single-segment companies in the same industry as the segment unit, attributed by using the narrower SIC code. 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.

	Excess value		Excess default prob. (PD)	
	(1)	(2)	(3)	(4)
Conglomerate	-0.155***	-0.123***	-0.092***	-0.080***
	(-13.694)	(-10.579)	(-5.690)	(-4.843)
Age		-0.102***		-0.041***
		(-14.380)		(-4.167)
Leverage		-0.106***	2.418***	2.410***
		(-3.902)	(62.47)	(62.39)
Assets	0.080***	0.094***	-0.233***	-0.228***
	(21.35)	(23.31)	(-37.780)	(-36.805)
CAPEX	0.180***	0.237***	-0.629***	-0.610***
	(3.86)	(5.07)	(-9.492)	(-9.170)
Sales growth	0.404***	0.345***	-0.184***	-0.208***
	(32.51)	(27.69)	(-10.820)	(-12.128)
Dividends	1.392***	1.437***	-2.678***	-2.623***
	(6.33)	(6.36)	(-8.593)	(-8.487)
EBITDA			-1.433***	-1.435***
			(-19.326)	(-19.390)
NITA			-1.257***	-1.244***
			(-23.341)	(-23.161)
CACL			-0.130***	-0.132***
			(-33.047)	(-33.152)
p-value (t-test)	(0.000)	(0.000)	(0.000)	(0.000)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj-R2	0.085	0.097	0.393	0.393
N	87,427	87,427	87,427	87,427

Table 5: Excess value and excess default probability: quantile regression

The table reports the estimates, over the years 1980 - 2014, of the following equation:

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

The dependent variable is the excess value. The excess value is 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 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of companies' excess default probability. We compute the default probability as in Cambpell et al. (2008). The model controls for a vector of company characteristics used throughout, including year and industry fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Dep Var: ExcessValue			
Excess Default Probability:	p(10) (1)	p(25) (2)	p(50) (3)	p(100) (4)
Conglomerate	-0.151***	-0.143***	-0.126***	-0.085***
	(-5.206)	(-7.545)	(-8.431)	(-7.200)
Low survival (PD>p50)	-0.424***	-0.308***	-0.362***	-0.489***
	(-7.997)	(-14.984)	(-29.034)	(-42.957)
Age	-0.118***	-0.104***	-0.105***	-0.081***
	(-6.662)	(-9.210)	(-11.828)	(-11.350)
Controls	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-squared	0.156	0.124	0.138	0.194
N	8,758	13,110	22,002	43,557

Table 6: The contagion premium of low survival conglomerate firms
The table reports the results of the estimation of the following equation:

$$y_{i,t} = \alpha + \beta_1\, Conglomerate_{it} + \beta_2\, lowsurvival_{it} + \beta_3\, Conglomerate_{it} \times lowsurvival_{it} + \Gamma X_{i,t-1} + \varepsilon_t\ ,$$

where the dependent variable are the excess value of conglomerates and focused firms, over the years 1980 - 2014. The excess value is 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 code, for industries including at least five single-segment companies in the year of the analysis. The variable "conglomerate" is an indicator variable equal to one if the company is multi-segments. The variable "low survival" is an indicator variable equal to one for firms with a survival rate below the median of the year. In column (3), we also control for additional firm events: firms involved in M&A, whether the firm is a new entry firm, or firms that exits the sample for unspecified reasons. 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	(1)	(2)	(3)
Conglomerate	-0.123***	-0.180***	-0.180***
	(-10.579)	(-2.473)	(-11.987)
Conglomerate× low survival		0.151***	0.152***
		(9.31)	(9.44)
Low survival		-0.599***	-0.592***
		(-58.393)	(-58.190)
M&A (Y)			0.019**
			(2.56)
New entry firm			0.067***
			(9.69)
Exit firm			-0.059***
			(-4.828)
Age	-0.102***	-0.094***	-0.081***
	(-14.380)	(-14.704)	(-12.302)
Leverage	-0.106***	0.618***	0.616***
	(-3.902)	(22.41)	(22.40)
Firm controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adj-R2	0.085	0.205	0.208
N	87,427	87,427	87,427

Table 7: Excess value at the ex-ante stage of conglomerate formation
The table reports the results of the estimation of the following equation:

$$y_{i,t} = \alpha + \beta\, treated_i + \beta_1\, treated_i \times after_t + \Gamma X_{i,t-1} + \varepsilon_t$$

where the dependent variable is the excess value of treated and control groups. The treated group is composed by firms that change their status from focused to conglomerate firms (multisegment firms), while focused firms compose the control group. We estimate the difference-in-difference regression as in Villalonga (2006b) over a window of one year before/after the change. The excess value is 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 code, for industries including at least five single-segment companies in the year of the analysis. The model controls for a vector of company characteristics used throughout, including year and firm 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	(1)	(2)	(3)	(4)
Switch status×after	0.012	0.001	0.010	-0.002
	(0.437)	(0.025)	(0.320)	(-0.048)
Switch status×after×low survival			-0.004	0.016
			(-0.060)	(0.234)
Switch status×low survival			-0.015	-0.008
			(-0.217)	(-0.121)
Low survival×after			0.010	-0.011
			(0.350)	(-0.374)
Treated	-0.048	-0.041	-0.020	-0.004
	(-1.462)	(-1.281)	(-0.343)	(-0.068)
Low survival			-0.340***	-0.345***
			(-10.650)	(-11.178)
Propensity score model	Reduced	Enhanced	Reduced	Enhanced
Firm Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj-R2	0.094	0.092	0.139	0.141
N	30,554	30,516	30,441	30,441

Table 8: Excess value and default probability of conglomerate firms: Fixed effects - 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 are the excess value (columns (1)-(2), and (5)-(8), and the excess default probability (columns (3)-(4)), over the years 1980 - 2014, of conglomerates and focused firms. In columns (5)-(8), the model is performed on four subsamples split according to the 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of companies' survival probability. We define the survival probability as 1 minus one-year-ahead default probability computed according to Cambpell et al. (2008). The excess value is 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 code, for industries including at least five single-segment companies. The excess default probability is 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 the average of the values of the segments' PD, the latter being computed by multiplying the segments' sales to the median PD-to-sales multiplier of the single-segment companies in the same industry as the segment unit, attributed by using the narrower SIC code. 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 used throughout, including year and firm 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

					Excess value Survival probability			
	Excess value		Excess PD		p(10)	p(25)	p(50)	p(100)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conglomerate	-0.111***	-0.093***	-0.041*	-0.053**	-0.068*	-0.083***	-0.085***	-0.091***
	(-8.732)	(-7.369)	(-1.906)	(-2.418)	(-1.760)	(-2.933)	(-3.844)	(-4.583)
Age		-0.279***		0.198***	-0.120**	-0.082**	-0.192***	-0.292***
		(-20.627)		(8.40)	(-2.363)	(-2.341)	(-7.258)	(-14.713)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj-R2	0.590	0.602	0.607	0.609	0.731	0.708	0.668	0.590
N	87,427	87,427	87,427	87,427	8,683	13,030	21,843	43,871

Table 9: Conglomerate Discount by survival probability-robustness

The table reports of the following equation:

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

where the dependent variables is the excess value over the years 1980 - 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 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of companies' survival probability as computed in 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(10)	p(25)	p(50)	p(100)
	(1)	(2)	(3)	(4)	(5)	(6)
Conglomerate	-0.185***	-0.144***	-0.037	-0.092***	-0.079***	-0.125***
	(-8.328)	(-6.427)	(-1.119)	(-3.196)	(-3.365)	(-5.190)
Age		-0.138***	-0.080***	-0.100***	-0.134***	-0.200***
		(-9.924)	(-3.914)	(-5.619)	(-9.357)	(-14.037)
Firm controls	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj-R2	0.124	0.143	0.190	0.163	0.148	0.135
N	27,327	27,327	3,748	5,616	10,960	18,656

Table 10: Excess value and excess pd by leverage groups

The table reports of the following equation:

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

where the dependent variables is the excess value (columns 1-4), and the excess default probability (columns 5-8), over the years 1980 - 2014, computed within leverage quintiles. The excess value is 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 code, for industries including at least five single-segment companies in the year of the analysis. 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 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of the company leverage. The model controls for a vector of company characteristics used throughout, including year and industry fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Dep Var: ExcessValue				Dep Var: Excess Default PD			
Leverage Distribution:	p(10) (1)	p(25) (2)	p(50) (3)	p(100) (4)	p(10) (5)	p(25) (6)	p(50) (7)	p(100) (8)
Conglomerate	-0.142***	-0.131***	-0.121***	-0.086***	-0.226***	-0.209***	-0.170***	0.007
	(-4.440)	(-4.697)	(-6.578)	(-6.599)	(-5.482)	(-5.436)	(-6.360)	(0.32)
Age	-0.149***	-0.179***	-0.094***	-0.066***	-0.051**	0.001	-0.060***	-0.048***
	(-7.673)	(-10.659)	(-7.857)	(-8.515)	(-2.133)	(0.040)	(-3.598)	(-3.756)
Chi2				2.76				25.95
Prob > chi2				0.096				0.000
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.156	0.146	0.092	0.122	0.379	0.326	0.336	0.344
N	12,545	9,375	21,850	43,657	12,545	9,375	21,850	43,657

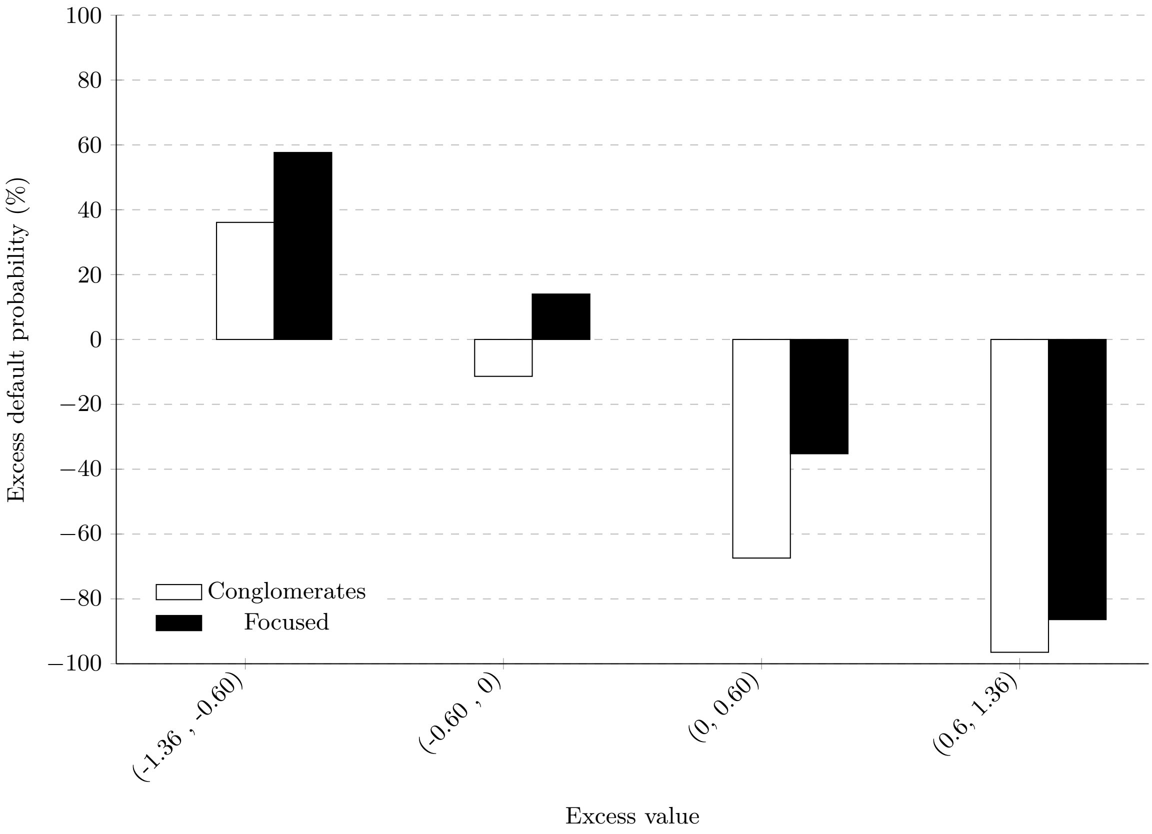

Figure 1: Excess default probability by excess values categories
This figure reports the excess probability of default of conglomerates and focused companies for different intervals of the excess value. The excess value is the natural logarithm of the ratio between a company's market value and its imputed 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 company PD is computed following Cambpell et al (2008), as reported in Table 2. The imputed PD is the average of the values of the segments' PD, the latter being computed by multiplying the segments' sales to the median PD-to-sales multiplier of the single-segment companies in the same industry as the segment unit. We retrieve information on company bankruptcy from Compustat North America database, CRSP, and UCLA- LoPucki Bankruptcy Research Database (BRD). The sample period goes from 1980 to 2014.

B Proofs and Extensions

B.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 in the main text;

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

$$R_C < R_A + R_B \tag{B.1}$$

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

$$X_B \geq D_B p_B^{-1} \tag{B.2}$$

In state $\{LH\}$, unit B is unable to rescue unit A. Since conglomerate lenders require a lower interest rate than focused 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

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

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:

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

b. We need to prove that $R_C < R_A + R_B$, that is:

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

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

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

$$p_B^2(1 - p_A)X_B > D_B p_B - D_B p_A$$

$$X_B > D_B(p_B - p_A)[p_B^2(1 - p_A)]^{-1} \equiv X_B^* \,.$$

This inequality always holds because X_B, by (Equation (B.2)), exceeds $D_B p_B^{-1}$ which in turn exceeds X_B^*:

$$D_B(p_B - p_A)[p_B^2(1 - p_A)]^{-1} < D_B p_B^{-1}$$

$$(p_B - p_A)[p_B(1 - p_A)]^{-1} < 1$$

$$p_B - p_A < p_B(1 - p_A)$$

$$p_A > p_A p_B \,,$$

since $p_B < 1$ holds by assumption.

Proposition 1: *ex-ante* company value

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

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

which proves Equation (4) in the paper since $p_A^{Sur} = p_A$ and $p_B^{Sur} = p_B$. In turn, conglomerate expected profit is equal to

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

where $p_C^{Sur} = p_A$.

Proposition 2: the expected value of survivors

In order to determine the average market price of a surviving company, MV_i, at the interim stage, we need to know which companies belong to the sample in each state. Let us start with focused units. The probability of state $\{H\}$, when a focused company is alive, is equal to one because in other state it would have gone bankrupt. It follows that the average stock price of a focused company, when it is alive, is equal to the cash flow realizations net of the debt repayment state $\{H\}$; that is:

$$MV_i = X_i + K_i - R_i = \pi_i (p_i^{Sur})^{-1} + K_i \,. \tag{B.7}$$

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

$$MV_F = \pi_A (p_A^{Sur})^{-1} + K_A + \pi_B (p_B^{Sur})^{-1} + K_B \,. \tag{B.8}$$

We similarly determine the average value of a surviving conglomerate. C survives in both state HH and in state HL. Therefore, the probability of state $\{HH\}$, when a conglomerate is alive, is lower than one:

$Pr(HH)/[Pr(HH) + Pr(HL)] = p_A p_B [p_A p_B + (1 - p_B) p_A]^{-1}$, which simplifies to p_B.

In turn, the probability of state $\{HL\}$, when the conglomerate is alive, (i.e., $Pr(HL)/[Pr(HH)+Pr(HL)]$), is equal to $(1 - p_B)$. Thus, the average market value of a surviving conglomerate will be a weighted average of the profits in those two states:

$$\begin{aligned} MV_C &= p_B(X_A + K_A + X_B + K_B - R_C) + (1 - p_B)(X_A + K_A + K_B - R_C) = \\ &= (\pi_A + \pi_B)(p_C^{Sur})^{-1} + K_A + K_B \,. \end{aligned} \tag{B.9}$$

This expression captures another way of thinking about the survivorship bias for conglomerates: they survive also through adverse states of the world thanks to coinsurance. Appropriately combining Equations (4) and (5) in the paper proves the proposition.

Proposition 3: the Survival Discount and the Contagion Premium

To prove part (a), we determine the difference in the expected value of survivors of different types.Subtracting (B.8) from (B.9) delivers the conglomerate excess value relative to focused companies:

$$\begin{aligned} MV_C - MV_F &= (\pi_A + \pi_B)(p_C^{Sur})^{-1} + K_A + K_B + \\ &\quad - \pi_A (p_A^{Sur})^{-1} - K_A - \pi_B (p_B^{Sur})^{-1} - K_B = \\ &= \pi_A[(p_C^{Sur})^{-1} - (p_A^{Sur})^{-1}] + \pi_B[(p_C^{Sur})^{-1} - (p_B^{Sur})^{-1}] = \\ &= (p_B X_B - D_B)[p_A^{-1} - p_B^{-1}] \,, \end{aligned} \tag{B.10}$$

since $p_C^{Sur} = p_A^{Sur} = p_A$. The term in the first parenthesis is positive by assumption, hence the sign of the excess value is negative if and only if $p_A > p_B$. This condition ensures that coinsurance more than offsets contagion in conglomerates, leading to a higher probability of survival in conglomerates than in a combination of focused units.

To prove part (b), we just need to appropriately combine Equations (4), and (5) in the paper, as follows:

$$V_C - V_F = (p_C^{Sur} - p_B^{Sur}) K_B, \tag{B.11}$$

This shows that the *ex-ante* expected excess value of conglomerates is an increasing function of their relative survival ability, if bankruptcy costs, K_B, are positive. On the contrary, the expected excess value of surviving conglomerates is a decreasing function of their relative survival ability, irrespective of bankruptcy costs (see Equations (B.10). Therefore, the larger the *ex-ante* premium of a company type due to its excess survival, the larger its discount due to the survivorship bias will be.

B.2 Model with Mutual Supports

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 company type, 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 $p_C^{Sur} = (p_A^H + p_B^H - p_A^H p_B^H +$

$p_A^M p_B^M$).

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

$$R_i = D_i(p_i^M + p_i^H)^{-1} = D_i(p_i^{Sur})^{-1} \tag{B.12}$$

for a focused,

$$\begin{aligned} R_C &= (D_A + D_B - p_A^M p_B^L X_A^M - p_A^L p_B^M X_B^M)(p_A^H + p_B^H - p_A^H p_B^H + p_A^M p_B^M)^{-1} \\ &= (D_A + D_B - p_A^M p_B^L X_A^M - p_A^L p_B^M X_B^M)(p_C^{Sur})^{-1} \end{aligned} \tag{B.13}$$

for a conglomerate. As before, we can show that the following inequality holds:

$$R_C < R_A + R_B\,. \tag{B.14}$$

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 (4)-(5) in the paper), stock price definitions (Equations (B.7)-(B.9)), 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 company type.

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.

C Further Empirical Tests

Until now, we have used the conglomerate dummy to capture industry diversification. 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 coinsurance degree across segment units. We, therefore, estimate our main regression with those diversification measures, and we drop from the sample fake conglomerate firms, that is, firms operating in the same industry but with multiple segments. We identify segment industries at the four-digit SIC level. We compute the coinsurance measure as one minus the segments' cash flow correlation, the latter computed following:

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

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 five-year period before year t. A high correlation coefficient between segment cash flows is a proxy for lower coinsurance across divisions with focused firms, at the maximum level having a correlation equal to one and zero coinsurance. The results are in Table B.1.

In columns (1)-(4), we estimate different specifications where our dependent variable is the excess value while, in columns (5)-(8), we estimate the same specification on the excess default probability. The results confirm a negative correlation between each measure of diversification and both the excess value and the excess default probability.[17] Finally, our results hold when using different clustering (not reported in the tables), including industry (three-digit SIC codes), industry-year, and firm-year clustering. Overall, the robustness section confirms the existence of a survivorship bias that reduces the excess value of conglomerate firms relative to focused industry peers, consistent with Proposition 3a.

In order to show how excess value changes when changing excess default probability in a separate estimation, we regress company excess value and excess default probability on four sub-samples divided according to 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of company survival probability, as in:

$$y_{i,t} = \alpha + \beta Conglomerate_{it} + \Gamma X_{i,t-1} + \varepsilon_t \,, \tag{C.2}$$

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

where $X_{i,t-1}$ is a vector of controls including company characteristics and year fixed effects (as in Villalonga [2004b] and many others). The coefficients of the conglomerate dummy measures the benchmark discount and the benchmark excess default probability of conglomerate companies. Table 2 reports the results of this quantile regression. Conglomerates in the lowest quintile of survival probability show close to no value discount (2%, not statistically different from zero) when compared to their focused peers (Column [1]), but much higher default probability (see the conglomerate dummy coefficient equal to 0.27 in the excess default probability regression in column 5). On the contrary, conglomerates with higher survival skills experience a 12% discount with respect to their focused industry peers (Column [4]), but lower default probability than them (-0.28). The table also reports the test for the difference in the coefficient between columns (1) and (4), and columns (5) and (8). These tests confirm that firms closer to distress have a significantly lower discount compared to firms with better survival probabilities.

C.1 Propensity to diversify

In this section, we report the details of the estimation of the propensity to diversity by using different models (baseline and enhanced), for the difference-in-difference propensity score matching estimation, where the treated firms are those that switch from focused to conglomerate, and the control firms are focused firms that never change their status. The models are based on Villalonga (2004b, which uses two sets of controls: a set of standard controls that includes firms' assets, EBITDA, CAPEX, industry q and lagged industry-adjusted q, and an enhanced set of controls that also includes firm age, R&D intensity, dummies for major exchange, S&P index inclusion, and firm foreign incorporation.

Variables are defined as follows. EBIT is the ratio of company Earnings to company sales. CAPEX are the firm capital expenditures scaled by firm total sales. The Industry (and Industry-adjusted) q are computed as the median of all focused companies industry tobin q, computed in the same 3 digits SIC Code. The variables S&P, Major Exchange, and Foreign incorporation are indicator variable equal to one when the firm belongs to the S&P index of to a major exchange (NASDAQ, NYSE or AMEX), or the firm has a foreign incorporation. We also control for the firm expenses in research and development (RD, scaled by total assets), and for the fraction of firms that are conglomerate in the same industry (three digits SIC code), and their sales.

The estimation is a propensity score model where the dependent variable is an indicator variable equal to one for firms propensity to diversify, zero otherwise. All models include year effects. The sample of firms switching from standalone to conglomerates compose the treated sample, while standalone firms compose the control sample. The firms are observed one year before and after the switching, and matched according to the variables reported in Table 3, Columns (1) and (2). In columns (3) and (4), we report the estimates from Villalonga (2004b) for comparison purposes.

Specifically, the results confirm that big firms are more prone to diversification, which is the main variable that drives the decision to diversify. Similar to Villalong(2004b), CAPEX has a negative effect on diversification, which confirms the past findings of diversifying firms invetsing less than focused firms in normal times (Glaser et al. (2013), Rajan et al. (2000)). While the industry Tobin-q is negative in the baseline model, it turns insignificant in the augmented model, while is positive and statistically significant in the sample of Villalonga (2004b). This result may reflect the conflicting evidence about the relationship between firms investment and firm market value that has been documented in some works which show that, as investments are positively related to the discrepancy between the market value of installed capital and its replacement cost (Anderson and Garcia-Feijoo, 2006), controlling for the value of firms becomes redundant once the investment factor is added (Fama and French (2015)).

Overall, our results confirm the main drivers for the deciison to diversify as found from past researchers: the presence of economies of scale, and the firms being mature with less investment opportunity pushing the firms to invest in alternative industries.

Table 1: Excess value and measures of diversification

The table reports the estimates of the following equation:

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

where the dependent variable is the excess value, and the excess default probability, when we drop from the sample fake conglomerate firms, that is, firms operating in the same industry with multiple segments. The excess value is 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. The excess default probability is 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 the average of the values of the segments' PD, the latter being computed by multiplying the segments' sales to the median PD-to-sales multiplier of the single-segment companies in the same industry as the segment unit, attributed by using the narrower SIC code. We use different proxies for the variable diversification: the number of segments, the coinsurance across segments (one minus the segment cash-flow correlation), and the number of three digits SIC code industries in which the firm is operating. The model controls for the vector of company characteristics used throughout, including year and industry fixed effects. The sample include all non-financial, and non-utility firms, over the years 1980-2014. In all specifications, the standard errors are clustered at firm level. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Table B.1 - continued

Dep. Var.: Excess Value	All sample				Excess default probability			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conglomerate	-0.106***				-0.0816**			
	(-7.45)				(-3.28)			
Num. Segments(ln)		-0.116***			-0.0668**			
		(-8.95)				(-2.82)		
Coinsurance			-0.0564***				-0.0587**	
			(-5.05)				(-2.89)	
Num. industries (ln)				-0.0560***				-0.0399**
				(-8.56)				(-3.10)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	78073	78073	78073	78073	78073	78073	78073	78073
R^2	0.096	0.098	0.094	0.097	0.204	0.204	0.204	0.204

Table 2: Excess value and excess default probability: quantile regression

The table reports the estimates, over the years 1980 - 2014, of the following equation:

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

The dependent variables are the excess value and the excess default probability within survival probability quintiles. The excess value is 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 10^{th}, 25^{th}, 50^{th}, and 100^{th} percentiles of companies' survival probability. We define the survival probability as 1 minus one-year-ahead default probability, computed according to the model in Cambpell et al. (2008). The model controls for a vector of company characteristics used throughout, including year and industry fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

Panel A	Dep Var: ExcessValue				Dep Var: Excess Default PD			
Survival quintiles:	p(10)	p(25)	p(50)	p(100)	p(10)	p(25)	p(50)	p(100)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Conglomerate	-0.024	-0.047***	-0.070***	-0.123***	0.274***	0.091***	-0.094***	-0.278***
	(-1.305)	(-3.137)	(-5.206)	(-7.819)	(10.45)	(4.64)	(-5.480)	(-13.724)
Age	-0.040***	-0.028***	-0.062***	-0.126***	0.014	0.000	-0.002	-0.030**
	(-3.235)	(-3.151)	(-7.644)	(-13.723)	(0.85)	(0.04)	(-0.199)	(-2.539)
Chi2				11.77				26.50
Prob > chi2				0.000				0.000
Controls	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes		Yes	Yes	Yes
R-squared	0.320	0.287	0.205	0.094	0.230	0.187	0.163	0.236
N	8,683	13,062	21,870	43,871	8,683	13,062	21,870	43,871

Table 3: Propensity to diversify

This table reports the propensity score estimation on the subsample of firms that change their status from single to multiple segment firms. The dependent variable is the variable "treated", an indicator variable equal to one if the company change status from single to multi-segment firms, zero for focused firms. Columns (1)-(2) report the probit estimates from two different models for the propensity to diversify of the firms in our sample. The sample in columns (1) and (2) includes all the firms that change their status from one to multiple segment with data one year before, and one year after the change of status, plus focused firms, over the years 1980 - 2014. for comparison purposes, in columns (3)-(4) we report the same models estimates from Villalonga (2004b) on a sample period ranging from 1976 to 1997. The model controls for a vector of company and industry characteristics (listed in the table), including year fixed effects. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels.

	Model 1 (1)	Model2 (2)	Model 1(V) (3)	Model 2 (V) (4)
Log of assets	0.299***	0.209***	0.132***	0.223***
	(13.316)	(7.599)	(6.640)	(6.370)
EBIT/sales	0.277	0.352	-1.163***	-1.910***
	(1.076)	(1.042)	(-2.630)	(-3.190)
Capex/sales	-0.161***	-0.101**	-0.145	-0.133
	(-3.435)	(-1.989)	(0.680)	(-0.470)
Industry q (t-1)	-0.093***	-0.060	0.079***	0.108***
	(-2.626)	(-1.456)	(2.820)	(3.450)
Industry-adjusted q (t-1)	-0.063*	-0.030	-0.092	0.045
	(-1.854)	(-0.824)	(-1.650)	(0.810)
S&P		0.034		-0.196
		(0.337)		(-1.400)
Major exchange		0.000		-0.070
		(0.098)		(-0.066)
Dividends paid		0.100		-0.283
		(0.747)		(-1.240)
Foreign incorporation		-0.475		0.026
		(-0.224)		(0.280)
RD/assets		-0.130		2.301*
		(-0.195)		(1.800)
Log of age		0.552***		0.003
		(11.262)		(0.030)
Fraction diversified firms in the industry		0.268		1.098***
		(0.869)		(4.120)
Fraction sales of diversified firms in the industry		-0.077		0.44***
		(-0.346)		(2.120)
Year FE	Yes	Yes	Yes	Yes
Pseudo R-squared	0.098	0.128	0.030	0.100
N	27,695	27,695	24,689	22,527