Trade Receivables Policy of Distressed Firms and Its Effect on the Costs of Financial Distress

Carlos A. Molina and Lorenzo A. Preve*

This paper studies the trade receivables policy of distressed firms as the trade-off between the firm's willingness to gain sales and the firm's need for cash. We find that firms increase trade receivables when they have profitability problems, but reduce trade receivables when they have cash flow problems. We also find that a firm that significantly cuts its trade receivables when in financial distress will experience an additional drop of at least 13% in sales and stock returns over the previously documented 20% average drop for financially troubled firms. Moreover, the performance decline of a firm in financial distress is significantly higher if the firm cuts trade receivables than if it does not.

Trade receivables are a large part of firms' assets. Mian and Smith (1992) report that 21% of the total assets of US manufacturing firms in 1986 were invested in financing clients. Deloof (2003) documents that 17% of the total assets of Belgian firms in 1997 were account receivables. The management of trade receivables, given its importance for firms' assets, has the potential to play an important role when firms encounter financial problems. Previous studies have focused on the estimation of the costs of financial distress (Altman, 1984; Alderson and Betker, 1995; Andrade and Kaplan, 1998; Molina, 2005), in some cases explicitly recognizing the importance of the relations with clients for capital structure decisions and for the costs of financial distress (Titman, 1984; Opler and Titman, 1994). One question that has not been considered before, however, is how troubled firms, and the costs of their financial distress, may be affected by their trade receivables policy.

In this paper, we address two questions. First, we study the trade receivables policy of a firm in financial distress as the trade-off between the firm's willingness to gain sales by financing its clients' purchases and the firm's need for cash. Second, we measure the effect of suboptimal trade receivables investment policies on the costs of financial distress. Financing clients via trade receivables can be seen as a short-term investment to capture clients, and we know that firms in

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[*]Carlos A. Molina is a Professor of Finance at Instituto de Estudios Superiores de la Empresa (IESA), in Caracas, Venezuela. Lorenzo A. Preve is a Professor of Finance at IAE Business School, Universidad Austral in Buenos Aires, Argentina.

financial distress are expected to underinvest.[1] Consistent with this intuition, Mian and Smith (1992) find that firms with lower bond ratings increase the use of factoring to manage their accounts receivables, suggesting that they are willing to collect their receivables faster as the quality of their ratings decreases. In contrast, Petersen and Rajan (1997) find that firms whose sales drop and firms with negative profits increase trade receivables to their clients. They argue that this increase might be due to a voluntary attempt to gain market share and sales or to an unwanted increase in receivables given the impaired ability of troubled firms to enforce the timely collection of their commercial credit. If this last interpretation is correct, the increase in receivables could be considered a cost of financial distress. Trying to buy market share by extending additional financing to clients may seem appealing to a troubled firm, as Petersen and Rajan (1997) suggest, but this strategy can be very costly, especially for those firms whose access to financial credit is severely curtailed.

To reconcile these two seemingly contradictory views, we explore the nature of the financial distress problem in greater detail by defining it in two different stages: 1) firms facing profitability problems, usually at the prefinancial distress stage and 2) firms facing cash flow problems, usually in full-blown financial distress. We study and compare the trade receivables policy of firms in both groups. We argue that firms facing profitability problems may attempt to apply an aggressive credit policy to clients in order to gain market share, especially if they have the market power to do so without incurring significant sales losses. Firms facing cash flow problems, however, should try to decrease their investment in clients' credit in order to get cash, especially if they can afford to do so without relinquishing an excess of their sales volume to their competitors.

Our results suggest that firms: 1) tend to increase the use of trade receivables when they start facing profitability problems, usually in a prefinancial distress situation and 2) provide fewer trade receivables to their clients when they face cash flow problems and enter full financial distress. Our results support the hypothesis that firms might try to buy market share when they face profitability problems but cut their trade receivables in an attempt to get cash when they experience serious cash flow problems.

However, it would seem that only firms that can exert market power are likely to succeed in buying market share by increasing trade receivables and obtaining cash by reducing the terms of trade receivables without paying a large penalty in terms of a sales drop. Therefore, firms in competitive industries may find it difficult to pursue either of the two strategies in a cost-effective manner.[2] Supporting this hypothesis, we find that firms in concentrated industries, which are assumed to have higher market power, tend to show a larger effect of financial distress on trade receivables; they show larger increases in trade receivables when facing profitability problems, and larger reductions in trade receivables when facing cash flow problems in financial distress.

We also study the effect that a decrease in trade receivables has on the performance of firms in financial distress. Our results are consistent with the drop in performance for firms in financial distress documented in the literature, but we add to this body of knowledge by demonstrating that the drop is significantly larger when there is a reduction in trade receivables. A firm that

[1]The underinvestment problem, as originally described by Myers (1977), arises when a firm's existing debt load causes it to pass up profitable investments because borrowing is too costly or impossible.

[2]Industry competition has been traditionally related to the environmental pressure imposed on a firm's decisions (Leibenstein, 1966). Schmalensee (1989) finds a positive, strong relationship between industry concentration and intraindustry profitability dispersion. Almazan and Molina (2005) find that firms in more concentrated industries present more differences in their capital structure.

experiences financial distress will have a drop in sales of about 20% to 28%, but if the firm decreases its trade receivables by an amount larger than the 10th percentile of the sample, sales will drop an extra 13% to 20%. In other words, decreases in trade receivables account for at least one-third of the drop in performance of firms in financial distress.

To complement the previous analysis, and overcome potential fears about a structural endogeneity, we use a setting very similar to the one used by Opler and Titman (1994). We also examine the additional costs of financial distress for firms with high leverage that, following an industry downturn, decrease their trade receivables. Our findings support the idea that trade receivables management is important for financially troubled firms. Highly leveraged firms in situations of economic distress experience a significantly higher drop in sales if they cut their trade receivables.

This paper contributes to the financial distress literature in at least two ways. First, we assess the trade receivables policy of troubled firms, which helps to explain the role that trade receivables play when firms are in financial trouble. Second, we explicitly provide an estimate for the cost of decreasing the investment in trade receivables when firms face financial distress.

The paper proceeds as follows. Section I describes the data sample. Section II explains the empirical strategy and studies the trade receivables policy of firms in financial distress. Section III discusses the importance of the industry structure. Section IV analyzes the trade receivables policy of firms in predistress circumstances. Section V revises the effect of cutting trade receivables on the costs of financial distress. Section VI presents the concluding remarks.

I. Data

The sample considers firms in Compustat for which trade receivables data are available for the 1978-2000 period. We drop all firms with net sales lower than $5 million, firms that do not report positive cost of goods sold, and firms with total assets lower than $10 million. We also discard all companies in the banking, insurance, real estate, and trading industries (Standard Industrial Classification [SIC] codes between 6000 and 6999), and the nonclassifiable establishments (SIC between 9995 and 9999). Additionally, we drop all the firms in the services industries according to the Fama and French (1997) classification (SIC between 7000 and 8999).[3] The total number of firm-year observations for which our dependent variable is not missing from 1978 to 2000 is 79,926; obviously, missing observations in other variables diminish the number of observations in our regressions. We have been conservative in our approach to removing outliers in order not to affect the evidence of firms in financial distress; we eliminated only the most extreme observations in each variable.[4] Table I presents the descriptive statistics of our data set, reporting the mean, standard deviation, and the 25th, 50th, and 75th percentiles of the main variables used throughout the paper.

Figure 1 plots the yearly mean of the ratio of trade receivables to sales (measured in days) for all the firms in the database from 1978 to 2000. The average number of days that firms finance their clients via trade receivables has grown overall during the 23-year period, but with a high dispersion around the mean.

[3]The financial and service industries eliminated correspond to SIC codes between 6000 and 8999, and Fama and French (1997) industry numbers 7, 11, 33, 44, 45, 46, and 47. For Fama and French's 48 industry classification, see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/.

[4]We alternatively followed Hadi's (1992, 1994) method to treat our outliers with no change on our results.

Table I. Summary Statistics

The sample consists of 60,202 firm-year observations in the base case that includes firms from Compustat that have trade receivable data available for the 1978-2000 period. The data exclude SICs 6000-6999, 7000-8999, and 9995-9999. Here, *Sales* and *Total Assets* are in US$ millions; *TR/Sales* is the ratio of trade receivables over daily sales; *TR/Assets* is the ratio of trade receivables over total assets; *FINDIST* is a dummy variable equal to one if the firm is in financial distress that year, as defined by Asquith, Gertner, and Scharfstein (1990), and zero otherwise; *FDLEV* is a dummy variable that is equal to one if *FINDIST* is one and the firm is in the top two deciles of the industry leverage in a given year, and zero otherwise (Opler and Titman, 1994); *LOSSFD* is a dummy variable equal to one if the firm experienced losses for the last three years in a row (DeAngelo and DeAngelo, 1990); *TrPay/CGS* is the ratio of trade payables to the daily cost of goods sold; *Inventory/CGS* is the ratio of inventories to the daily cost of goods sold; *Leverage* is the ratio of the book value of total debt to book value of debt plus book value of equity. The book value of equity is *Total Assets – Total Liabilities – Preferred Stocks + Deferred Taxes + Convertible Debt;* Δ*Sales* is the growth of sales; *EBITDA/TA* is the ratio of EBITDA to total assets; *Inv/TA* is the ratio of investments to total assets; and *Asset Sales* is the negative asset growth divided by total assets.

	Mean	Percentile 25	Percentile 50	Percentile 75	Standard Deviation
Sales (US$ millions)	1,559.29	48.51	168.29	725.72	6,677.80
Total Assets (US$ millions)	1,712.92	42.89	144.27	699.30	7,717.99
TR/Sales (days)	55.69	34.27	51.95	70.10	39.54
TR/Assets	0.18	0.08	0.16	0.25	0.12
FINDIST	0.11	0.00	0.00	0.00	0.31
FDLEV	0.04	0.00	0.00	0.00	0.19
LOSSFD	0.04	0.00	0.00	0.00	0.19
TrPay/CGS (days)	53.48	25.99	38.79	58.10	64.59
Inventory/CGS (days)	0.25	0.09	0.20	0.33	0.27
Leverage	0.26	0.11	0.25	0.38	0.18
Δ*Sales*	0.22	0.00	0.10	0.23	1.25
EBITDA/TA	0.13	0.09	0.14	0.19	0.11
Inv/TA	0.08	0.04	0.06	0.10	0.07
Asset sales	−0.10%	−0.08%	0.00%	0.01%	0.90%

II. The Effect of Financial Distress on Trade Credit

In this section, we analyze the behavior of firms' trade receivables when they enter financial distress, and consider the hypothesis that troubled firms decrease their investment in trade receivables in an attempt to get cash.

We estimate the following equation to study the effect of financial distress on trade receivables:

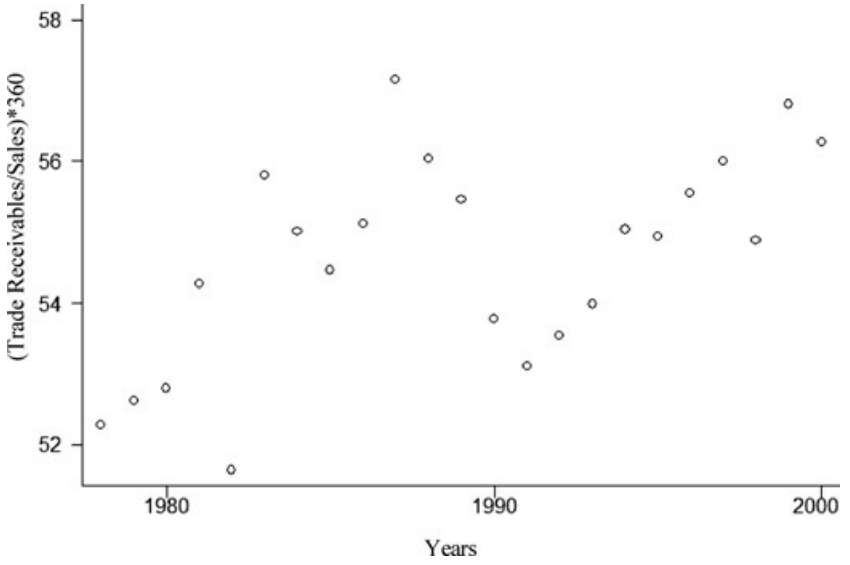
$$(TR/Sales)_{it} = \alpha_i + \beta FD_{it-1} + \gamma X_{it} + \varepsilon_{it}. \quad (1)$$

In this model, *TR/Sales* is the ratio of trade receivables to sales, measured in days, and defined as *TR/Sales* = (*Trade Receivables/Net Sales*) × 360.[5] Here, *FD* is a dummy variable equal to one if the firm is in financial distress in a particular year, and zero otherwise, and *X* is a matrix of controls.

[5]This measure has two implicit assumptions. First, it assumes that all the firms' sales are made on credit, and second, it assumes that sales and trade receivables are not affected by seasonality (i.e., sales are homogenously distributed through the year). The inclusion of firm and industry dummies in our models should alleviate any potential problems regarding these assumptions.

Figure 1. Trade Receivables from 1978 to 2000

This figure shows the evolution of trade receivables from 1978 to 2000. Each dot in the graph represents the average level of trade receivables over daily sales: (*Trade Receivables/Sales*) × 360 for all the firms in the sample every year.



Given the lack of a widely accepted definition of financial distress, we consider three different measures that have been used in the literature. Our first approach, which follows Asquith, Gertner, and Scharfstein (1994), considers a firm to be in financial distress if its coverage ratio (defined as earnings before interest, taxes, depreciation, and amortization [EBITDA]/Interest Expenses) is less than one for two consecutive years or if it is less than 0.8 in any given year. Firms that are classified as being in financial distress are identified with a dummy variable named *FINDIST*.

Although *FINDIST* is one of the most common definitions for financial distress, it can capture firms that fail to meet the specified coverage ratio because: 1) the interest payments are too high and 2) the EBITDA is too low due to poor economic performance, even if the firm is not excessively leveraged. To account for this fact, we also use a second, and seemingly stricter, measure of financial distress that takes into account the leverage of the firm relative to its industry. We use a dummy variable, *FDLEV*, that is equal to one if the firm is both highly leveraged and financially distressed according to our first definition (i.e., *FINDIST* = 1), and zero otherwise. A firm is considered to be highly leveraged when its leverage is in the top two deciles of its industry in a particular year.[6]

We follow DeAngelo and DeAngelo (1990) to build our third definition of financial distress. We use *LOSSFD*, a dummy variable that is equal to one if the firm has three consecutive years of losses, and zero otherwise. More specifically, a firm is considered to be in financial distress in

[6]Following Opler and Titman (1994), we measure leverage as the book value of total debt over the book value of debt plus the book value of equity. The book value of equity is calculated as *Total Assets – Total Liabilities – Preferred Stocks + Deferred Taxes + Convertible Debt*. Other measures of leverage, including one that considers the market value of equity, do not affect the results.

the third year of losses if net profit, the first lag of net profit, and the second lag of net profit are negative. This measure is based on the intuition that a firm with three consecutive years of losses is likely to behave as a financially distressed firm, even in the absence of high leverage.

Our model includes a matrix of control variables: the firm's level of trade credit received from suppliers (i.e., *TrPay/CGS*), the firm's leverage, the lagged firm's sales growth (i.e., $\Delta Sales_{t-1}$), and the level of inventories scaled by costs of goods sold (i.e., *Inventory/CGS*).[7]

We estimate Equation (1) using a fixed effects model.[8] The results are in Table II. Column 1 shows the results using *FINDIST* as the measure of financial distress (our base case), while Columns 2 and 3 present the results obtained using *FDLEV* and *LOSSFD* as measures of financial distress. The coefficients for the financial distress variables are negative and significant in all models, suggesting that firms in financial distress reduce the level of investment in financing their clients via trade receivables. This result is consistent with the hypothesis that firms in financial distress underinvest, possibly in an attempt to get cash that is needed to cope with their situation. Our findings suggest that the decrease in trade receivables ranges between two and three days of net sales.[9]

We find a positive effect of *TrPay/CGS* and leverage on the amount of trade receivables. This result implies that firms with higher levels of trade payables to suppliers or higher levels of financial debt tend to increase the level of trade receivables, creating a redistribution channel in the economy as suggested by Meltzer (1960). In addition, we find a positive effect of *Inventory/CGS* on the level of trade receivables, a result that is consistent with the intuition that firms with high inventory levels have stronger incentives to try to increase sales through investments in trade receivables. We also include a variable to control for the growth of sales between year $t - 1$ and year t, which is meant to capture the potential impact of the market power acquired by a fast-growing firm on its level of trade receivables. The coefficient of this variable has a negative sign, with different levels of significance depending on the definition of financial distress. Given that we use a fixed effects model, most of the time-invariant firm characteristics are already captured by the firm dummies.

We find a negative effect of financial distress on trade receivables and argue that this is due to the urgent cash needs of financially distressed firms. Such a negative relationship could also arise if the distressed firm sells its trade receivables to a factoring company instead of directly reducing its trade receivables. When the distressed firm sells its trade receivables through factoring, the firm drops the trade receivables from its balance sheet in exchange for cash from the factoring company.[10] If a firm in financial distress sells its trade receivables to a factoring company, the effect on its balance sheet and need for cash is the same as if the firm directly cuts its credit to clients. In the end, the relation between financial distress and trade receivables will be the

[7]The inclusion of the trade payables variable is important since both Atanasova (2007) and Molina and Preve (2007) report an increase of trade credit financing from suppliers for financially constrained firms.

[8]Additionally, we used a pooled ordinary least squares (OLS) model with Fama and French (1997) industry and year dummies. The standard errors in these models are White's (1980) heteroskedasticity consistent, and clustered by firm in the pooled OLS model to allow for an unspecified correlation between observations of the same firm in different years. These regressions, not reported in this paper, show very similar results.

[9]If financially distressed firms are also in Chapter 11 bankruptcy, and are entitled to use debtor-in-possession financing (DIP), they will be more likely to increase the offer of trade receivables to their clients. The effect of DIP works in an opposite direction to the negative relationship between financial distress and trade receivables. Therefore, it would only decrease the strength of our results. See Carapeto (2003) for a more detailed explanation of DIP.

[10]The factoring referred to here is factoring without recourse. In the case of factoring with recourse, the trade receivable remains on the firm's balance sheet and the firm registers a new debt with the factoring company, potentially provoking a bias that would weaken our results. See Smith and Schnucker (1994) for a more detailed description of factoring.

Table II. The Effect of Financial Distress on Trade Receivables

This table presents firm fixed effects regressions that consider *TR/Sales*, measured as the ratio of trade receivables over daily sales, as the dependent variable. Here, $FINDIST_{t-1}$ is a dummy variable equal to one if the firm was in financial distress a year earlier, as defined by Asquith, Gertner, and Scharfstein (1994); *FDLEV* is a dummy variable that is equal to one if *FINDIST* is one and the firm is in the top two deciles of the industry leverage in a given year, and zero otherwise (Opler and Titman, 1994); $LOSSFD_{t-1}$ is a dummy variable equal to one if the firm experienced losses for three years in a row up to one year ago (DeAngelo and DeAngelo, 1990); *TrPay/CGS* is the ratio of trade payables to the daily cost of goods sold; *Leverage* is the ratio of the book value of total debt to book value of debt plus book value of equity. The book value of equity is *Total Assets – Total Liabilities – Preferred Stocks + Deferred Taxes + Convertible Debt*; $\Delta Sales_{t-1}$ is the lagged growth of sales; and *Inventory/CGS* is the ratio of inventories to the daily cost of goods sold. All regressions include a constant, whose coefficients are not reported to save space. Absolute *t*-values are in parentheses below each coefficient.

Dep. Var.	*TR/Sales* (1)	*TR/Sales* (2)	*TR/Sales* (3)
$FINDIST_{t-1}$	−1.93***		
	(5.69)		
$FDLEV_{t-1}$		−3.18***	
		(6.41)	
$LOSSFD_{t-1}$			−2.11***
			(3.85)
TrPay/CGS	0.15***	0.15***	0.16***
	(60.64)	(59.22)	(59.09)
Leverage	21.06***	21.34***	22.75***
	(25.23)	(25.44)	(25.03)
$\Delta Sales_{t-1}$	−0.14*	−0.13	−1.04***
	(1.73)	(1.55)	(5.12)
Inventory/CGS	18.78***	18.87***	19.33***
	(25.17)	(25.38)	(23.43)
Observations	60,202	60,168	51,340
Number of firms	8,055	8,052	6,740
R^2	0.10	0.10	0.12

***Significant at the 0.01 level.
*Significant at the 0.10 level.

same whether the firm uses factoring to collect the receivables faster or directly reduces credit to clients.[11]

The results in this section suggest a forced reduction of the investment in trade receivables for firms in financial distress. However, it could also be argued that a firm enters financial distress because its clients fail to pay their bills, or that a negative exogenous shock in sales can cause a mechanical drop in the level of trade receivables and can drive the firm into financial distress at the same time. Both effects would suggest a positive relationship between financial distress and trade receivables, contrary to our findings. In any case, and to alleviate potential endogeneity concerns, we rely on previous results reported in the literature. Love, Preve, and Sarria-Allende (2007) demonstrate that in the presence of a clearly exogenous shock generated by a macroeconomic

[11]To look for patterns in the use of factoring by firms in our sample, we randomly selected 80 firms from our sample and checked their 1999 10-Ks. We find that the correlation between financial distress and the use of factoring is indistinguishable from zero.

crisis in a country, firms decrease their level of trade receivables. In fact, their paper reveals that in the event of a country-wide macroeconomic shock, firms first experience an unwanted increase in trade receivables, and then react by sharply decreasing their level of trade receivables to their clients.[12] As an additional precaution, we use the first lag of the financial distress dummy (*FD*), relying on the time variation between the firm's entrance into financial distress and its investment in trade receivables. In Section V, we use a different approach to address this concern.

A possible concern, given the long time span covered by our data sample, is that macroeconomic conditions could affect the provision of trade credit.[13] Should this be the case, our results could be driven by macroeconomic conditions rather than by firms' financial distress. On the one hand, during periods of high inflation, the incentive to extend trade credit to clients should decrease since the present value of receivables is lower. On the other hand, during periods of tight monetary policy, trade credit can act as a substitute for financial credit as suggested by Meltzer (1960). Consistent with this, Figure 1 displays first a lower level of trade receivables in the high inflation period of the early 1980s, and then a gradual increase in trade credit as the tight monetary policy affects the economy toward the end of the decade.

Since our study covers such a long period, we also check the interaction of macroeconomic conditions and financial distress during the years of our sample. To do so, we split the sample in four shorter subperiods of time (1980-1985, 1986-1989, 1990-1995, and 1996-2000) and estimate Equation (1) separately on each subsample. We find that firms in financial distress decrease their level of trade receivables to clients in the second decade of the sample (i.e., the decade between 1990 and 2000). Between 1980 and 1989, we find no significant relation between the firms' trade receivable policies and financial distress. These nonreported results suggest that the effect of financial distress on the trade receivables policies we study in this paper is less important when firms face periods of high inflation or tight monetary conditions. Under higher inflation, firms have a greater incentive to reduce their trade receivables even if they are not in financial distress, making it more difficult to distinguish the effect of financial distress on firms' trade receivables.

III. The Effect of Market Power and Industry Concentration

The effect of financial distress on trade receivables need not be equal for all firms. Financially distressed firms need cash, but this does not mean that they will be able to reduce the terms of trade receivables to their clients without consequences for their commercial relations. We have already argued that the ability to negotiate terms of trade credit with clients might affect the trade receivables policies of firms in financial distress. The ability to bargain is a function of the competitive structure of the industry and can be measured by the firm's market power. Depending on their degree of market power, firms in financial distress that want to collect their receivables faster might not be able to do so without negatively affecting their commercial relations with clients.

It seems plausible that firms in less competitive, or more concentrated, industries should be able to reduce trade receivables with a lower cost in terms of lost market share; the higher the

[12] We have to be careful when comparing our study to that of Love, Preve, and Sarria-Allende (2007). The large macroeconomic shocks they studied affect the whole economy and not only individual industries or firms such as those we refer to in this paper. We thank an anonymous referee for pointing this out.

[13] Love, Preve, and Sarria-Allende (2007) find an important effect of financial crisis on trade credit in emerging economies during the 1990s.

market power of the firm, the lower the probability that a competitor will take its place based on more generous terms of trade credit. In addition, we can expect firms in concentrated industries to have longer lasting relationships with suppliers. Given the absence of alternative suppliers, clients will be forced to maintain their reputation as reliable customers when suppliers face tough times. This argument can also be related to the switching costs model (Klemperer, 1987; Chevalier and Scharfstein, 1996). Switching costs include learning costs, transaction costs, and other costs "artificially" imposed by firms to prevent clients from switching between suppliers. Clients are more likely to face higher switching costs if the supplier's industry is concentrated.

To address the importance of industry structure on the ability of a firm to reduce trade receivables when entering financial distress, we repeat the analysis of the previous section dividing the sample for firms in concentrated and nonconcentrated industries. In this setting, concentration acts as a proxy for the firm's market power. We consider an industry to be concentrated if its Herfindahl index is above the median for the year, and competitive otherwise.[14]

The results are shown in Table III. Odd-numbered columns present the results for competitive industries and even-numbered columns display the results for concentrated industries. If our intuition is correct, we should expect firms in different groups to behave differently with respect to their trade receivables when entering financial distress. More specifically, we expect to observe that firms in concentrated industries are able to diminish their trade receivables to clients when entering financial distress, while firms in competitive industries should not be able to do the same without suffering a penalty.

Consistent with this intuition, we find that the negative effect of financial distress on trade receivables is significantly stronger when firms are in concentrated industries and have, presumably, more market power. The coefficients on all the variables measuring financial distress are negative in every model; however, their economic and statistical significance is much stronger in the case of firms in more concentrated industries. We report a Hausman test of differences between the coefficients of the financial distress dummies of concentrated industries with respect to the corresponding case of competitive industries. This demonstrates that the difference is statistically significant at the 1% level in every model.

As an additional test, we individually estimate Equation (1) on each of the 44 Fama and French (1997) industries used in the paper. Our goal is to determine whether the negative effect of financial distress on trade receivables is driven by some specific industries, or if it is a general effect. The results (not reported) show that only two industries out of 44 display a positive and significant coefficient for the financial distress dummy, while 13 industries show a negative and significant coefficient.

The results in this section suggest that firms with enough market power are able to reduce the trade credit terms to their clients when they are in financial distress. In contrast, firms in competitive industries that face financial distress will find bill collection more costly, making it harder for them to reduce their trade receivables.

IV. Profitability Problems and Cash Flow Problems

So far, we have presented evidence that supports the hypothesis that firms reduce their trade receivables when entering financial distress. Firms in financial distress will experience cash flow problems, which pressure them to cut financing to clients if they have enough market power to do so. However, firms may behave differently when they experience profitability problems prior

[14]The Herfindahl Index is the sum of the squares of the market share of the firms in an industry, $HFI = \sum(Mkt\_share^2)$.

Table III. The Effects of the Competitiveness of the Industry

This table presents firm fixed effect regressions similar to those in Table I but divides the sample according to the competitiveness of the industry. The dependent variable is *TR/Sales*, measured as the ratio of trade receivables over daily sales. Columns 1, 3, and 5 report the results for the competitive industries, defined as the half sample of firms in industries whose Herfindahl Index is below the year median. Columns 2, 4, and 6 report the results for the concentrated industries, defined as the half sample of firms in industries whose Herfindahl Index is above the year median. Here, $FINDIST_{t-1}$ is a dummy variable equal to one if the firm was in financial distress a year earlier, as defined by Asquith, Gertner, and Scharfstein (1994); *FDLEV* is a dummy variable that is equal to one if *FINDIST* is one and the firm is in the top two deciles of the industry leverage in a given year, and zero otherwise (Opler and Titman, 1994); $LOSSFD_{t-1}$ is a dummy variable equal to one if the firm experienced losses for three years in a row up to one year ago (DeAngelo and DeAngelo, 1990); *TrPay/CGS* is the ratio of trade payables to the daily cost of goods sold; *Leverage* is the ratio of the book value of total debt to book value of debt plus book value of equity. The book value of equity is *Total Assets – Total Liabilities – Preferred Stocks + Deferred Taxes + Convertible Debt*; $\Delta Sales_{t-1}$ is the lagged growth of sales; and *Inventory/CGS* is the ratio of inventories to the daily cost of goods sold. The Hausman test reports a test of differences between the coefficients of the financial distress measures of concentrated industries with respect to the corresponding case of competitive industries (Columns 2 vs. 1, 4 vs. 3, and 6 vs. 5). The *p*-values are in parentheses. All regressions include a constant, whose coefficients are not reported to save space. Absolute *t*-values are in parentheses below each coefficient.

Dep. Var.	Competitive Industries *TR/Sales* (1)	Concentrated Industries *TR/Sales* (2)	Competitive Industries *TR/Sales* (3)	Concentrated Industries *TR/Sales* (4)	Competitive Industries *TR/Sales* (5)	Concentrated Industries *TR/Sales* (6)
$FINDIST_{t-1}$	−1.44***	−3.33***				
	(2.94)	(6.89)				
$FDLEV_{t-1}$			−1.90***	−4.91***		
			(2.67)	(6.89)		
$LOSSFD_{t-1}$					−1.39*	−3.92***
					(1.82)	(4.82)
TrPay/CGS	0.17***	0.14***	0.17***	0.14***	0.19***	0.14***
	(50.89)	(31.93)	(49.35)	(32.09)	(50.41)	(30.85)
Leverage	21.39***	21.97***	21.59***	22.44***	21.78***	25.39***
	(18.15)	(17.35)	(18.22)	(17.60)	(17.06)	(18.41)
$\Delta Sales_{t-1}$	0.17	−0.33***	0.19	−0.31***	−1.29***	−0.82***
	(1.19)	(3.26)	(1.29)	(3.04)	(3.75)	(3.25)
Inventory/CGS	18.11***	17.43***	18.39***	17.38***	14.43***	21.79***
	(16.19)	(16.04)	(16.47)	(16.02)	(12.02)	(17.92)
Hausman test (χ^2)		677.60***		2,314.55***		86.28***
(*p*-value)		(0.00)		(0.00)		(0.00)
Observations	34,082	26,120	34,058	26,110	29,379	21,961
Number of firms	5,427	4,858	5,422	4,858	4,560	4,099
R^2	0.12	0.08	0.12	0.08	0.13	0.10

***Significant at the 0.01 level.
*Significant at the 0.10 level.

to entering financial distress. Petersen and Rajan (1997) find that firms that incur losses and sales drops increase their trade receivables. This is probably because the firms are attempting to buy sales volume and market share or because they are not able to effectively enforce the timely repayment of their receivables. If the latter occurs, the unwanted increase in receivables can be considered a cost of financial distress.[15]

To analyze the behavior of trade receivables when firms have profitability problems, we construct a model following Petersen and Rajan (1997), and estimate it using fixed effects in our much larger and less detailed data set:

$$TR/Sales_{it} = \gamma_i + \beta_1 SlsGw\_P_{it} + \beta_2 SlsGW\_N_{it} + \beta_3 NetProfits_{it} + \beta_4 NetLosses_{it} + \theta X_{it} + \varepsilon_{it}. \quad (2)$$

In this model, *TR/Sales* is the ratio of account receivables to sales, as defined in Section II; *SlsGw_P* is equal to the one-year sales growth if it is positive, and zero otherwise; *SlsGw_N* is equal to the one-year sales growth if it is negative, and zero otherwise; *NetProfits* is equal to the firm's net profits scaled by sales if positive, and zero otherwise, and *NetLosses* is equal to the value of the firm's net losses scaled by sales, if the firm has losses, and zero otherwise; and X is a matrix of control variables. We control for financial distress to distinguish between firms that are only experiencing profitability problems (losses) and firms with cash flow problems (in financial distress). We also control for *TrPay/CGS* because firms with higher levels of trade payables will have more funds to finance their trade receivables.[16]

The results are shown in Table IV. Column 1 indicates the results for the full sample. Consistent with Petersen and Rajan (1997), we find that firms that experience losses and negative sales growth increase their use of trade receivables.[17] The results on the controls ($FINDIST_{t-1}$ and *TrPay/CGS*) are consistent with what we find in the previous sections. These results support the intuition that firms facing profitability problems seem to buy market share through better credit conditions, so long as these profitability problems do not affect their cash flow.

Given the results presented in Section III, we split the sample in this section according to industry concentration. The results, in Columns 2 and 3, are similar to the results of the full sample. The main difference with respect to our interest variables is that they have a larger economic and statistical significance for firms in concentrated industries than for firms in competitive industries, reflecting the same intuition discussed in the previous section. In fact, *Sales Growth* $(-)$ is negative in both cases, but is only statistically significant in the case of firms in concentrated industries.

These results suggest that when firms with higher market power face losses, they are able to use trade receivables in order to "buy" higher sales volume and market share, consistent with a more dominant position with respect to their clients. Firms in competitive industries show similar patterns, but with lower levels of market power.

[15] Petersen and Rajan (1997) use a data set that covers a cross-section of small firms during the year 1987. This is a year in which the average level of *TR/Sales* was unusually high (see Figure 1), probably influenced by the stock market crash of October 1987. This is consistent with Meltzer (1960), who states that during monetary contractions trade credit increases as a substitute for financial credit.

[16] Petersen and Rajan (1997) consider other controls, such as firm age and maximum available line of credit. Our results do not change if we include a control for age or firm size. Since we are using a broader data set, we do not have information for firms' maximum line of credit.

[17] Petersen and Rajan (1997) find a positive and significant effect on trade receivables for both firms with losses and firms with negative sales growth. Notice, however, that they do not find a significant effect for firms with negative sales growth in their model V, where industry dummies and other controls are included, as we do in this paper.

Table IV. The Case of Losses and Decreasing Sales

This table presents firm fixed effects regressions that consider the ratio of trade receivables over daily sales as the dependent variable. Here, *SalesGrowth*(+) is equal to the sales growth from year$_{t-1}$ to year$_t$ if positive, and zero otherwise; *SalesGrowth*(−) is equal to the sales growth from year$_{t-1}$ to year$_t$ if negative, and zero otherwise; *NetProfits/Sales* is equal to the firm's profit divided by sales if positive, and zero in the case of losses, while *NetLosses/Sales* is equal to the firm's net losses divided by sales, and zero in the case of profits; $FINDIST_{t-1}$ is a dummy variable equal to one if the firm was in financial distress a year earlier, according to the definition of financial distress given by Asquith Gertner, and Scharfstein (1994); and *TrPay/CGS* is the ratio of trade payables to the daily cost of goods sold. All regressions include a constant, whose coefficients are not reported to save space. Absolute *t*-values are in parentheses below each coefficient.

Dep. Var.	Full Sample *TR/Sales* (1)	Competitive Industries *TR/Sales* (2)	Concentrated Industries *TR/Sales* (3)
SalesGrowth(+)	0.32***	0.76***	0.07
	(2.93)	(4.03)	(0.54)
SalesGrowth(−)	−2.77***	−1.25	−2.98**
	(3.15)	(1.01)	(2.29)
NetProfits/Sales	−2.66***	−1.85**	−5.25***
	(5.32)	(2.48)	(6.25)
NetLosses/Sales	−2.31***	−2.14***	−3.15***
	(12.04)	(6.72)	(11.81)
$FINDIST_{t-1}$	−0.65**	0.41	−2.21***
	(2.09)	(0.92)	(4.88)
TrPay/CGS	0.15***	0.16***	0.14***
	(70.11)	(56.96)	(39.69)
Observations	73,221	41,743	31,478
Number of firms	9,711	6,626	5,885
R^2	0.08	0.09	0.07

***Significant at the 0.01 level.
**Significant at the 0.05 level.

The coefficient on $FINDIST_{t-1}$ confirms the results from the previous section. It is indistinguishable from zero for firms in competitive industries and it is negative and significant for firms in concentrated industries.

An alternative interpretation of the results in Table IV, following Petersen and Rajan (1997), could be that when firms experience losses and face negative sales growth, they lose the ability to enforce payments from their clients. In this case, the increase in trade receivables would be a consequence of the firms' financial weakness rather than a desired outcome. That is, firms in financial distress would face higher bill collecting costs regardless of their market power. Should this be the case, we would see firms further increase their level of trade receivables when they enter financial difficulty, since their ability to enforce the collection of the receivables would be further weakened by their financial situation. Yet, this is not what we find in Section II. This finding reinforces the validity of our original interpretation of the results in this section.[18]

[18]As a robustness check, we run a regression of *TR/Sales* on financial distress using a dummy variable that identifies firms that will enter financial distress in the next three years. The results, fully consistent with our findings in this section, show that firms tend to increase their trade receivables before entering financial distress (when they first experience profitability problems).

In addition, the results in Table IV demonstrate that profitable firms (i.e., firms with positive values of *NetProfits/Sales*) significantly cut their use of trade receivables. This result differs from that of Petersen and Rajan (1997), who find an insignificant coefficient for this variable. Our result implies that profitable firms extend less trade credit to their clients; moreover, this effect is significantly stronger for firms operating in concentrated industries. Increasing trade receivables is expensive, and firms will only do it if they need to increase sales. The more profitable the firms are, the less they will need to increase trade receivables. The results indicate that this need for financing clients is even less important when profitable firms have more market power. Profitable firms operating in concentrated industries reduce their credit to clients without losing sales.

Figure 2 displays an unconditional graph of *TR/Sales* on the timeline of financial distress, providing additional graphical evidence of the trade receivables behavior of firms in financial distress. We see that firms seem to increase their level of trade receivables to clients in the prefinancial distress years and then steeply reduce them when entering financial distress. The timeline of events is on the horizontal axis and *TR/Sales* is on the vertical axis. The timeline of events takes the value of zero in the year that the firm enters financial distress and then adds one for each additional year that the firm stays in financial distress. In addition, it takes a negative value for each year in which the firm is not yet in financial distress, measuring the time (in years) until the trouble occurs. A horizontal line is added at *TR/Sales* = 51.46 days, which is the average time in days of *TR/Sales* of all the firms in our sample that are not considered in Figure 2 (i.e., those that are not in financial distress and will not be in financial distress during the sample time).

V. The Cost of Cutting Trade Receivables

In this section, we estimate the cost of decreasing trade receivables for firms in financial distress. First, we look at how much of the drop in the firm's performance is caused by the decrease in the trade receivables. We then show the relative severity of the drop in performance for firms that decrease their trade receivables when they encounter financial distress due to an exogenous shock in their industries, as compared with firms that do not decrease their use of trade receivables.

A. The Cost of Cutting Trade Receivables When Firms Are in Financial Distress

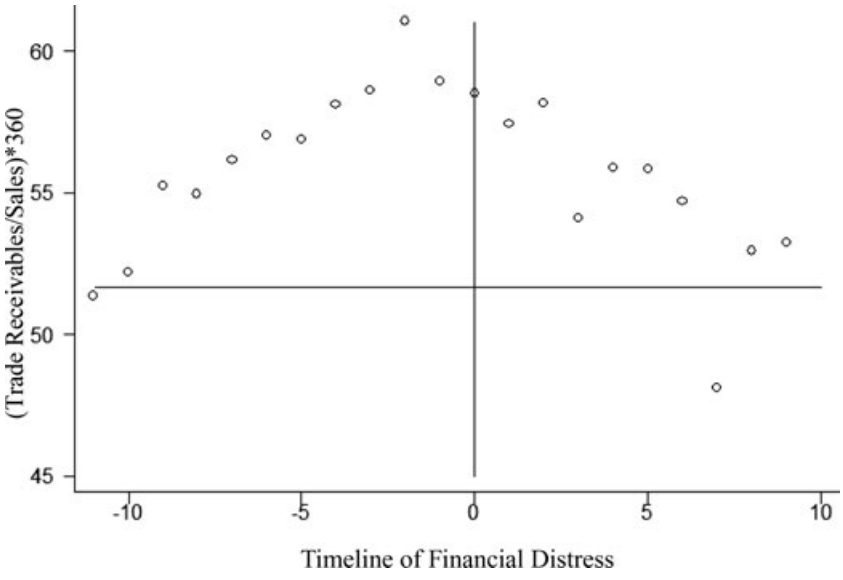
To empirically estimate the cost of cutting trade receivables when firms are in financial distress, we regress proxies for firm performance on a dummy for financial distress, a dummy for significant drops in trade receivables, and their cross-effect. The cross-effect of the two dummies (financial distress and significant drop in trade receivables) measures the marginal effect of a cut in trade receivables on the performance of a firm in financial distress. Quantifying this marginal effect allows us to measure the costs of financial distress caused by decreases in the use of trade receivables.

From Opler and Titman (1994), we borrow the following model for measuring firm performance:

$$Performance_{i,t-2\to t} = \delta + \beta_1 FINDIST_{i,t-1} + \beta_2 (DropTR/Sales)_{i,t-2\to t} + \frac{1}{n}\beta_3 ((DropTR/Sales)_{i,t-2\to t} * FINDIST_{i,t-1}) + \gamma X_{i,t-2} + \varepsilon_{it}. \quad (3)$$

Figure 2. Average Days of Trade Receivables

This figure shows the average days of trade receivables for firms that will enter financial distress at some point during the sample time. The horizontal axis measures the timeline of the financial distress event. It is set to 0 the year the firm enters financial distress under Asquith, Gertner, and Scharfstein's (1994) definition (*FINDIST*). Negative values represent the number of years before financial distress occurs, and positive values represent the time that the firm has spent in financial distress. The vertical axis measures the number of days of trade receivables measured by *TR/Sales* = (*Trade Receivables/Sales*) × 360. Each point in the graph represents the average number of days of trade receivables that firms show at each year. The vertical line drawn at Timeline = 0 shows the moment at which the firms enter financial distress and the horizontal line drawn at *TR/Sales* = 51.46 represents the non-time-varying average of *TR/Sales* for those firms that are in the sample but do not enter financial distress during the sample period of this study.



We consider three different proxies for firm performance ($Performance_{i,t-2\to t}$) adjusted by industry medians, and use four controls ($X_{i,t-2}$). Firm performance is measured over a two-year period, from $t-2$ to t. The controls are measured at $t-2$.

To measure financial distress, we consider the definition of Asquith, Gertner, and Scharfstein (1994) and use the first lag (at $t-1$) of the *FINDIST* dummy as in Section II. We also consider two alternative measures of financial distress defined in Section II, (i.e., *FDLEV* and *LOSSFD*). We measure financial distress at $t-1$ to assure that the firm is in financial distress at the time we measure its performance.

We measure the decrease in the investment in trade receivables by creating a dummy that is equal to one if the firm exhibits a significant drop in trade receivables, normalized by sales and measured in days ($(DropTR/Sales)_{i,t-2\to t}$). We normalize trade receivables by total assets when sales growth is our measure of performance ($(DropTR/Assets)_{i,t-2\to t}$) because sales growth may have a mechanical relation to the *TR/Sales* ratio.[19]

[19]The regular way of normalizing trade receivables is to use daily sales, so we obtain the days of trade receivables that firms give to their clients. However, when considering drops in the ratio of trade receivables to sales, the drop could be caused by an unexpected increase in sales, inducing a mechanical positive relation with sales growth (one of our dependent variables).

We consider a drop to be significant if the firm decreases its use of trade receivables by an amount that is larger than the 10th percentile in its industry. Alternatively, we also use the 25th percentile. Since we can expect different drops for firms in different industries, we determine a high drop in trade receivables by comparing it to trade receivables variations of firms in the same industry. However, as a robustness check, we also compute the percentiles using the entire sample (results not reported). To be consistent with the timing of the other variables, we measure the drop in trade receivables in the same two-year period that we use for firm performance; from $t-2$ to t.

The results are shown in Table V. Notice that we have fewer observations than in the previous tables because, following Opler and Titman (1994), we limit ourselves to industries with at least four firms in order to carry the industry adjustments. We also drop firms with sales growth, operating income growth, or equity returns in excess of 200%. In addition, we lose one year of data because we need two lags to build the performance variables in these regressions. The reported regressions include firm fixed effects.

We find that while all firms in financial distress experience drops in performance (the coefficients on *FINDIST* are negative and significant in all regressions), this drop is significantly larger when there is an important drop in trade receivables. In fact, the sum of the coefficients on the decrease in the trade receivables dummy and the interaction term is negative in all cases. This result is consistent through different measures of performance, and it is also robust considering the significance of the drop in trade receivables with respect to the entire sample rather than only to the firm's respective industry (results not reported).

The magnitude of the effect of a drop in trade receivables on firm performance is economically important. A firm that experiences financial distress will have a drop in sales of about 19% to 20%, but if this firm also decreases its trade receivables by an amount larger than the 10th percentile (25th percentile) of the firm's industry, sales will drop by an additional 21% (18%). Similarly, when we measure performance with operating income growth or with stock return, we observe an additional drop of 13% when the firm in distress decreases its use of trade receivables to the 10th industry percentile. These results compare well with those in Opler and Titman (1994). We find that a firm that is in financial distress and that decreases its trade receivables significantly shows a total drop in sales, operating income, and stock return of up to 41%, 40%, and 35%, respectively. Our results suggest that about one-third of this drop in performance is due to the decrease in trade receivables, which supports the importance of trade receivables management for firms in financial trouble.

Table VI presents the same performance models as Table V but considers the two alternative measures for financial distress defined in Section II, *FDLEV* and *LOSSFD*. The results are the same, demonstrating a significantly larger drop in performance when the firm in financial distress decreases its trade receivables. The results in Table VI, although still economically very significant, are somehow weaker than when *FINDIST* is used as financial distress measure. This is likely due to the fact that *FDLEV* and *LOSSFD* are stricter measures of financial distress.[20]

It can be argued that the drop in receivables is not exogenous, and that this drop can be a proxy for the extent to which firms are distressed. To address this concern, we examine the effect of a

[20]In Table I, we can see that only 4% of the firm-year observations of our sample would be considered financially distressed according to *FDLEV* or *LOSSFD* measures. Using the *FINDIST* measure, 11% of firm-year observations qualify as financially troubled.

Table V. Cost of Decreasing Trade Receivables When Firms Are in Financial Distress

This table presents firm fixed effects regressions of firm performance on a financial distress dummy, a dummy for decrease in trade receivables, and their cross-effects. The dependent variables are measured as in Opler and Titman (1994). Operating income growth, stock returns, and sales growth are industry adjusted and measured over the two-year period from $t-2$ to t. The industry adjustment is carried out by subtracting the Fama and French (1997) industry median from the firm's performance. The independent variables include four controls taken from Opler and Titman that are also industry adjusted and measured at $t-2$. The financial distress dummy (*FINDIST*) is equal to one if the firm is in distress at $t-1$ according to the Asquith, Gertner, and Scharfstein (1994) definition. To measure a significant drop in trade receivables, we use the ratio of trade receivables to assets (*TR/Assets*) when the dependent variable is sales growth and the ratio of trade receivables to daily sales (*TR/Sales*) when the dependent variable is operating income growth or stock return. The dummy for decrease in the trades receivables is equal to one if the variation in the ratio of trade receivables to assets or daily sales, and from $t-2$ to t, is lower than the 10th percentile in Columns 1, 3, and 5, and lower than the 25th percentile in Columns 2, 4, and 6. We measure the trade receivables reductions by their respective percentiles within industries. The last row shows the cross-effect of the dummy for financial distress times the dummy for decrease in *TR/Sales*. All regressions include a constant, whose coefficients are not reported to save space. Absolute *t*-values are in parentheses below each coefficient.

	Ind. Adj. *Sales Growth* ($t/t-2$)	**Ind. Adj. *Sales Growth* ($t/t-2$)**	**Ind. Adj. *Operating Income Growth* ($t/t-2$)**	**Ind. Adj. *Operating Income Growth* ($t/t-2$)**	**Ind. Adj. *Stock Return* ($t/t-2$)**	**Ind. Adj. *Stock Return* ($t/t-2$)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Lg(*Sales*)$_{t-2}$	−0.24***	−0.24***	−0.19***	−0.19***	−0.09***	−0.09***
	(80.71)	(80.59)	(32.98)	(32.96)	(20.06)	(20.04)
EBITDA/TA$_{t-2}$ Ind. Adj.	−0.11***	−0.09***	−0.41***	−0.41***	−0.84***	−0.84***
	(5.63)	(4.53)	(9.80)	(9.74)	(23.92)	(23.97)
Inv/TA$_{t-2}$ Ind. Adj.	0.08***	0.09***	−0.06	−0.06	−0.83***	−0.83***
	(2.67)	(3.05)	(1.00)	(1.00)	(16.46)	(16.40)
Asset Sales$_{t-2}$ Ind. Adj.	−1.15***	−1.14***	−0.67***	−0.65***	0.64***	0.65***
	(14.47)	(14.43)	(4.08)	(3.97)	(5.94)	(6.04)
FINDIST$_{t-1}$	−0.20***	−0.19***	−0.27***	−0.28***	−0.22***	−0.21***
	(32.34)	(28.68)	(19.72)	(18.32)	(20.33)	(17.82)
Decrease in *TR/Assets* dummy$_{(t/t-2)}$	−0.08***	−0.07***				
	(13.03)	(18.59)				
Decrease in *TR/Sales* dummy$_{(t/t-2)}$			0.01	0.01	−0.06***	−0.04***
			(0.60)	(1.02)	(5.90)	(6.27)
FINDIST$_{t-1}$ × decrease in *TR/Assets* dummy$_{(t/t-2)}$	−0.13***	−0.11***				
	(8.09)	(9.33)				
FINDIST$_{t-1}$ × decrease in *TR/Sales* dummy$_{(t/t-2)}$			−0.14***	−0.07***	−0.07***	−0.08***
			(4.58)	(2.91)	(2.92)	(4.36)
Δ*TR/Assets* < / Δ*TR/Sales* <	10th Pct.	25th Pct.	10th Pct.	25th Pct.	10th Pct.	25th Pct.
Observations	51,871	51,871	47,191	47,191	46,285	46,285
Number of firms	7,043	7,043	6,888	6,888	6,641	6,641
R^2	0.17	0.17	0.04	0.04	0.04	0.04

***Significant at the 0.01 level.

Table VI. Cost of Decreasing Trade Receivables—Different Measures for Financial Distress

This table presents firm fixed effects regressions of firm performance on two different measures of financial distress, a dummy for decrease in trade receivables, and their cross-effects. The dependent variables are measured as in Opler and Titman (1994). Operating income growth, stock returns, and sales growth are industry adjusted and measured over the two-year period from $t-2$ to t. The industry adjustment is carried out by subtracting the Fama and French (1997) industry median from the firm's performance. The independent variables include four controls taken from Opler and Titman, which are also industry adjusted and measured at $t-2$. Here, *FDLEV* and *LOSSFD* are dummies that indicate financial distress; $FDLEV_{t-1}$ is a dummy variable that is equal to one if $FINDIST_{t-1}$ is one and the firm is in the top two deciles of the industry leverage in a given year, and zero otherwise (Opler and Titman, 1994); $FINDIST_{t-1}$ is a dummy variable equal to one if the firm was in financial distress a year earlier, as defined by Asquith Gertner, and Scharfstein (1994); and $LOSSFD_{t-1}$ is a dummy variable equal to one if the firm has experienced losses for three years in a row up to one year ago (DeAngelo and DeAngelo, 1990). To measure a significant drop in trade receivables, we use the ratio of trade receivables to assets (*TR/Assets*) when the dependent variable is sales growth and the ratio of trade receivables to daily sales (*TR/Sales*) when the dependent variable is operating income growth or stock return. The dummy for decrease in the trade receivables is equal to one if the variation in the ratio of trade receivables to assets or daily sales, and from $t-2$ to t, is lower than the 10th percentile. We measure the trade receivables reductions by their respective percentiles within industries. The last row shows the cross-effect of the dummy for financial distress times the dummy for decrease in *TR/Sales*. All regressions include a constant, whose coefficients are not reported to save space. Absolute t-values are in parentheses below each coefficient.

	Ind. Adj. *Sales Growth* ($t/t-2$) (1)	Ind. Adj. *Sales Growth* ($t/t-2$) (2)	Ind. Adj. *Operating Income Growth* ($t/t-2$) (3)	Ind. Adj. *Operating Income Growth* ($t/t-2$) (4)	Ind. Adj. *Stock Return* ($t/t-2$) (5)	Ind. Adj. *Stock Return* ($t/t-2$) (6)
Lg($Sales$)$_{t-2}$	−0.24***	−0.24***	−0.19***	−0.19***	−0.09***	−0.10***
	(80.04)	(82.44)	(33.10)	(33.62)	(19.99)	(20.70)
$EBITDA/TA_{t-2}$ Ind. Adj.	−0.01	−0.03	−0.29***	−0.31***	−0.76***	−0.75***
	(0.63)	(1.54)	(6.93)	(7.47)	(21.46)	(21.63)
Inv/TA_{t-2} Ind. Adj.	0.08**	0.05*	−0.03	−0.04	−0.82***	−0.86***
	(2.52)	(1.77)	(0.52)	(0.68)	(15.91)	(16.92)
$Asset\ Sales_{t-2}$ Ind. Adj.	−1.22***	−1.18***	−0.74***	−0.67***	0.67***	0.44***
	(15.07)	(15.08)	(4.46)	(4.25)	(5.66)	(4.03)
$FDLEV_{t-1}$	−0.16***		−0.18***		−0.21***	
	(16.97)		(8.50)		(13.00)	
$LOSSFD_{t-1}$		−0.11***		−0.10***		−0.05***
		(11.26)		(4.29)		(3.36)

(*Continued*)

Table VI. Cost of Decreasing Trade Receivables—Different Measures for Financial Distress (*Continued*)

	Ind. Adj. *Sales Growth* (*t*/*t* − 2) (1)	Ind. Adj. *Sales Growth* (*t*/*t* − 2) (2)	Ind. Adj. *Operating Income Growth* (*t*/*t* − 2) (3)	Ind. Adj. *Operating Income Growth* (*t*/*t* − 2) (4)	Ind. Adj. *Stock Return* (*t*/*t* − 2) (5)	Ind. Adj. *Stock Return* (*t*/*t* − 2) (6)
Decrease in *TR/Assets* dummy$_{(t/t-2)}$	−0.09***	−0.10***				
	(15.07)	(17.51)				
Decrease in *TR/Sales* dummy$_{(t/t-2)}$			−0.01	−0.01	−0.07***	−0.08***
			(1.17)	(0.72)	(6.79)	(8.21)
$FDLEV_{t-1}$ × decrease in *TR/Assets* dummy$_{(t/t-2)}$	−0.12***					
	(4.96)					
$LOSSFD_{t-1}$ × decrease in *TR/Assets* dummy$_{(t/t-2)}$		−0.08***				
		(2.70)				
$FDLEV_{t-1}$ × decrease in *TR/Sales* dummy$_{(t/t-2)}$			−0.05		−0.08**	
			(1.07)		(2.24)	
$LOSSFD_{t-1}$ × decrease in *TR/Sales* dummy$_{(t/t-2)}$				−0.13***		−0.05
				(2.65)		(1.26)
$\Delta TR/Assets <$ / $\Delta TR/Sales <$	10th Pct.	10th Pct.	10th Pct.	10th Pct.	10th Pct.	10th Pct.
Observations	51,163	52,517	46,603	47,828	45,670	47,004
Number of firms	6,989	7,108	6,828	6,955	6,585	6,682
R^2	0.16	0.15	0.03	0.03	0.04	0.03

***Significant at the 0.01 level.
**Significant at the 0.05 level.

drop in trade receivables only for firms in financial distress. In Table VII we report firm fixed effect regressions of firm performance on a dummy for significant drops in trade receivables and the same controls used in Tables V and VI. We only consider firms that are in financial distress according to the Asquith, Gertner, and Scharfstein (1994) definition (i.e., $FINDIST_{t-1} = 1$). The results persist. Firms in financial distress that significantly drop their trade receivables experience an additional decrease in performance of 10% to 15%, depending on the performance measure considered.

B. The Effect of Cutting Trade Receivables for Highly Leveraged Firms in Distressed Industries

It is possible to argue that an exogenous drop in performance can cause financial distress in the firm leading to a possible reverse causality in our study of the effect of distress on performance. In this section, we address this problem by using a model in which financial distress is clearly exogenous to the performance of the firm. Instead of using financial distress at the firm level, we consider a firm to be in financial distress if it is highly leveraged when its industry enters into an economic shock. As explained in Opler and Titman (1994), from whom we borrow the setting of our model, we assume that the capital structure of the firm is chosen exogenously, and that the shock to the industry is unexpected, assured by the construction of the variable explained below. We argue that highly leveraged firms that decrease their use of trade receivables in periods of economic distress should lose more sales than firms that do not decrease their use of trade receivables. In Table VII, we present the same model of performance as Opler and Titman (1994) in their Table V:

$$Performance_{i,t-2\to t} = \delta + \beta_1 High - Lev_{i,t-3} + \beta_2 (DistInd)_{i,t-2\to t} + \beta_3((DistInd)_{i,t-2\to t} * High - Lev_{i,t-3}) + \gamma X_{i,t-2} + \varepsilon_{it}. \quad (4)$$

Here, $High - Lev_{i,t-3}$ is a dummy for high leverage, equal to one if the firm is in the top three deciles (8 to 10) of leverage in its industry in any given year, and zero otherwise; and $(DistInd)_{i,t-2\to t}$ is a dummy for a distressed industry, equal to one if the Fama and French (1997) industry experiences a negative median sales growth and a median stock return below −30%, and it is measured over the same period we use to measure performance (from $t-2$ to t). The inclusion of a large negative stock return for a given year assures that the shock in the industry was unexpected for its investors.[21]

We show the results in Table VIII only for industry-adjusted growth in sales.[22] Column 1 presents the results using the entire sample. Column 2 presents the results considering only the firms that do not decrease trade receivables. Column 3 displays the results for firms that present a decrease in *TR/Sales* that is larger than the 25th percentile of the sample (−6.89 days), and Column 4 shows the results for firms with drops in *TR/Sales* larger than the 10th percentile of the sample (−19.16 days). The Hausman tests measure the differences in the coefficients of the cross-effect of the distressed industry dummy times the high leverage dummy. The tests compare the coefficients of the cases where there is a drop in *TR/Sales* (Columns 3 and 4) with respect to the case where there is a no decrease in *TR/Sales* (Column 2), and with respect to the whole sample case (Column 1).

Our purpose here is to compare the effect of a decrease in trade receivables on performance for firms in economic distress. As the Hausman tests indicate, highly leveraged firms that decrease

[21] Expected shocks are discounted in advance by investors.

[22] The results for other measures of performance are similar (not reported).

Table VII. Cost of Decreasing Trade Receivables in a Sample of Firms in Financial Distress

This table presents firm fixed effects regressions of firm performance on a dummy for decrease in trade receivables for a sample of firms already in financial distress. A firm is included in the sample if it is in financial distress according to Asquith, Gertner, and Scharfstein's (1994) definition of distress ($FINDIST_{t-1} = 1$). The dependent variables are measured as in Opler and Titman (1994). Operating income growth, stock returns, and sales growth are industry adjusted and measured over the two-year period from $t-2$ to t. The industry adjustment is carried out by subtracting the Fama and French (1997) industry median from the firm's performance. The independent variables include four controls taken from Opler and Titman, which are also industry adjusted and measured at $t-2$. To measure a significant drop in trade receivables, we use the ratio of trade receivables to assets (*TR/Assets*) when the dependent variable is sales growth and the ratio of trade receivables to daily sales (*TR/Sales*) when the dependent variable is operating income growth or stock return. The dummy for decrease in the trade receivables is equal to one if the variation in the ratio of trade receivables to assets or daily sales, and from $t-2$ to t, is lower than the 10th percentile. We measure the trade receivables reductions by their respective percentiles within industries. The last row shows the cross-effect of the dummy for financial distress times the dummy for decrease in *TR/Sales*. All regressions include a constant, whose coefficients are not reported to save space. Absolute *t*-values are in parentheses below each coefficient.

	Ind. Adj. *Sales Growth* ($t/t-2$) (1)	**Ind. Adj. *Operating Income Growth* ($t/t-2$) (2)**	**Ind. Adj. *Stock Return* ($t/t-2$) (3)**
$\text{Lg}(Sales)_{t-2}$	−0.45***	−0.09**	−0.06***
	(27.91)	(2.08)	(2.90)
$EBITDA/TA_{t-2}$ Ind. Adj.	−0.19***	0.04	−0.80***
	(2.87)	(0.21)	(8.07)
Inv/TA_{t-2} Ind. Adj.	0.19	0.18	−0.68***
	(1.49)	(0.48)	(3.55)
$Asset\ Sales_{t-2}$ Ind. Adj.	−0.2	−0.36	0.60**
	(0.97)	(0.57)	(2.32)
Decrease in *TR/Assets* $\text{dummy}_{(t/t-2)}$	−0.15***		
	(6.47)		
Decrease in *TR/Sales* $\text{dummy}_{(t/t-2)}$		−0.14**	−0.10***
		(2.37)	(3.48)
$\Delta TR/Sales <$ / $\Delta TR/Assets <$	10th Pct.	10th Pct.	10th Pct.
Observations	5,116	3,901	4,762
Number of firms	2,380	2,191	2,276
R^2	0.28	0.01	0.05

***Significant at the 0.01 level.

**Significant at the 0.05 level.

their use of trade receivables in situations of economic distress experience a decline in sales of up to −28% as compared with a nonsignificant decrease of −2% when firms do not decrease their trade receivables. As in Opler and Titman (1994), we control for several performance determinants, and include firm fixed effects to proxy for unobservable heterogeneity.

Compared with Opler and Titman (1994), our results are consistent but weaker; the cross-effect of high leverage and distressed industry is negative, but insignificant. The difference may be explained by our use of a much larger sample that includes 22 years of data and many smaller

Table VIII. The Cost of Decreasing Trade Receivables for Highly Leveraged Firms in Distressed Industries

This table presents fixed effects regressions of firm performance on a high leverage dummy, a dummy for economic industry distress, and their cross-effects, stratified by the variation in trade receivables. The specifications follow Opler and Titman (1994). The dependent variable is the sales growth, industry adjusted and measured over the two-year period from $t-2$ to t. The industry adjustment is carried out by subtracting the Fama and French (1997) industry median from the firm's performance. The independent variables include four controls, which are also industry adjusted and measured at $t-2$. Here, *Leverage* is defined in $t-3$ as the book value of total debt divided by assets. The dummy for leverage is set to one if the firm's leverage is in deciles 8 to 10 considering the entire sample, and to zero otherwise. The distressed-industry dummy is equal to one if the Fama and French (1997) industry exhibited poor performance during the period between $t-2$ and t. An industry is considered to have poor performance if it had a negative median sales growth and a median stock return less than −30% in the $t-2/t$ two-year period. Column 1 presents the results using the entire sample. Column 2 presents the results considering only the firms that experienced a positive increase in the ratio of trade receivables to daily sales (*TR/Sales*), measured in days and over the period $t/t-2$. Column 3 has the results for firms exhibiting a larger decrease in *TR/Sales* than the 25th percentile of their respective industry, and Column 4 for firms with a larger decrease in the *TR/Sales* than the 10th percentile of their respective industry. The Hausman test reported first tests the differences in the cross-effect (*Distressed Industry* $\text{dummy}_{(t/t-2)} \times$ *Leverage* deciles 8-10 dummy_{t-3}) coefficients of the decrease in *TR/Sales* cases (Columns 3 and 4) with respect to the increase in *TR/Sales* case (Column 2). The Hausman test reported second presents the case with respect to the whole sample (Column 1). The *p*-values are in parentheses. All regressions include a constant, whose coefficients are not reported to save space. Absolute *t*-values are in parentheses below each coefficient.

	Whole Sample	**Δ*TR/Sales* > 0**	**Δ*TR/Sales* < 25 pct.**	**Δ*TR/Sales* < 10 pct.**
Dep. Var.	**Ind. Adj. *Sales Growth* (*t*/*t*−2)**			
	(1)	**(2)**	**(3)**	**(4)**
$\text{Lg}(Sales)_{t-2}$	−0.24***	−0.22***	−0.30***	−0.38***
	(85.01)	(56.06)	(35.81)	(19.09)
$EBITDA/TA_{t-2}$ Ind. Adj.	−0.04*	−0.05*	−0.02	−0.07
	(1.85)	(1.70)	(0.39)	(0.82)
Inv/TA_{t-2} Ind. Adj.	0.07**	0.16***	−0.14	−0.17
	(2.37)	(3.70)	(1.63)	(1.00)
$Asset\ Sales_{t-2}$ Ind. Adj.	−1.09***	−1.15***	−0.82***	−0.33
	(14.46)	(9.22)	(4.69)	(1.04)
Leverage deciles 8-10 dummy_{t-3}	−0.04***	−0.04***	−0.05***	−0.06*
	(8.76)	(6.89)	(4.24)	(1.95)
Distressed Industry $\text{dummy}_{(t/t-2)}$	0.09***	0.07***	0.12***	0.16**
	(6.12)	(3.16)	(3.36)	(2.20)
Distressed Industry $\text{dummy}_{(t/t-2)} \times$ *Leverage* deciles 8-10 dummy_{t-3}	−0.03	−0.02	−0.13*	−0.28**
	(0.88)	(0.40)	(1.95)	(2.36)
Hausman test with respect to the $\Delta TR/Sales > 0$ case (χ^2)			5.23**	5.70**
(*p*-value)			(0.02)	(0.02)
Hausman test with respect to the whole sample case (χ^2)			3.02*	4.91**
(*p*-value)			(0.08)	(0.04)
Observations	56,722	30,665	12,055	4,158
Number of firms	7,406	6,543	4,708	2,425
R^2	0.14	0.13	0.17	0.19

***Significant at the 0.01 level.

**Significant at the 0.05 level.

*Significant at the 0.10 level.

firms. If we use a sample period up to 1991, as done by Opler and Titman, and restrict the sample to firms with assets larger than US $50 million, our results are practically the same as theirs.

This section presents evidence that supports the importance of trade receivables management when firms are in trouble. We find, first, that decreases in trade receivables account for at least one-third of the drop in sales and stock returns of firms in financial distress. Additionally, highly leveraged firms in the throes of economic distress experience a significantly higher drop in sales if they cut their trade receivables.

Moreover, this section confirms the fact that our previous results are not caused by an endogenous relation in our model. The fact that the results are still present in this very different setting is quite encouraging.

VI. Concluding Remarks

In this paper, we study the effects of financial distress on trade receivables, and estimate the cost of financial distress due to inefficiencies in the investment in trade receivables. It constitutes, to our knowledge, the first attempt to understand the trade receivables policy of firms undergoing financial difficulties, and the first measurement of the effect of cutting credit to the firm's clients on the costs of financial distress.

We find that firms increase their level of trade receivables, presumably in an attempt to buy market share, when they have profitability problems, but change their policy when they are in financial distress, effectively reducing their investment in trade receivables. These results are robust to different definitions of financial distress. Additionally, our results suggest that financially distressed firms in concentrated industries seem to have sufficient market power to enforce a less painful term reduction in trade receivables, while financially distressed firms in competitive industries find it more difficult to reduce their trade receivables. We argue that this finding is due to the fact that the clients of firms in competitive industries are less pressured to maintain a reputation for reliable payment given the higher probability of supplier failure and the availability of alternative providers.

This paper also presents evidence on the importance of trade receivables policies for firms in financial distress. We find that drops in trade receivables account for at least one-third of the average drop in sales and stock returns experienced by firms in financial distress. This result is confirmed when we use a setting in which financial distress is exogenous to the performance of the firm. With these results, we supplement the explanation of the costs of financial distress reported in the literature.

Our analysis of the trade receivables policy of distressed firms and its significant impact on the costs of financial distress suggests new questions that warrant additional research. For instance, what is the impact of a suboptimal inventory for a firm facing financial trouble? When a firm faces tough times, does the management of the firm's current assets have an important role in reducing costs of financial distress? These are areas for future exploration. ■

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