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journal homepage: [www.elsevier.com/locate/jfec](http://www.elsevier.com/locate/jfec)Customer concentration and loan contract terms<sup>☆</sup>Murillo Campello<sup>a,\*</sup>, Janet Gao<sup>b</sup><sup>a</sup> *Cornell University & NBER, 369 Sage Hall, 114 East Avenue, Ithaca, NY 14853-6201, United States*<sup>b</sup> *Indiana University, 1309 E 10th Street, Bloomington, IN 47401, United States*

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## ABSTRACT

We study pricing and non-pricing features of loan contracts to gauge how the credit market evaluates a firm's customer-base profile and supply-chain relations. Higher customer concentration increases interest rate spreads and the number of restrictive covenants featured in newly initiated as well as renegotiated bank loans. Customer concentration also abbreviates the maturity of those loans as well as the relationship between firms and their banks. These effects are intensified by customers' financial distress, the level of relationship-specific investments, and the use of trade credit in customer-supplier relations. Our evidence shows that a deeper exposure to a small set of large customers bears negative consequences for a firm's relations with its creditors, revealing limits to integration along the supply chain.

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## 1. Introduction

U.S. manufacturers attribute, on average, one-third of their sales to a small set of "large customers." A concentrated customer base is often cited as a positive factor in analyst reports, management forecasts, and even IPO prospectuses, as it is believed to increase economies of scale and improve operating efficiency. These arguments even find support in academic research (e.g., Irvine, Park, and Yildizhan, 2014; Patatoukas, 2012). Relying on

large customers has shortcomings, nonetheless. Major customers demand lower prices, purchase irregularly, and often delay payments (Fee and Thomas, 2004; Kelly, Lustig, and Van Nieuwerburgh, 2013; Murfin and Njoroge, 2014).<sup>1</sup> They also require firms to make relationship-specific investments (Allen and Phillips, 2000; Titman and Wessels, 1988). Shocks to large firms are also known to reverberate through their supply chain (Cohen and Frazzini, 2008; Kolay, Lemmon, and Tashjian, 2016). Critically, the literature has not examined whether a close association with fewer, larger customers exposes firms to costs and risks that may ultimately affect their access to credit. This issue becomes pressing as the level of customer concentration in the makeup of supply chains in the U.S. has increased in recent years.

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<sup>1</sup> These behaviors have attracted the attention of the financial press, with reports that large, powerful firms such as Walmart and P&G "abuse" their suppliers when paying for products. See *Wall Street Journal* article: "Small firms' big customers are slow to pay" (June 6, 2012).

This paper examines how the credit market evaluates a firm's customer base, showing how customer concentration, customer financial status, relationship investments, and various dimensions of customer–supplier relations affect a firm's creditworthiness. It does so looking at detailed data from private loan contracts between firms and their banks. The contract-level analysis we conduct is unique in allowing us to assess how informed lenders modify the terms of their credit offerings in response to the evolving nature of firms' customer base. We empirically examine the impact of customer concentration on several features of bank loans, including interest rate spreads, maturity, and the number of restrictive covenants. We also study the impact of customer concentration on the length and depth of the relationships between firms and their banks. Our results are new in revealing significant costs associated with firms' reliance on large customers. We show that these costs are manifested along various dimensions, pointing to limitations to deeper integration along the supply chain.

To perform our tests, we gather information on bank loan terms from LPC–Dealscan and merge that information with data on corporate customers from Compustat's Segment Database. Our data collection produces a comprehensive sample of 3,375 loans granted to 1,110 individual firms in the manufacturing sector over 25 years. We add to these data information on corporate failures, product differentiation, and other firm- and industry-level characteristics in order to sharpen our inferences.

Our baseline results can be summarized as follows. A more concentrated customer base generally increases both the interest rate spreads and the number of restrictive covenants featured in new (or renewed) bank loans. Customer concentration also reduces the maturity of those loans. These effects are statistically and economically significant. Controlling for bank identity, industry effects, macroeconomic conditions, and firm characteristics, a one-standard-deviation increase in customer concentration leads to 10 basis points higher interest spreads on bank loans; or a 6% higher loan markup compared to an average spread of 179 basis points. The same shift leads to 0.2 additional restrictive loan covenants; compared to the sample mean of 1.8 covenants. It also leads to a reduction in loan maturity by two months; compared to average maturity of 46 months. These magnitudes are significant given the highly competitive credit market that we study.

We also examine whether customer concentration affects the length and depth of firm–bank relations. We find that banks lend less to firms with more concentrated customer bases. Banks also abbreviate the duration of their credit relationships with those firms.

Estimates of the relation between customer concentration and borrowing terms are subject to empirical biases. In particular, one may argue that unobserved characteristics might cause a firm's customer concentration to increase and its credit terms to deteriorate. This is a tall order in light of the documented positive association between customer concentration and firm profitability — a relation that we verify in our data. To alleviate concerns about estimation biases, we experiment with a testing approach that uses M&A waves in customers' industries (downstream industry mergers) as an instrument for con-

centration. Downstream M&A activity is a plausible instrument for two reasons. First, it is related to customers' own growth prospects (see Erel, Jang, and Weisbach, 2015; Fee and Thomas, 2004) and following mergers in customer industries, suppliers face higher customer concentration (*inclusion restriction*). Second, downstream M&A activity is not a policy variable for suppliers and need not affect their borrowing terms through channels other than customer–supplier linkages (*exclusion restriction*).<sup>2</sup> We go a step further and incorporate in our test strategy downstream M&A activity that is triggered by Acts and Orders by the Federal Government that alter prices, entry, and other elements of the competitive environment.<sup>3</sup> Our IV estimations confirm the prior that following high levels of M&A activity in downstream industries, firms observe higher customer-base concentration. This (instrumented) shift, in turn, leads to costlier, stricter borrowing terms, as well as shorter banking relationships, confirming our baseline tests.

Aside from increasing loan markups, customer concentration is also related to higher profitability (Patatoukas, 2012). More profitable firms tend to receive lower loan rates as higher cash flows may absorb losses and prevent default. As such, our reduced-form estimates are limited in that they only show the effect of customer concentration on loan contract terms net of the effect from profitability. Indeed, the estimation of models with interactive effects suggests that at a very high level of profitability, the detrimental impact of customer concentration on bank credit is reduced. In other words, profitability modulates the impact of customer concentration on loan spreads. To gauge the direct impact of customer concentration, we estimate systems of equations that take into account the joint dynamics of loan markups, profitability, and customer concentration. We do so using both a three-stage-least-square (3SLS) and a generalized method of moments (GMM) approach. Estimations from both approaches suggest that, despite its positive impact on profitability, customer-base concentration is associated with higher loan markups.

Our empirical investigation further characterizes the channels through which customer concentration affects the credit terms offered by banks. As highly regulated intermediaries, banks are acutely concerned about loan underperformance. If higher customer concentration is associated with higher rates of loan underperformance, banks should naturally impose stricter loan terms. To examine this conjecture, we identify loan failures by matching our sample with the corporate default database used in Chava and Jarrow (2004) and Chava, Stefanescu, and Turnbull (2011). We find a positive, significant relation between customer concentration and loan failure rates. To wit, a one-standard-deviation increase in a firm's customer

<sup>2</sup> Bearing in mind concerns that suppliers' industry-level, time-varying dynamics could influence customers' M&A activity and credit terms, we further account for industry-year-fixed effects in our tests. To avoid contagion effects, we also remove data from firms whose secondary SIC codes coincide with their customers' SIC codes. A number of proxies capturing industry competitive dynamics are further added to the analyses.

<sup>3</sup> Examples of Federally mandated Acts and Orders that we use include the Natural Gas Wellhead Decontrol Act of 1989, the Energy Policy Act of 1992, the Trucking Industry and Regulatory Reform Act of 1992, and the Telecommunications Act of 1996.

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