Building a Customer Base under Liquidity Constraints*

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Abstract

Do liquidity constraints limit the formation of a customer base? This paper uses a unique data set covering the universe of intra-EU trade relationships of French firms to test this hypothesis. We identify the causal effect of liquidity constraints by relying on a reform that set a limit to the number of days in which French firms could contractually pay each other. We show that the reform reduced working capital needs with French customers, unlocking cash to initiate new international trade relationships. Our results indicate that a decrease of payment periods in the domestic market by 3 days (a sample standard deviation) reduces working capital by 120,000 euros and raises export growth by 1.5 percentage points. Export growth is achieved by expanding the set of customers, not by increasing sales with existing customers. Firms do not seem to attract new customers by charging lower prices. Instead, our results suggest that product market frictions represent the main obstacle to the accumulation of customer capital.

JEL codes: F14, G31.

Key words: liquidity constraints, customer capital, trade credit, IV estimation.

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1 Introduction

Why do some firms attract more customers than others? The ability of a firm to build and to maintain a demand for its products (or "customer capital") is a key driver of its size, survival, and long-term profitability. Yet, surprisingly little research has been devoted to identifying the firm-level determinants of customer capital. This paper attempts to fill this void by exploring the role of liquidity constraints in the formation of a network of customers.

There are two main channels through which firms invest in customer capital. First, firms devote considerable marketing resources to developing and securing a customer base. US firms spend about as much in advertising as they do in R&D, with estimates of total marketing expenditures ranging from 2 to 8% percent of GDP (Arkolakis, 2010). Second, firms may offer price discounts to attract new customers and retain existing ones. In both cases, firms give up a fraction of present cash-flows to invest in future trade relationships. Liquidity-constrained firms are likely to put more value to immediate cash-flows and therefore to invest less in customer capital (Chevalier and Scharfstein, 1996).

Using a unique customer-supplier data set, we show in a quasi-experimental setting that liquidity constraints limit firm growth on the *demand* side. Specifically, our results indicate that in response to a positive liquidity shock, firms increase sales by expanding their customer base. By contrast, the effect on sales with existing customers is not significant. Looking at the economic mechanism, we find that firms do not appear to charge lower prices following the liquidity shock. Instead, the expansion of the customer base is more pronounced when product market frictions (search costs, switching costs) are high. These findings suggest that (i) liquidity-constrained firms under-invest in customer capital and (ii) for liquidity-constrained firms, overcoming product market frictions is the main obstacle to the expansion of their customer bases.

We develop a stylized model to rationalize the link between liquidity constraints and product market frictions. Firms incur marketing costs to build their demand. Marketing serves two purposes: acquiring and retaining customers. When product markets are more frictional, switching suppliers is more costly for customers, and customer acquisition becomes relatively more important for suppliers. Unlike retention costs, acquisition costs have however to be paid

before any transaction takes place. We introduce liquidity constraints by assuming that only an exogenous fraction of future sales can be pledged to finance customer acquisition costs. Our model predicts that the effects of the policy will be larger in frictional product markets as access to liquidity is more important when identifying and attracting customers is relatively more costly.

The empirical strategy that we develop relies on an exogenous liquidity shock generated by the enactment of a 2009 French law (the "policy"). The policy introduced a cap on the payment terms authorized in transactions contracted under the French trade code. Specifically, firms were required to pay their suppliers within 60 days, otherwise they would be exposed to important legal sanctions. This resulted in a large decrease in payment periods for firms operating in France. Importantly, for financially constrained firms, this large variation in payment terms acted as a positive liquidity shock. Consistently with Barrot (2016), we show that firms more exposed to the policy ex ante exhibit lower working capital needs and higher cash ratios after its enactment.

The restriction of trade credit contracts could also affect the ability of suppliers to initiate and maintain trade relationships (Breza and Liberman, 2017). To isolate the impact of the liquidity shock on customer capital, we focus on the effects of the policy on international transactions. Indeed, unlike transactions occurring between French firms, export transactions were not affected by the 60-days cap. The mechanism that we study, therefore, is the effect of lower domestic payment periods on the accumulation of international customer capital. The focus on international transactions is moreover a natural starting point for our research question as previous research shows that they generate important working capital needs and are subject to large product market frictions.[1] We rely on an extensive data set recording the quasi-universe of product-level transactions between French exporters and their EU-based customers to keep track of international customer capital.

Our identification strategy is based on the observation that firms that were paid in 90 days before the policy change were more likely to be affected than firms that were already paid in less than 60 days. The distance to the 60-days threshold, however, is likely to be correlated with

[1] See Hummels and Schaur (2013); Schmidt-Eisenlohr (2013) for evidence on working capital needs and Feenstra, Li and Yu (2014); Rauch (1999); Eaton et al. (2014) on search frictions.

unobservable variables (suppliers' bargaining power, for instance). We address this issue by designing a "shift-share" variable (Bartik, 1991) based on the heterogeneity of payment terms in downstream sectors. This "shift-share" variable serves as an instrument of the variation of payment periods. Our estimations therefore compare customer capital dynamics between firms present in sectors with high payment periods before the policy to firms operating in sectors with low payment periods. Moreover, we exploit the granularity of our data set by introducing both country-year and firm fixed effects. The estimates are therefore immune to the confounding effects of country-level shocks during the 2008 trade collapse as they are based on the comparison of export dynamics in a given market and in a given year between firms differentially affected by the policy (Paravisini et al., 2014).

Our baseline specification indicates that being paid three days earlier by domestic customers (the sample standard deviation) raises export growth by 1.5 percentage points. To give an idea of the magnitude of the shock, a 3-days decrease in payment delays implies that the average firm permanently unlocks 120,000 euros in cash.[2] When decomposing the impact of the policy on export growth, we find that the totality of the effect is driven by an expansion of the customer base of exporters. More precisely, two thirds of the increase in export growth comes from the acquisition of new customers, the remaining part being driven by a higher retention of existing ones. Furthermore, we find that the positive liquidity shock increased entry into new countries and limited the exit rate (country extensive margin).

Our results resist to a battery of robustness checks, of which we mention the three main ones for brevity. First, we modify the definition of the instrument to account for the fact that the weights in the construction of the Bartik instrument might be endogenous. Second, we look at export dynamics at the product level and allow for differentiated demand shocks across products. Third, we simultaneously take into account payment from customers and payment to suppliers when assessing the effects of the policy. Our main findings remain unchanged. Looking for alternative interpretations of the results, we show that firms that were exposed to the policy did not experience higher export growth prior to its enactment, which rules out the presence of confounding pre-trends. We also check that the increase in export growth is not

[2]The average turnover of firms in our sample is 14,6 million euros, which means that a 3-days decrease in payment delays unlocks 3/365*14,6 = 0.12 million euros.

explained by firms reallocating their activity from the domestic market to international ones and find no effect of the policy on domestic sales.

Comparing how the policy affected export growth across the different countries served by firms, we find evidence that firms invested more in customer capital in countries where they had a low pre-policy market share. We interpret this finding as evidence that investment in customer capital exhibit decreasing returns to scale (Bagwell, 2007). Sales per customer did not seem to vary following the shock, suggesting that new customers were similar to the incumbent customer base. Similarly, firms did not alter their product mix following the policy and sold the same products to new customers than to existing ones.

Digging further into the mechanism, we first test whether firms expand their set of customers by charging lower prices. We find no impact of the decrease in payment periods on prices (as measured by unit values), even when allowing for differentiated pricing strategies between new and existing customers. We then investigate how the effects of the policy varied with the intensity of product market dynamics. Building on the methodology of Garicano and Steinwender (2016), we show that within a firm, export growth increased more following the policy for products that are not sold on organized exchanges (Rauch, 1999) or for which change in suppliers are less frequent (Martin, Mejean and Parenti, 2018). This finding implies that liquidity frictions reduces more the value of investing in customer capital when the customer search process is more likely to fail. Overall, the results indicate that product market frictions constitute the main obstacle to the accumulation of customer capital.

Related literature. Our work contributes to the growing literature that explores the role of financial frictions in shaping export dynamics. Manova (2013) and Chaney (2016) spawned this strand of research by expanding the workhorse model of Mélitz (2003) to delineate the influence of financial constraints on international trade patterns. Using aggregate data, Manova (2013) estimates that one third of the effect of financial frictions on trade comes from the reduction of the number of countries in which firms export (country extensive margin). Conversely, using export-level data on Peruvian firms, Paravisini et al. (2014) show that the 2008 bank credit crunch affected exports solely at the country intensive margin, and conclude that a reduction

of bank credit supply is observationally equivalent to an increase in variable trade costs.[3] We find that such equivalence does not hold for internal financing, as the reduction of liquidity constraints also had effects at the country extensive margin. Moreover, we provide new evidence that short-term financing frictions affect the customer extensive margin, but not the intensive one.

The concept of market penetration costs introduced by Arkolakis (2010) in the context of international trade allows to rationalize this finding. Unlike fixed costs of entry, penetration costs rise with the targeted number of customers in a market. They do not, by contrast, depend on the average amount of sales per customer.[4] The effects that we uncover on the acquisition of customers are consistent with the policy allowing firms to finance the penetration costs required to expand their customer base. By extension, the policy affected the country extensive margin through the impact on firms that were close to leaving or entering a market (marginal firms). Overall, the finding that liquidity constraints raise market penetration costs rather than the variable cost of exporting suggests that access to short-term financing may exert a larger role on aggregate trade than previously thought.[5]

Our work also contributes to the literature investigating the influence of capital structure on the product market decisions of firms (e.g., Phillips (1995); Chevalier (1995) on the role of leverage and Frésard (2010); Boutin et al. (2013) on cash holdings). Chevalier and Scharfstein (1996) show in a model featuring both financing and product market frictions that liquidity-constrained firms under-invest in the acquisition of customers as they discount more future cash-flows.[6] The authors find evidence that financially constrained supermarkets raise their prices more during economic recessions, which helps rationalize the observation that aggregate measures of markups tend to be counter-cyclical.[7]

[3] See also Caggese and Cuñat (2013), Feenstra, Li and Yu (2014) or Schmidt-Eisenlohr (2013) for theoretical contributions and Amiti and Weinstein (2011), Minetti and Zhu (2011) for empirical ones.

[4] Penetration costs therefore regroup all the costs associated with the acquisition and the retention of customers (*e.g.*, marketing costs, provision of trade credit).

[5] Indeed, in a recent empirical study, Bernard, Moxnes and Ulltveit-Moe (forthcoming) find that the number of importers (customer extensive margin) is twice as important as average sales by customer (customer intensive margin) in explaining bilateral trade volumes.

[6] Dou and Ji (2018) embed the model of Chevalier and Scharfstein (1996) in a dynamic general equilibrium setting. They show that both precautionary cash holdings and general equilibrium effects tend to reduce the sensitivity of prices to aggregate shocks.

[7] Gilchrist et al. (2017) recently reexamined this theory in the context of the 2008 financial crisis and showed using Compustat data that liquidity-constrained firms were responsible for the lack in deflationary pressures

Unlike previous research, we are able to jointly track prices, quantities *and* the identity of customers and thus provide the first direct evidence of a causal effect of liquidity constraints on the dynamics of customer capital. Our results, moreover, contrasts with the existing literature by emphasizing the role of non-price actions in the creation of a customer base. This finding is in line with recent research suggesting that firms might be primarily investing in customer capital through marketing and advertising activities.[8,9] Our paper suggests that research on the cyclicality of markups should also consider the role of customer search costs, as financially constrained firms may not necessarily charge higher prices during recessions but instead cut advertising expenditures.

By uncovering a causal link between financing capacity and customer accumulation, our results eventually resonate with recent research emphasizing the role of demand factors in the determination of firm size.[10] Hottman, Redding and Weinstein (2016) use barcode data to show that 50 to 75 % of the heterogeneity in firm size is explained by variations in demand, while less than 20% is driven by differences in technical efficiency. Similarly, Bernard et al. (2019) find that 81% of the variation in firm sales in the Belgian production network originate from factors related to the number and the identity of customers. This paper provides one explanation for this heterogeneity in demand, as differences in customer capital can in our setting be traced back to the presence of financing frictions.

Section 2 briefly presents the institutional details of the policy and discusses its effects on firms' access to liquidity. The different data sets and descriptive variables are presented in section 3. Section 4 breaks down the different steps of the identification strategy. The results of the main estimations as well as of various robustness checks are given in section 5. We investigate the economic channels of the policy in section 6. Section 7 look at how firms invest

following the large decrease in demand. See also Campello (2003).

[8]Using micro data on Irish exporters, Fitzgerald, Haller and Yedid-Levi (2016) observe that while prices stay unchanged, export quantities substantially increase with time spent in a market. Based on a structural model, they estimate that 20 to 30% of firm cash flows are devoted to non-price investments in the customer base. See also Fitzgerald and Priolo (2018).

[9]Dou et al. (2019) show that firms' ability to attract key talents affects the attractivity of their brands. Higher wages for key talents may therefore constitute a form of non-price investment in customer capital.

[10]This area of research has explored the role of demand variation on industry dynamics (Foster, Haltiwanger and Syverson, 2008, 2016; Dinlersoz and Yorukoglu, 2012), the size distribution of firms (Hottman, Redding and Weinstein, 2016; Arkolakis, 2016), the relation between Tobin's q and investment (Gourio and Rudanko, 2014).

in customer capital and section 8 concludes.

2 Institutional and theoretical context

2.1 Presentation of the policy

Faced with a general increase in payment periods across European economies, the European Union called in the beginning of the 2000s on the member countries to take action against what was considered to be a financial burden on SMEs. In response, the French government passed a law in 2001 setting by default payment terms at thirty days after reception of the product. The 30-days limit was however only indicative and rarely applied in practice.

Acknowledging the limitations of the 2001 law, the French government enacted in 2006 a reform limiting contractual payment terms to thirty days in the trucking sector (see Barrot (2016) for more details). The "policy" extended this limit to any transaction involving French firms, regardless of the sectors they were operating in. The policy was voted in 2008 and was part of a large reform called "Law on the Modernization of the Economy" (or LME) implemented in 2009.[11]

The policy prohibited firms as of January 1st 2009 from agreeing on contractual payment terms exceeding sixty days after reception of the invoice (or 45 days following the end of the month).[12] The government ensured that the policy was implemented by introducing large sanctions for non-complying firms and by urging the French competition authority to conduct audits to detect bad payers.[13]

Importantly, the policy solely applied to transactions contracted under the French trade code.

[11]The Law of Modernization of the Economy was not limited to payment periods. The law introduced a broad set of measures : simplified procedures for self-employers, removal of regulatory hurdles to apply for public procurement contracts, etc. More importantly, the law facilitated price discrimination between suppliers and customers. These measures are however not a concern for identification. Indeed, the payment periods reform is the only one relying a specific payment periods threshold. Consequently, the exposure of firms to the payment periods policy through their distance to this threshold is unlikely to be correlated with the other LME measures.

[12]Importantly, asking suppliers to delay their invoices is considered as an abusive practice and is subject to important sanctions.

[13]Contractual payment terms exceeding the legal limit must be reported to public authorities by firms' accounting auditors. Penal procedures can be initiated in case of a violation and may result in a 75,000 euros fine. Non-complying firms are subject to civil sanctions amounting up to 2 millions euros. In 2015, for instance, a major telecom group had to settle a fine of 750 000 euros following several complaints from suppliers. See TelecomPaper.com (2015).

Therefore, it did not directly affect exporters as they could circumvent the cap on payment terms by contracting with the importer under the trade code of the foreign counterpart or the CISG[14] international trade code.[15]

The legislators were aware that a "one-size-fits-all" approach could have been detrimental to the economic activity of some firms or even impossible to implement in practice. As a result, some temporary derogations were granted for some sectors of activity. The complete list of derogations is displayed in appendix I. We discuss how derogations are dealt with in the presentation of the empirical setting.

To illustrate the policy and its implementation, figure 1 displays the evolution of days of sales outstanding between 1999 and 2013 in the manufacturing and wholesale sector (the data sets and the construction of the measures are described in section 3) for firms whose total exports represent less than 10% (blue solid line) and more than 50% (red dashed line) of total sales on average. The introduction of the policy is correlated with a dramatic decrease in payment periods for firms operating mainly in the domestic market, from around 77 days in 2007 to 71 in 2009.

[Insert figure 1 here]

A few comments are in order here. First, exporters consistently face longer payment periods than domestic firms, which is consistent with the idea that transportation time comes on top of payment periods. Moreover, while payment periods decreased markedly for domestic firms before 2009, there is no break in the trend for firms operating mainly in international markets. This confirms that the policy did not directly affect international transactions, and left unaffected firms operating mostly in international markets.

Second, the sharp decline of payment periods one year before the implementation of the law reflects that the law has largely been anticipated (ODDP, 2009). Professional organizations were indeed aware of the legislation since they were part of its preparation. Moreover, French firms are required by the law to publish their general terms and conditions in the first quarter of each year. This document notably details the menu of unit prices and payment conditions for

[14] Convention on Contracts for the International Sale of Goods, also known as the Vienna Convention)
[15] See Le Roch and Bricq (2013) for more details (in French)

the year to come. In order to comply with the policy as of January 1st 2009, firms had therefore to apply this rule in advance.

Finally, one might also suspect that the decrease in payment periods have been caused by the coincident 2008 financial crisis. If anything, however, the crisis lead firms to further delay their payments, not shorten them (Garcia-Appendini and Montoriol-Garriga, 2013). Moreover, payment periods approximately stayed at their 2009 level in 2012 even though the financial conditions had largely returned to normal in the meantime. The persistence of the reduction in payment periods strongly suggests that the observed drop between 2007 and 2009 was not driven by the financial crisis.

2.2 Trade credit provision and liquidity constraints

Should a cap on payment terms mitigate firms' liquidity constraints? Traditional analysis of trade credit would give the opposite prediction. Given the large cost of trade credit, the corporate finance literature has rationalized the presence of interfirm lending as an optimal answer to liquidity frictions affecting customers.[16] The different theories based on this idea predict that trade credit flows from large, creditworthy suppliers to small and financially constrained customers.[17] Consistently with this view, Garcia-Appendini and Montoriol-Garriga (2013) show that liquidity-rich suppliers increased their provision of trade credit to liquidity-poor customers during the 2008 financial crisis.[18]

[Insert figure 2 here]

This traditional view has been challenged by empirical studies showing that firms with high bargaining power actually receive trade credit from smaller, potentially financially constrained suppliers (Klapper, Laeven and Rajan, 2012; Fabbri and Klapper, 2016).[19] Murfin and Njoroge

[16] Ng, Smith and Smith (1999) estimate the cost of trade credit to be as high as 44% in annualized terms.

[17] By assumption, in the absence of trade credit, customers would be unable to finance their purchases through bank credit. Suppliers may then fill the void left by banks because of a greater ability to screen customers (Smith, 1987; Biais and Gollier, 1997), to prevent fund diversion (Burkart and Ellingsen, 2004; Cunat, 2007) or to liquidate intermediate goods (Long, Malitz and Ravid, 1993). Providing trade credit to customers is optimal from the point of view of suppliers as it allows to increase total sales.

[18] See also Restrepo, Sosa and Strahan (forthcoming) for evidence of increased reliance on accounts payable in face of an adverse shock on short-term bank financing.

[19] Anecdotal evidence suggests that the financial gains at stake are massive for high bargaining power firm. In 2015, for instance, when Procter & Gamble unilaterally extended its payment terms to all its suppliers by 30 days, the cash balance of the company nearly doubled (Esty, Mayfield and Lane, 2016).

(2015) shows that the provision of trade credit depletes small firms' internal funds, leading them to cut back capital expenditures.[20] Under this view, capping payment terms might be a way to limit the transfer of liquidity from small supplier to high bargaining power firms through the provision of trade credit.

There are good reasons to believe that the second view prevails in our case. Figure 2 plots the average payment periods from customers faced by firms in our data set for the year 2007. Firms are sorted by size decile, which we measure using total sales. The distribution of payment periods shows that small firms were disproportionately exposed to long payment periods, which is hard to reconcile with the first view of trade credit. Looking at the effects of an early implementation of the policy in the trucking sector in 2007, Barrot (2016) finds that the cap on payment periods lead to a decrease in working capital needs and to lower rates of corporate defaults. This finding strongly supports the hypothesis that long payment periods exacerbates liquidity constraints.[21]

Note we do not take a strong stance on whether a cap on payment delays is in itself welfare-improving or not. Our focus is on the effects of the policy on the accumulation of customer capital, and a detailed analysis of the distortions introduced by the cap would accordingly be beyond the scope of the paper. We take however into account the potential negative effects of the cap when they can prove to be a danger for identification. In particular, the restriction on payment terms may have made suppliers less able to attract or to retain domestic customers though the provision of trade credit (Breza and Liberman, 2017; Demir and Javorcik, 2018; Singh, 2017). This observation motivates our focus on international transactions as they were not directly affected by the policy. Our empirical analysis attempts therefore at capturing the

[20] Providing trade credit would not consume internal liquidity if receivables were readily convertible into cash. Empirical evidence suggests however that the use of working capital financing solutions such as factoring is largely limited to big firms. High costs or a lack of visibility are the main obstacles put forward to explain the low penetration of this type of short-term financing (Garcin and Charpin, 2013).

[21] There is, however, a "third" view of trade credit that is compatible with high bargaining power firms receiving trade credit and that would predict a negative effect of the policy. Giannetti, Serrano-Velarde and Tarantino (2017) argue for instance that unlike price discounts, offering trade credit does not reduce the marginal cost of the customer. Granting large payment delays might therefore be a way for firms to limit the expansion of high bargaining power customers so as to preserve profitable trade relationships with low bargaining firms. A last strand of papers posits that trade credit amounts to a short-term leasing of the product (Long, Malitz and Ravid, 1993; Kim and Shin, 2012). In presence of uncertainty over the quality of the product, trade credit might be an optimal way to incentivize suppliers to satisfy the requirements of their customers. However, both theories predict that the policy should have negative effects on domestic sales, which is not the case in our setting. See section 6.2 and appendix V for more details.

effects of a cap on payment periods from domestic customers on the expansion of the set of international customers.

2.3 A stylized model of investment in customer capital

In this subsection, we conduct a partial equilibrium analysis of the role of liquidity constraints in the accumulation of customer capital. Our stylized model delivers testable predictions which will guide the empirical analysis.

We consider a unique representative firm facing a continuum of identical customers present in one single product market. There are two periods denoted by 1 and 2. By simplicity, the risk-free interest rate is set equal to zero. A commercial transaction with a customer delivers with certainty profit $a > 0$ to the firm at time 2. The exogenous parameter a reflects both the profitability of the firm and the level of demand in the product market

Firms must undertake marketing activities to match with x customers. The level of marketing expenditures rise with the targeted number of customers and is given by cx^{ρ}. Both $c > 0$ and $\rho > 1$ are exogenously determined. The matching with customers is assumed to take place in two steps: potential customers are made aware of the existence of the firm at time 1 ("customer acquisition"), and induced to trade with firm f at time 2 ("customer retention"). Accordingly, the firm spends a fraction $0 < \gamma < 1$ of total marketing expenditures at time 1 in customer acquisition and the remaining share $1 - \gamma$ at time 2 in customer retention.

The temporal structure of marketing expenditures (governed by the parameter γ) is determined by the intensity of product market frictions. When it is costly to identify customers (high search costs) or to switch suppliers (high input specificity), customer acquisition is likely to be more important for the firm (high γ). Conversely, firms operating in fluid product markets are likely to devote relatively more effort to maintain their existing customer base (low γ).[22]

Liquidity constraints are introduced by assuming that the firm can not obtain more than a

[22]The optimal mix between acquisition and retention spending is the subject of a wide literature in marketing (for instance, see Reinartz, Thomas and Kumar (2005); Ovchinnikov, Boulu-Reshef and Pfeifer (2014)). Min et al. (2016) show in particular that retention spending is the most cost-efficient way of investing in customer capital in competitive markets.

fraction $0 < \kappa < 1$ of its future sales to finance customer acquisition spending in period 1:

$$\gamma c x^{\rho} \leq \kappa a x \tag{1}$$

We borrow this specification of the working capital constraint from Bigio and La'o (2016).[23] A low parameter κ makes the liquidity constraint more severe.

The specification of marketing costs implies that without liquidity constraints, the firm would spend a fraction $1/\rho$ of its sales in marketing. It follows that the firm is liquidity constrained if and only if

$$\frac{\kappa}{\gamma} < \frac{1}{\rho} \tag{2}$$

Equation 3 states that all other things equal, a firm is more likely to be liquidity-constrained when the product market is frictional (high γ). The reason for this is that a greater share of marketing expenditures has to be financed in advance, leading the working capital constraint to bind more easily. Firms are also more likely to be liquidity constrained when marketing costs increase less quickly with the number of targeted customers (lower ρ). Writing $\xi = \min(1/\rho, \kappa/\gamma)$, it follows immediately that at the optimum, the number of customers x^* is given by

$$x^* = \left(\frac{a\xi}{c}\right)^{\frac{1}{\rho-1}} \tag{3}$$

Investment in customer capital is increasing in the value of a customer a and decreasing in the cost of marketing c. We can see moreover that the size of the customer base does not depend on product market frictions when the firm is not liquidity constrained. This allows us to write

Proposition 1. *Following a positive liquidity shock (increase in κ), investment in customer capital will increase more in the presence of high financing or product market frictions. In particular, investment in customer capital is not be affected by the shock if the firm is not liquidity constrained ex ante (*ie, $\kappa/\gamma \geq 1/\rho$*).*

We test the different implications of the proposition in the remaining part of the paper.

[23] Bigio and La'o (2016) show in particular how the constraint can be micro-founded in a limited commitment setting.

3 Description of the data sets

We use firm-level data sets coming respectively from the French customs (firm-to-firm exporting transactions), the French fiscal administration (balance sheet as well as profit and loss statements) and the French National Institute of Statistics (Insee). The different sets of data are merged via a unique firm identifier.

3.1 Customs data

We use a French custom data set which records all transactions occurring between 2003 and 2012 involving a French exporter and an importing firm located in the European Union. For each transaction, the data set records the identity of the exporting firm (its SIREN identifier), the identification number of the importer (VAT number), the date of the transaction (month and year), the product category (at the 8-digit level of the combined nomenclature) and the value of the shipment. On average, 85% of French exports in value are realized every year by importing firms that were also present the year before, a sign of the good quality of the customer identifier. We follow Bergounhon, Lenoir and Mejean (2018) for the remaining data cleaning.

In most of the following analysis, the data is aggregated at the firm f, year t and country m level. For a given (f,m,t)-triplet, however, we distinguish exports realized with a customer c active with firm f at both time t and $t-1$ (*stable* customer), not active at time $t-1$ but is at time t (*new* customer), or active at time $t-1$ but not at t (*lost* customer). Export growth is then computed as :

$$\begin{aligned}\Delta Exports_{f,m,t} &= \frac{2*(Exports_{f,m,t} - Exports_{f,m,t\text{-}1})}{(Exports_{f,m,t} + Exports_{f,m,t\text{-}1}} \\ &= \frac{2*(Exports^{S}_{f,m,t} - Exports^{S}_{f,m,t\text{-}1})}{(Exports_{f,m,t} + Exports_{f,m,t\text{-}1}} + \frac{2*(Exports^{N}_{f,m,t} - Exports^{L}_{f,m,t\text{-}1})}{(Exports_{f,m,t} + Exports_{f,m,t\text{-}1}} \\ &= \Delta Stable\ customers_{f,m,t} + \Delta Customer\ base_{f,m,t}\end{aligned} \tag{4}$$

where the subscripts S, N and L respectively denote stable, new and lost customers.

To measure exports growth, we use the "mid-point" growth rate introduced by Davis,

Haltiwanger and Schuh (1996) as it is conveniently bounded.[24] This decomposition allows to separate the share of the growth of exports that is due to a variation of sales with existing customers ($\Delta Stable\ customers_{f,m,t}$) from the contribution of the evolution of the customer base ($\Delta Customer\ base_{f,m,t}$).[25]

The extensive margin is analyzed through the lens of the variables $Entry_{f,m,t}$ and $Exit_{f,m,t}$ which are respectively equal to 1 when firm f enters (exits) country m at time t. By construction, $Exit_{f,m,t}$ ($Entry_{f,m,t}$) is only defined if firm f was exporting (was not exporting) in country m at time $t-1$.

3.2 Profitability, capital structure, sales by sector

The second data set comes from tax returns collected by the French fiscal administration. This data set gives accounting information for the whole universe of French firms in the private economy (excluding the financial and agricultural sectors) between 2003 and 2012. In addition to balance sheet information, a 5-digits sector code (along the NACE, the EU economic activity nomenclature) is provided. As we focus on the effects of the policy on international transactions, we restrict our analysis to the two main exporting industries, the manufacturing and wholesale sectors. To correct for reporting errors we systematically replace outliers of all variables by missing values.[26]

To identify precisely the different sectors in which firms operate, we rely on an extensive yearly survey conducted by the Ministry of Industry (Enquête Annuelle des Entreprises, "EAE"). The survey is exhaustive for French firms with more than 20 employees or whose sales exceed 5 millions euros and records the amounts of sales realized by each surveyed firms in each 5-digits sector.[27] The total turnover of the firms included in the sample represents more than 95% of the aggregate turnover.

[24] Our results are entirely robust to using the standard growth rate, but we have to take into account the presence of very large values of the variation of international sales. See table A5 of the online appendix.

[25] We focus on export growth conditional on survival. Namely, we record $\Delta Exports_{f,m,t}$ only when firm f exports in m both at time t and $t-1$.

[26] We define an outlier as an observation that is superior (resp. inferior) to the median plus (resp. minus) three times the gap between the 5th and the 95th percentile. This treatment imposes less structure on the data than winsorizing outliers and is more flexible than trimming a given fraction of the distribution of the different variables.

[27] The firm-level sector code available in the tax returns corresponds to the sector in which the firm realizes the most of its activity.

3.3 Measuring payment periods

Transaction-level payment information is not reported in our data set. Instead, we rely on balance sheet statements to compute a firm-level measure of the time taken to collect payment from clients:

$$Days\ of\ sales\ outstanding_{f,t} = \frac{Accounts\ receivable_{f,t}}{Sales_f} * 365$$

$Accounts\ receivable_{f,t}$ gives the amount of sales that customers of firm f still haven't paid at time t. The ratio is multiplied by 365 to be interpretable in terms of days. $Days\ of\ sales\ outstanding_{f,t}$ reflects the average payment period between firm f and its customers for a given fiscal year t. Symmetrically, we estimate the average time taken for a firm to pay its suppliers by

$$Days\ payable\ outstanding_f = \frac{Accounts\ payable_f}{Purchases_f} * 365$$

We focus on days of sales outstanding in most of the analysis and we take the supplier side into account in robustness checks.[28]

[Insert table 1 here]

Table 1 displays the sectors with the highest and lowest average value of DSO and DPO in 2007. Strikingly, high payment periods appear mostly in heavy industries. By contrast, low payment periods are observed nearly exclusively for food processing firms. This is consistent with the prediction of Long, Malitz and Ravid (1993) that product durability should be positively correlated with average payment terms.

Importantly, while this measure provide sensible information at the aggregate level, there might be important measurement errors at the firm-level. The computation method indeed assumes that accounts receivable (or account payable) are evenly distributed over the fiscal exercise. The instrumentation method described in the next section explicitly deals with this issue.

[28]The source of identification in the baseline empirical strategy comes from a differential exposure to the policy due to an heterogeneous presence of firms in downstream sectors prior to the policy. The breakdown of sales by downstream sector is given by the EAE survey. The survey, however, does not record the sectors of the suppliers (upstream sectors) of the firms in the sample, which makes the analysis with days payable outstanding less precise.

3.4 Final sample and descriptive statistics

[Insert table 2 here]

As the identification strategy requires to observe the breakdown of sales by sector, the final sample is restricted to firms present in the EAE survey. The description of the construction of the different variables is summarized in panel A of Table 2 and their distributions are presented in panel B. The data set contains 173,749 firm-year observations (approximately 17,000 firms per year) and accounts for approximately 80% of total export to the European Union by manufacturers and wholesalers between 2003 and 2012. Firms belong mostly to the manufacturing sector (71 %) and are on average relatively mature (median age of 24 years). Panel B of table 2 shows moreover that average total assets is around 11.3 millions euros.

[Insert table 3 and table 4 here]

The average firm in our data set exports 9 millions euros in the European Union, is present in 7.2 countries and has 5.0 customers per country (table 3). Table 4 shows that the number of customers increases with the number of years spent in a country, with about 8.8 customers on average after five years compared to 3.6 in the year of entry. Similarly, we observe that the probability that a firm exits a country or terminates a trade relationship with a customer of this country decreases with the time spent in the market.

4 Identification strategy

Several specificities of the policy described in section 2.1 makes it challenging to use for causal inference:

(a): Control group No natural control group emerges as this policy affects all sectors.

(b): Unobserved heterogeneity As is shown in the literature, payment terms of a contract are likely to depend on the bargaining power of the firm, which in turn might be correlated with its ability to export. Therefore, OLS regressions of export patterns on the evolution of payment periods may be biased.

(c): Measurement error Payment periods are imperfectly observed and are only available at the firm-level (see subsection 3.3).

(d): Financial crisis The policy was enacted in the middle of the global 2008 financial crisis. The crisis triggered a sharp decrease in global exports ("trade collapse") and had in particular a large negative impact on French exports (Bricongne et al., 2012). Not properly accounted for, any inference would be subject to the risk of being contaminated by the confounding impact of the crisis.

We outline the strategy designed to address these points in the following subsections. The econometric design is based of three main components, namely the exploitation of the heterogeneity in exposure to the reform (subsection 4.1), the introduction of fixed effects at a granular level (4.2) as well as the use of control variables (4.3).

4.1 Description of the IV strategy

In the absence of a control group (item (a)), the heterogeneity in exposure to the policy is exploited as a source of identification. The 60-days rule provides a natural reference point. Firms that were paid in 80 days prior to the policy should in principle have been impacted more than firms which were paid in just 65 days. Moreover, the policy should have left suppliers that were already paid in less than 60 days virtually unaffected by the rule. We formalize this idea by defining

$$d(DSO,60)_f = \max(0, Days\ of\ sales\ outstanding_f - 60)$$

The maximum operator captures the fact that only firms that were facing payment periods higher than 60 days were exposed to the policy.

As mentioned in item (b) and (c), however, days of sales outstanding are only imperfectly observed and may be correlated to unobservable firm characteristics. We address these concerns by taking a step back and performing the analysis at the sectoral level. While payment conditions vary across sectors, they tend to be relatively homogeneous within a given product market (Ng, Smith and Smith, 1999). A first explanation is that most trade credit determinants emphasized

in the literature are homogeneous at the sector-level.[29] Second, as firms use the provision of trade credit to compete with each other (Singh, 2017; Demir and Javorcik, 2018), payment terms tend to be comparable within a sector. Consequently, firms which operate in sectors where the distance to the 60-days threshold was higher on average prior to the policy should have experienced a stronger liquidity shock.

This idea is implemented through the construction of a "shift-share" variable (Bartik, 1991)[30] defined by

$$\overline{d(DSO,60)}_{f,07} = \sum_s \omega_{f,s,07} \cdot d(DSO,60)_{s,07}$$

where $\omega_{fs07} = Sales_{fs07}/Sales_{f07}$ is the share of firm f's sales in sector s in 2007 total sales (observed using the EAE survey) and

$$d(DSO,60)_{s,07} = \frac{1}{N_{s,07}} \sum_{g \in \Omega_{s,07}} d(DSO,60)_{g,07}$$

is the average distance to the threshold in sector s taken from the universe $\Omega_{s,07}$ of all firms making less than 10% of their turnover abroad and operating primarily in sector s.[31] This variable captures the *ex ante* exposure to the policy based on the distance to the 60-days threshold in the sectors in which the firm was operating in 2007. According to this metric, firms were more exposed to the policy if they were present in downstream sectors with high payment periods in 2007.

[Insert figures 3 and 4 here]

As discussed in Borusyak, Hull and Jaravel (2018), two conditions are required for this shift-share variable to be considered as a valid exogenous factor. First, sectoral averages need to be uncorrelated to the individual unobserved characteristics. This will not be the case if for instance some firms are big enough to influence sectoral payment conditions. This concern is

[29] Among them one can mention the degree of product market competition (Brennan, Maksimovic and Zechner, 1988), the degree of uncertainty on the quality of the product (Long, Malitz and Ravid (1993) and Lee and Stowe (1993)) and the information advantage of suppliers over banks to observe product quality or to enforce high effort (Smith (1987), Biais and Gollier (1997), Burkart and Ellingsen (2004) or Cunat (2007)).

[30] See Berman, Berthou and Héricourt (2015) for another recent use of this type of strategy in an international trade setting.

[31] The main sector of activity is observable for all French firms; the average distance is therefore computed using information on over 800 thousands companies. Sectors with less than 10 non-exporting firms are discarded.

however mitigated by the fact that we take a simple average of days of sales outstanding within a sector[32] and that we only keep sectors in which we observe at least 10 firms. The second condition states that the 2007 heterogeneity in product market portfolio should not capture other factors that might affect export patterns. This potential issue is addressed in section 4.3 where the different control variables are defined.

In addition to dealing with the problem of unobserved firm-level heterogeneity (item (b)), this instrumentation strategy has the advantage of limiting potential biases due to the use of an imperfect proxy of payment periods (item (c)). By definition, *Days of sales outstanding*$_f$ compares the amount of sales generated in the whole fiscal year to the amount of receivables recorded at the time of the tax report; payment periods from clients will therefore be overestimated if sales are concentrated at the end of the fiscal year. Taking sectoral averages should in principle mitigate this concern provided that measurement error is not too correlated within a sector. Second, by computing the average value of *Days of sales outstanding*$_f$ on the population of firms making less than 10% of their turnover abroad, we ensure that the exogenous variation induced by the policy is based on factors originating mostly from the domestic market. This removes a potential mechanical link between the evolution of the rate of payment collection and export activity.

The instrument purposely ignores the derogations introduced by the law (see section 2.1). These exceptions might have been implemented because of some unobservable factors that could be related to the ability to export. Introducing the derogation in the computation of $\overline{d(DSO,60)}_{f,07}$ would in that case compromise the validity of the instrument. The definition of the instrument implies that the first-stage estimation only identifies the change in days of sales outstanding that can be explained by the 60-days threshold. Put another way, the IV estimator captures the *local average treatment effect* (LATE) by relying only on the effects of the policy on the firms that were affected by and that applied the 60-days rule (*compliers*).

The computation of the exposure to the policy has not so far exploited the time dimension of the data set. Yet, it is expected that the exposure to the policy should not affect the variation

[32] Our results are broadly unaffected by changes of the definition of $\overline{d(DSO,60)}_{f,07}$ such as using weighted averages in the computation of $d(DSO,60)_{s,07}$ or including exporters in the set $\Omega_{s,07}$.

of payment delays before the reform. The final definition of the instrument is therefore given by

$$\overline{d(DSO,60)}_{f,t} = 1[t \geq 2007] \cdot \overline{d(DSO,60)}_{f,07}$$

the dummy being chosen to equal one as soon as 2007 to account for a potential anticipation of the policy.

Figures 3 and 4 summarize the main steps of the strategy outlined in this subsection.[33] The x-axis in both graphics gives the 2007 value of days of sales outstanding as measured by

$$\overline{Days\ of\ sales\ outstanding}_{f,07} = \sum_{s} \omega_{f,s,07} \cdot Days\ of\ sales\ outstanding_{s,07}$$

where $Days\ of\ sales\ outstanding_{s,07}$ is the simple average of DSO in sector s.[34] In figure 3, the y-axis represents the evolution of actual firm-level days of sales outstanding between 2007 and 2009. Firms that were facing payment periods from clients below 60 days in 2007 experienced a small decrease in days of sales outstanding after the implementation of the policy. By contrast, there is a large and significant negative correlation between $\overline{Days\ of\ sales\ outstanding}_{f,07}$ and $\Delta Days\ of\ sales\ outstanding_{f,07\text{-}09}$ when average pre-policy payment periods exceed 60-days. This indicates that our estimation method correctly detects the effects of the presence of the 60-days rule on the variation of payment periods. Furthermore, figure 4 shows that there is no obvious correlation between the instrument and the evolution of payment periods between 2003 and 2005, which suggests that the pattern shown in figure 3 indeed reflects the effects of the implementation of the policy.

4.2 Unit of observation

The identification assumption behind the IV strategy is that factors other than payment periods affecting export outcomes are not correlated to $\overline{d(DSO,60)}_{f,t}$. However, this condition will not be met if, for instance, the financial crisis impacted more firms that were more exposed

[33] In both figures, the sample is split in 100 percentiles along the x-axis; the ordinate axis display the average value of the y variable in each percentile.

[34] $\overline{Days\ of\ sales\ outstanding}_{f,07}$ is therefore akin to a slightly modified version of $\overline{d(DSO,60)}_{f,07}$ that does not account for the 60-days rule.

to the law. In particular, if exporters mostly affected by the reform were mainly present in countries where demand fell relatively more during the crisis, a "naive" estimation might erroneously conclude to a significant positive correlation between the variation in payment periods and export activity.

We take advantage of the disaggregated nature of exports data and introduce country-year fixed effects to take care of this potential issue. Instead of comparing total exports variations, the regressions will therefore be based on the comparison of export outcomes in a given country and in a given year between firms that were differently exposed to the reform. In robustness checks, we rerun our regressions using different units of observation (firm, firm-year and firm-product-year) and sets of fixed effects to assess the influence of this choice on our results.

Studying export behavior at the level of the destination market entails however a special attention on inference issues: while the left-hand variable is observed at the level of the combination of a firm f, a country m and date t, the right-hand variables vary only at the firm-year level such that error terms ϵ_{fmt} will be correlated for a given firm f. We follow the econometric literature on that subject and cluster standard errors to allow for arbitrary patterns of cross-correlation between observations related to the same firm f.

4.3 Control variables and baseline specification

Control variables are included in the main specification to limit the effect of several sources of heterogeneity that might contaminate our estimation. Our main concern here is that because of its "shift-share" design, the instrument may inappropriately capture sectoral variations that are unrelated to payment periods but that affect export activity. For instance, the instrument variable might be positively correlated to the dynamism of the different downstream sectors in which the firm operates. In order to account for this possibility, we introduce in the specification the weighted average of the growth rate of sectoral sales, $\overline{Sales\ growth\ rate}_{ft}$ computed using the same methodology as the instrument. This variable therefore controls for the varying economic conditions that firm f experiences in the different sectors in which it operates.

The portfolio of downstream sectors in which the firm operates could then be endogenously determined by other variables related to export patterns such as productivity or size: we therefore

include $log(Total\ Assets)_{f,t-1}$ and $Labor\ productivity_{f,t-1}$ (defined as the ratio value added to the number of employees) in the specification. Conversely, characteristics of downstream sectors might affect capital structure decisions; the literature emphasizes in particular the role of leverage as a way to deter entry from competitors (see for instance Chevalier (1995)). The presence in some specific downstream sectors might therefore be related to firms' financing choices, which in turn could affect export activity. The leverage variable $Long\text{-}term\ debt/TA_{f,t\text{-}1}$ (defined as the ratio of debt of more than one year to total assets) is added to the set of control variables to address this potential issue. Lastly, the time dimension of the data set is exploited by including firm fixed effects so as to remove the influence from time-unvarying unobservable firm characteristics (management quality, distance to the closest port...).

Bringing together the different elements of the identification strategy, our baseline equation is given by the 2SLS estimation of:

$$
\begin{aligned}
Y_{f,m,t} &= \alpha_f + \gamma_{m,t} + \beta_1 \cdot \Delta Days\ of\ sales\ outstanding_{f,t} + \beta_X \cdot X_{f,t} + \epsilon_{f,m,t} \\
\Delta Days\ of\ sales\ outstanding_{ft} &= \delta_f + \eta_{m,t} + \theta_1 \cdot \overline{d(DSO,60)}_{f,t} + \theta_2 \cdot X_{f,t} + \nu_{f,m,t}
\end{aligned}
\tag{5}
$$

where $Y_{f,m,t}$ is an exporting variable, α_f and δ_f are firm fixed effects,$\gamma_{m,t}$ and $\eta_{m,t}$ are country-year fixed effects and $X_{f,t}$ the set of firm-level control variables. We expect the reform to induce a downward adjustment of payment periods ($\theta_1 < 0$), thereby lowering firms' liquidity risk and enhancing their propensity to export ($\beta_1 < 0$).

4.4 Effects of the reform on payment periods

Before presenting the main results, this subsection assesses the effects of the reform on payment periods. We estimate to that end

$$
\Delta Days\ of\ sales\ outstanding_{ft} = \mu_f + \rho_t + \pi_1 \cdot \overline{d(DSO,60)}_{f,t} + \pi_X \cdot X_{f,t} + \xi_{f,t} \tag{6}
$$

Note that this step is not formally equivalent to an estimation of the first stage of equation 5 since we abstract here from the set of exporting countries in which firm f operates (the regression

here is performed at the firm-level).

[Insert table 5 here]

Table 5 displays the results of the different specifications. The coefficient π_1 is significantly negative in all columns: the specifications 1 to 3 indicate that each additional day of distance to the 60-days threshold is associated with a reduction of 0.09 to 0.11 day of client payment periods per year. The specification of column 4 is more demanding as we replace year by industry-year fixed effects (an industry being defined by a 3-digits code of the NACE). The magnitude of the coefficient remains strikingly close to the other estimates (though only significant at the 10% level). This implies that within an industry, the heterogeneity in the activity of firms was sufficiently large to generate a differentiated effect of the policy.

The coefficients associated to control variables give moreover some clues on the economic mechanisms behind the evolution of payment periods. Conditionally on time-invariant characteristics, firms that got bigger or more productive got paid more quickly (column 3). This is in line with the findings of Fabbri and Klapper (2016) that higher bargaining power is associated with more advantageous payment terms. Firms operating in booming sectors also faced higher payment periods. It may reflect a higher demand for trade credit from customers present in relatively less performing sectors.

5 Building a customer base under liquidity constraints

5.1 Main results

Table 6 displays the estimated effects of the policy on exports growth ($\Delta Exports_{f,m,t}$) as well on the probability to exit or to enter a country ($Exit_{f,m,t}$ and $Entry_{f,m,t}$). Note that by construction, the size of the estimation sample changes with the dependent variable (see subsection 3.1). Column 1 presents the first stage regression of the $\Delta Exports_{f,m,t}$ analysis: the $\overline{d(DSO,60)}_{f,t}$ coefficient is equal to -0.09, which is within the range of estimates in table 5. Accordingly, the Kleibergen-Paap statistics presented in columns 2 to 4 go in favor of a rejection of the hypothesis of a weak instrument.

[Insert table 6 here]

The -0.055 coefficient for $\Delta Exports_{f,m,t}$ means that a 10-days decrease in days of sales outstanding is estimated to cause an increase in the exports growth rate of 5.5 percentage points. Expressing the economic magnitudes in terms of sample standard deviation, we find that a 3-days decrease in DSO increases the growth rate of exports by 1.5 pp (compared to a sample mean of -1.2%), lowers the propensity to exit a country by 1.2 pp (sample mean: 14.3%) and raises the probability of entry by 0.1 pp (sample mean: 3.9%). As expected, firms operating in booming industries grew relatively more in countries where they were already present and were more (less) likely to enter (exit) a market. Conditionally on time-invariant characteristics, we find size and productivity to be negatively correlated with export growth, probably reflecting the larger expansion capacity of small firms.

[Insert table 7 and table 8 here]

Using equation 4, we decompose in table 7 the growth of exports $\Delta Exports_{f,m,t}$ into a component capturing the variation of exports with existing customers ($\Delta Stable\ customers_{f,m,t}$) and another one reflecting the evolution of the customer base ($\Delta Customer\ base_{f,m,t}$). Strikingly, sales with existing customers did not increase following the enactment of the policy. Instead, the entirety of the increase in exports appear to stem from the expansion of the set of customers. We further dissect the impact of the policy on the evolution of exports by highlighting the contributions of the creation and termination of trade relationships to the evolution of exports. The results of columns 5 and 6 indicates that approximately two thirds of the effects on $\Delta Customer\ base_{f,m,t}$ is attributable to an increase in the acquisition of new customers and one third to a higher rate of retention of existing customers.

Similarly, we test in table 8 whether firms realized higher international sales by selling more units of their existing products or by expanding their set of products. The estimations indicate that firms did not alter their product mix following the policy, but rather sold more of their current products to new customers.[35]

[35] In this table, we define a product as 3-digits Classification of Products by Activity (CPA) code. In untabulated results, we show that this result holds even when using the most disaggregated classification of products.

Taken together, these tables show that reducing liquidity constraints spurs sales growth. Moreover, our results indicate that improved access to liquidity allows firms to expand the set of customers rather than selling more to existing clients or developing new products. This constitutes our main finding.

5.2 Placebo and dynamics of the effects

We then explore the evolution of the effects of the policy over time. This exercise serves two main purposes. First, it is important to remove any suspicion of the presence of pre-existing trends. It could indeed be the case that firms more exposed to the reform were operating in industries that were already expanding prior to the enactment of the law. Second, analyzing the dynamics of the effects after the policy is revealing as it allows to understand whether the provision of trade credit has short- or long-run effects on the expansion of the firm.

[Insert table 9 here]

A natural way to investigate the dynamics of the effects of the policy is to interact the explanatory variable with time dummies in the baseline regression (equation 5). However, the estimation of this specification is not straightforward as it would require to include in the instrument set all the interactions of $\overline{d(DSO,60)}_{f,t}$ with time dummies (see Wooldridge (2010)).

We choose therefore to replicate our estimation on three different subperiods. We follow figure 1 to define the following time intervals: the *placebo* period takes place before the policy (2005-2006), the *treatment* period during the observed drop in payment periods (2007-2008) and the *long-term* period after the drop (2009-2010). Including 2009 only in the last subperiod allows in particular to test whether the policy was partially or perfectly anticipated. For each subperiod, we include two years before the years of interest and we set the instrument variable systematically to zero for these first 2 years in order to make before/after comparisons.[36]

[36]More precisely, the first period encompasses the years 2003 to 2006. Similarly to our main analysis, we instrument the variation in payment periods by the distance to the 60-days threshold in 2007. We set the instrument to zero for 2003 and 2004. The second period considers the period 2005 to 2008 and the instrument is set to 0 for years 2005 and 2006. The last period includes the period 2007 to 2010 and the instrument is set to 0 in 2007 and 2008. This last specification aims at measuring the potential long-term effects of the reform after the observed drop in days of sales outstanding.

The coefficients of the different estimations are given in table 9. It is first striking that the relation between the variation of days of sales outstanding and $\overline{d(DSO,60)}_{f,07}$ becomes negative and significant only for the treatment period. Using the exact same methodology before the observed drop in payment periods in France, we find no systematic link between days of sales outstanding and export growth. This finding proves that our main specification does not capture any existing pre-trends. Our results eventually do not point to any long-term effects of the large drop in days of sales outstanding (third column). This result excludes in particular the possibility that firms might have benefited only temporarily of the policy by exclusively initiating short-term trade relationships. Indeed, this scenario would translate in a negative long-term effect of the policy as terminated relationships would drive down export growth.

5.3 Robustness checks

For brevity, we relegate the details of the robustness checks to the section II of the online appendix. We proceed to several different exercises. First, we change the specification by considering OLS estimations or by including the derogations in the definition of the instrument. Second, the effects of the variation of payment periods on exports is reassessed using different levels of aggregation (firm, firm-year, firm-country-product-year). Moreover, we introduce country-product-year fixed effects in the last specification to account for differentiated demand shocks across products and potential composition effects. Third, we test several alternative methods of construction of the instrument. Fourth, we present the results of the estimation with various adjustments for clustering of the residuals. Fifth, we re-estimate the impact of the policy on the different components of export growth using the standard growth rate instead of the mid-point growth rate. Taken together, the tests strongly support the presence of an economically significant effect of the policy on export growth.

It could then be objected that, since firms are clients as well as suppliers, the net effect of the policy may be null or ambiguous. In appendix III, we address this issue by computing the rate of payment collection in *net* terms. As both payment periods from customers and to suppliers decreased all the more following the policy than the pre-policy distance to the 60-days threshold was larger, the policy mechanically reduced net payment terms. Specifically, we find

that pre-policy imbalances between payment terms to suppliers and from clients were predictive of the sign and the magnitude of the subsequent change in net days outstanding. We use this insight to instrument the variation in net payment periods. We find our main results to be qualitatively unchanged by this exercise.

5.4 Liquidity constraints and market penetration

Before exploring the economic mechanism behind the increase in international sales, we characterize further the effect of the policy on the expansion of the customer base. First, we investigate whether the effects of the policy on export growth in a country varied depending on whether firms had a low or a high market share in that country before the policy. Prior research suggests that investment in the customer base should exhibit decreasing returns. Bagwell (2007), for instance, writes that "advertising often entails diminishing returns beyond a threshold level, where the threshold level varies across circumstances and may be small." In the presence of decreasing returns, firms should have invested more in customer capital in countries in which they had a low market share before the policy. To test this hypothesis, we measure the pre-policy market share of a firm in a given country by its quartile in the distribution of exports in the country in 2007, and estimate

$$\begin{aligned} \Delta Exports_{f,m,t} = \dot{\alpha}_{f,t} + \dot{\gamma}_{m,t} + \dot{\beta}_X \cdot X_{f,t} + \dot{\mu}_i + \dot{\beta}_1 \cdot \overline{d(DSO,60)}_{f,t} \\ + \sum_{i=2}^{10} \dot{\beta}_i \cdot 1(Quartile_{f,m,07} = i) \times \overline{d(DSO,60)}_{f,t} + \dot{\epsilon}_{f,m,t} \end{aligned} \tag{7}$$

This specification differs from equation 5 in two important ways. First, we use the reduced form in order to flexibly assess how the impact of the policy varies with the pre-existing market share of the firm.[37] The variation of the elasticity is captured by the interacted coefficients $\dot{\beta}_i$ ($\dot{\mu}_i$ is a quartile fixed effects). Second, we use firm-year fixed effects instead of firm fixed effects. This specification is more demanding as the coefficients $\dot{\beta}_i$ are identified by the comparison of export dynamics between markets *within firms*.[38]

[37] As mentioned in previous subsection, interacting the endogenous regressor with market share dummies in the 2SLS specification would require to add additional instruments in the first stage.

[38] To visualize the source of identification, assume that following the policy, exports indeed increased more in markets in which firms had a low market share. We should observe no differential of export dynamics between

[Insert table 10 here]

Column 1 of table 10 presents the reduced form estimation with firm fixed effects. The $\dot{\beta}_1$ coefficient is equal to 0.005, meaning that on average, ten additional days of distance to the 60-days threshold caused a 0.5 percentage points increase in export growth after the policy. In column 2, we introduce interacted terms but keep firm fixed effects. The estimates show that the average coefficient of column 1 hides an heterogeneous impact of the policy between markets. While the coefficient is equal to 0.044 in low market-share countries (first quartile of exports in 2007), it is non statistically significant in high market-share countries. This gap is even more pronounced once we introduce firm-year fixed effects (column 3), as we find that an increase of the distance by 10 days generates a within-firm gap in export growth of 5.7 pp between low- and high market-share countries. This finding strongly suggests that firms invested more in customer capital in countries in which they had a low market share.

[Insert table 11 here]

Second, we ask if within a country, firms devoted more effort to target some specific customers. If firms can identify potential clients and customer acquisition entails fixed costs, firms should target larger customers first. In that case, a relaxation of liquidity constraints would allow firms to expand their customer base by adding relatively smaller clients. This would result in lower average sales per customer after the policy. On the other hand, if customer search is random, firms should be able to match with more customers after the policy but average sales would stay unchanged. In table 11, we test the effects of the policy on the logarithm of average sales per customer and average sales per new customer. We do not find any effect of the policy on average sales. This suggests that firms did not target specific clients when investing in customer capital.

markets for firms with zero exposure to the reform as they experienced no liquidity shock. As the exposure to the policy increases, however, we should observe a higher gap between export growth in low and high market-share countries. The coefficients $\dot{\beta}_i$ should capture this widening within-firm differential between low and high market-share countries as the exposure to the policy increases.

6 How did the policy affect export growth?

6.1 Did the policy alleviate liquidity constraints?

We check in this subsection that the policy acted as a positive liquidity shock by studying how firms adjusted their capital structure following the change in payment periods. We look at the evolution of financial characteristics related to liquidity constraints (working capital needs, cash and drawn credit lines) induced by the drop in client payment periods. The effect of payment periods on long-term debt is also considered.[39] All variables are expressed as a ratio to the lag of total assets. We bring back the analysis to the firm-level; regressions are similar to equation 6 presented in section 4.4 with the financial characteristics mentioned above as dependent variables. The specification includes firm and year fixed effects.

[Insert table 12 here]

Column 1 of table 12 confirms that firms that experienced a decrease in days of sales outstanding benefited from lower working capital needs. They also exhibit higher cash ratios (column 2). Interestingly, the coefficient on the cash ratio is very close in absolute value to the credit line coefficient (column 3) but is of the opposite sign. This suggests that in reaction to a decrease in payment periods, firms drew less on their credit lines and held more cash instead. The long-term debt coefficient is also significative, but three times smaller than the effects on cash. Overall, the results of table 12 are consistent with the idea that lower payment periods from clients mitigated liquidity constraints.

As a complementary test, we check whether the effects of the policy are more important for financially constrained firms (see subsection 2.3). Following the literature on the subject,[40] we proxy the intensity of financial constraints by the size of the firm (measured by the volume of total sales), the ratio of cash holdings over assets and of long-term debt over assets. We also draw on Bates, Kahle and Stulz (2009) and include the volatility of sales in the analysis, as firms with more volatile sales are more likely to be liquidity constrained. The three first variables are

[39] The leverage measure is accordingly removed from the set of control variables in this subsection.
[40] See for instance Fazzari et al. (1988),Hadlock and Pierce (2010) or Almeida, Campello and Weisbach (2004).

averaged for the period preceding the implementation of the policy (2003-2007). The volatility of sales is computed over the same period and normalized by the average amount of sales.

[Insert table 13 here]

Table 13 presents the estimations of the effects of the policy on export growth on different sub-samples of firms. Each of the sub-samples is obtained by ranking firms according to the four indicators of financial constraints described above. Regressors are standardized (*ie*, demeaned and then divided by the standard deviation) separately for each sub-sample so as to make the estimated coefficients directly comparable across groups.

Columns 1 to 8 show that the coefficients are significant at the 5% level only for small firms, firms with low levels of cash, high levels of debt and exhibiting high idiosyncratic risk.[41] Combined with the results of table 12, this finding strongly supports the idea that the decrease in payment periods affected export growth by easing the access to short-term financing of liquidity-constrained firms.

6.2 Interaction between domestic and international sales

Restricting the set of trade credit contracts by capping payment terms between French firms might have unintended adverse consequences. In particular, since the policy applied only to transactions contracted under the French code, French customers might have decided to switch to foreign suppliers so as to keep benefiting from more advantageous payment terms. Under this hypothesis, the positive impact of the policy on export growth might only reflect the presence of firms redirecting their activity to international markets in response to the cap of payment terms in the domestic market.

[Insert table 14 here]

This scenario implies that (i) an exogenous decrease in payment periods from French clients should result in lower domestic sales and (ii) an exogenous decrease in payment periods to French suppliers should result in higher import shares (defined as the ratio of imports to total

[41] In untabulated tests, we check that the $\overline{d(DSO,60)}_{f,t}$ are all statistically negative in the first stage (they all are at the 10% level) .

purchases). We test this joint hypothesis in table 14. Columns 1 and 2 show that sales on the French territory did not decrease following the fall of payment periods. The coefficient is statistically not significant even when we try to control for time-varying industry trends.

The second part of the hypothesis states that when faced with an exogenous decrease in payment periods to domestic suppliers, firms chose to rely relatively more on foreign firms to source their inputs. This would translate into a negative relationship between the share of inputs that are imported (import share) and the evolution of payment periods to suppliers ($\Delta Days\ payable\ outstanding_{f,t}$).[42] We find no evidence of a statistically significant link between the two variables. Taken together, these findings indicate that the observed growth in export markets does not originate from the disruption of trade relationships in the domestic market.

[Insert table 15 here]

Firms' presence in domestic and international markets may in turn have shaped their exposure to the reform. First, firms that imported a large fraction of their inputs should have benefited more from the policy. Indeed, they should have been paid more rapidly by their French customers while still being able to pay international suppliers in more than 60 days. We test this idea by sorting firms according to their 2007 import shares (following the same procedure as in last subsection). Accordingly, we find that the elasticity is significantly different from zero only for firms that imported a lot before the policy.

Second, as firms with low market power are more likely to be hurt by disadvantageous payment terms (Klapper, Laeven and Rajan (2012)), they should benefit more from a regulation restricting long payment terms. To test this hypothesis, we split the sample based on the 2007 market share in France in their main sector of activity. In line with our hypothesis, we find that firms with a low domestic market share (low market power) are strongly impacted by the fall in payment periods, while dominant firms appear largely unaffected.

[42] The evolution of DPOs is instrumented by the sales-weighted average of the 2007 sectoral distance of payment periods to suppliers to the 60-days threshold. The weights are the same as for the baseline specification (share of sales realized by the firm in a given sector in 2007 total sales). This specification makes the assumption that days payable outstanding are homogeneous across firms operating in the same sector.

7 What are the costs of expanding the customer base?

7.1 Do firms attract new customers through lower prices?

How did firms attract new customers? An interpretation of our results along the lines of Chevalier and Scharfstein (1996) would be that the liquidity shock lead firms to grow more in international markets by allowing them to charge lower prices. The study explores the pricing decisions of liquidity-constrained firms in the presence of product market frictions. Suppliers choose prices by making a trade-off between present and future profits. While lower prices decreases current cash-flows, it attracts customers which ultimately results in higher future expected profits. As liquidity-constrained firms value more current profits, they charge higher prices and, therefore, invest less in customer capital.

[Insert table 16 here]

We confront this hypothesis to data by looking at how product prices reacted to the variation of payment periods. If the policy allowed firms to attract more customers through lower prices, we should observe a positive relationship between the variation of days of sales outstanding and the evolution of prices. To test for this hypothesis, exports are aggregated at the level of a product p (defined as an 8-digit item of the Combined Nomenclature)[43], a firm f, a country m and a time t. Our proxy for price is given by the ratio of the volume of exports to the quantity of products sold ("unit value"). We specify our regression as

$$\Delta Price_{f,m,p,t} = \kappa_f + \chi_{m,p} + \psi_t + \zeta_1 \cdot \Delta Days\ of\ sales\ outstanding_{f,t} + \zeta_X \cdot X_{f,t} + \upsilon_{f,m,p,t} \quad (8)$$

where κ_f and ψ_t denote firm and year fixed-effects and $\chi_{m,p}$ is a country-product dummy[44]. The variable $\Delta Days\ of\ sales\ outstanding_{f,t}$ is as usual instrumented by the ex ante exposition to the reform. $\Delta Price_{f,m,p,t}$ is measured in growth rates.[45]

[43] We harmonize through time the product nomenclature following the procedures of Pierce and Schott (2012) and Bergounhon, Lenoir and Mejean (2018).

[44] Introducing country-product fixed effects $\chi_{m,p}$ allows to control for "pricing-to-market" patterns; see Drozd and Nosal (2012) for instance on the subject.

[45] We remove the influence of outliers by dropping the bottom 5 % and top 5% of unit values growth rates. Our results are entirely robust to alternative standard measures of the evolution of prices.

Table 16 presents the results of the estimations. The first stage coefficient is still negative and precisely estimated, albeit lower in magnitude than in the baseline estimation. By contrast, we find no evidence of a statistical link between the variation in days of sales outstanding and prices. The estimations yield otherwise sensible results for the determinants of prices. Firms facing positive labor productivity shocks, for instance, tend to charge lower prices. We also observe that firms operating in booming industries raise prices, potentially reflecting the reaction to an upward shift of the demand curve.

The absence of an average effect on prices may actually be hiding some heterogeneous patterns between customers. In particular, it could be that firms decreased prices with their new customers but simultaneously increased prices with their existing customer base. We look therefore separately at the evolution of prices for existing and new customers:

$$\Delta Price^{N}_{f,m,p,t} = \frac{Price^{N}_{f,m,p,t} - Price_{f,m,p,t\text{-}1}}{Price_{f,m,p,t\text{-}1}} \text{ and } \Delta Price^{S}_{f,m,p,t} = \frac{Price^{S}_{f,m,p,t} - Price_{f,m,p,t\text{-}1}}{Price_{f,m,p,t\text{-}1}}$$

with S standing for stable customers and N for new customers as in subsection 3.1. Columns 3 and 4 show the results of the estimation of the effects of the variation in payment periods on prices charged to existing and new customers. We find the coefficient for the variation of payment periods to be non-significant for both variables, which rules out the hypothesis of the presence of differentiated price dynamics between customers.

7.2 The role of search costs

The absence of effect on product prices suggests that firms are facing other types of costs to expand their set of customers. Non-price obstacles to the expansion of the customer base can be classified into two main types. Firms can face frictions to find and match with customers (*e.g.*, marketing costs, advertisement) or to meet with specific client requirements (*e.g.*, provision of trade credit, product customization). In other words, posting low prices will not allow a firm to expand its customer base if customers are unaware of the existence of the supplier (*search costs*) or if the product is not adapted to their needs (*input specificity*).

[Insert table 17 here]

If liquidity constraints limit the ability of firms to overcome non-price frictions to trade, then the sensitivity of exports to payment periods should be higher when trade relationships are costly to initiate (see subsection 2.3). We build several proxies of trade frictions to test for this hypothesis.[46]

First, we rely on the classification of products established by Rauch (1999) to build a first proxy of trade frictions. Products are labelled as "homogeneous" if they are traded on an organized exchange (*e.g.*, cereals) or reference priced (*e.g.*, construction materials) and "differentiated" otherwise. Rauch show that when products are differentiated, geographical proximity as well as cultural ties have a stronger impact on bilateral country-level trade volumes as they help mitigate the presence of information asymmetries.

A limitation of this measure is that it focuses only one source of trade frictions, namely the way product markets are organized. We turn to that end to the "relationship stickiness" index recently introduced by Martin, Mejean and Parenti (2018). The index is based on the average length of firm-to-firm relationships in various product markets. Intuitively, long average trade relationships in a product market signal the presence of high switching costs, be it be because of the difficulty to find alternative suppliers or a high specificity of the traded inputs. A more precise description of the construction of the variable is available in appendix IV.

[Insert table 18 here]

We rank observations according to the two proxies of trade frictions (homogeneous versus differentiated product, quartile of relationship stickiness index). As in section 5.4, we focus on within-firm export growth variations, that is, we look at whether the within-firm difference in export growth dynamics between frictional and non-frictional products gets larger as the exposure to the policy increases.

In column 1, we see that ten additional days of distance to the 60-days threshold generated on average a 1.6 pp increase in export growth at the country-product level. Column 2 and 3 suggest that all the increase was concentrated on differentiated product. The within-firm estimation in

[46]By convenience, we come back in the following to the setting of table A2 and define a product as 3-digits code of the European product classification. Variations of customer capital are difficult to interpret at a very disaggregated level. The CPA classification has moreover the advantage to be directly comparable to the French classification of sectors, which makes it more suited for our analysis based on sectoral heterogeneity in payment delays. Our results are however robust to changing the product classification or the unit of aggregation.

column 3 indicates that an increase in the distance by 10 days raised the within-firm variation in export growth by 2.2 pp between homogeneous and differentiated products. Similar results can observed for the relationship stickiness, though the increase in export growth generated by the policy appears to have been larger for intermediate levels of product market frictions (second quartile of the index).

In a last empirical exercise, we use another dimension of our data set to highlight the role of product market frictions. Chaney (2014) show that trading with a firm in a foreign country (being "connected") subsequently reduces the costs to find trade partners in the same network. Importers that have already traded with French firms should therefore be easier to reach.[47] Every year, we identify new buyers that have never interacted with a French exporter before ("non-connected" firms) and define[48]

$$\frac{Exports_{f,m,t}}{0.5 * (Exports_{f,m,t} + Exports_{f,m,t-1})} = \frac{Exports^{C}_{f,m,t} + Exports^{NC}_{f,m,t}}{0.5 * (Exports_{f,m,t} + Exports_{f,m,t-1})}$$

where C stands for "connected" and NC for "non-connected". Table 18 show that exports to non-connected firms increased more following the enactment of the policy, confirming that product market frictions are the main obstacle firms face to accumulate customer capital.

8 Conclusion

This paper exploits a policy restricting payment terms between French firms as an exogenous liquidity shock to investigate the role of liquidity constraints in the accumulation of customer capital. Our results show that being paid earlier by domestic customers spurs export growth. Crucially, firms grow in export markets by expanding their set of customers, not by increasing sales with existing customers. Firms do not appear to attract new customers by offering lower prices. Instead, we observe that the expansion of the customer base is more pronounced when identifying and attracting customers is likely to be costly.

Our findings show that liquidity constraints dampen the accumulation of customer capital by

[47] For instance, connected importers may have adapted their production process to French standards (lower specificity of inputs) or be more aware of the existence of French suppliers (lower search costs).

[48] The year 2003 is accordingly removed from the analysis.

limiting the ability of firms to overcome product market frictions. This paper suggests therefore that the large heterogeneity in demand emphasized by recent research can be traced back to the presence of financing frictions. At the macroeconomic level, our results indicate that taking into account both product market and financing frictions might be important to understand the evolution of prices over the business cycle.

While we can not directly observe non-price investment in customer capital in the data, our results naturally point at marketing as an essential instrument to build and maintain a base of customers. Providing a detailed analysis of the role of the different types of marketing expenditures and of the financing costs they entail would constitute the logical next step towards a better understanding of the determinants of customer capital.

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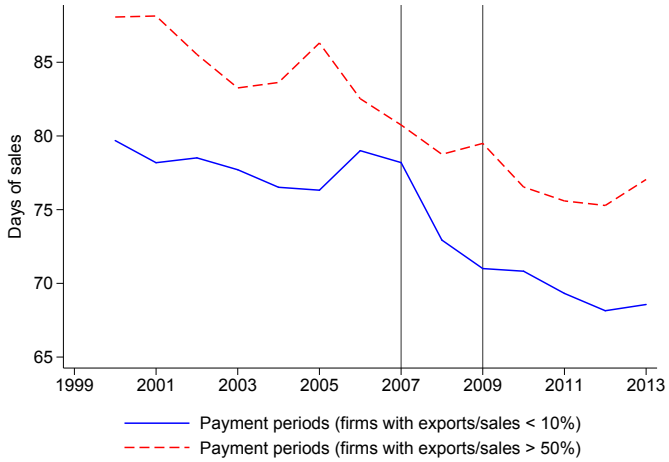
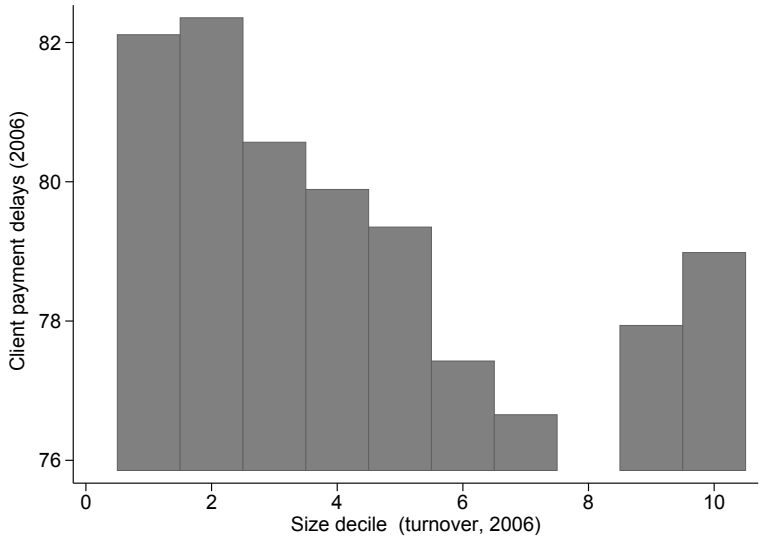
Figures and tables

Figure 1: Evolution of days of sales outstanding between 1999 and 2013.



Source: Tax returns data. *Field:* manufacturing and wholesale sector.
Interpretation: This graph displays the evolution of days of sales outstanding between 1999 and 2013 in the manufacturing and wholesale trade sectors. Days of sales outstanding are computed as the average ratio of accounts receivable over sales multiplied by 365. The blue solid line gives the evolution of days of sales outstanding for firms whose average share of exports in total sales is below 10%. The red dashed line gives the evolution of days of sales outstanding for firms whose average share of exports in total sales is above 50%.

Figure 2: Days of sales outstanding by firm size (2006)



Source: Tax returns data. *Field:* manufacturing and wholesale sector.
Interpretation: This graph displays the average days of sales outstanding by decile of total sales (all values are taken in 2006). Days of sales outstanding are computed as the average ratio of accounts receivable over sales multiplied by 365.

Table 1: Top and bottom 5 sectors for client and supplier payment periods (2007).

$\overline{\textit{Days of sales outstanding}_s}$		$\overline{\textit{Days payable outstanding}_s}$	
Manufacture of non-metallic mineral products	145.1	Manufacture of ceramic sanitary	99.7
Manufacture of industrial gases	120.1	Manufacture of batteries	98.1
Manufacture of locomotives	119.7	Manufacture of fibre cement	82.8
Manufacture of steam generators	118.1	Manufacture of other mineral products	80.6
Manufacture of cement	112.6	Wholesale of beverages	80.2
Processing and preserving of potatoes	8.2	Bakery confectionery	30.5
Confectionery shop	6.7	Bakery products	30.4
Delicatessen	6.4	Processing of potatoes	28.7
Bakery	6.1	Cooked meats production and trade	28.1
Industrial bakery	5.0	Manufacture of medical equipment	32.3

Source: 2007 tax returns. *Field:* manufacturing and wholesale sector.
Interpretation: This table displays the NAF 5-digits sectors in the manufacturing and wholesale sector with the highest and lowest values of average days of sales outstanding ($\overline{\textit{Days of sales outstanding}_s}$) and days payable outstanding ($\overline{\textit{Days payable outstanding}_s}$). Days of sales outstanding are computed as the average ratio of accounts receivable over sales multiplied by 365. Days payable outstanding are computed as the average ratio of accounts payable over purchases (multiplied by 365).

Table 2: Description of the data set.

Panel A: Definitions of the variables	
Export variables	
$\Delta Exports_{fmt}$	Variation of the amount of exports (in mid-point growth rate) of firm f in market m between t and $t-1$ conditionally on firm f being present in m in t and $t-1$. *Source: Customs.*
$\Delta Stable\ customers_{fmt}$	Variation of the amount of exports of firm f realized in market m with customers with which firm f trades in both t and $t-1$ (scaled by the average of total exports in market m between t and $t-1$). *Source: Customs.*
$Entry_{fmt}$	Probability of firm f entering market m at time t conditionally on firm f being not present in m at time $t-1$. *Source: Customs.*
$Exit_{fmt}$	Probability of firm f exiting market m at time t conditionally on firm f being present in m at time $t-1$. *Source: Customs.*
$Lost\ customers_{fmt}$	Exports of firm f realized in market m with customers lost at time $t-1$ (scaled by the average of total exports in market m between t and $t-1$). *Source: Customs.*
$\Delta Customer\ base_{fmt}$	Exports of firm f realized in market m with new customers at time t minus the amount of exports of firm f realized in market m with customers lost at time $t-1$ (scaled by the average of total exports in market m between t and $t-1$). *Source: Customs.*
$New\ customers_{fmt}$	Exports of firm f realized in market m with new customers at time t (scaled by the average of total exports in market m between t and $t-1$). *Source: Customs.*
Firm variables	
$\Delta Days\ of\ sales\ outstanding_{f,t}$	Variation of days of sales outstanding (see section 4.1). *Source: Tax returns.*
$\Delta Net\ days\ outstanding_{f,t}$	Variation of net days outstanding (see section III). *Source: Tax returns.*
$Age_{f,t}$	Age of the firm. *Source: Tax returns.*
$Labor\ productivity_{f,t-1}$	Value added over the number of employees. *Source: Tax returns.*
$log(Total\ Assets)_{f,t-1}$	Logarithm of total assets (in thousand euros).*Source: Tax returns.*
$log(Turnover)_{f,t-1}$	Logarithm of turnover (in thousand euros). *Source: Tax returns.*
$Long\text{-}term\ debt/TA_{f,t}$	Ratio of long-term debt to total assets. *Source: Tax returns.*
$\overline{Sales\ growth\ rate}_{f,t}$	Sales-weighted average of sectoral sales growth rates between $t-1$ and t. *Source: EAE, Tax returns.*
Instruments	
$\overline{d(DSO,60)}_{f,t}$	Sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007 (see section 4.1). *Source: EAE, Tax returns.*
$\overline{Net\ days\ outstanding}_{f,t}$	Sales-weighted average of 2007 sectoral net days outstanding (see section III). *Source: EAE, Tax returns.*

Panel B: Summary Statistics								
				Percentiles				
	# Obs.	Mean	Std. Dev.	5th	25th	50th	75th	95th
Dependent variables								
$\Delta Exports_{f,m,t}$	835770	-0.01	0.81	-1.51	-0.43	0.00	0.41	1.47
$\Delta Stable\ customers_{f,m,t}$	835770	-0.02	0.62	-1.16	-0.30	0.00	0.26	1.06
$Customer\ base_{f,m,t}$	835770	0.02	0.51	-0.84	-0.02	0.00	0.03	0.96
$Entry_{f,m,t}$	3441043	0.04	0.21	0.00	0.00	0.00	0.00	0.00
$Exit_{f,m,t}$	974991	0.14	0.35	0.00	0.00	0.00	0.00	1.00
$New\ customers_{f,m,t}$	835770	0.19	0.41	0.00	0.00	0.00	0.15	1.21
$Lost\ customers_{f,m,t}$	835770	0.18	0.39	0.00	0.00	0.00	0.13	1.12
Independent variables								
$\Delta Days\ of\ sales\ outstanding_{f,t}$	173749	0.11	2.83	-3.87	-0.91	0.04	1.06	4.10
$\Delta Net\ days\ outstanding_{f,t}$	173749	-0.02	2.66	-3.82	-1.06	0.00	1.03	3.74
$Age_{f,t}$	173749	24.16	18.07	3.00	12.00	21.00	33.00	53.00
$Labor\ productivity_{f,t}$	173749	0.07	0.05	0.03	0.04	0.06	0.08	0.15
$log(Total\ assets)_{f,t}$	173749	9.34	1.34	7.56	8.40	9.11	10.05	11.91
$log(Turnover)_{f,t}$	173749	9.59	1.36	7.84	8.71	9.43	10.33	12.03
$Long\text{-}term\ debt/TA_{f,t}$	173749	0.04	0.06	0.00	0.00	0.01	0.06	0.17
$\overline{Sales\ growth\ rate}_{f,t}$	173749	0.01	0.13	-0.22	-0.03	0.03	0.07	0.18
Instruments								
$\overline{d(DSO,60)}_{f,t}$	173749	19.42	19.20	0.00	0.00	16.06	37.35	48.81
$\overline{Net\ days\ outstanding}_{f,t}$	173749	7.37	18.07	-17.54	0.00	0.00	16.17	42.88

Source: Tax returns, EAE, Customs data. *Field:* SMEs of the manufacturing and wholesale sector. *Interpretation:* The average value of the logarithm of the total value of assets (in thousand euros) across firm-year observations is 9.05.

Table 3: Export values and number of destinations served.

	Mean	Std. Dev.	P5	P25	P50	P75	P95
$Total\ exports_{f,t}$ (k€)	8690.75	47072.19	12.07	202.36	907.22	3767.93	32769.12
$Exports\ by\ country_{f,m,t}$ (k€)	1058.47	8345.16	5.95	48.01	156.18	527.72	3757.11
$\#Countries\ served_{f,t}$	7.18	5.26	1.00	3.00	6.00	10.00	18.00
$\#Customers\ by\ country_{f,m,t}$	4.99	10.24	1.00	1.50	2.50	4.80	15.86

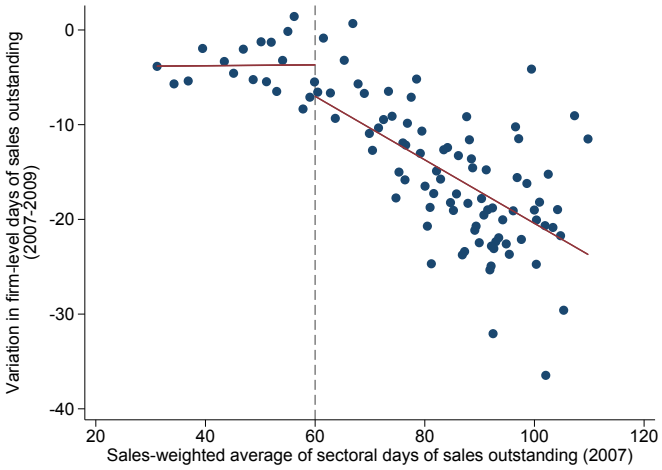
Source: Customs data. *Field:* SMEs of the manufacturing and wholesale sector.
Interpretation: On average over the period 2003-2012, a French firm exports 985 k€ per year and destination, serves 7 destinations and is in contact with 5 buyers within a market.

Table 4: Description of export dynamics at the customer- and market-level.

Level	#Years after entry:	1	2	3	4	5
Customer	Export value (mean)	74,969	154,827	215,396	266,420	424,528
	Exit rate (%)	55	39	32	29	31
Market	Export value (mean)	529,195	842,330	1,071,760	1,225,000	1,776,048
	Exit rate (%)	27	15	11	9	6
	# customers (mean, UE)	4	5	6	7	9

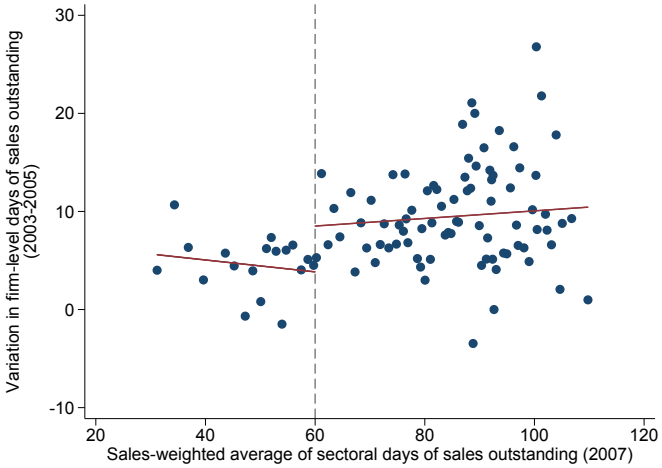
Source: Tax returns, EAE, Customs data. *Field:* SMEs of the manufacturing and wholesale sector
Interpretation: The table displays the average export value and exit rate at the customer- and market-level for the five years consecutive to the entry in a destination or to the formation of a new customer-supplier relationship. The last line indicate the evolution of the average number of customers per destination in the five years consecutive to the time of entry.

Figure 3: Impact of the policy on payment periods - treatment period.



Source: Tax returns data. *Field:* manufacturing and wholesale sector.
Interpretation: This graph displays the evolution of *Days of sales outstanding*$_{f,t}$ between 2007 and 2009 as a function of $\overline{\textit{Days of sales outstanding}}_{f,2007}$. *Days of sales outstanding*$_{f,t}$ is computed as the firm-level ratio of accounts receivable over sales multiplied by 365. $\overline{\textit{Days of sales outstanding}}_{f,2007}$ is computed as the average of the sectoral means of *Days of sales outstanding*$_{g,2007}$ weighted by the sales of firm f in each sector. The data set is split in 100 percentiles along the x-axis; the ordinate axis represents the average value of the y variable in each percentile.

Figure 4: Impact of the policy on payment periods - placebo test.



Source: Tax returns data. *Field:* manufacturing and wholesale sector.
Interpretation: This graph displays the evolution of *Days of sales outstanding*$_{f,t}$ between 2003 and 2005 as a function of $\overline{\textit{Days of sales outstanding}}_{f,2007}$. *Days of sales outstanding*$_{f,t}$ is computed as the firm-level ratio of accounts receivable over sales multiplied by 365. $\overline{\textit{Days of sales outstanding}}_{f,2007}$ is computed as the average of the sectoral means of *Days of sales outstanding*$_{g,2007}$ weighted by the sales of firm f in each sector. The data set is split in 100 percentiles along the x-axis; the ordinate axis represents the average value of the y variable in each percentile.

Table 5: Effects of the policy on payment periods.

	Δ*Days of sales outstanding*$_{f,t}$			
	(1)	(2)	(3)	(4)
$\overline{d(DSO,60)}_{f,t}$	−0.112***	−0.092***	−0.114***	−0.099*
	(0.004)	(0.004)	(0.012)	(0.058)
$log(Assets)_{f,t-1}$		−0.349***	−24.508***	−25.424***
		(0.068)	(0.745)	(0.789)
$\overline{Sales\ growth\ rate}_{f,t}$		23.632***	9.683***	0.607
		(0.713)	(0.802)	(1.651)
$LT\ debt/Assets_{f,t-1}$		9.034***	18.548***	18.483***
		(1.230)	(2.487)	(2.505)
$Labor\ productivity_{f,t-1}$		9.821***	−30.543***	−28.627***
		(1.817)	(4.446)	(4.491)
Observations	103141	103141	103141	103038
Firm FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry-Year FE	No	No	No	Yes

The dependent variable is the variation of days of sales outstanding. Days of sales outstanding are computed at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The main independent variable is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates) as well as the square and the cube of $\overline{d(DSO,60)}_{f,t}$. Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 6: Payment periods and exports.

	Δ*Days of sales outstanding*$_{f,t}$	Δ*Exports*$_{f,m,t}$	*Exit*$_{f,m,t}$	*Entry*$_{f,m,t}$
log(Assets)$_{f,t-1}$	-2.269^{***}	-0.159^{***}	0.008	0.008^{**}
	(0.073)	(0.052)	(0.024)	(0.003)
$\overline{\textit{Sales growth rate}}_{f,t}$	0.671^{***}	0.141^{***}	-0.025^{***}	0.008^{***}
	(0.073)	(0.020)	(0.009)	(0.002)
LT debt/Assets$_{f,t-1}$	2.071^{***}	0.119^{**}	-0.035	0.007
	(0.244)	(0.058)	(0.026)	(0.005)
Labor productivity$_{f,t-1}$	-1.829^{***}	-0.216^{***}	0.007	-0.005
	(0.430)	(0.075)	(0.037)	(0.008)
$\overline{d(DSO,60)}_{f,t} \times 10$	-0.087^{***}			
	(0.012)			
Δ*Days of sales outstanding*$_{f,t} \times 10$		-0.055^{**}	0.034^{***}	-0.004^{**}
		(0.023)	(0.011)	(0.002)
Observations	835770	835770	974991	3441043
# Firms	17280	17280	18772	20192
Firm FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Kleibergen-Paap		48.7	53.9	206.4

The dependent variables are (in the order of the columns) the variation of days of sales outstanding (days of sales outstanding are computed at the firm-level as the ratio of accounts receivable over sales multiplied by 365), the variation of exports in market m for firms that stay in the market between time t and $t-1$, a dummy indicating whether firm f exits market m at time t and a dummy indicating whether firm f enters market m at time t. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 7: Effects of payment periods on the formation of a customer base.

	$\Delta Exports_{f,m,t}$	$\Delta Stable\ customers_{f,m,t}$	$\Delta Customer\ base_{f,m,t}$	$New\ customers_{f,m,t}$	$Lost\ customers_{f,m,t-1}$
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	−0.055**	−0.008	−0.047***	−0.030***	0.017*
	(0.023)	(0.015)	(0.014)	(0.010)	(0.010)
$log(Assets)_{f,t-1}$	−0.159***	−0.035	−0.124***	−0.091***	0.033
	(0.052)	(0.035)	(0.031)	(0.024)	(0.022)
$\overline{Sales\ growth\ rate}_{f,t}$	0.141***	0.097***	0.045***	0.027***	−0.017**
	(0.020)	(0.013)	(0.012)	(0.008)	(0.008)
$LT\ debt/Assets_{f,t-1}$	0.119**	0.035	0.084**	0.087***	0.003
	(0.058)	(0.040)	(0.035)	(0.026)	(0.024)
$Labor\ productivity_{f,t-1}$	−0.216***	−0.177***	−0.039	−0.057*	−0.018
	(0.075)	(0.049)	(0.046)	(0.033)	(0.028)
Observations	835770	835770	835770	835770	835770
# Firms	17280	17280	17280	17280	17280
Firm FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	48.7	48.7	48.7	48.7	48.7

The dependent variables are (in the order of the columns) the variation of exports in market m between time $t-1$ and t, the variation of exports to customers in market m with whom firm f has a trade relationship at $t-1$ and t, the variation of exports to customers in market m with whom firm f has a trade relationship only at $t-1$ or at t, the amount of exports to customers acquired at t (lost at $t-1$) standardized by the average of total exports in market m of firm f between time $t-1$ and t. All the dependent variables are defined only for firms that stay in the market between $t-1$ and t. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 8: Effects of payment periods on the composition of products.

	$\Delta Exports_{f,m,t}$	$\Delta Stable\ products_{f,m,t}$	$\Delta Product\ base_{f,m,t}$	$New\ products_{f,m,t}$	$Discarded\ products_{f,m,t-1}$
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	−0.055**	−0.062***	0.007	0.007	0.001
	(0.023)	(0.022)	(0.006)	(0.006)	(0.006)
$log(Assets)_{f,t-1}$	−0.159***	−0.177***	0.018	0.018	−0.006
	(0.052)	(0.050)	(0.015)	(0.015)	(0.013)
$\overline{Sales\ growth\ rate}_{f,t}$	0.141***	0.144***	−0.002	−0.002	−0.001
	(0.020)	(0.019)	(0.006)	(0.006)	(0.005)
$LT\ debt/Assets_{f,t-1}$	0.119**	0.134**	−0.014	−0.014	0.022
	(0.058)	(0.057)	(0.017)	(0.017)	(0.014)
$Labor\ productivity_{f,t-1}$	−0.216***	−0.243***	0.026	0.026	−0.004
	(0.075)	(0.073)	(0.020)	(0.020)	(0.016)
Observations	835770	835770	835770	835770	835770
# Firms	17280	17280	17280	17280	17280
Firm FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	48.7	48.7	48.7	48.7	48.7

The dependent variables are (in the order of the columns) the variation of exports in market m between time $t-1$ and t, the variation of exports of products in market m that firm f exported in m both at time $t-1$ and t, the variation of exports of products in market m that firm f exported in m only at time $t-1$ or at t, the amount of exports to products that firm started to export in m at time t (stopped to export in m at $t-1$) standardized by the average of total exports in market m of firm f between time $t-1$ and t. All the dependent variables are defined only for firms that stay in the market between $t-1$ and t. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$, which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 9: Dynamics of the effects.

	$\Delta Exports_{f,m,t}$		
	Before (03-06)	Treatment (05-08)	After (07-10)
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	0.078	−0.075**	0.051
	(0.152)	(0.034)	(0.031)
Observations	308584	364758	369625
# Firms	14885	15475	15338
Firm FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Kleibergen-Paap	1.0	22.9	20.9

The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). The regression is estimated for different subperiods: 2003-2006, 2005-2008 and 2007-2010. In the first two years of each subperiod, the instrument variable is set to 0. It is equal to $\overline{d(DSO,60)}_{f,07}$ for the two following years. Standard errors are clustered at the firm-level. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 10: Impact of the policy and ex ante market penetration.

	$\Delta Exports_{f,m,t}$		
	(1)	(2)	(3)
$\overline{d(DSO,60)}_{f,t}$	0.005***	0.037***	
	(0.002)	(0.002)	
Q2 *Market share*$_{f,m,07} \times \overline{d(DSO,60)}_{f,t}$		−0.018***	−0.020***
		(0.001)	(0.001)
Q3 *Market share*$_{f,m,07} \times \overline{d(DSO,60)}_{f,t}$		−0.035***	−0.045***
		(0.001)	(0.001)
Q4 *Market share*$_{f,m,07} \times \overline{d(DSO,60)}_{f,t}$		−0.040***	−0.057***
		(0.001)	(0.002)
Observations	835770	687906	670519
# Firms	17280	14046	12286
Firm FE	Yes	Yes	No
Firm-year FE	No	No	Yes
Country-year FE	Yes	Yes	Yes
Quartile FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

The table presents the reduced form specification of the 2SLS estimation. The dependent variable is the variation of exports in market m for firms that stay in the market between time t and $t-1$. The independent variable is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. The market share in 2007 is measured as the quartile of 2007 exports of firm f in country m. *Q2 Market share*$_{f,m,07} = 1$ means for instance that firm f was in the second quartile of exports in country m in 2007. The first and second columns include firm, country-year and quartile fixed effects. The third column include firm-year, country-year and quartile fixed effects. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 11: Effect of the policy on average sales per customer.

	$log(Avg\ Exports)_{f,m,t}$	$log(Avg\ Exports^N)_{f,m,t}$
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	−0.021	−0.038
	(0.051)	(0.058)
$log(Assets)_{f,t-1}$	0.275**	0.004
	(0.116)	(0.135)
$\overline{Sales\ growth\ rate}_{f,t}$	0.057	0.087*
	(0.037)	(0.045)
$LT\ debt/Assets_{f,t-1}$	−0.162	−0.008
	(0.122)	(0.150)
$Labor\ productivity_{f,t-1}$	0.847***	0.580***
	(0.134)	(0.190)
Observations	835770	427118
# Firms	17280	15312
Firm FE	Yes	Yes
Country-year FE	Yes	Yes
Kleibergen-Paap	48.7	42.9

The dependent variables are (in the order of the columns) the logarithm of average sales per customer and the logarithm of average sales per new customer. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%

Table 12: Payment periods and capital structure.

Dependent variables (scaled by $Total\ assets_{f,t-1}$):	$Working\ capital_{f,t}$	$Cash_{f,t}$	$Credit\ line_{f,t}$	$Long\text{-}term\ credit_{f,t}$
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	0.029***	−0.013***	0.014***	−0.005**
	(0.006)	(0.004)	(0.003)	(0.002)
$log(Assets)_{f,t-1}$	0.049***	−0.056***	0.037***	−0.015***
	(0.015)	(0.011)	(0.008)	(0.005)
$\overline{Sales\ growth\ rate}_{f,t}$	−0.016**	0.019***	−0.012***	0.005*
	(0.007)	(0.005)	(0.003)	(0.002)
$LT\ debt/Assets_{f,t-1}$	−0.094***	−0.056***	−0.017*	0.474***
	(0.018)	(0.011)	(0.010)	(0.010)
$Labor\ productivity_{f,t-1}$	0.256***	0.095***	0.024*	−0.010
	(0.031)	(0.019)	(0.014)	(0.009)
Observations	99584	103080	102806	103001
# Firms	15296	15406	15387	15406
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

The dependent variables are (in the order of the columns) the working capital needs of firm f at time t (defined as the sum of inventories, accounts receivable net of accounts payable as well as other operating receivables), cash holdings, drawn credit lines and long-term debt. All the dependent variables are standardized by the lag of total assets. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 13: Heterogeneity I - Intensity of liquidity constraints

	$\Delta Exports_{f,m,t}$							
	Cash/Assets		Debt/Assets		Total sales		Volatility of sales	
	$\leq P50$ (1)	$\geq P50$ (2)	$\leq P50$ (3)	$\geq P50$ (4)	$\leq P50$ (5)	$\geq P50$ (6)	$\leq P50$ (7)	$\geq P50$ (8)
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	−0.450**	0.011	−0.050	−0.247***	−0.268**	−0.100	−0.157	−0.220**
	(0.185)	(0.063)	(0.130)	(0.085)	(0.114)	(0.089)	(0.106)	(0.101)
Observations	394154	394277	391471	391506	398390	398657	389605	389711
# Firms	8139	8239	7796	8561	10337	7346	7568	7486
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	14.1	45.8	13.0	41.6	21.1	31.4	21.6	26.7

The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). In the first three groups, observations are sorted by the average values between 2003 and 2007 of total sales, ratio of cash to assets and long-term debt over assets. In the last group, observations are sorted by volatility of sales computed as the standard deviation of sales normalized by the average value of sales between 2003 and 2007. Rankings are within country× year (P50 is the median). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 14: Effects of the policy on domestic sales and sourcing strategies.

	$\Delta Domestic\ turnover_{f,t}$		$Import\ share_{f,t}$	
	(1)	(2)	(3)	(4)
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	0.005	−0.071		
	(0.011)	(0.084)		
$\Delta Days\ payable\ outstanding_{f,t} \times 10$			−0.004	0.038
			(0.013)	(0.063)
Observations	103001	103001	102880	102876
# Firms	15399	15399	15393	15393
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Industry-Year FE	No	Yes	No	Yes

The dependent variables are the variation of sales in the domestic market in the two first columns and the import share (ratio of imports to total purchases) in the last two columns. The instrumented variable in the first column is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. The instrumented variable in the second column is $\Delta Net\ days\ outstanding_{f,t}$ and is defined as the difference between days of sales outstanding and days payable outstanding. The instrument for the variation of net days outstanding is the sales-weighted average of 2007 sectoral net days outstanding multiplied by a dummy equal to one after 2007. The instrumented variable in the third column is $\Delta Days\ payable\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts payables over sales multiplied by 365. The instrument for the variation of days payables outstanding is $\overline{d(DPO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days payables outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 15: Heterogeneity II - Exposure to the policy.

	$\Delta Exports_{f,m,t}$			
	Import share (2007)		Market share (2007)	
	$\leq P50$	$\geq P50$	$\leq P50$	$\geq P50$
	(1)	(2)	(3)	(4)
Δ*Days of sales outstanding*$_{f,t} \times 10$	−0.121	−0.277**	−0.264**	−0.049
	(0.094)	(0.131)	(0.106)	(0.094)
Observations	409380	409287	408397	408536
# Firms	9510	7208	11236	7576
Firm FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Kleibergen-Paap	26.6	19.1	30.1	22.3

The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is Δ*Days of sales outstanding*$_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). $\overline{\textit{Import share}}_{s,07}$ is defined as the average import share in sector s in 2007. $\overline{\textit{Import share}}_{f,07}$ is then computed by taking the average of $\overline{\textit{Import share}}_{s,07}$ weighted by the sales of firm f in each sector s. The domestic market share is defined as the ratio of domestic sales realized by the firm in its principal sector of activity over the total sum of domestic sales realized in the sector. Rankings are within destination× year (P50 is the median). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 16: Payment periods and product prices.

	All Buyers		Continuing Customers	New Customers
	First stage	$\Delta Price_{f,p,c,t}$	$\Delta Price_{f,p,c,t}$	$\Delta Price_{f,p,c,t}$
$\overline{d(DSO,60)}_{f,t} \times 10$	−0.001***			
	(0.000)			
$log(Assets)_{f,t-1}$	−0.004***	−0.016	−0.014	−0.021
	(0.000)	(0.020)	(0.019)	(0.022)
$\overline{Sales\ growth\ rate}_{f,t}$	0.001**	0.035***	0.036***	0.034***
	(0.000)	(0.007)	(0.007)	(0.010)
$LT\ debt/Assets_{f,t-1}$	0.005***	0.016	0.016	0.033
	(0.001)	(0.029)	(0.028)	(0.036)
$Labor\ productivity_{f,t-1}$	−0.001	−0.049**	−0.050**	−0.080**
	(0.002)	(0.022)	(0.020)	(0.037)
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$		−1.941	−2.127	−2.263
		(4.613)	(4.224)	(5.125)
Observations	3820845	3820845	3294942	1548918
# Firms	16693	16693	16333	14766
Firm FE	Yes	Yes	Yes	Yes
Country-product FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Kleibergen-Paap		12.5	15.2	17.0

Prices are computed as the ratio of volume to quantity (unit value) at the firm (f), country (m), product (p), and time (t) level. A product is defined as a 8-digits Combined Nomenclature (CN) product code. The main variable is the evolution of prices computed in growth rate (trimmed at the 5% level). In the second and third columns, we compare product prices charged to existing and new customers to the average price charged for the same product in the same country at year $t-1$. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm, year and country-product fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 17: Heterogeneity III - Costs of customer acquisition.

	$\Delta Exports_{f,m,t}$				
	(1)	(2)	(3)	(4)	(5)
$\overline{d(DSO,60)}_{f,t}$	0.017***	−0.001		0.012***	
	(0.004)	(0.003)		(0.004)	
$1(Differentiated)_p \times \overline{d(DSO,60)}_{f,t}$		0.017***	0.022***		
		(0.001)	(0.001)		
$Q2\ Stickiness_p \times \overline{d(DSO,60)}_{f,t}$				0.013***	0.013***
				(0.002)	(0.002)
$Q3\ Stickiness_p \times \overline{d(DSO,60)}_{f,t}$				0.006***	0.003*
				(0.002)	(0.002)
$Q4\ Stickiness_p \times \overline{d(DSO,60)}_{f,t}$				0.006***	0.001
				(0.002)	(0.002)
Observations	3230915	2624939	2614866	3230012	3219502
# Firms	19705	18741	18083	19705	18525
Firm FE	Yes	Yes	No	Yes	No
Firm-Year FE	No	No	Yes	No	Yes
Country-Year FE	Yes	Yes	Yes	Yes	Yes
Product FE	Yes	Yes	Yes	Yes	Yes

This table displays the results of the reduced form specification of the 2SLS estimation. The dependent variable is the variation of exports in market m of product p between $t-1$ and t. The independent variable is the variation of days of sales outstanding $\overline{d(DSO,60)}_{f,t}$, which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. A product is defined by a 3-digits Classification of Products by Activity (CPA) code. In columns 2 and 3, we attribute to each HS8 product a number (0: homogeneous, 1: reference priced, 2: differentiated) in line with its position in the Rauch (1999) classification. For each firm-country-CPA3-year observation, the Rauch code is computed as the average of the Rauch code weighted by exports. Observations are ranked as "Homogeneous" (resp. "Differentiated") if the average Rauch code is below (resp. superior) to the median. In columns 4 and 5, observations are ranked in quartiles according to the value of the "relationship stickiness" index associated with product p (Martin, Mejean and Parenti, 2018). A higher value of the index signals longer durations of trade relationships for a given product and reflects higher product market frictions. Columns 1, 2 and 4 include firm, country-year and product fixed effects. Columns 3 and 5 include firm-year, country-year and product fixed effects. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table 18: Connected and non-connected customers.

	$All\ customers_{f,m,t}$	$Non\text{-}connected\ customers_{f,m,t}$	$Connected\ customers_{f,m,t}$
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	-0.025^{**}	-0.010^{**}	-0.014
	(0.011)	(0.004)	(0.010)
Observations	749132	749132	749132
# Firms	16959	16959	16959
Firm FE	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes
Kleibergen-Paap	54.1	54.1	54.1

The dependent variable in the first column is the ratio of exports at time t in market m to the average value of exports between t and $t-1$. The dependent variable in the second (resp. third) column is the ratio of exports at time t in market m realized with non-connected (resp. connected) customers to the average value of exports between t and $t-1$. A customer is said to be "connected" it has already traded with a French exporter before time t, and "non-connected" otherwise. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and country-product-year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Additional tables and figures for online appendix

I Derogations

This appendix gives the maximum contractual payment terms after the date of the invoice authorized by the LME reform. When the limit varies in 2009 (*e.g.* 120 days between January 01 and May 31 2009 and 80 days between June 01 and December 31 2009), we report the average number of days (100 days). When the supplier and the customer face different thresholds, the minimum payment limit prevails for the transaction.

- *Purchases of living cattle:* 20 days
- *Purchases of perishable products, purchases of alcoholic beverages:* 30 days
- *Manufacture and sale of metal food packaging; record industry; recreational fishing; manual, creative and recreational activities:* 75 days
- *Construction industry; bathroom and heating equipment; sailing stores; industrial tooling; industrial hardware; steel products for the construction industry; automotive tools wholesaling:* 85 days
- *DIY stores; stationery and office supplies; tire industry; drugs with optional medical prescriptions; pet trade; garden stores; coatings, paints, glues, adhesives and inks; sports stores ; leather industry; clothing sector:* 90 days
- *Jewellery, gold- and silversmiths' trade; round wooden elements; food supplements; optical-eyewear industry; cooperage :* 105 days
- *Firearms and ammunition for hunting:* 115 days
- *Quads, two- or three-wheeled vehicles, recreational vehicles::* 125 days
- *Agricultural supplies:* 150 days
- *Toy stores:* 170 days
- *Book edition, agricultural machines:* 195 days

II Robustness checks

In table A1, we re-estimate the baseline regression using various alternative specifications. In the column 1, we tweak the definition of the instrument so as to incorporate the deviations to the 60-days rule introduced by the law. While the sign of the coefficient stays unchanged, the magnitude in absolute value becomes much bigger (-0.254). Since the derogations are likely to be endogenously determined, however, we tend to see our baseline coefficient as being closer to the actual elasticity.

[Insert table A1 here]

Strikingly, the OLS regression yields a positive coefficient for the variation of payment periods. This is expected, as payment periods decreased simultaneously to the collapse in international trade caused by the financial crisis. The OLS regression captures this simultaneous drop, which leads to a positive coefficient for the variation of days of sales outstanding. This exercise highlights the necessity of an instrumentation strategy to capture the causal effect of the policy.

In column 4, the specification is estimated without country-year fixed effects (only firm and year fixed effects). The estimated coefficient is lower in absolute value (-0.043) but not statistically different from the baseline estimate. The estimated coefficient in the absence of firm fixed effects is a bit larger (-0.071) but is no longer significantly different from zero.

[Insert table A2 here]

In table A2, we assess the effect of the variation of domestic payment periods on international sales using different units of aggregation for exports. In an influential paper, Bertrand, Duflo and Mullainathan (2004) argue that in presence of serially correlated outcomes, econometric estimations based on panel data with a limited number of individual entities might under-reject the null hypothesis as standard errors are likely to be under-estimated. As a robustness check, they recommend collapsing the data in a "pre" and "post" period and estimating the coefficient of interest on the resulting data set so as to limit the influence of the time dimension.

Accordingly, we reduce the dimension of our data in two steps. First, we sum all the exports at the firm-year level and estimate our baseline specification without the country dimension and with $Y = \Delta Exports$ (columns 1 and 2). We can see that the negative and significant relationship between the variation of days of sales outstanding and export growth is still present even when abstracting from country level-variations.

In a second stage (columns 3 and 4), we remove the time dimension of the data set by computing the growth rate of firm total exports between 2006 and 2009. Δ*Days of sales outstanding* is defined in this context as the long difference of days of sales outstanding between 2006 and 2009. It is instrumented by $\overline{d(DSO,60)}_{f,06}$. Once again, the causal relationship that we uncover resists to the change in the unit of observation and stays significant at the 5% whether we include controls or not.

In a similar setting, Paravisini et al. (2014) advocates for the use of country-product-time fixed effects so as to limit the influence of confounding composition effects. The estimated sensitivity of exports to domestic payment periods might indeed reflect that firms exposed to the policy were actually disproportionately exporting products experiencing relatively higher foreign demand. We address this concern by estimating the regressions at the country-product-year level, a product being defined by a 3-digits code of the Classification of Products by Activity.

The last two columns of table A2 shows that our main conclusion stays unchanged: a fall in payment periods generates higher export growth. The magnitudes of the elasticity of export growth to payment periods are much larger than the baseline estimates (-0.351 in the last column). We observe however that export growth is both more dynamic (average of 3.5%) and more volatile (standard deviation of 1.4) at the country-product than at the country-level, which may partly explain this difference.

[Insert table A3 here]

Another potential concern with our empirical strategy relates the weights used to compute the instrumental variable. We use firms' past sectoral sales as weights to compute the firm-level average distance to the 60-days threshold. We argue that the weights are likely to depend primarily on technological constraints and on the sectoral specialization of the firm. It may

be possible, however, that the portfolio of sectors of a firm may be related to its capacity of acquiring customers. The statistical link between the exposition to the reform and the export behavior would as a consequence reflect the presence of these confounding factors. Since those factors are likely to vary little over time, we should under this hypothesis find evidence of a statistical link between the exposure to the policy and the variation of exports even before the implementation of the policy. Subsection 5.2 shows that we don't.

Still, we check in table A3 that our results are not affected by the method of construction of the instrument. Column 1 displays the baseline estimate. In column 2 and 3, the weights are based on 2006 sectoral sales and average sectoral sales between 2003 and 2006. The estimates are barely changed, which implies that our results are not driven by the precise timing of construction of the shift-share variable. In column 4 we compute the instrument as the simple average of the sectoral distance to the 60-days threshold (based on the presence of the firm in downstream sectors in 2007) so as to remove the influence of the weights. The coefficient is statistically indistinguishable from the baseline estimate.

[Insert table A4 here]

In table A4, we change the definition of the computation of standard errors to allow for various patterns of correlation of residuals. Column 1 present the baseline specification with adjustment for clustering at the firm-level. In columns 2 and 3, we adjust the computation of standard errors for clustering of residuals at the country-year and sector-year level. We then double-cluster standard errors in column 4 (column 5) to adjust for correlation of residuals both at the level of the firm and the country-year (sector-year). The significance of the main coefficient drops in the last columns but stays above the 10% level.

[Insert table A5 here]

Lastly, in table A5, we re-estimate the decomposition of the effects of the policy between the evolution of the customer base and the evolution of sales with stable customers using the standard growth rate. Compared to the mid-point growth rate, the standard computation of the growth rate has the disadvantage of being unbounded. To deal with the presence of outliers, we

remove the observations with growth rates exceeding 1000%. This procedure discards 3.2% of the observations.

The results of the decomposition using the standard growth rate are very close to the baselines estimates. In particular, the coefficient for the variation of days of sales outstanding (column 1) is not statistically different from the baseline estimated elasticity. Moreover, we find once again that the entirety of the effect of the policy on international sales comes from the expansion of the customer base. Unlike the baseline results, however, the expansion of the customer base appears with this specification to be solely driven by the acquisition of new customers, and not by a higher retention rate of existing customers.

Table A1: Alternative specifications.

	$\Delta Exports$				
	Baseline	Derogations	OLS	No country-year FE	No firm FE
	(1)	(2)	(3)	(4)	(5)
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	−0.055**	−0.254*	0.012***	−0.043*	−0.071
	(0.023)	(0.143)	(0.001)	(0.022)	(0.054)
$log(Assets)_{f,t-1}$	−0.159***	−0.605*	−0.008	−0.129***	−0.001
	(0.052)	(0.321)	(0.007)	(0.050)	(0.003)
$\overline{Sales\ growth\ rate}_{f,t}$	0.141***	0.278***	0.096***	0.134***	0.182***
	(0.020)	(0.100)	(0.010)	(0.019)	(0.052)
$LT\ debt/Assets_{f,t-1}$	0.119**	0.549*	−0.018	0.091	0.207***
	(0.058)	(0.302)	(0.032)	(0.057)	(0.053)
$Labor\ productivity_{f,t-1}$	−0.216***	−0.571**	−0.091*	−0.198***	0.330***
	(0.075)	(0.289)	(0.054)	(0.073)	(0.074)
Observations	835770	812857	835770	835770	835770
# Firms	17280	16873	17280	17280	17280
Firm FE	Yes	Yes	Yes	Yes	No
Country-year FE	Yes	Yes	Yes	No	Yes
Year FE	No	No	No	Yes	No
Kleibergen-Paap	48.726	4.277		49.030	12.750

The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). In the Derogations column, the instrumented variable is modified so as to take into account the sectoral derogations to the 60-days rule (see the appendix for a list of the derogations). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table A2: Alternative units of aggregation.

Unit of aggregation:	$\Delta Exports$					
	Firm-year		Firm		Firm-product-year	
	(1)	(2)	(3)	(4)	(5)	(6)
Δ*Days of sales outstanding*	−0.120***	−0.120***	−0.050***	−0.083***	−0.388*	−0.351*
	(0.032)	(0.030)	(0.018)	(0.021)	(0.209)	(0.186)
Observations	142427	125926	13025	12406	3230915	3230915
Firm FE	Yes	Yes	No	No	Yes	Yes
Year FE	Yes	Yes	No	No	No	No
Product-Year FE	No	No	No	No	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

In the first two columns, we sum all the exports at the firm-year level and estimate our baseline specification without the country dimension. The instrumented variable is Δ*Days of sales outstanding*$_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). In the next two columns, we remove the time dimension of the data by calculating the growth rate of firm total exports between 2006 and 2009. Δ*Days of sales outstanding* is defined in this context as the long difference of days of sales outstanding between 2006 and 2009; it is instrumented by $\overline{d(DSO,60)}_{f,06}$. Controls include the logarithm of total assets in 2006, the average growth rate between 2006 and 2009 of the sectors in which the firm operates, leverage and labor productivity in 2006. In the last two columns, exports are computed at the level of a firm f, country m, a year t and a product p. A product is defined as a 3-digits code of the Classification of Products by Activity produced by the European Commission. The specification is otherwise identical to the one used in the first two columns. Standard errors are clustered at the firm-level in the first and last two columns and corrected for heteroskedasticity otherwise. Standard errors are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table A3: Alternative measures of exposure to the reform.

	$\Delta Exports_{f,m,t}$			
	Baseline	2006 weights	2003-2006 average weights	2007 dummies
Δ*Days of sales outstanding*$_{f,t} \times 10$	−0.055**	−0.029*	−0.029*	−0.045**
	(0.023)	(0.018)	(0.018)	(0.022)
Observations	835770	812857	816089	835770
# Firms	17280	16873	16901	17280
Firm FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Kleibergen-Paap	48.7	70.2	71.6	45.8

The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is Δ*Days of sales outstanding*$_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). In the Baseline column, the instrument for the variation of days of sales outstanding is defined as the average of the 2007 sectoral distance to the 60-days threshold weighted by the 2007 shares of sales of firm f realized in each sector (multiplied by a dummy equal to one after 2007). In the second (third) column, the weights are defined as the shares of sales of firm f realized in each sector in 2006 (realized on average between 2003 and 2006). In the fourth column, the instrument is defined as the simple average of the 2007 sectoral distance to the 60-days threshold in the sectors in which it operates in 2007 (multiplied by a dummy equal to one after 2007). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table A4: Alternative computations of standard errors.

	$\Delta Exports_{f,m,t}$				
Cluster:	Firm	Country-Year	Sector-Year	Firm × Country-Year	Firm × Sector-Year
Δ*Days of sales outstanding*$_{f,t} \times 10$	−0.055**	−0.055**	−0.055*	−0.055*	−0.055*
	(0.023)	(0.024)	(0.029)	(0.028)	(0.030)
log(Assets)$_{f,t-1}$	−0.159***	−0.159***	−0.159**	−0.159**	−0.159**
	(0.052)	(0.055)	(0.067)	(0.065)	(0.067)
$\overline{\textit{Sales growth rate}}_{f,t}$	0.141***	0.141***	0.141***	0.141***	0.141***
	(0.020)	(0.020)	(0.026)	(0.024)	(0.027)
LT debt/Assets$_{f,t-1}$	0.119**	0.119**	0.119*	0.119*	0.119*
	(0.058)	(0.055)	(0.068)	(0.067)	(0.070)
Labor productivity$_{f,t-1}$	−0.216***	−0.216***	−0.216***	−0.216**	−0.216**
	(0.075)	(0.067)	(0.080)	(0.088)	(0.085)
Observations	835770	835770	835770	835770	835770
# Firms	17280	220	3078	220	3078
Firm FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	48.7	38.0	32.0	22.4	30.2

Standard errors are adjusted for clustering of the residuals at the level of the firm, country-year, sector-year in columns 1 to 3. We then double-cluster standard errors in column 4 (column 5) to adjust for correlation of residuals both at the level of the firm and the country-year (sector-year). Standard errors are given in parentheses. The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is Δ*Days of sales outstanding*$_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table A5: Effects of payment periods on the formation of a customer base (standard growth rate).

	$\Delta Exports_{f,m,t}$	$\Delta Stable\ customers_{f,m,t}$	$\Delta Customer\ base_{f,m,t}$	$New\ customers_{f,m,t}$	$Lost\ customers_{f,m,t-1}$
$\Delta Days\ of\ sales\ outstanding_{f,t} \times 10$	−0.073**	−0.017	−0.056**	−0.059**	−0.003
	(0.037)	(0.026)	(0.022)	(0.023)	(0.007)
$log(Assets)_{f,t-1}$	−0.264***	−0.106*	−0.158***	−0.175***	−0.017
	(0.081)	(0.057)	(0.049)	(0.052)	(0.015)
$\overline{Sales\ growth\ rate}_{f,t}$	0.180***	0.120***	0.060***	0.062***	0.002
	(0.031)	(0.022)	(0.018)	(0.019)	(0.005)
$LT\ debt/Assets_{f,t-1}$	0.198**	0.107	0.091	0.136**	0.045***
	(0.093)	(0.066)	(0.056)	(0.059)	(0.017)
$Labor\ productivity_{f,t-1}$	−0.408***	−0.323***	−0.086	−0.135*	−0.050***
	(0.114)	(0.079)	(0.066)	(0.069)	(0.019)
Observations	808061	808061	808061	808061	808061
# Firms	17193	17193	17193	17193	17193
Firm FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	48.0	48.0	48.0	48.0	48.0

The dependent variables are (in the order of the columns) the standard growth rate of exports in market m between time $t-1$ and t, the variation of exports to customers in market m with whom firm f has a trade relationship at $t-1$ and t, the variation of exports to customers in market m with whom firm f has a trade relationship only at $t-1$ or at t, the amount of exports to customers acquired at t (lost at $t-1$). All the dependent variables are defined only for firms that stay in the market between $t-1$ and t. The instrumented variable is $\Delta Days\ of\ sales\ outstanding_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. The instrument for the variation of days of sales outstanding is $\overline{d(DSO,60)}_{f,t}$ which is defined as the sales-weighted average of the 2007 sectoral distance of days of sales outstanding to the 60-days threshold multiplied by a dummy equal to one after 2007. Control variables include $Labor\ productivity_{f,t-1}$ (value added over the number of employees), $log(Total\ Assets)_{f,t-1}$ (total assets in logarithm), $Long\text{-}term\ debt/TA_{f,t}$ (ratio of long-term debt to total assets), $\overline{Sales\ growth\ rate}_{f,t}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

III Accounting for both demand and supply of trade credit

The baseline specification does not take into account the role of the demand of trade credit addressed to suppliers. Since firms are both clients and suppliers, the reduction of the provision of trade credit granted to customers could be entirely offset by the diminution of supplier payment periods. To tackle this issue, we compare clients payment periods to the time taken by firm f to pay its suppliers, a measure of payment periods in *net terms*:

$$\textit{Net days outstanding}_{f,t} = DSO_{f,t} - \frac{\textit{Purchases}_{f,t}}{\textit{Sales}_{f,t}} \times DPO_{f,t}$$

The baseline identification strategy is not relevant with this measure of payment periods as the distance to the 60-days rule should no longer predict the effect of the policy. It remains true, however, that payment periods (from clients or to suppliers) should decrease all the more after the policy than they were previously more distant to the 60-days threshold. This directly implies that a firm with a positive net days outstanding measure in 2007 should have experienced a decrease in $\textit{Net days outstanding}_{f,t}$ after the implementation of the policy as days of sales outstanding should have decreased more than days payable outstanding.

[Insert figure A1 here]

This idea is illustrated by figure A1. In the industrial mechanical engineering sector, payment periods from clients (DSO) far exceeded payment periods to suppliers (DPO) before the reform with net days outstanding of 54 days in 2007. As DSO were much more distant to the 60-days threshold, they decreased more than DPO. This resulted in net days outstanding of 42 days in 2009. Conversely, DPO were higher than DSO for wholesalers of non-specialized food in 2007, leading to net days outstanding of minus 12 days. Net days outstanding in this case increased after the reform, reaching minus 2 days. This mechanism implies that previous imbalances between DSO and DPO are predictive of the sign and the magnitude of the subsequent change in net days outstanding. We formalize this idea by instrumenting $\Delta\textit{Net days outstanding}_{f,t}$ by

$$\overline{\textit{Net days outstanding}_{f,t}} = 1[t \geq 2007] \cdot \sum_{s} \omega_{f,s,07} \cdot \overline{\textit{Net days outstanding}_{s,06}}$$

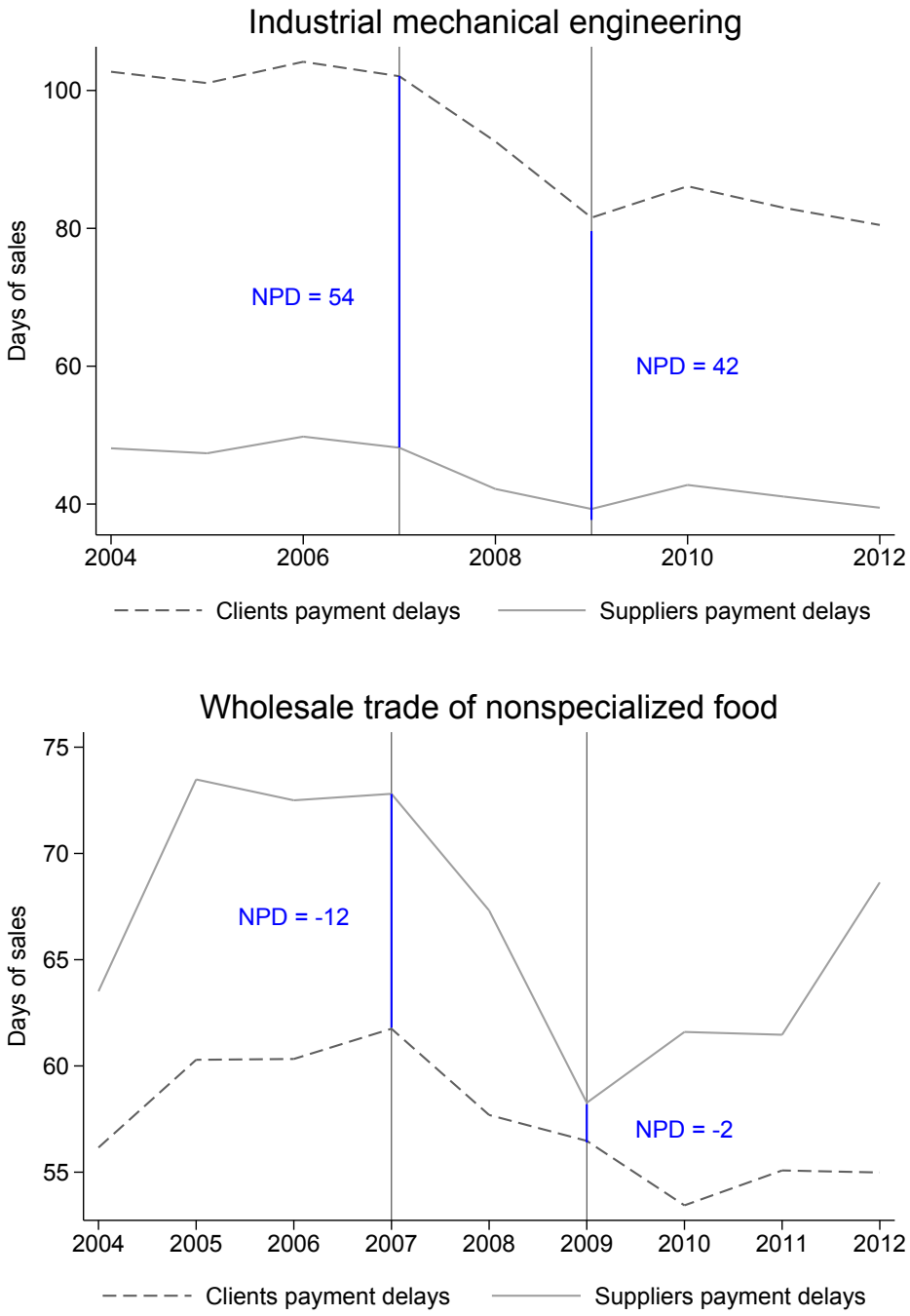
where $\overline{Net\ days\ outstanding}_{s,07}$ denotes the average value of net days outstanding in sector s in 2007.

[Insert tables A6 and A7 here]

Tables A6 and A7 reproduce the results of the previous section using this alternative measure of payment periods. We can see that each additional day of imbalance between supplier and client periods is associated to a subsequent decrease in 0.01 day, meaning that the adjustment was much less pronounced in net terms than for client payment periods. We find that as with $\Delta Days\ of\ sales\ outstanding_{f,t}$, a decrease in net days outstanding leads to higher growth of exports and a higher probability of entry. The effect on the probability of exiting a country is only significant at the 10% level.

Strikingly, the magnitudes of the effects are much larger. This is in line with the intuition that a decrease in client payment periods *compared to supplier payment periods* is more important for the firm than the sole decrease in days of sales outstanding. Interestingly, we find this time $\Delta Stable\ customers$ to be affected by the variation of net days outstanding; the magnitude of the coefficients indicates however that the effect on the customer base remains the main driver of the growth rate of exports, two thirds of the effects being attributable to $\Delta Customer\ base$.

Figure A1: Effects of the reform on net days outstanding.



Source: Fiscal data.
Interpretation: This graph displays the evolution of days of sales outstanding and days payable outstanding between 2004 and 2012 in the industrial mechanical engineering and wholesale trade of nonspecialized food. Days of sales outstanding are computed as the average ratio of accounts receivable over sales multiplied by 365. Days payable outstanding are computed as the average ratio of accounts payable over purchases. Net days outstanding are defined as DSO minus DPO. Lower net days outstanding means that DSO decreased more than DPO.

Table A6: Net days outstanding and exports.

	Δ*Net days outstanding*$_{f,t}$	Δ*Exports*$_{f,m,t}$	*Exit*$_{f,m,t}$	*Entry*$_{f,m,t}$
$\overline{\textit{Net days outstanding}_{f,t}} \times 10$	-0.028^{***}			
	(0.009)			
Δ*Net days outstanding*$_{f,t} \times 10$		-0.227^{***}	0.041^{*}	-0.011^{***}
		(0.080)	(0.023)	(0.003)
Observations	831222	831222	970149	3429117
# Firms	17151	17151	18627	20038
Firm FE	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes
Kleibergen-Paap		10.2	10.7	55.7

The dependent variables are (in the order of the columns) the variation of net days outstanding (which are defined as the difference between days of sales outstanding and days payable outstanding), the variation of exports in market m for firms that stay in the market between time t and $t-1$, a dummy indicating whether firm f exits market m at time t and a dummy indicating whether firm f enters market m at time t. The instrument for the variation of days of sales outstanding is the sales-weighted average of 2007 sectoral net days outstanding multiplied by a dummy equal to one after 2007. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}_{f,t}}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

Table A7: Effects of net payment delays on the formation of a customer base.

	Δ*Exports*$_{f,m,t}$	Δ*Stable customers*$_{f,m,t}$	Δ*Customer base*$_{f,m,t}$	*New customers*$_{f,m,t}$	*Lost customers*$_{f,m,t-1}$
Δ*Net days outstanding*$_{f,t} \times 10$	-0.227^{***}	-0.073^{**}	-0.154^{***}	-0.108^{***}	0.045^{*}
	(0.080)	(0.036)	(0.054)	(0.039)	(0.023)
Observations	831222	831222	831222	831222	831222
# Firms	17151	17151	17151	17151	17151
Firm FE	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	10.2	10.2	10.2	10.2	10.2

The dependent variables are (in the order of the columns) the variation of exports in market m between time $t-1$ and t, the variation of exports to customers in market m with whom firm f has a trade relationship at $t-1$ and t, the variation of exports to customers in market m with whom firm f has a trade relationship only at $t-1$ or at t, the amount of exports to customers acquired at t (lost at $t-1$) standardized by the average of total exports in market m of firm f between time $t-1$ and t. All the dependent variables are defined only for firms that stay in the market between $t-1$ and t. The instrumented variable is Δ*Net days outstanding*$_{f,t}$ and is defined as the difference between days of sales outstanding and days payable outstanding. The instrument for the variation of net days outstanding is the sales-weighted average of 2007 sectoral net days outstanding multiplied by a dummy equal to one after 2007. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}_{f,t}}$ (sales-weighted average of sectoral sales growth rates). Regressions include firm and year fixed-effects. Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.

IV Relationship stickiness

The index of relationship stickiness developed by Martin, Mejean and Parenti (2018) is based on the average length of trade relationships for a given product. In practice, the duration of a trade relationship is measured as the time (in months) between the first transaction of a given product between a seller and buyer and the first time the same buyer interacts with a different French exporter for importing the same product.[49] Interpreting the length of trade relationships at the individual level is however not straightforward as a long spell can either be reflective of high switching costs or a good match quality between the buyer and the seller. Martin, Mejean and Parenti (2018) use the average export volume over the length of the transaction ($Size_{b,s,p}$ for a buyer b, a seller s and a product p) as an indicator of the quality of the match. More precisely, denoting d a decile of $Size_{b,s,p}$ for a given product and a given importing country c, we compute the average trade duration $Duration_{c,p,d}$ in size-bin d and estimate[50]

$$\log(Duration_{c,p,d}) = FE_c + FE_p + FE_d + \epsilon_{c,p,d}$$

A high product fixed-effect $\widehat{FE}_p$ ("relationship stickiness index") is interpreted as reflecting the presence of important frictions in the product market p.

[49] To avoid having to deal with left- and right-censored data, we focus on transactions initiated after 2004 and terminated before 2011. If the buyer starts trading with a supplier he already interacted with, we consider that a new relationship is created. The duration of the second relationship is calculated independently of the first one.

[50] We trim the data set so as to remove the observations that belong to the bottom and top 1% of $Size_{c,s,p}$.

V Additional results - Impact of the reform on domestic sales

In this section, we explore further the impact of the policy on domestic sales. We show in section 6.2 that the policy did not affect domestic sales on average. It might be, however, that the policy had differentiated impact on domestic sales depending on the nature and the intensity of competition faced by firms. When the degree of competition between suppliers is high, a cap on payment periods between French firms might generate a decrease in domestic sales as customers may demand lower prices to be compensated for less advantageous payment terms. We measure the intensity of competition faced by suppliers as the sales-weighted average of the 2007 value of the Herfindahl index of domestic sales in the sectors in which firms operated in 2007.

Breza and Liberman (2017) show that in the presence of large customers with high bargaining power, a exogenous cap on payment periods may lead customers to terminate trade relationships with small suppliers. We have to design an indirect measure of the bargaining power of customers as our data set does not record the identity of customers for domestic transactions. Import transactions, however, are collected at the level of the French importer.[51] Moreover, import data includes a product identifier that can easily be matched to the producing sector.[52] Using this information, we can compute the concentration of the imports of the products associated with a given sector. A high value of the Herfindahl index means that in that sector, a large share of international purchases is realized by a small number of French customers. In this test, therefore, we make the assumption that the concentration of imports from a given sector of activity is reflective of the concentration of domestic purchases from that sector. We interpret a high concentration of imports as a sign of the presence of large customers in the domestic market and, therefore, of high customer bargaining power. We sort firms by the average 2007 value of the Herfindahl index of imports of the sectors in which they were present before the policy.

[51] A limitation of import data, however, is that intra-EU transactions must be rather large to be included in the sample. Imports are included in the custom data if the overall value of intra-EU imports are larger than 150 thousand euros before 2010, and larger than 460 thousand euros after 2011. We choose therefore to include the universe of imports instead of focusing on imports from the European Union.

[52] The match works only for the manufacturing sector. Consequently, this tests excludes the observations of firms operating in the wholesale trade sector (about 30% of the sample).

Finally, suppliers with low bargaining power were more likely to experience lower domestic sales as a result of the policy as customers had more flexibility to negotiate lower prices. We proxy the bargaining power of firms by the average 2007 domestic market share of firms in the sectors in which they operated at the time.

Table A8 presents the estimations of the effects of the policy on the growth of domestic sales on different sub-samples of firms. Each of the sub-samples is obtained by ranking firms according to the three indicators of financial constraints described above as in section 6.1. Regressors are standardized (*ie*, demeaned and then divided by the standard deviation) separately for each sub-sample so as to make the estimated coefficients directly comparable across groups. We include industry-year fixed effects so as to neutralize the effects of time-varying shocks.

The results show a negative effect of the policy only in the presence of low levels of concentration of customers (column 3). However, the coefficient is only significant at the 10% level and is relatively sensitive to the selected specification. Therefore, we conclude that there is no strong evidence of a negative impact of the policy on the dynamics of domestic sales. One explanation for the absence of economic effect is that the law included some temporary derogations at the level of the sector of activity. To obtain a derogation, professional organisations representing the interests of the companies of a sector had to come up with an alternative sectoral deal on payment periods before the beginning of 2008. The deal could specify longer maximum payment periods than 60 days, but it had to include a gradual decrease of the cap so as to comply with the 60-days rule before January 2012. Importantly, the deal had to provide evidence that applying the policy as of 2009 would harm the economic activity of the sector, and that additional time was required to reorganize the financing of commercial transactions in that sector. It follows that the sectors the most likely to be harmed by the policy probably benefited from a derogation (the list of derogations is available in section I of the appendix), which can explain the absence of negative effect of the policy on domestic sales.

Table A8: Heterogeneity of the effects on domestic sales.

	$\Delta Exports_{f,m,t}$					
	Concentration (suppliers)		Concentration (customers)		Market power (supplier)	
	$\leq P50$	$\geq P50$	$\leq P50$	$\geq P50$	$\leq P50$	$\geq P50$
	(1)	(2)	(3)	(4)	(5)	(6)
Δ*Client delays*$_{f,t}$	0.101	−2.313	1.017*	−6.829	−0.696	−0.607
	(0.801)	(5.827)	(0.591)	(30.099)	(2.443)	(0.788)
Observations	50292	51844	33404	35052	49011	52039
# Firms	7786	7525	4806	5094	7769	7382
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country-year FE	Yes	Yes	Yes	Yes	Yes	Yes
Kleibergen-Paap	1.3	0.2	3.4	0.1	0.3	2.2

The dependent variable is the variation of exports in market m for firms that stay in the market between $t-1$ and t. The instrumented variable is Δ*Days of sales outstanding*$_{f,t}$ and is defined at the firm-level as the ratio of accounts receivable over sales multiplied by 365. Control variables include *Labor productivity*$_{f,t-1}$ (value added over the number of employees), *log(Total Assets)*$_{f,t-1}$ (total assets in logarithm), *Long-term debt/TA*$_{f,t}$ (ratio of long-term debt to total assets), $\overline{\textit{Sales growth rate}}_{f,t}$ (sales-weighted average of sectoral sales growth rates). In the first two columns, observations are sorted by the 2007 average value of the Herfindahl index of the domestic sales in the sectors in which firms operated in 2007. In the next two columns, observations are sorted by the 2007 average value of the Herfindahl index of the French imports of products associated with the sectors in which firms were present 2007. In the last two columns, observations are sorted by the 2007 average domestic market share in sectors in which firms operated in 2007. Rankings are within country× year (P50 is the median). Standard errors are clustered at the firm-level and are given in parentheses. *, **, and *** denote statistical significance at 10, 5 and 1%.