

UNIVERSITÉ CATHOLIQUE DE LOUVAIN

DOCTORAL THESIS

**Essays on Globalisation and
Conflicts, Populism and Firm
Heterogeneity**

Tommaso Sonno

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Abstract

The first chapter of this thesis studies the macroeconomic effect of firm-level collateral requirements after a trade shock. A measure of firm-level collateral requirements is structurally retrieved from the model, then used to test the main implications empirically. In particular, we show that for a given level of collateral requirement, more financially capable firms do not transfer all the cost advantage they have in generating the required amount of collateral into lower prices, but rather retain relatively higher margins. Moreover, we also find that at the aggregate level the presence of financial frictions can affect the pass-through effects taking place in episodes of economic liberalization, with key consequences in terms of welfare.

The second chapter analyses people's support for populist platforms, the timing of the appearance of populist parties and their choice of political orientation between left and right. The factor that we highlight as key for the understanding of both demand and supply of populism is electoral participation. We show that the abstentionism, disillusionment effect, which the literature generally ignores, makes economic insecurity appear to be the real driver of populism on the demand side. And, these same abstention effects determine the timing, the quantity, and the orientation choice of populist parties on the supply side.

The third chapter inquires into the impact of the activities of multinational enterprises on armed conflict. I deal with this question by merging geolocalized information on conflict events with novel data on multinationals' affiliates and headquarters for all African countries from 2007 to 2015. The multinationals' activity is seen to have significant, heterogeneous effects on the probability of conflict. Enterprises that increase local human capital (e.g. those operating in education and health) significantly decrease the probability of conflict, while affiliates operating in exploitative sectors (e.g. those that are intensive in scarce resources, such as agriculture and forestry) have the opposite effect. The increase in conflict due to multinationals' activities in exploitative sectors appears to be amplified in areas that feature the presence of politically unrepresented ethnic groups and/or groups targeted for large-scale land acquisition.

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Contents

Chapter 1	1
<i>Markups, Productivity and the Financial Capability of Firms</i>	
with Carlo Altomonte, and Domenico Favoino	
 Chapter 2	59
<i>Populism: Demand and Supply</i>	
with Luigi Guiso, Helios Herrera, and Massimo Morelli	
 Chapter 3	131
<i>Globalisation and Conflicts: the Good, the Bad, and the Ugly</i>	
<i>of Corporations in Africa</i>	

*For both my families,
the one I was awarded, and the one I gained on my way.*

x

Markups, Productivity and the Financial Capability of Firms

Carlo Altomonte

Bocconi University

Domenico Favoino

Tinbergen Institute

Tommaso Sonno

Université catholique de Louvain, LSE, and F.R.S.-FNRS

Abstract: We incorporate the presence of financial frictions in a framework of monopolistically competitive firms with endogenous markups. Before producing, firms need to obtain a loan necessary to cover part of production costs, for which they have to pledge collateral in the form of tangible assets. Firms are heterogeneous in both productivity and access to finance: some firms have access to collateral at lower costs. As a result, financial capability and collateral requirements enter, together with productivity, in the expression of the equilibrium markup at the firm level. At the aggregate level, our framework shows that financial frictions in the form of higher collateral requirements mitigate the pro-competitive outcome of economic liberalization via the effects they have on the pass-through of shocks to prices. We validate our theoretical results capitalizing on a representative sample of manufacturing firms surveyed across a subset of European countries during the financial crisis. Guided by theory, we estimate for each firm financial capability, TFP and markups. We then employ those estimates to structurally retrieve from the model a measure of the collateral requirements faced by each firm (a proxy of firm-level credit constraints), and test our main propositions.

Keywords: Financial frictions, heterogeneous firms, markups

JEL Codes: D24; E22; F36; G20

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1 Introduction

A large and growing literature shows how financial market frictions affect economic outcomes through their interplay with firms' characteristics. In particular, credit constraints have been recognized as an important determinant of export or innovation activity, on top of firms' productivity.¹ Financial frictions have also been shown to influence the allocation of capital across firms, and thus aggregate productivity (Gopinath et al., 2017; Larrain and Stumpner, 2017). Most of the models developed by this literature, however, assume CES preferences, and thus abstract away from the competitive effects induced on the economic equilibrium by endogenous markups. This is because in CES models the pass-through of financial shocks on prices is complete. Still, a growing evidence points at a distribution of firm-level markups that tends to be dispersed rather than concentrated at a single value (Atkin et al., 2015; De Loecker et al., 2016; Mrázová et al., 2017). In addition, empirical evidence points at the fact that firms, on top of productivity and markups, are also highly heterogeneous in their access to external finance.²

Motivated by these findings, this paper incorporates financial frictions in a framework in which firms are heterogeneous in both productivity, access to finance and markups. Specifically, before

¹See among others Minetti and Zhu (2011); Gorodnichenko and Schnitzer (2013); Manova (2013); Peters and Schnitzer (2015); Muuls (2015).

²Irlacher and Unger (2016) use World Bank firm-level data across countries to decompose the total variation of access to credit (proxied as tangible over total assets) into within- and between-industry variation, finding that roughly 80% of the variation is within (narrowly defined) industries, also after controlling for firm-level characteristics.

producing firms need to access collateral in the form of tangible assets. Collateral is required by banks in order to provide a loan necessary to cover part of the firm's production costs. Once the loan is obtained, firms set profit maximizing prices, given their specific productivity. To account for the heterogeneous access of firms to external finance, firms differ not only in productivity, but also in their financial capability, i.e. different firms require a different volume of loans and access collateral at different costs.

The main implication of our framework is that financial capability (the cost of collateral for firms) and collateral requirements (the quantity of collateral requested by banks) enter, together with productivity, in the equilibrium expressions of firm's prices and markups. At the individual firm level our model shows that, for any given level of collateral requirement and productivity, more financially capable firms do not transfer all their financing cost advantage into lower prices, but rather retain relatively higher margins in equilibrium. This result implies that heterogeneity in access to finance can explain part of the dispersion of prices and markups observed across firms in the data, even after controlling for productivity and size. A second result shows that, for any given distribution of financial capability across firms, higher collateral requirements requested by banks (a proxy of credit constraints) tend to mitigate the pro-competitive effects typically induced by positive demand shocks at the industry level. The latter result implies that the presence of financial frictions can affect the aggregate pass-through effects taking place in episodes of economic liberalization, with important

consequences in terms of welfare.

These two novel theoretical results are tested empirically on a large representative sample of manufacturing firms surveyed across seven European countries during the financial crisis (the Efige dataset).³ The cross-country nature of our data allows us to draw conclusions that do not depend on specific institutional features of individual countries. For each firm in the Efige survey we have balance-sheet data from 2002 to 2013, an information retrieved using the Amadeus database managed by Bureau van Dijk. The latter allows us to retrieve a number of indicators on individual firms' performance as well as financial structure. Through the survey we also have access to a number of additional firm-specific characteristics, typically unobserved in balance sheet (e.g. innovation activities, firm-bank relationship), that we use to assess the robustness of our results.

Specifically, guided by our model we retrieve from balance sheet data a non-parametric measure of the financial capability characterizing each firm. We then estimate a firm-level measure of total factor productivity (TFP) purged from the effect of financial capability, and use it to compute firm-specific markups along the methodology proposed by De Loecker and Warzynski (2012).⁴ Fi-

³The European Firms in the Global Economy (Efige) dataset is a harmonized cross-country dataset containing quantitative as well as qualitative information on around 150 variables for a representative sample of some 15,000 manufacturing firms surveyed in 2010 across the following countries: Austria, France, Germany, Hungary, Italy, Spain, and the United Kingdom.

⁴We employ a modified version of the routine for markup estimation proposed by De Loecker and Warzynski (2012). The latter relies on a control function for unobserved productivity and allows for flexible production technologies, being able to accommodate a different range of (dynamic or fixed)

nally, we use the estimated financial capability, TFP and markups to structurally back out from the model a firm-specific measure of collateral requirement (a proxy of credit constraints now measured at the firm level), and test our theoretical propositions. Empirical estimates confirm the theoretical insights of the model, and are robust to a battery of sensitivity and robustness checks. The structurally estimated firm-level measure of collateral requirement can be retrieved from our framework using simple balance sheet data, and performs in line with other proxies of credit constraints measured at the firm-level currently employed in the literature. The latter is an additional empirical contribution of this paper.

The theoretical model draws a number of insights from the financial literature. In order to provide a micro-founded channel for the heterogeneity of firms in their access to finance, we exploit the fact that tangible assets have a different level of ‘redeployability’ (Berger et al., 2011; Campello and Giambona, 2013; Cerqueiro et al., 2016). The idea is that more redeployable tangible assets (e.g. land) are less firm-specific, but can be more easily sold and thus are more easily accepted as collateral. We also exploit evidence that a larger firm size is typically associated to higher loans (Rampini and Viswanathan, 2013). As more productive firms have a larger size in equilibrium, in our framework they request higher loans to finance production and thus require more collateral. In turn, more finan-

inputs of production. As in our model more financially capable firms are able to obtain fixed assets at cheaper costs, in order to obtain unbiased productivity and markup estimates at the firm-level we have modified the standard algorithms of TFP estimation (Woolridge, 2009 or Akerberg et al., 2015) incorporating a control for the effects of financial capability.

cially capable firms obtain redeployable assets which they can use as collateral at lower prices, and thus benefit from lower financing costs.

The paper is also related to a recent literature that looks at the implications of financial frictions for capital allocation and productivity. Larrain and Stumpner (2017) develop a multi-sector heterogeneous-firm model of misallocation to study the effects of capital liberalization on aggregate productivity. In their framework two groups of firms face different costs of capital: only one group of firms can tap the capital market, while the other has to borrow funds from a monopolist bank. The two groups of firms also have different markups, which coincides with the (sector-specific) markup of the bank in one case, and is instead equal to unity for the group of firms that can borrow directly from households. Guided by their stylized framework Larrain and Stumpner (2017) are able to provide reduced-form evidence consistent with the idea that episodes of financial liberalization work their effects on aggregate productivity also through markups, which is consistent with one of our findings. However, in our framework we do not need specific financial shocks to derive our aggregate results: given our setup, the simple presence of financial frictions affects the pass-through effect of any economic shock (e.g. a demand shock) on prices and welfare.

In a related paper, Gopinath et al. (2017) introduce the idea of size-dependent borrowing constraints in a small open economy model with heterogeneous firms and capital adjustment costs. They

show how a model with the presence of financial frictions depending on firm size is better able to replicate actual firm behavior in the data, with capital inflows going to firms that have higher net worth but are not necessarily more productive, thus leading to a potential misallocation. While in our paper we do not directly address the issue of resource misallocation, the structural measure of firm-level financial constraint we are able to retrieve is significantly correlated with size, as firms with larger assets or turnover display systematically lower constraints in our data.

The paper also speaks to a literature that has introduced credit constraints in models of firm heterogeneity and international trade.⁵ Manova (2013) incorporates financial frictions in a CES framework of heterogeneous firms in which firms use tangible assets as collateral, as in our model, in order to obtain loans from a perfectly competitive banking sector and cover part of their export costs (vs. part of production costs in our case). In her framework, credit constraints affect both the extensive and intensive margin of exports but the pass-through of financial frictions on prices is complete, as markups are constant. Our model with variable markups allows instead for an incomplete pass-through effect. Egger and Seidel (2012) introduce credit constraints in models of heterogeneous firms with endogenous markups and the use of collateral proportional to a firm's production cost, thus in line with our setup. Differently from our approach, however, they do not take into account the heterogeneity of firms in access to external finance. As a result,

⁵We do not work out an open economy version of our model in this paper, as it would not change our main results.

financial frictions enter in their profit-maximizing quantities and prices through a cost cutoff parameter driven (among others) by a common collateral requirement, with no role for the heterogeneous cost of collateral for firms, which is a distinct feature of our model. Peters and Schnitzer (2015) incorporate financial frictions in a variable markup framework with endogenous technology adoption, in which the cost of purchasing the advanced technology has to be financed externally. However, as they assume that technology adoption results in an increase of the price margin by a fixed amount, they do not work out the implications of financial frictions for markups.

The rest of the paper is organized as follows. We present our theoretical framework in Section II. Section III describes our data and introduces our estimation routines for financial capability, productivity and markups. In Section IV we discuss the empirical strategy used to test our predictions, including our structural estimate of firm-level collateral requirements, and present our main results together with robustness checks. Section V concludes.

2 Theoretical Framework

2.1 Setup and identification

We consider an economy with L consumers, each supplying one unit of labor. Consumers can allocate their income over two goods: a homogeneous good, supplied by perfectly competitive firms, and a differentiated good, produced under monopolistic competition. In

order to produce, liquidity constrained firms need to finance a share of their production costs through loans from a perfectly competitive banking sector. To provide a loan, banks require firms to pledge an amount of tangible assets to be used as collateral. There are two types of tangible assets: redeployable (land, buildings) and non-redeployable (machinery). Redeployable assets are easier to collateralize. Firms have a positive initial endowment out of which they can purchase tangible assets to use as collateral, but are heterogeneous in financial capability: more financially capable firms have a lower cost of obtaining redeployable assets. Firms are also heterogeneous in marginal costs (productivity), and learn about their specific level of financial capability and productivity after having incurred a sunk entry cost. Once endowed with information on their financial capability and marginal costs, firms that can cover production costs and satisfy the liquidity constraint (net revenues at least equal to the repayment of the loan) stay in the market.

The two sources of heterogeneity, productivity and financial capability, are ex-ante uncorrelated as they are drawn from two independent probability distributions. Still, they jointly influence firm behavior: a firm with a higher level of financial capability will face lower costs for the required amount of collateral, which in turn influences her overall cost structure, and thus, given the specific firm-level productivity, her optimal production choice.

To disentangle the effects of financial capability from marginal costs and identify the model, we exploit an empirical regularity detected in our data and already discussed in the literature (Rampini

and Viswanathan, 2013), i.e. the proportionality between firms' output and collateral. In equilibrium, more productive (lower cost) firms end up with higher output, whose financing requires a larger volume of loans, and thus a higher amount of collateral. Motivated by this empirical regularity, in our framework banks require a fixed amount of collateral per unit of output that varies across sectors.⁶ We can then derive an expression for the cost advantage that a firm characterized by a given level of financial capability has in creating the required amount of collateral. Since the collateral requirement is exogenous to the firm, her cost advantage influences the firm's output, but is independent of marginal costs. The latter allows identification of the model.⁷

Importantly, the assumed orthogonality between firm-specific productivity and financial capability is verified in the data: our non-parametric measure of the firm-specific financial capability is uncorrelated with a standard proxy of firm-level productivity (value added per employee), as well as with our computed TFP measures (see Appendix D).

2.2 Demand and Production Technology

Consumers exhibit love for variety with horizontal product differentiation and quasi-linear preferences, and thus variable markups

⁶To the extent that output and assets are positively correlated, this is equivalent to the assumption that the share of productive assets that can be collateralized varies across sectors. We also introduce a firm-level collateral requirement, i.e. varying within sectors.

⁷Technically the model yields a profit equation with a separable cost advantage term related to the firm's financial capability.

(e.g. as in Melitz and Ottaviano, 2008). Specifically the utility function is:

$$U = q_0 + \alpha \int_{i \in \Omega} q_i^c di - \frac{1}{2} \gamma \int_{i \in \Omega} (q_i^c)^2 di - \frac{1}{2} \eta \left[\int_{i \in \Omega} q_i^c di \right]^2 \quad (1)$$

where the set Ω contains a continuum of differentiated varieties, each of which is indexed by i . The term q_0 represents the demand for the homogeneous good, taken as numeraire, while q_i^c corresponds to the individual consumption of variety i of the differentiated good. The parameters α and η index the substitution pattern between the homogeneous and the differentiated good; γ represents the degree of differentiation of varieties $i \in \Omega$.

Conditional on the demand for the homogeneous good being positive, i.e. $q_0 > 0$, and solving the utility maximization problem of the individual consumer, it is possible to derive the inverse demand for each variety:

$$p_i = \alpha - \gamma q_i^c - \eta \int_{i \in \Omega} q_i^c di, \forall i \in \Omega \quad (2)$$

By inverting (2) we obtain the individual demand for variety i in the set of consumed varieties Ω^* , where the latter is a subset of Ω for which $q_i^c > 0$, and retrieve the following linear market demand system:

$$q_i = Lq_i^c = \frac{\alpha L}{\gamma + \eta N} - \frac{L}{\gamma} p_i + \frac{\eta N \bar{p} L}{\gamma(\gamma + \eta N)}, \forall i \in \Omega^* \quad (3)$$

In the above expression N represents the number of consumed varieties, which also corresponds to the number of firms in the market since each firm is a monopolist in the production of its own variety; $\bar{p} = \frac{1}{N} \int_{i \in \Omega^*} p_i di$ is the average price charged by firms in the differentiated sector. In order to obtain an expression for the maximum price that a consumer is willing to pay, we set $q_i = 0$ in the demand for variety i and obtain the following:

$$p_{max} = \frac{\alpha\gamma + \eta N \bar{p}}{\gamma + \eta N} \quad (4)$$

Therefore, as already shown by Melitz and Ottaviano (2008), prices for varieties of the differentiated good must be such that $p_i \leq p_{max}$ for every variety $i \in \Omega^*$, which implies that Ω^* is the largest subset of Ω that satisfies the price condition above.

Conditional on having adequate financial resources, firms produce using labor, inelastically supplied in a competitive market. The production of the homogeneous good requires one unit of labor, which implies a wage normalized to one for both sectors. Both the homogeneous and the differentiated goods are produced under constant returns to scale, but entry in the differentiated goods industry involves a sunk cost f_E . Firms are heterogeneous in productivity, having a firm-specific marginal cost of production $c \in [0, c_M]$ randomly drawn from a given distribution. In equilibrium the output level $q(c)$ of a firm with cost c will thus be equal to the total demand for its own variety.

2.3 Financing of firms

In our framework, liquidity constrained firms need to borrow money from banks in order to finance a fixed share $\rho \in [0, 1]$ of their production costs $cq(c)$. Banks, which operate in a perfectly competitive banking sector, define contract details for loans and, based on their participation constraint (see *infra*), can make a take-it or leave-it offer to firms specifying the collateral needed against the loan. Firms have a positive initial endowment out of which they can purchase tangible assets to use as collateral, and pay the sunk entry cost f_E .⁸ Given production technology, firms characterized by a larger output $q(c)$ also have larger production costs $cq(c)$ whose financing requires a larger volume of loans. In order to disburse a loan banks require $\beta > 0$ units of collateral for each unit of output. The unit requirement β is chosen by the bank and varies across sectors (as e.g. in Manova, 2013): it is therefore exogenous from the perspective of individual firms. It then follows that a firm characterized by marginal costs c and total output $q(c)$ has to pledge an amount of collateral equal to $\beta q(c)$ to obtain the loan.⁹

The above setup is supported by empirical evidence. In our data, regressing a firm's (log) turnover on firm's bank liabilities

⁸Expenditures on collateral and the sunk cost f_E are incorporated in the entry decision of the firm via the expected profit equation, and thus enter in the expression of the industry equilibrium.

⁹We do not need to impose ex-ante an upper bound to β , because collateral will enter into the firm's profit as a cost and thus, if the unit requirement β is too high with respect to the firm's optimal size, the firm would simply decide not to produce (free exit). More in general, our results hold with different specifications of a functional form for collateral requirement, as long as it is exogenous to firms. Similar considerations apply when we model a firm-specific collateral requirement.

yields a positive and significant coefficient, i.e. larger firms require more bank loans.¹⁰ Moreover, the idea that banks require an amount of collateral that is proportional to a firm’s output is an empirical regularity detected in the literature (Rampini and Viswanathan, 2013) and again confirmed in our data: regressing firms’ bank liabilities on tangible assets, a proxy for collateral, also yields a positive and significant coefficient, supporting the existence of a proportional relation between output and the amount of collateral pledged.

Another key feature of our framework, also in line with empirical evidence, is the idea that firms differ in their access to finance. Similar to Irlacher and Unger (2016), we find a high dispersion of access to credit (proxied as tangible over total assets) across firms within narrowly defined (NACE-4 digit) industries in our dataset, also after controlling for firm-level characteristics (e.g. productivity). To encompass in the model the idea that different firms might have a more or less privileged access to external finance, we exploit the distinction made in the literature between redeployable assets (*Re*) constituted by land, plants and buildings, and non-redeployable assets (*NRe*), e.g. machinery and equipment (Campello and Giambona, 2012). Redeployable assets are easier to resell on organized markets: being more liquid, they can be more easily used as collateral and thus facilitate firms’ borrowing. Non-redeployable assets are more firm-specific and with a value that deteriorates over

¹⁰We use the item “Loans” reported in balance sheet data to test for this stylized fact, which incorporates firms’ liabilities to credit institutions. The relation is robust to the inclusion of firm fixed effects. More details are available on request.

time (e.g. due to technological obsolescence): as such, they are less easy to be used as collateral.¹¹

We posit that firms use tangible assets as collateral (as e.g. in Manova, 2013), and that firms have a different ability in negotiating the price of the redeployable assets they acquire, with each firm having a specific level of financial capability $\tau \in [0, 1]$ randomly drawn from a probability distribution and independent of marginal costs $c \in [0, c_M]$. Firms with higher financial capability τ end up paying relatively less for their redeployable assets. As redeployable assets are part of the tangible assets that are used as collateral, the function $C(\tau)$ then maps the marginal cost of collateral for the firm characterized by a level of financial capability τ , with $C(\tau)$ strictly decreasing in τ .¹² From here we can define the financial capability cutoff $\tilde{\tau} < \tau$ such that $C(\tilde{\tau}) = C_{max}$, that is a firm characterized by the (cutoff) financial capability $\tilde{\tau}$ would obtain no advantage in the price of redeployable assets with respect to other firms, i.e. her marginal cost of collateral would be the upper bound value C_{max} of the cost function. It then follows that the function

$$\theta(\tau) = C(\tilde{\tau}) - C(\tau) \quad (5)$$

is increasing in τ and describes the cost advantage in terms of rais-

¹¹More in general, under asset-based lending, collateralizable assets include inventory, accounts receivable, machinery and equipment, real estate or the cash flow. Note that it is always possible to express these assets, and thus collateral, as a generic function of a firm's output.

¹²See Appendix A for a micro-founded characterization of this function. In general our results hold with any specification of a functional form for the cost of collateral, as long as $\partial C(\tau)/\partial \tau < 0$.

ing collateral that a firm characterized by financial capability τ will have with respect to the cutoff firm. By definition, the financial capability cutoff firm $\tilde{\tau}$ will have no cost advantage, i.e. $\theta(\tilde{\tau}) = 0$.

Alternatively, one could look at the relationship lending literature, which studies how the relations of managers with banks increase funds availability and reduce loan rates.¹³ In our framework firms would be more or less financially capable depending on their share τ of managers more skilled (or better connected) in bargaining with banks, and thus able to reduce the overall cost of collateral. In this case, the financial capability cutoff firm would have no managers with such relations ($\tilde{\tau} = 0$), and thus, as before, no cost advantage, i.e. $\theta(\tilde{\tau}) = 0$.¹⁴

The implications of heterogeneity in financial capability can be seen considering the case of all firms having the same financial capability $\bar{\tau}$. In this case firms in the industry would end up with the same marginal cost of collateral $C(\bar{\tau})$. As a result, productivity would remain the only firm-specific variable characterizing the industry equilibrium: a given level of marginal costs c would in fact determine the firm's size $q(c)$, the volume of the required loan as a share of total production costs and hence, via the collateral require-

¹³The channels through which bank-managers relations can have an impact on a firm's borrowing are fund availability and quantity, or prices and collateral (see Berger and Udell, 1995 and 1998; Cole et al., 2004; Petersen and Rajan, 1995). Elyasiani and Goldberg, 2004 provide a general review of this literature.

¹⁴In our model both asset redeployability and relationship lending can be considered as channels that can explain heterogeneity in access to finance by firms, as they both map the same parameter $\theta(\tau)$ that enters our equilibrium equations. However, as we do not have detailed information on each firm-bank relationship, in the empirical part of the paper we will use the channel of asset redeployability (namely, balance sheet information on nominal asset value) in order to retrieve a measure of financial capability from our data.

ment β requested by banks, the total cost of collateral to pledge. In this case, financial frictions would play a role only through changes in collateral requirement, with a similar effect for every firm in the industry. Introducing heterogeneity also on financial capability τ , on top of productivity, allows instead to derive a more complex interaction between productivity and financial frictions in the industry equilibrium.

2.4 Bank and firm problem

Firms that fund a share $\rho > 0$ of their total production costs $cq(c)$ have to repay $R(c)$ to banks. Repayment occurs with exogenous probability $\lambda \in (0, 1)$; with probability $(1 - \lambda)$ the financial contract is not enforced, the firm defaults, and the bank seizes the collateral $\beta q(c)$. To close the deal and make an offer to the firm, the participation constraint of a bank is:

$$-\rho cq(c) + \lambda R(c) + (1 - \lambda)\beta q(c) \geq 0 \quad (6)$$

that is, the value of the disbursed loan $\rho cq(c)$ has to be equal to its expected reimbursement, either as a repayment $R(c)$ or through the seizing of the collateral $\beta q(c)$ in case of default. Given perfect competition in the banking sector, the participation constraint holds with equality for all banks.

In turn, firms will apply for a loan if a liquidity constraint is satisfied, such that net revenues are at least equal to the repayment of the loan $R(c)$ to the bank. Specifically, the liquidity constraint

incorporates the two sources of firm heterogeneity in marginal costs and financial capability (c, τ) as follows:

$$p(c, \tau)q(c, \tau) - (1 - \rho)cq(c, \tau) + \theta(\tau)q(c, \tau) \geq R(c, \tau) \quad (7)$$

that is, firm will apply for a loan if the difference between revenues and the internally financed fraction of the costs, net of the cost advantage that a firm with financial capability τ has in generating the required amount of collateral, is larger or equal then the repayment of the loan necessary for production.¹⁵

Each firm in the differentiated sector maximizes the following profit function

$$\Pi(c, \tau) = p(c, \tau)q(c, \tau) - (1 - \rho)cq(c, \tau) - \lambda R(c, \tau) - (1 - \lambda)\beta q(c, \tau) + \theta(\tau)q(c, \tau)$$

As there are two sources of heterogeneity (c and τ) and imperfect financial markets, in order to solve the firm's problem we have to consider the cutoff level of marginal production costs at which profits are zero (i.e. the free exit condition as in Melitz and Ottaviano, 2008) under, in turn, the bank's participation constraint (6), the demand for the supplied variety (3) and the liquidity constraint (7), conditional on the cost advantage in collateral (5).

From equation (6) it is possible to derive an expression for the

¹⁵We have written the cost of the firm in raising collateral already with respect to the cost advantage $\theta(\tau)$, i.e. conditional on the financial capability cutoff $\tilde{\tau}$. Clearly the latter has to be endogenized to close the model (see *infra*).

repayment function:

$$R(c) = \frac{1}{\lambda}[\rho c - (1 - \lambda)\beta]q(c)$$

Plugging the expression above in the profit function, and maximizing profits under the linear demand (3) yields the FOC:

$$p(c, \tau) - \frac{\gamma}{L}q(c, \tau) - c + \theta(\tau) = 0$$

Rearranging the terms above, we obtain the supply curve:

$$q(c, \tau) = \frac{L}{\gamma} [p(c, \tau) - c + \theta(\tau)] \quad (8)$$

We can now use the liquidity constraint (7) to derive an expression for the production cost cutoff c_D . Firms characterized by a level of marginal costs such that the associated net revenues are not enough to repay the loan will exit the market; hence, the liquidity constraint must hold with equality for the cutoff firm characterized by marginal production costs c_D . Moreover, this cutoff firm faces an upper bound in prices $p_i = p_{max}$ (see Equation 4). We can thus rewrite the liquidity constraint as follows:

$$p_{max}q(c_D, \tau) - (1 - \rho)c_Dq(c_D, \tau) + \theta(\tau)q(c_D, \tau) = R(c_D, \tau)$$

Substituting and rearranging the terms in the equation above yields a simple expression for p_{max} as a function of the cost cutoff c_D and

the cost advantage $\theta(\tau)$:

$$p_{max}(c_D, \tau) = \omega c_D - \phi - \theta(\tau)$$

where $\omega = \frac{\rho}{\lambda} + 1 - \rho$ and $\phi = \frac{1-\lambda}{\lambda}\beta$ are constants.

Our results are still conditional on the financial capability cutoff $\tilde{\tau}$ with respect to which the cost advantage is calculated. In order to endogenize $\tilde{\tau}$ in the expression of p_{max} , recall from expression (5) that $\theta(\tau)$ is increasing in τ . Hence, the maximum price charged by a firm in our setting is the one set by the least financially capable firm $\tilde{\tau}$ having marginal production costs c_D (the ‘double’ cutoff firm). As $\theta(\tilde{\tau})$ is the lower bound of $\theta(\tau)$ and is equal to 0 (no cost advantage), it then follows that the expression for p_{max} incorporating both the production and the financial capability cutoffs is simply

$$p_{max} = \omega c_D - \phi \tag{9}$$

We can now solve for optimal prices and markups. In equilibrium, the demand for each variety equals supply:

$$\left[\frac{\alpha\gamma}{\gamma + \eta N} + \frac{\eta N \bar{p}}{\gamma + \eta N} - p(c, \tau) \right] \frac{L}{\gamma} = \frac{L}{\gamma} [p(c, \tau) - c + \theta(\tau)]$$

Recalling the expressions of p_{max} in (4) and (9), substituting it in the above equation and rearranging, we obtain the equilibrium

price charged by a (c, τ) firm

$$p(c, \tau) = \frac{1}{2} [\omega c_D + c - \phi - \theta(\tau)] \quad (10)$$

From here, by subtracting the marginal cost we derive the expression of the equilibrium markup of a (c, τ) firm:

$$\mu(c, \tau) = p(c, \tau) - c = \frac{1}{2} [\omega c_D - c - \phi + \theta(\tau)] \quad (11)$$

As in Melitz and Ottaviano (2008), the equilibrium markup charged by a (c, τ) firm is increasing in the production cost cutoff c_D and decreasing in the firm-specific marginal cost of production c . In our framework, however, the imperfect nature of financial markets (as captured by the parameters ω and ϕ), as well as the heterogeneity of firms in financial capability, i.e. the term $\theta(\tau)$, both affect the expression of the markup, as summarized in the following

Proposition #1. *The equilibrium markup $\mu(c, \tau)$ of a firm characterized by a pair (c, τ) , and a given level of collateral requirement β , is ceteris paribus an increasing function of its cost advantage $\theta(\tau)$ in raising collateral.*

In other words, similar to productivity, more financially capable firms do not transfer all the cost advantage they have in generating the required amount of collateral into lower prices, but rather retain relatively higher margins. Moreover, the markup is also affected by the collateral requirement β , as the latter enters in the expression of the parameter ϕ , the cutoff c_D and, in principle, the same cost

advantage $\theta(\tau)$ (see for example the formalization proposed in Appendix [A](#)). To understand how a change in collateral requirement affects firm behavior in our model, we need to solve for the industry equilibrium.

2.5 Industry equilibrium and economic shocks

In order to characterize the industry equilibrium, we have to solve for the value of the cutoffs c_D and $\tilde{\tau}$. As we have no ex-ante prior on the distribution of financial capability of firms, we assume that τ follows a uniform distribution with $\tilde{\tau} = a$ and $a \in [0, 1)$. The distribution of surviving firms, once financial capability has been drawn, is still uniform with density equal to $f(\tau) = \frac{1}{1-a}$.^{[16](#)}

The marginal cost of production c follows an inverse Pareto distribution (as in Melitz and Ottaviano, 2008), with a shape parameter $k \geq 1$ over the support $[0, c_M]$. The cumulative density functions can then be written as:

$$G(c) = \left(\frac{c}{c_M} \right)^k \quad \text{with } c \in [0, c_M]$$

The density functions is $g(c) = \frac{kc^{k-1}}{c_M^k}$ while the distribution of surviving firms, once productivity has been drawn, is still an inverse

¹⁶The assumption of a uniform distribution of τ implies that the financial capability cutoff $\tilde{\tau}$ does not vary with market characteristics, whereas the cost cutoff c_D of the industry is a function of the distribution of surviving firms' productivity. This simplification allows to introduce a second source of heterogeneity in the firm-level equilibrium equations, while maintaining the model tractable at the level of industry aggregates. In any case it can be shown that, independently on the distributional assumption, a relevant shock (e.g. a change in market size) affects in the same way both the financial capability and the production cost cutoffs, and thus the industry equilibrium.

Pareto with density equal to $g(c) = \frac{k c^{k-1}}{c_D^k}$.

From the equations of demand and supply we can derive an expression for a firm's profits in equilibrium:

$$\pi(c, \tau) = \frac{L}{4\gamma} [\omega c_D - c - \phi + \theta(\tau)]^2 \quad (12)$$

A (c, τ) firm would be willing to enter the market until expected profits are equal to the fixed cost of entry f_E , i.e.:

$$\pi^e(c, \tau) = \int_0^{c_D} \int_a^1 \frac{L}{4\gamma} [\omega c_D - c - \phi + \theta(\tau)]^2 dF(\tau) dG(c) = f_E \quad (13)$$

Since $dG(c) = g(c)dc$ and $dF(\tau) = f(\tau)d\tau$, we can rewrite the integral as:

$$\pi^e(c, \tau) = \frac{Lk}{4\gamma c_M^k} \int_0^{c_D} \int_a^1 [\omega c_D - c - \phi + \theta(\tau)]^2 c^{k-1} d\tau dc = f_E \quad (14)$$

As shown in Appendix [B](#), one can prove that a positive solution always exists for c_D and it is unique conditional on a choice of c_M . Average prices and markups are a function of the average marginal cost c and financial capability. Following Melitz and Ottaviano (2008), we define average marginal costs as:

$$\bar{c} = \frac{\int_0^{c_D} c g(c) dc}{G(c_D)} = \frac{k c_D}{k+1} \quad (15)$$

Similarly we can derive an expression for the average markup charged

by firms active in the market, which corresponds to:

$$\bar{\mu} = \frac{1}{2} \frac{\int_0^{c_D} \int_a^1 [\omega c_D - c - \phi + \theta(\tau)] f(\tau) g(c) dc d\tau}{G(c_D) F(1-a)}$$

Solving the integral yields:

$$\bar{\mu} = \frac{1}{2} \left[\frac{\omega k + \omega - k}{k + 1} c_D - \beta \psi \right] \quad (16)$$

with $\psi > 0$ being a constant depending on the parameters a , δ and λ of the model.

In order to analyze the effects of an economic shock on average markups, we can consider the effects of a change in the market size parameter L . Differentiating equation (16) yields

$$\frac{\partial \bar{\mu}}{\partial L} = \frac{1}{2} \left[\frac{\omega k + \omega - k}{k + 1} \frac{\partial c_D}{\partial L} \right]$$

As shown in Appendix C, we have that $\partial c_D / \partial L < 0$, and thus $\partial \bar{\mu} / \partial L < 0$, i.e. an increase in market size tends to reduce the average industry markup by lowering the cost cutoff, in line with the pro-competitive effects identified in the literature.¹⁷

Financial frictions, however, play a role in the reaction of the economy to the shock, as the magnitude of the derivative of the cost cutoff with respect to L depends, among others, on the amount of collateral requirements β . In particular, when β is relatively large,

¹⁷Given the uniform distributional assumption on τ , in this setting financial capability does not affect the reaction of average markups to a change in market size. Extending the model to the case of an endogenous financial capability cutoff, i.e. solving the free entry condition also for $\tilde{\tau}$, would in any case yield a similar pro-competitive effect on average markups.

i.e. when banks require more collateral for the same loan, *ceteris paribus* the effect of a change in L on the cost cutoff is smaller (see Appendix [C](#) for a discussion). We can thus state that:

Proposition #2. *An increase in market size induces pro-competitive effects on the average industry markup. Financial frictions in the form of higher collateral requirements mitigate these effects.*

3 Data and estimation of covariates

3.1 Firm-level data

Our firm-level data derive from the survey on European Firms in a Global Economy (Efige), a research project funded by the European Community’s Seventh Framework Programme (FP7/2007-2013).¹⁸ The dataset collects around 150 variables for a representative sample of some 15,000 manufacturing firms in the following countries: Austria, France, Germany, Hungary, Italy, Spain, and the United Kingdom, as reported in in Table [1](#).

¹⁸The complete questionnaire is available on the Efige web page, www.efige.org. The sampling design follows a stratification by industry, region and firm size. Firms with less than 10 employees have been excluded from the survey, that instead presents an oversampling of firms with more than 250 employees to allow for adequate statistical inference for this size class. Descriptive statistics are reported in Appendix [D](#). Detailed information on the distribution of firms by country/size class and industry, as well as a validation of the data vs. official statistics and the weighting scheme are available in Altomonte and Aquilante (2012).

Table 1: Efige sample size, by country

Country	Number of firms
Austria	443
France	2,973
Germany	2,935
Hungary	488
Italy	3,021
Spain	2,832
UK	2,067
Total	14,759

The firm-level information present in the Efige dataset has been matched with balance sheet data drawn from the Amadeus database managed by Bureau van Dijck, and collected from 2002 to 2013.

3.2 Estimation of financial capability

Guided by our theoretical model, and using simple balance sheet information, it is possible to retrieve an estimate of the cost advantage $\theta(\tau)$ accruing to each firm. As firms are able to collect collateral at different costs, and collateral is constituted by tangible assets, it then follows that the nominal value of a firm's tangible assets (TA) observed in a firm's balance sheet should be decreasing in the firm's financial capability τ , once controlling for firm size and industry (technology) effects. The intuition here is that all firms within the same industry would be required to collect approximately the same amount β of TA per unit of output to use as collateral: firms with higher τ will obtain that required amount at a lower cost, and thus, controlling for size, would display a lower book value of tangible assets in their balance sheets. Also, for the same

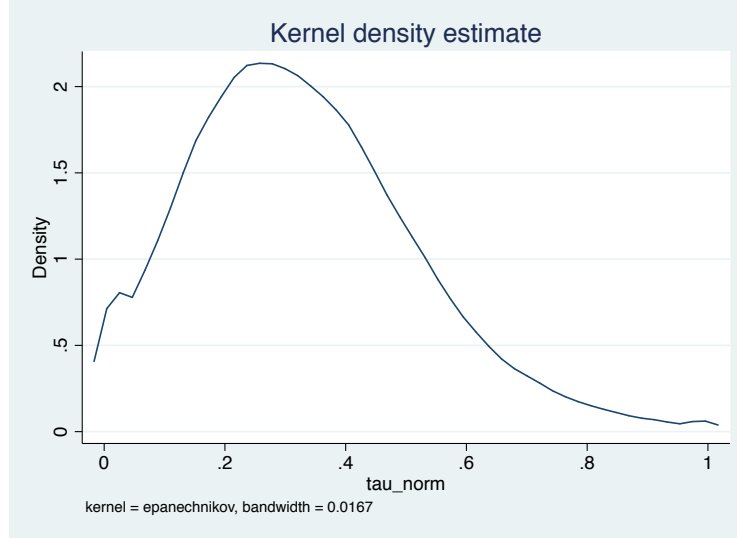
reason, the cutoff firm $\tilde{\tau}$ would have the highest nominal value of tangible assets across firms of that specific size and industry. From here we can estimate $\theta(\tau)$ in three stages. First, we create bins of firms characterized by the same size within each industry (deciles of turnover, with quintiles and twentiles used as robustness). Second, for each bin within each industry, we identify the upper bound level of nominal tangible assets recorded by firms, calculated as the average value of the top 5% largest TA (robustness with 1%): this value represents the tangible assets of the cutoff firm(s). Finally, we compute the firm-specific cost advantage $\theta(\tau)$ by taking the ratio between the value of tangible assets of the cutoff firm and the TA value of specific firms, within each size/industry partition. We retrieve from here an index that we normalize between 0 (cutoff firms) and 1 (maximum financial capability).

Figure [1](#) reports the distribution of the retrieved measure of financial capability across firms in our sample, which gives us a good proxy of the heterogeneity with which different firms face different costs in their access to finance. Considering all combinations of firms' size ranges (quintiles, deciles, twentiles) within industries, different cutoff levels of tangible assets (1%, 5%), as well as different industry aggregations (at the 2 or 3-digit level), we can obtain several versions of our firm-specific cost advantage measure, which we will use as sensitivity checks in testing our Propositions.

Importantly for our identification strategy, all the correlations between our retrieved measure of firm-level financial capability and productivity are not larger than 0.06, as shown in the first column

of Table D.2 in Appendix [D](#).

Figure 1: Distribution of $\theta(\tau)$



Note: Financial capability across deciles of firms' sales in each industry. Cutoff firms are those in the top 5% of Tangible Assets value in each size/industry partition. Financial capability is computed by taking ratios of each firm's TA value with respect to the cutoff firm's TA, within every size/industry partition, and then bounding the index between zero (cutoff firms) and one (maximum financial capability).

3.3 Estimation of productivity and markups

In order to estimate markups and productivity at the firm level we start from De Loecker and Warzynski (2012, henceforth DLW), who estimate markups combining the output elasticity on a input with the share of the same input's expenditure on total sales. The DLW methodology is particularly suited for our estimation strategy for two reasons. First, it obtains output elasticity from the estimation

of a general production function, allowing for flexible technologies and different sources of firm heterogeneity. Second, the correlation between the estimated markups and firm-level characteristics is not affected by the availability of real vs. nominal output (revenue) data.¹⁹ The latter allows us to test our Propositions using simple balance sheet information at the firm-level.

Additional problems nevertheless arise when estimating our model in a setting in which financial capability is heterogeneous across firms. The reason is twofold. On the one hand, our proxy of financial capability $\theta(\tau)$ is likely to be correlated to the (unobserved) firm-specific price of capital. If the latter is unaccounted for, this input price variation typically leads to a downward bias in the estimated coefficients of the production function from which markups are calculated, an issue discussed in detail by De Loecker and Goldberg (2014). Moreover, the same idiosyncratic variation in the price of capital would remain in the error term of the production function, thus ending up in our TFP estimates. This induces a potential problem of multicollinearity between TFP and financial capability when structurally estimating Equation (11). For these reasons, we have modified the standard algorithms through which TFP is estimated.

Technically, we have estimated our production function coefficients relying on Wooldridge (2009), which proposes to improve on the Akerberg, Caves and Frazer (2015, henceforth ACF) algorithm

¹⁹De Loecker and Warzynski (2012) discuss how, under a Cobb-Douglas technology, the output elasticity reduces to a constant, and thus the bias induced by unobserved output prices impacts only the estimate level of the markup, not its correlation with firm characteristics.

originally employed in De Loecker and Warzynski (2012) through the use of a GMM framework. In our baseline measure, we have computed estimates of the production function following Woolridge (2009), both through the standard algorithm and augmenting the set of regressors with our proxy for financial capability.²⁰ As a robustness check, we have also estimated the production function through the ACF approach, both correcting the control function with financial capability and in its standard version, thus replicating the original DLW methodology. The correlation at the firm level between all these different measures of productivity and the retrieved measure of financial capability is always very small (see Table D.2 in Appendix D), thus confirming in the data the substantial orthogonality of these two variables.

We have then used the estimated production function coefficients in order to compute different measures of firm-level markups. Specifically, Table 2 reports the median values and standard deviations of four different firm-level markups. The first two measures are markups estimated through the Woolridge (2009) algorithm, both in the standard and corrected version discussed above. The third measure of markups is computed using production function coefficients estimated through the standard ACF routine, as in De Loecker and Warzynski (2012). The fourth estimate reports markups estimated via the ACF algorithm in which the control function has been corrected for financial capability. We will employ

²⁰When not controlling for the firm specific financial capability, our estimates show an upward bias in the estimated productivity, i.e. a downward bias in the estimated coefficients of the production function, in line with the effects postulated by De Loecker and Goldberg (2014).

these different measures to provide additional robustness checks in the tests of our Propositions.

Table 2: Markup estimates: median values and standard deviations

Estimation method	Median	Standard deviation
Wooldridge (no correction)	1.2063	0.7543
Wooldridge (correction)	1.2152	0.7066
ACF (no correction)	1.0668	0.4016
ACF (correction)	1.0886	0.6267

4 Empirical analysis

4.1 Financial capability, productivity and markups

We structurally estimate the markup equation (11)

$$\mu(c, \tau) = \frac{1}{2} [\omega c_D - \phi - c + \theta(\tau)]$$

at the firm-year level, with the dependent variable $\mu(c, \tau)$ being the markup estimated through DLW (2012), as previously discussed. In terms of covariates, ωc_D and ϕ are fixed effects or controls (depending on specification), c is (the inverse of) our retrieved TFP measure at the firm-level, while $\theta(\tau)$ is the cost advantage term stemming from the heterogeneous financial capability of firms, retrieved as described in section 3.2. We test our markup equation for the years 2002-2013 under various specifications plus a number of sensitivity and robustness checks. In addition, as heterogeneity in financial capability is relevant only for liquidity constrained firms,

we always condition our estimates on firms that have requested a loan from a bank.²¹

Table 3 presents our benchmark results, in which our proxy $\theta(\tau)$ for financial capability is estimated by deciles of sales, and the cutoff level of tangible assets is calculated on the top 5% of the distribution for each size decile within each NACE-2 digits and year. Productivity and markups are estimated through the Woolridge (2009) algorithm, corrected for financial capability. In column (1), we employ a full set of firm fixed effects to wipe out any unobserved heterogeneity at the firm level that can drive the results, as well as year fixed effects. Results confirm that markups are positively and significantly correlated with productivity and that, even controlling for productivity, more financially capable firms display significantly higher markups as predicted by the theoretical framework. In column (2) we control for the possibility that some financial/price shock happening over time across some firms (and thus not picked up by our firm FE) might drive the results, introducing as an additional control a country-time change in collateral requirement as retrieved from the ECB Bank Lending Survey.²² While the latter is negative and significant, in line with the idea that higher average collateral requirements increase costs and thus reduce the markup of firms, our main results are confirmed.

Insofar we have identified the effects of productivity and finan-

²¹A total of 14,139 firms in our data, i.e. 96% of the sample, have requested a bank loan.

²²The ECB Bank Lending Survey reports a large variation in collateral requirements by banks across euro area countries around the years 2008 and 2009: requirements tightened threefold on average in the euro area, but these effects have not been all similar across countries.

cial capability through the within variation in the data, thus implying that firms can adjust their allocation of tangible assets, productivity and, consequently, markups over time. If our theory is valid, however, our results should also hold when we identify the effects through the between variation in the data, i.e. across firms.

Table 3: Test of Proposition 1

	(1)	(2)	(3)	(4)
	Within estimator	Within estimator	Between estimator	OLS
	decile of sales, top 5% TA cutoff	decile of sales, top 5% TA cutoff	decile of sales, top 5% TA cutoff	decile of sales, top 5% TA cutoff
	all years	all years	all years	only 2008
Dependent variable	$\ln(\mu)_i$	$\ln(\mu)_i$	$\ln(\mu)_i$	$\ln(\mu)_i$
$\ln(\text{TFP})_i$	1.547*** (0.0109)	1.594*** (0.0139)	1.363*** (0.0123)	1.462*** (0.0191)
Financial capability _i	0.437*** (0.0189)	0.484*** (0.0231)	0.205*** (0.0237)	0.280*** (0.0375)
Change in collateral requirement		-0.0152* (0.00778)	-0.173* (0.101)	
Obs.	53,698	35,525	32,149	4,548
R2	0.807	0.836	0.726	0.769
Number of marks	7,873	7,249	6,544	
Firm size and age controls	NO	NO	YES	YES
Firm FE	YES	YES	NO	NO
Country-Industry FE	NO	NO	YES	YES
Year FE	YES	YES	YES	NO
Robust SE	YES	YES	NO	YES

***, **, * = indicate significance at the 1, 5, and 10% level, respectively. The dependent variable is the (log of) markups estimated as in De Loecker and Warzynski (2012), using production function coefficients estimated as in Wooldridge (2009). The financial capability variable is computed across deciles of sales, with firms having the top 5% of TA considered as the cutoff firms. TFP is computed through a modified version of Wooldridge (2009), cleaning production function estimates for firm-level financial capability. Change in collateral requirements indicates the percentage increase/decrease in the collateral requirements by banks. All specifications estimated with robust standard errors.

In columns (3) and (4) we thus replicate our analysis reported in column (2) without firm fixed effects. We include a set of country $\times$ industry fixed effects to capture all possible spurious compositional effects

beyond variation at the firm level. We also control for additional firms' characteristics that might be correlated with both productivity and financial capability, notably the (logarithm of) firm's age as well as firm size (employment), variables that are known to exert an impact on TFP and financial constraints (see for example Hadlock and Pierce, 2010).²³ Specifically, in column (3) we keep the panel dimension through a between estimator, while in column (4) we focus on the cross-section for the year 2008. In both cases the coefficient of financial capability decreases by around a third with respect to the within-estimation, but remains positive and highly significant.

In Table (4) we proceed with some sensitivity and robustness checks, reporting the results of the estimated coefficients of the two key variables of our model, productivity and financial capability, in different specifications of the markup regression, while always controlling for firm fixed effects (unless differently specified). In a first battery of tests (1 to 5), we change the estimation procedure of $\theta(\tau)$. Namely, in row (1) we estimate the latter by shrinking the size ranges of firms' sales to quintiles, and widening the cutoff level threshold of tangible assets to the top 10% of firms in each NACE-2 digit industry and year. In row (2) we do the opposite,

²³Industry fixed-effects are retrieved from Manova (2013) as measures of financial vulnerability (i.e. the extent to which a firm relies on outside capital for its investment). Firm size is controlled as a categorical variable, varying from 1 to 4 based on the firm having between 10-19, 20-49, 50-249 or more than 250 employees, respectively. The choice of a categorical variable is driven by the willingness of reducing the possible endogeneity with TFP and other firm-specific controls. All our results are confirmed if we substitute the natural log of the number of employees to the size categories.

broadening the size ranges of firms within which we estimate $\theta(\tau)$ to twentiles, and narrowing the cutoff level of tangible assets to the top 1% of the distribution in each industry-year. In rows from (3) to (5) we replicate the three different estimation methods of our benchmark Table 3 (FE, BE and OLS on the 2008 cross-section) with financial capability now measured within each NACE-3 digits industry and year, i.e. for a total of around 100 industries. The sign and significance of our key parameters is always confirmed, with little changes in magnitude with respect to our benchmark results.

In a second group of sensitivity checks (rows 6 to 8), we revert to our benchmark measures of financial capability and TFP used in Table 3, but we experiment with the methods through which markups have been estimated. This, in order to avoid picking up some spurious correlation deriving from the markup estimation method itself. In row (6) we employ markups retrieved from production function coefficients estimated with the ACF (2015) method and corrected for financial capability; in row (7) we replicate the results with markups estimated from production function coefficients calculated through the standard Woolridge (2009) algorithm, i.e. not corrected for financial capability; in row (8) we repeat the exercise using standard ACF (2015) estimates, thus replicating the original De Loecker and Warzynski (2012) measure of markups. Once again the sign and significance of our key param-

ters of TFP and financial capability are confirmed.

Table 4: Test of Proposition 1 - Sensitivity

	TFP		Financial Capability		Obs.	R2
	Coeff	Std. Err.	Coeff	Std. Err.		
Baseline	1.594***	(0.0139)	0.484***	(0.0231)	35,525	0.836
Different measures of Financial Capability						
(1) Quintile of sales, top 10% TA cutoff	1.587***	(0.0137)	0.390***	(0.0212)	35,525	0.835
(2) Twentiles of sales, top 1% TA cutoff	1.588***	(0.0138)	0.466***	(0.0256)	35,393	0.834
(3) Disaggregation at Nace 3 digits - FE	1.584***	(0.0142)	0.297***	(0.0190)	34,528	0.833
(4) Disaggregation at Nace 3 digits - BE	1.363***	(0.0123)	0.180***	(0.0198)	31,470	0.726
(5) Disaggregation at Nace 3 digits - Cross Section	1.450***	(0.0192)	0.223***	(0.0300)	4,459	0.769
Alternative estimates of Markups						
(6) Markups ACF (corrected)	0.707***	(0.00922)	0.458***	(0.0201)	40,034	0.645
(7) Markups Wooldridge (not corrected)	1.575***	(0.0137)	1.283***	(0.0260)	35,565	0.825
(8) Markups ACF (not corrected)	1.585***	(0.0129)	0.655***	(0.0231)	39,777	0.836
Omitted variables (Cross Section)						
(9) Number of Banks	1.459***	(0.0188)	0.296***	(0.0367)	4,500	0.777
(10) R&D Investments	1.461***	(0.0191)	0.281***	(0.0375)	4,548	0.770
(11) Exporter Status	1.459***	(0.0191)	0.284***	(0.0372)	4,548	0.771
(12) N. of Banks, R&D Inv., and Exporter	1.457***	(0.0188)	0.299***	(0.0365)	4,500	0.778

***, **, * = indicate significance at the 1, 5, and 10% level, respectively. The model specification follows column (2) of Table 3 (column (4) for the cross-section). All estimates with robust standard errors.

Finally, rows (9) to (12) of Table 4 present a number of robustness checks on the cross-section specification. The purpose is to assess whether our specification remains significant also when controlling for additional firm-level variables potentially correlated with both financial capability and markups. To that extent, we use three questions available in the Efige survey for the year 2008. A first question looks at the number of banks used by the firm. The question is answered by almost the entire sample and shows an average of three banks per firm (two for the median firm). The intuition is that a firm better connected to a relatively high number of banks might have access to financial conditions that entail both a lower cost of collateral, and thus a higher $\theta(\tau)$, and the possibility to charge relatively higher markups (as losses would be covered by an extension of the credit lines). In this case, the relation between

financial capability and markups might be spuriously driven by this omitted variable. The second question we use relates to the R&D investments incurred by the firm. The idea is that a firm could exploit its higher financial cost advantage to invest in R&D and innovation, thus increasing either her physical productivity or the quality of her products. Both elements end up into a higher revenue TFP and higher markups, again generating a spurious correlation with financial capability. The third characteristic that we observe in the data and we control for in our cross-sectional estimates is whether a firm has been consistently exporting over time part of its production. De Loecker and Warzynski (2012) in fact show that markups differ dramatically between exporters and non-exporters, being statistically higher for exporting firms; at the same time, exporting firms might be better able to raise collateral at cheaper costs. We control for each of these three characteristics in rows (9) to (11), respectively, while in row (12) we run our benchmark specification considering banks, R&D and export status together. All our main results remain unchanged.

4.2 Firm-level collateral requirements and average markups

Our second theoretical result states that financial frictions in the form of higher collateral requirements can mitigate the pro-competitive effects (lower average markups) generally induced by a positive economic shock such as, e.g., a larger market size. In order to test for this result and identify the average effect of financial frictions on

markups, we need to exploit variation across firms both in markups and in collateral requirements. The latter requires deriving firm specific collateral requirements from the model.

To that extent, we incorporate in our model and thus in the firm-level markup equation (11) an additional source of heterogeneity related to a firm-specific collateral requirement β_i

$$\mu(c, \tau, \beta) = \frac{1}{2} [\omega c_D - c - \phi(\beta) + \theta(\tau, \beta)] \quad (17)$$

We can again estimate the equation in its structural form, with ωc_D and ϕ being fixed effects, c is (the inverse of) our retrieved TFP measure at the firm-level, while $\theta(\tau, \beta)$ is the cost advantage term stemming from the heterogeneous financial capability of firms, now embedding a firm-specific collateral requirement. As the latter is not observable, we estimate this equation separately for each industry including firm and time fixed effects, and use our original measure $\theta(\tau)$ as a proxy of firm-level financial capability. Then, the residuals of the regression can be interpreted as the deviation of the firm-year specific markup from the firm and year average markup within each industry, controlling for the firm-specific productivity and financial capability. We posit that this deviation is likely induced by the existence of firm-specific collateral requirements.²⁴ Technically, our proxy for β_i is thus constructed as the normalized

²⁴In other words, equation (17) correctly estimated using the (unobservable) term $\theta(\tau, \beta)$ should yield i.i.d. residuals. As we estimate it using $\theta(\tau)$, that is a proxy of firm-level financial capability derived considering an industry, rather than firm-specific amount of collateral per unit of output, the residuals of this estimation should incorporate a proxy of the firm-level collateral requirements β_i .

residuals of the estimation of equation (17). In Appendix D we show the low level of correlation of our proxy with other regressors of the model, notably financial capability and TFP.

We perform two plausibility checks of this new proxy of firm-specific credit constraint. First, we regress the retrieved β_i on different proxies of a firm's net worth (total assets, tangible assets, operating revenue), controlling for firm and year fixed effects. The latter yields negative and significant coefficients, in line with the assumption of Gopinath et al. (2017) of size-dependent credit constraints. Second, in Appendix E we perform a detailed test our retrieved firm-specific collateral requirements against other standard measures of credit constraints at the firm-level existing in the literature (e.g. the Whited and Wu index), with consistent results.

Once endowed with a plausible measure of β_i , we can test the model around an economic shock that significantly changes the market size L of an industry. To that extent, we exploit the sudden, ample and symmetric collapse of export flows incurred by European countries during the credit crisis of 2008/09 (Baldwin, 2009). We start from BACI trade data at the country-industry-year level, and create a dummy variable $T_{zjt} = 1$ if the yearly growth of a given zj export flow in each country-industry pair in year t is in the bottom 25% of the overall growth rate distribution of export flows.

Our theoretical model predicts that $\partial\bar{\mu}/\partial L < 0$, i.e. an increase in market size tends to reduce the average industry markup, in line with the pro-competitive effects identified in the literature. As a result, in our empirical setting, we should obtain a positive sign of

the economic shock dummy in the augmented markup equation, as lower exports (smaller market size) lead to higher markups. Our theoretical setting also points at a negative sign of the firm-specific collateral requirement: with higher collateral requirements some firms would not be able to satisfy the liquidity constraint, as the repayment function $R(c)$ becomes larger. Hence, the least efficient firms in the market (in terms of production) would exit, generating a fall in the production cost cutoff c_D , and thus a reduction of markups. Finally, we should also observe a negative sign of the interaction between the economic shock and the collateral requirement, as Proposition 2 states that, on average across firms, the effect of the economic shock should be smaller the higher is the collateral requirement.

Table 5 reports the results of our estimation for the time window 2006-2009, i.e. around the economic shock of the end of 2008.²⁵ Since we are testing for an effect on the average industry markup across firms, the model is estimated as a pooled OLS. We add controls for the evolution of credit markets in a given country $\times$ year (share of bank credit/GDP and amount of non-performing loans in the bank sector/GDP, as retrieved from Eurostat), industry and year fixed effects, as well as individual time-varying firms' characteristics (age and size). Moreover we always employ bootstrapped standard errors, as we use an estimated proxy for firm-specific col-

²⁵We obtain similar results with the time window 2007-2010.

lateral requirements.

Table 5: Test of Proposition 2

	(1)	(2)	(3)	(4)	(5)
	decile of sales, top 5% TA cutoff	decile of sales, top 5% TA cutoff, Nace 3 digits	quintile of sales, top 10% TA cutoff	decile of sales, top 5% TA cutoff	decile of sales, top 5% TA cutoff
	Firm-specific CR	Firm-specific CR	Firm-specific CR	Firm-specific CR	CR above/below median
Dependent variable	$\ln(\mu)_i$ Wooldridge (correction)	$\ln(\mu)_i$ Wooldridge (correction)	$\ln(\mu)_i$ Wooldridge (correction)	$\ln(\mu)_i$ ACF (correction)	$\ln(\mu)_i$ Wooldridge (correction)
$\ln(TFP)_i$	1.362*** (0.0137)	1.360*** (0.0138)	1.361*** (0.0132)	1.205*** (0.0176)	1.366*** (0.0132)
Financial capability _i	0.222*** (0.0278)	0.188*** (0.0229)	0.209*** (0.0252)	0.204*** (0.0300)	0.224*** (0.0287)
Collateral requirement (CR) _i	-0.585*** (0.0467)	-0.593*** (0.0503)	-0.585*** (0.0477)	-0.338*** (0.0552)	-0.143*** (0.0113)
Negative trade shock (NTS)	0.422*** (0.0793)	0.415*** (0.0870)	0.421*** (0.0858)	0.518*** (0.0897)	0.408*** (0.0741)
CR*NTS	-0.192** (0.0947)	-0.168* (0.101)	-0.195** (0.0936)	-0.443*** (0.101)	-0.114*** (0.0279)
Obs.	13,126	12,853	13,126	12,466	13,126
R2	0.757	0.757	0.757	0.672	0.754
Number of marks	5,794	5,681	5,794	5,516	5,794
Firm size and age controls	YES	YES	YES	YES	YES
Country-Year controls	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Bootstrapped (1000) SE	YES	YES	YES	YES	YES

***, **, * = indicate significance at the 1, 5, and 10% level, respectively. The dependent variable is the log of markups estimated as in De Loecker and Warzynski (2012). Financial capability is computed by decile of sales, assuming firms having the top 5% of TA to be the cut-off firms in columns 1, 2, 3, 5, and 10% in column 4. TFP is computed through a modified version of Wooldridge (2009), cleaning production function estimates for firm-level financial capability in columns 1, 2, 3, 5, and a modified version of Akerberg, Caves and Frazer (2015) in columns 4. The negative economic shock is a dummy=1 if the yearly growth of a given export flow in a country*industry*year is in the bottom 25% of the overall growth rate distribution of exports. Collateral requirement is the variable β_i estimated from equation (17). All specifications are estimated with bootstrapped standard errors (1,000 reps).

In column (1), markups, TFP and financial capability are defined as in our benchmark specification. Results are in line with our prediction: on top of the standard sign and significance of TFP and financial capability, a negative economic shock leads to significantly higher markups, while tighter firm-specific collateral requirements lower them. Most importantly, the interaction between

the economic shock and the collateral requirement is negative and significant, in line with Proposition 2. In columns (2) to (5) we provide a number of robustness checks of this result. In column (2) we use the measure of financial capability estimated at the NACE-3 digits level. In column (3) financial capability is retrieved by shrinking the size ranges of firms' sales to quintiles, and widening the cutoff level threshold of tangible assets to the top 10% of firms in each NACE-2 digit industry and year. In column (4), we employ as dependent variable markups estimated through the ACF (2015) algorithm. Finally, in column (5) we use as a measure of firm-level collateral requirement a dummy taking value 1 if a firm is above the median estimated β_i . All our results remain consistent with our theoretical priors.

5 Conclusions

In this paper we have introduced financial frictions in a framework of monopolistically competitive firms with endogenous markups and heterogeneous productivity. Before producing, firms need to obtain a loan necessary to cover part of production costs, for which they have to pledge collateral in the form of tangible fixed assets. In addition to productivity, firms are also heterogeneous in their financial capability: some firms have access to collateral at lower costs. As a result, both financial capability and collateral requirements enter together with productivity in the expression of the equilibrium firm-level markup.

Looking in particular at firm-level markups we find that, for a given level of collateral requirement, more financially capable firms do not transfer all the cost advantage they have in generating the required amount of collateral into lower prices, but rather retain relatively higher margins. The latter is an interesting finding, as it might explain part of the variation of firm-level markups across a given level of productivity typically observed in the data. Moreover we also find that at the aggregate level the presence of financial frictions can affect the pass-through effects taking place in episodes of economic liberalization, with important consequences in terms of welfare.

Our theoretical results are validated exploiting a representative sample of manufacturing firms surveyed across a subset of European countries during the financial crisis. Guided by theory, we estimate for each firm financial capability, TFP and markups. We then employ those estimates to structurally retrieve from the model a firm-specific measure of collateral requirements useful to test our main propositions.

The latter measure can be obtained from simple balance sheet figures, and performs in line with other standard proxies of firm-level financial constraints existing in the literature. In future research, we plan to extend its application to different instances in which financial frictions are likely to affect firm-level outcomes, in particular in terms of reallocation of economic activities.

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A Heterogeneous access to finance

We provide here a possible micro-foundation of the generic function $C(\tau)$ denoting the marginal cost of collateral for a firm with financial capability τ . In order to produce, firms combine redeployable and non-redeployable assets using a generic CES aggregator of the form $\left(\delta Re^{\frac{\sigma-1}{\sigma}} + (1-\delta)NRe^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}$, with $\delta \in (0, 1)$ and $\sigma > 1$ being respectively the input share and elasticity of substitution between Re and NRe assets. These are exogenous parameters fixed by the industry-specific technology in which the firms operate, capturing the idea that certain industries require the use of relatively more redeployable assets (e.g. land) vs. others, or allow for different substitutability between redeployable and non-redeployable assets for production. As firms are required by banks to pledge β units of tangible assets per unit of output, the technological constraint for a firm willing to produce is

$$\left(\delta Re^{\frac{\sigma-1}{\sigma}} + (1-\delta)NRe^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}} = \beta \quad (18)$$

A firm having a specific level of financial capability $\tau \in [0, 1]$ is able to lower the requirement of redeployable assets by $1-\epsilon(\tau)$ units, with $\epsilon(\tau) \geq 0$ and strictly increasing in τ .²⁶ Given the technological constraint, the expenditure function computed in the optimal amount of redeployable and non-redeployable assets for a firm with

²⁶Guner et al. (2008) find that the financial expertise of directors plays a positive role in the investment policies adopted by the firm. Glode et al. (2012) model financial expertise as the ability in estimating the value of securities, showing how this characteristic increases the ability of firms of raising capital.

financial capability τ and a β unit requirement for collateral then is

$$C(\tau) = \frac{\beta(1 - \epsilon(\tau))}{[\delta^\sigma + (1 - \delta)^\sigma (1 - \epsilon(\tau))^{\sigma-1}]^{\frac{1}{\sigma-1}}} \quad (19)$$

in which $C(\tau)$ is strictly decreasing in τ . From Equation (19) it is possible to define the financial capability cutoff $\tilde{\tau}$ such that $\epsilon(\tilde{\tau}) = 0$: a firm characterized by the (cutoff) financial capability $\tilde{\tau}$ would not obtain any type of advantage in the price of redeployable assets. The latter represents the upper bound in the marginal cost of collateral and is equal to:

$$C(\tilde{\tau}) = \beta[\delta^\sigma + (1 - \delta)^\sigma]^{-\frac{1}{\sigma-1}} \quad (20)$$

By subtracting (19) from (20) we get:

$$\theta(\tau) = C(\tilde{\tau}) - C(\tau) = \beta[\nu(1 - \eta(\tau))] \quad (21)$$

with $\eta(\tau) = [(1 - \epsilon(\tau))^{\sigma-1}]^{-\frac{1}{\sigma-1}}$ and $\nu = [\delta^\sigma + (1 - \delta)^\sigma]^{-\frac{1}{\sigma-1}}$ both constant terms. Given the exogenous parameters, Equation (21) is increasing in τ and describes the cost advantage in terms of raising collateral that a firm characterized by financial capability τ will have with respect to the cutoff firm. As it can be easily seen, the financial capability cutoff firm characterized by $\epsilon(\tilde{\tau}) = 0$ will have no cost advantage, i.e. $\theta(\tilde{\tau}) = 0$.

B Existence and uniqueness of cost cut-off

Equation (14) sets the expected profits of a firm facing the choice of entering the market as:

$$\pi^e = \frac{Lk}{4\gamma c_M^k} \int_0^{c_D} \int_a^1 [\omega c_D - c - \phi + \theta(\tau)]^2 c^{k-1} d\tau dc = f_E$$

Solving the integral yields

$$\pi^e = \frac{Lk}{4\gamma c_M^k} c_D^k [Ac_D^2 + Bc_D + C] = f_E$$

with the terms A , B and C being respectively equal to:

$$\begin{aligned} A &= (1-a) \left[\frac{1}{2+k} - \frac{2\omega}{1+k} + \frac{\omega^2}{k} \right] \\ B &= \frac{2(\omega + k\omega - k) [(a-1)(\delta-1)^2(\phi(1+2\delta^2-2\delta) - \beta)]}{k(1+k)(\delta-1)^2(1+2\delta^2-2\delta)} \\ &\quad + \frac{\left[\beta(1+2\delta^2-2\delta) \ln \left(\frac{\delta^2+a(\delta-1)^2}{1+2\delta^2-2\delta} \right) \right]}{k(1+k)(\delta-1)^2(1+2\delta^2-2\delta)} \\ C &= \frac{1}{k} \frac{\beta^2(\delta-1)^4}{(1+2\delta^2-2\delta)^2} \left[\frac{(1-a)(1+a-2\delta(1+a) + (3+a)\delta^2)}{(\delta-1)^4(\delta^2+a(\delta-1)^2)} \right] \\ &\quad - \frac{1}{k} \frac{\beta^2(\delta-1)^4}{(1+2\delta^2-2\delta)^2} \left[\frac{2(1+2\delta^2-2\delta) \ln \left(\frac{1+2\delta^2-2\delta}{\delta^2+a(\delta-1)^2} \right)}{(\delta-1)^6} \right] \\ &\quad + \frac{\phi^2(1-a)}{k} + \frac{2\beta\phi \ln \left(\frac{1+2\delta^2-2\delta}{\delta^2+a(\delta-1)^2} \right)}{k(\delta-1)^2} - \frac{2(1-a)\beta\phi}{k(1+2\delta^2-2\delta)} \end{aligned}$$

Now define $f(c_D)$ as:

$$f(c_D) = \pi^e - f_E = Ac_D^{k+2} + Bc_D^{k+1} + Cc_D^k - \frac{4f_E\gamma c_M^k}{Lk}$$

By Rolle's Theorem, between two solutions of $f(c_D) = 0$ there is always a solution of $f'(c_D) = 0$. Hence if we can prove that $f'(c_D) = 0$ exists, then at least two positive values of the cost cutoff exist, as $c \in [0, c_M]$. Moreover, as long as the second positive cost cutoff is $> c_M$, the latter also implies the uniqueness of c_D . By taking the first derivative of $f(c_D)$ we obtain

$$f'(c_D) = (k+2)Ac_D^{k+1} + (k+1)Bc_D^k + kCc_D^{k-1}$$

where $A > 0$ and $C > 0$ always, while $B < 0$. Hence, by Cartesio's Rule, $f'(c_D) = 0$ has at least two positive solutions, i.e. there is a solution to $f(c_D) = 0$.

C Derivative of cost cutoff with respect to L

Differentiating equation (16) yields

$$\frac{\partial \bar{\mu}}{\partial L} = \frac{1}{2} \left[\frac{\omega k + \omega - k}{k + 1} \frac{\partial c_D}{\partial L} \right]$$

By applying Dini's implicit function theorem, we obtain:

$$\frac{\partial c_D}{\partial L} = - \frac{\partial \pi^e(L, c_D(L))/\partial L}{\partial \pi^e(L, c_D(L))/\partial c_D}$$

The derivative of the expected profit function with respect to L (the numerator of the above expression) is equal to:

$$\frac{\partial \pi^e(L, c_D(L))}{\partial L} = \frac{k c_D^k}{4 \gamma c_M^k} (A c_D^2 + B c_D + C) > 0$$

with A , B and C having been defined in Appendix B. The denominator is instead equal to:

$$\frac{\partial \pi^e(L, c_D(\beta))}{\partial c_D} = \frac{L k c_D^{k-1}}{4 \gamma c_M^k} [(k + 2) A c_D^2 + (k + 1) B c_D + k C] > 0$$

Hence, we have that:

$$\frac{\partial c_D}{\partial L} = - \frac{\partial \pi^e(L, c_D(L))/\partial L}{\partial \pi^e(L, c_D(L))/\partial c_D} < 0$$

Looking at how collateral requirements affect the above derivative, we have to assess how changes in β affect the terms B and C ,

where β is present. Numerical computations show that a higher β will translate *ceteris paribus* into a lower value of $\frac{\partial c_D}{\partial L}$, for a very broad range of the exogenous parameters considered in the model.

D Descriptive statistics

Table D.1 reports descriptive statistics for the year 2008, i.e. the year referred to in the questions related to financial capability and investment in R&D. Table C.2 reports instead the correlations among our retrieved right-hand side variables, namely financial capability $\theta(\tau)$, total factor productivity (estimated with the Wooldridge, 2009 algorithm), both in the standard format and including a correction for financial capability, our firm-level proxy of credit constraints β_i , as well as labor productivity (value added per employee) as robustness.

Table D.1: Descriptive statistics

	Obs.	Mean	Std. Dev.	Min	Max
Tangible Fixed Assets (2008)	12035	1903	4582.88	1,002	50204
Sales (2008)	10554	10986	24694.42	194	250214
Employees (2008)	9583	66	113.94	10	1062
Number of Banks	14571	2.99	2.02	1	14
Investments in R&D	14759	59.90%	0.49	0	1

Table D.2: Correlations of right-hand side variables

	Cost advantage $\theta(\tau)$	TFP Wooldridge not corrected	TFP Wooldridge corrected	Firm-level collateral requirement β_i	Value added per employee	Total asset
Cost advantage $\theta(\tau)$	1					
TFP Wooldridge not corrected	0.0316	1				
TFP Wooldridge corrected	-0.0651	0.4674	1			
Firm-level collateral requirement β_i	-0.0086	-0.0001	0.013	1		
Value added per employee	0.0307	0.3215	0.265	-0.0464	1	
Total asset	-0.2342	0.1099	0.1488	-0.0191	0.2871	1

E Firm-level collateral requirement

In this section we offer a plausibility check for our firm-level measure of collateral requirement. Since the literature has not reached an agreement on this topic yet (Farre-Mensa and Ljungqvist, 2016), we correlate our measure to a well-known proxy of firm-level financial constraints as derived from balance sheet data existing in the literature.

Table E.1: Replication of Whited and Wu (2006) with β_i

	(1)	(2)	(3)
	OLS	OLS FE	OLS FE
Dependent variable	Beta (structural, no firm FE in estimation)	Beta (structural, no firm FE in estimation)	Beta (structural, firm FE in estimation)
Cash flow / Total assets	-0.413*** (0.0262)	-0.499*** (0.0261)	-0.334*** (0.0201)
Payment of dividends	-0.0451*** (0.00410)	-0.0372*** (0.00311)	-0.0195*** (0.00258)
Long term debt / Total assets	0.0330*** (0.0120)	0.00267 (0.0144)	-0.0225 (0.0122)
ln(Total assets)	-0.0907*** (0.00241)	-0.0676*** (0.00668)	-0.0849*** (0.00547)
Industry sales growth	0.0550 (0.0367)	0.132*** (0.0221)	0.0905*** (0.0184)
Firm sales growth	-0.0959*** (0.00857)	-0.0975*** (0.00611)	-0.0672*** (0.00463)
Obs.	27,765	30,317	30,293
R2	0.138	0.130	0.099
Number of marks		4,645	4,671
Firm size and age controls	YES	NO	NO
Firm FE	NO	YES	YES
Country-Industry FE	YES	NO	NO
Year FE	YES	YES	YES
Robust SE	YES	YES	YES

Note: The specification of the original Whited and Wu (2006) index is reported below:

$$WW = -.091CF/TA - .062DivPos + .021LTD/TA \\ - .044\ln(TA) + .102ISG - .035SG$$

where CF is Cash Flow/Total Assets, DivPos=1 if paid cash dividends, LTD/TA is long term Debt/Total Assets, TA is Total Assets, ISG is the industry sales growth while SG is a firms sales growth.

Specifically, we use a firm-specific index of financial constraints developed by Whited and Wu (2006) and comprising information on firm-level cash-flow, dividends, long-term debt, firm sales and industry sales and their growth and total assets. The original index was estimated with a GMM estimation using firm-level data from

quarterly COMPUSTAT data over the period 1975 to 2001. The higher the index, the more difficult (or costly) is for a firm to obtain external financing, thus in line with the interpretation of our β_i . Table E.1 above runs the same specification of Whited and Wu (2006) on the right hand side, using our estimated firm-level collateral requirements as dependent variable. This yields similar results in terms of sign and significance of the right-hand side variables with respect to the original paper, whose coefficient are reported in the footnote. We have also calculated the original Whited and Wu (2006) measure from our balance sheet data, and found it to be positively and significantly correlated with our estimated proxy of firm-level collateral requirements.

Populism: Demand and Supply

Luigi Guiso

Einaudi Institute for Economics and Finance, and CEPR

Helios Herrera

Warwick University

Massimo Morelli

Bocconi University, IGER, and CEPR

Tommaso Sonno

Université catholique de Louvain, LSE, and F.R.S.-FNRS

Abstract: We define as “populist” a party that champions short-term protection policies while hiding their long-term costs by using anti-elite rhetoric to manipulate beliefs. Our framework rationalizes this definition and generates significant implications for people’s support for populist platforms (the demand side), for the timing of the appearance of populist parties and their chosen orientation (the supply side) and also for the response of non-populist parties to the success of the populists (an equilibrium market reaction). Using individual data on voting in European countries, we show that key features of the demand for populism as well as its supply heavily depend on turnout incentives, previously neglected in the populism literature. Once turnout effects are taken into account, economic insecurity drives consensus to populist policies directly as well as through indirect negative effects on trust and attitudes towards immigrants. On the supply side, populist parties are more likely to emerge and prosper when countries are faced with a systemic crisis of economic security that incumbent parties (whether left-leaning, relying on government, or right-leaning, relying on markets) find hard to address, disappointing voters who lose faith in them and abstain. The orientation choice of populist parties, i.e., whether they arise on left or right of the political spectrum, is determined by the availability of political space. The typical non-populist policy response is to reduce the distance of their platform from that of new populist entrants, amplifying the aggregate supply of populist policies.

Keywords: turnout, short term protection, anti-elite rhetoric, populist entry.

JEL Codes: D72, D78

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1 Introduction

On both sides of the Atlantic, the Western world is facing an unprecedented wave of populist politics and populist rhetoric.¹ Some countries have seen mounting protest against inequality and capitalist institutions, leading to left-leaning policy demands matched by similarly oriented populist supply; in others, right-wing populist movements have found increasing support for protecting the country from immigrants and globalization. Protectionism against immigrants and free trade is also featured in the policy positions of the Trump administration in US and post-Brexit UK. In Southern Europe, the Italian Five Stars movement and the Greek and Spanish populist movements call for a guaranteed minimum income and other forms of short-term economic protection, in opposition to the European imposition of fiscal discipline – what we might call Mediterranean populism. In continental Europe, populist movements stress protection from immigrants (often linking them with Islamic terrorism) and from Chinese imports. Overall, nationalism and closure to immigration are on the rise. Why is there such a rising tide of consensus for populist proposals *now* and why *here* - i.e. with a clear time and geographical pattern? What is driving the simultaneous shift towards populism in so many countries? Is this a global shift in voters' preferences or emotions, immediately captured by new political leaders who enter politics? And if so, what is driving this global shift of demand? Is it related to economic crisis or stagnation and, if so, through what channels?

We believe that in order to tackle these questions and garner a better understanding of the phenomena, we need to abstract from the many observable differences in the existing strands of populism and focus instead on what is common to all populist movements.

¹Google Trends shows an astonishing spike in the number of searches for the word populism, which quadrupled in the fall of 2016.

We argue that populist movements, regardless of political orientation, all share a number of underlying common features. Focusing on these enables us (1) to acquire an analytical rather than a merely descriptive tool; (2) to zoom in on the key drivers of the populist wave and thus answer the questions of why *now* and *here*. To this end, we find the definition of populism in the *Encyclopedia* a particularly useful starting point: populists claim to promote the interest of common citizens against the elites; they pander to people’s fears and enthusiasms; and they promote policies without regard to the long-term consequences. This broad definition of populism highlights three important components: (1) the claim to be on the side of the people against the elite – which we label “supply rhetoric;” (2) the “fears or enthusiasms” of people – the demand conditions to which the populists pander; and (3) the disregard for longer-term consequences. We sum up the policy characteristics of populists’ political supply as *short-term protection*.² The definition of *Encyclopedia Britannica* encompasses both nationalist populism (emphasizing fear or enthusiasm regarding the protection of identity), and economic populism (proposing redistributive policies such as minimum income, regardless of costs). Thus, when we say that a populist party offers short-term protection we intend to include both possibilities.

Rationalizing the three-part definition of populism set out above, we will generate and test some specific implications concerning voters’ support (the demand side), when and where populist parties appear and their political orientation (the supply side), and the response of non-populist parties to populist success (an equilibrium market reaction). Within this framework, the broad answer

²Citing from *Encyclopedia Britannica* 2015: “...either a platform that promotes the interest of common citizens and the country as a whole or a platform that seeks to redistribute wealth to gain popularity, without regard to the consequences for the country such as inflation or debt.” see www.britannica.com/topic/populism

to *why now and why here* is that populist parties are more likely to emerge and prosper when a country has to deal with a crisis of systemic economic security that the traditional incumbent parties (whether left-leaning, relying on government-based policies, or right-leaning, relying on markets) find it hard to address, so that their voters lose faith in them. The 21st-century crisis (characterized by the external threats of globalization and migration as well as widespread financial crisis) undermined citizens' confidence in both leftist (government-based) policies and rightist (market-based) policies that respect the institutional constraints and functioning of politics. Previous crises, which basically resulted in the failure of only one side simply generated political cycles, and did not leave space for the emergence of populist platforms, which requires substantial disappointment and falling electoral turnout across the political spectrum. The best tack for the leader of a new entrant is to urge more protection from the effects of crisis, even at the cost of violating the existing constraints (various forms of exit, rejection of international treaties previously subscribed, construction of walls, and so on).

The anti-elite component of our three-part definition of populism is easily rationalizable when disappointment spreads on both left and right: when governmental and market-based policies both prove ineffective, it is the elite as a whole that has failed, justifying a new party with an anti-elite program and the demand to return power to the people. It should also be clear that this component is complementary to the others. To see this, note that the anti-elite rhetoric simply "supplies disinformation," making it possible to win elections with a short-term platform. For example, if a non-populist politician counters a populist policy proposal with objections about future costs, debt or banking crises, the winning rebuttal by the populist is to claim that all statements of concern for the consequences merely serve the self-interest of the elites. That

is, economists and incumbent politicians may well know something about how to calculate future costs, but since maintaining the status quo policies is in the elite interests, their arguments become non-credible.

The analysis of populism that we offer in this paper hinges on electoral turnout. Our theoretical premise is that voters' primary choice is between voting and staying home, but, conditional on deciding to participate, they usually vote for the closest party to them ideologically, as long as no populist is present yet on the supply side.³ In a systemic crisis, which depresses the motivation to vote for traditional parties of both left and right, the disappointment generates an *abstention-based entry space* for a populist platform.

Our framework suggests a number of testable hypotheses on both the demand side (voter behaviour) and the supply side (the appearance and political stance of populist parties and the non-populist reaction). First, on the demand side, the people most severely affected by the crisis - those facing the greatest economic insecurity - should be the most prone to abstain and to shift to the populist party when it appears. Second, abstention and the shift to populism should be more common among those with least trust in traditional parties, politics and institutions, to begin with, who are the most vulnerable to the manipulation of beliefs by populist rhetoric. Third, mistrust and various negative attitudes - e.g. hostility to immigrants - could themselves be endogenous to the crisis. That is, mistrust and anti-immigrant attitudes may not be autonomous, cultural drivers of voting behaviour but channels through which the economic insecurity brought by the crisis affects abstention and voting. Fourth, on the supply side, populist parties should be more likely to be present when and where disappointment with traditional parties is greatest - i.e. when and where the

³The decision to vote or abstain is based on simple expressive voting assumptions, but could be generalized.

basis for abstention due to economic insecurity is broadest; and less likely where national characteristics make entering with a populist platform more costly. We predict that the orientation of a new populist entrant (left or right) will be related to the relative entry space on the two sides of the political spectrum and the relative effectiveness of right-oriented or left-oriented rhetoric.

Our empirical analysis confirms these hypotheses on demand and supply, and delivers several other, more nuanced results.

We first study the determinants of the demand for populist platforms in the countries covered by the European Social Survey. Our empirical examination emphasizes accounting for selection issues, which other studies of populist voting typically ignore. We show that adverse shocks to economic security and trust in political parties induce people not to vote and, if they do, to choose a populist party. Ignoring the voter participation decisions not only biases the estimates of the drivers of the voting choice and underestimates the underlying demand for populist parties, but obscures the mechanism by which the disappointment induced by the crisis favors the populist vote.

A simultaneous Heckprobit estimation of the probability of participation and of a populist vote shows that economic insecurity has a statistically and economically significant direct effect, and trust in political parties and attitudes toward immigrants matter as well. Moreover, building a pseudo-panel from the individual data we show that the trust and attitude variables are themselves affected causally by shocks to economic insecurity, producing a large total effect (direct plus indirect) of economic insecurity on the demand for populism.

On the supply side we document that the presence of populist parties in the political arena is powerfully affected by economic insecurity and discouraged by the presence of strong non-aligned parties, which undercuts anti-elite rhetoric and so increases the cost

of entry. We also show that populist parties choose their orientation strategically, leaning left or right depending on the relative salience of left-type or right-type cleavages weighted with the share of left-leaning and right-leaning voters. We find that the successful entry of a populist party changes the subsequent electoral competition, prompting the established parties to adapt their platforms to populist concerns, lending support to our idea that the supply of disinformation and anti-elite rhetoric make it difficult to conduct a credible contrarian, anti-populist campaign. In the end, the traditional parties' attempt to contain populist success is adaptive reaction.

The paper is organized as follows. In the next section we review the recent literature. Next, we introduce a simple theoretical framework for our general view of the phenomenon of populism. Section 4 discusses the data; Section 5 presents the empirical results on the demand side, and Section 6 those on the supply side. Section 7 concludes.

2 The Relevant Literature

The traditional macro-economics literature on populism (Dornbush and Edwards 1991; Sachs 1989) looks at the *consequences* of populist short-term protection policies. Contemporary political economists (e.g. Acemoglu et al, 2013a) have begun to examine the *causes*, what voters want and how politicians play to those desires. The literature on trade exploits exogenous variation in import flows in relation to political polarization and support for populism (Steiner, 2012; Autor et al., 2016; Autor et al., 2017; Colantone and Stanig, 2016; Colantone and Stanig, 2017; Jensen et al., 2016), and analyzes the electoral impact of economic shocks from globalization or the European single market (Becker et al., 2016). Algan et al.

(2017) study the political consequences of the Great Recession in Europe, showing that in elections after 2008 the regions where unemployment rose saw the sharpest decline of trust in institutions and establishment politics. Dustman et al. (2017) reach similar results showing that in the aftermath of the crisis mistrust of European institutions, largely explained by the poorer economic conditions of the Euro-area countries, is correlated with the populist vote. Foster and Frieden (2017) nuance this result using individual characteristics from the Eurobarometer survey, and also show that the correlation is stronger in debtor countries. Di Tella and Rotemberg (2016) analyze the demand for populism based on the behavioral observation that voters are betrayal averse, and may accordingly prefer incompetent leaders to minimize the danger of betrayal.

All told, the political economics literature has tended to focus on explaining the demand for populist policies, but has not explored the causes and sustainability of those policies on the supply side. Nor has it explained “Why now and here?” Why, that is, there should be such a widespread following for populism in the Western world generally, not only in the Euro-area countries. An exception is Rodrik (2017), who traces the origin of today’s populism to the shock of globalization arguing that history and economic theory imply that waves of globalization will predictably lead to a populist backlash, and with specific timing (when the shock hits) and geographical pattern (in the countries most severely affected). While the shock of globalization generates demand for populist policies, Rodrik stresses the importance of also understanding the supply side, and in particular the political orientation that the populist parties chose, which in his view depends on the relative salience of the specific cleavages induced by globalization.⁴

⁴The channel of the inequality is investigated for the case of Sweden in Del Bo et al (2017).

Most political science inquiries considered the institutional preconditions for the formation of populist parties (Norris, 2005; Rydgen, 2007; Golder, 2016), or electoral dynamics, identifying parties on the radical right (Mudde, 2007), but increasingly also on the radical left (March, 2007; March and Mudde, 2005; Pauwels, 2014; Stavrakakis and Katsambekis, 2014); or else on the populists' strategy for surviving once in office (see e.g. Boix, 1999). Only recently, has the attention of political scientists shifted to the demand side. Inglehart and Norris (2016) observe that cultural variables outweigh economic ones in the decision to vote for a populist party (rather than abstain or vote for a non-populist party). But this, apparently, weak *direct* effect probably stems from a failure to consider that economic security shocks significantly affects the decision to abstain (see our empirical sections for the details on this turnout problem). In addition to a stronger direct effect of economic shocks, thanks to our consideration of the turnout effect, we also document a significant *indirect* effect: the shocks to economic security are responsible for a sharp change in political trust and in attitudes towards immigration, which means that these changes in the latter variables cannot be deemed independent drivers.⁵ For a review of the literature on populism in the social sciences in general, see e.g. Gidron and Bonikoeski (2013) and Mudde and Kaltwesser (2017).

Here we look simultaneously at the demand and supply sides, to explain the rise of populism. The demand side involves people's fears and enthusiasms, to which politicians pander. The supply side lies in the politicians' claim to be on the side of the people and against the elite. Demand and supply meet at a specific point:

⁵Lucassen and Lubbers give evidence – for 8 of the 11 countries they consider – that shifts towards far-right populism stemmed from perceived cultural threats more than due ethnic economic threats, whereas it is plausible that in shifts towards left-wing populism the relevant perceived threat is economic. But for us, the important observation is that the perceptions of economic and of cultural threats are affected by the economic shocks.

short-term protection. As economic insecurity intensifies, people demand short-run protection. At the same time, populist parties find their own space within the political landscape, with an agenda based on the dichotomy “the people vs the elite”. This leads to the promise of short-term protection, in that the long-term is disparaged as in the interest of the elite. Like Algan et al. (2017) we find that economic insecurity has an effect on voting for populist parties and also like them, document a causal effect of economic insecurity on people’s degree of trust in politics. Further, however, we find that economic insecurity affects the consensus for populist parties not directly but primarily because it disappoints the supporters of the traditional parties of both left and right. This induces abstention and creates a potential electoral basis for a populist new entrant. Unlike Algan et. al. (2017) and like Rodrik (2017), we study the supply side of populism, highlighting the role of economic insecurity in triggering entry of populist parties and the importance of the relative political space on the left and the right in explaining the orientation that the populist force chooses. As Rodrik (2017) notes this is crucial in separating the explanatory role of economic shocks from that of cultural shocks. Indeed, our results suggest that economic shocks spur populism through voting and abstention both directly and because they shift beliefs and attitudes, which have traditionally been classified as cultural traits. This sharpens our understanding of the channels of influence of populism.

As far as our finding of policy convergence is concerned (see Section 6), the closest related result is in Schumacher (2016), who shows from political manifestos that early success of populist parties did heighten scepticism over multiculturalism in mainstream party platforms. We document the systematic convergence of a broad set of policies towards the positions of successful populist parties.

3 Theory

We propose a simple narrative to clarify what generated the demand for populist policies simultaneously in so many countries and, in turn, what causes supply of different varieties of populism. Here we conceptualize of the overall phenomenon of demand and supply and derive the hypotheses for empirical testing.

3.1 Traditional politics before the crisis

The simplest model of voting is one in which voters are ideological and expressive. This means that: (1) First, conditional on participation, voters choose the party with their preferred ideology, left or right – the ideological component; and (2) second, that the decision whether to vote or abstain depends exclusively on a comparison between the cost and the expressive benefit of voting.

Voters are either left- or right-leaning. Assume the preference split in the population is:

$$(p_L, p_R)$$

where p_L (p_R) is the proportion of left (right) wing citizens in the population.

Voters have a degree of disappointment with traditional politics owing to the income difficulties they experience $d \in [0, 1]$. For simplicity, let this degree of disappointment be the same across ideologies. Disappointment is affected in the same way by an economic crisis.⁶

When voters do not feel sufficiently represented by the traditional parties on their side of the spectrum, or when they are dis-

⁶Allowing for heterogeneous effects on the two sides would not alter our main predictions, and our empirical evidence indicates that this assumption is actually consistent with the data.

satisfied enough, they abstain from voting. Formally, the abstention condition can be expressed as:

$$A - d < C$$

where C is the cost of voting and A is the benefit of voting for the preferred party when no disappointment is present. Rearranging we have:

$$d > B$$

where $B = A - C$ is civic sense or the net benefit of voting for an ideal party. This net benefit is clearly heterogeneous across voters. Assuming B is uniformly distributed on $[0, 1]$, the proportion of left-wing (or right-wing) voters abstaining is:

$$\Pr(B < d) = d$$

Thus, total abstention, not conditional on party orientation, is: $p_L d + p_R d = d$

3.2 Crisis and Populist Strategies

All crises have the effect of increasing voter disappointment d on average (although there are always some winners even when a crisis creates a multitude of losers). A protracted crisis that leads to a decline in trust of all the traditional policies on both sides of the spectrum creates space for a populist party to enter the political arena. The impact of globalization and free trade effects produces an unemployable workforce in some sectors, reducing confidence in free markets, while the simultaneous financial crisis and the constraints on the usual fiscal policy remedies in many European countries heightened perceptions of the irrelevance of the traditional left-wing policies to welfare.

The populist policy proposal depends crucially on short-term

protection, to be obtained through drastic dismantling of institutional constraints (e.g. imposing barriers on imports, say, or exiting from Euro-area, or building a border wall), together with a strategy of concealing the inevitable future costs –which requires a generalized anti-elite rhetoric.

Both leftist and rightist protection proposals involve major changes and very uncertain future effects. This, requires a conscious attempt by the populists to remain vague on the longer-run consequences, associating anyone who talks about future costs with the out-of-touch elite that caused the crisis and stagnation in the first place. These characteristics are common to all populist platforms, but some differences between left- and right-wing populists do remain.

3.2.1 Left-Wing Populism

Left wing populists entering the political arena are likely to focus on the inequality cleavage, thus catering primarily to progressive voters and people who are more likely to depend on government programs such as redistribution or guaranteed income. For instance, they may explicitly call for exit from the Euro-area or also promise some other form of immediate protection, such as guaranteed income and generalized insurance, with deficit implications that would violate European budget rules.

Anticipating the consequences, better informed and educated agents are less likely to vote for this proposal. Those with less education are more likely to underestimate the risks and potential costs of drastic changes in compliance with constraints, rules and institutions. They may also be deliberately manipulated by the strategy component that involves concealing the longer-run consequences.

3.2.2 Right-Wing Populism

On the right, populist entrants can be expected to capitalize on the national identity cleavage, calling for closing the borders to immigrants, protecting national companies, and so forth.

The right-wing populist platform, still featuring short-run protection, lacks any explicit redistributive component: the state should be minimal in terms of economic management. The right-wing populist pushes for walls and protectionism, but rejects any form of domestic income redistribution (actually proposing, instead, flat low taxes). Also in this case, the most likely supporters are the people and firms most exposed to the effects of the crisis deriving from globalization and migratory competition.

3.3 Demand Side Predictions

Ceteris paribus, citizens with income difficulties should be most tempted by short-term protection, so an economic crisis should amplify this effect. Second, protracted crisis has an indirect effect by undermining trust in traditional politics, so we should expect the citizens who experienced the sharpest drop in trust to be those most prone to vote for a populist party; and those who have most significantly devalued their trust in politics should be those most severely hit by the crisis. Third, the expectations of future costs of a populist platform and the levels of confidence in the established parties are variable owing to the heterogeneity of information. Thus, more informed/educated people, who may be able to evaluate e.g. the general equilibrium and long-term consequences of trade barriers, may be less willing to take the populist gamble.⁷ Hence:

Hypothesis 1: The percentage of people voting for a populist party is increasing in the number of those who

⁷The under-estimation of future costs of populist policies is a well recognized phenomenon. See e.g. Hainmueller and Hiscox (2006).

1. were affected significantly by the crisis in terms of economic security;
2. have a low degree of trust in the traditional alternative;
3. have low education.

A second testable hypothesis that emerges from our narrative is :

Hypothesis 2: Trust in traditional parties, institutions and politics is negatively affected by protracted crisis.

3.4 Supply Side Predictions

An office-seeking populist entrant must choose whether to enter on the left or on the right, fishing primarily in one or the other pool of disillusioned voters.

Disillusioned voters who now abstain are good prospects to vote for a new populist party. We define the probability of being won over by a new party located on the same side of the political spectrum as the voter as:

$$\rho_i \Pr(B < d) = d\rho_i \quad \text{with: } i = L, R$$

where $\rho_i \in [0, 1]$ measures how effective the populist left- or right-wing rhetoric is, namely what proportion of the dissatisfied voters on that side the populist rhetoric will attract. The effectiveness of this rhetoric, in turn, depends on the magnitude of the country's cleavages; for instance whether they are more anti-austerity and anti elite (left) or anti-immigrant (right).

Party entry entails an entry cost c which may in turn depend on country-specific institutional features.

A populist party presumably enters on the side where it will gather more votes. Entry is determined by the condition:

$$d \left(\max_{i=L,R} (p_i \rho_i) \right) > c$$

In sum, for a given cost of entry, the entry is determined by three independent factors: the proportion of the electorate that is left (right) wing, the overall level of disappointment, and the attractiveness of the populist message as a rationalization and solution for that disappointment. This conclusion leads to the two additional hypotheses.

Hypothesis 3: Upon entry, a populist party will choose a left orientation if $p_L \rho_L > p_R \rho_R$, and conversely a right orientation.

In other words, conditional on entry the populist party will position itself on the side of the political spectrum where there are more voters and where its rhetoric is more effective in mobilizing them.

Hypothesis 4: Given the optimal orientation, the likelihood of a populist entry is increasing in voters' disappointment and decreasing in the cost of entry (which is a function of institutional constraints).

3.5 A Case Study

Before getting to the general econometric analysis, Figure 1 (panel 1) exemplifies our story, drawing on the Italian case. It shows GDP in the run-up to the 2008 crisis and afterwards, together with the trend of popular confidence in political parties and the level of support (measured by voting intentions) for the Five Star movement - a new populist party. GDP falls significantly in 2009 and then stagnates, resulting in the longest and deepest recession in Italian his-

tory. Disappointed with the established parties, Italians lose faith in "the parties", which are blamed for the country's performance. The share of people trusting political parties falls from 25% before the crisis to 5% (or less) after 2009, with no sign of recovery. This disappointment has two consequences: electoral abstention;⁸ and, most strikingly, increased support for "outsiders." Driven by the demand for protection and disillusion with establishment parties, the Five Stars movement enters the political market. It first appears in 2009 and since then has gained increasing support, becoming the country's second largest party in the 2013 elections and the largest party in 2016 according to surveys. To counter their success, Prime Minister Matteo Renzi, head of the incumbent party, has adopted a number of "populist" policies - ranging from voter-friendly budget policies to more symbolic anti-Euro posturing (such as not exhibiting the EU flag together with the Italian flag as is customarily done by government representatives in public speeches).

The second panel of Figure 1 shows that a similar pattern holds in Greece: as the economic crisis deepens after 2007, people lose faith in the traditional parties, participation in elections falls, and the demand for protection rises. Populist movements either enter the market (Golden Dawn), or expand considerably (Syriza) starting from practically negligible electoral base.

[FIGURE 1 HERE]

In the following sections we provide systematic evidence from all European countries, to support the foregoing narrative.

⁸The fall in turnout in European elections is even sharper: in 2004 (before the crisis) it was 73%, falling to 66% in 2009, after Lehman Brothers but before the European sovereign debt crisis and to 58.7% in the 2014 elections, when the effects of the European crisis were felt.

4 The Data

Our main source of individual data is the European Social Survey (ESS), the richest social scientific endeavour to map attitudes, beliefs, and behaviour patterns in Europe. The ESS systematically tracks changing values, attitudes, attributes and behaviour patterns in European polities. It covers all European countries, though not every country participates in every wave. Data has been collected every two years, since September 2002, by face-to-face interviews. We use all seven waves through 2014. The questionnaire consists of a core module, constant from round to round and smaller rotating modules, repeated at intervals, on selected substantive topics or themes. We will use the core module, which covers a wide range of social, economic, political, psychological and demographic variables.

4.1 Measuring voting decisions

The ESS asks people whether they voted in the last parliamentary election in their country and which party they voted for: “Did you vote in the last [country name] national election in [month/year?]”. This gives us an indicator of turnout. Those answering yes were then asked: “Which party did you vote for in that election?” and shown the list of parties. From this we construct a dummy that takes value 1 if the voter voted for a populist party (identified in section 4.3).

4.2 Measuring voters’ characteristics

The ESS tracks a large number of variables from which we select a subset to construct proxies for the voters’ characteristics that influence both turnout and voting decisions, as discussed in Section 3. We start with our key explanatory variable for the rise of populism,

namely economic insecurity.

Economic insecurity. We capture heterogeneity in economic insecurity with three measures. First, whether the voter has been unemployed at some time in the past five years, forcing search for a new job; second, as a measure of financial distress, whether the voter is experiencing income difficulties, i.e. finds it hard to live on his current income; and third, an indicator of exposure to globalization, constructed exploiting information in the ESS on type of employment, industry and skill level – classifying as more exposed low-skill workers in low-tech manufacturing. The indicator takes value of 1 if the individual is a low-skilled blue-collar worker in manufacturing; 0 otherwise. We will find it useful to combine these three objective measures of financial and economic distress in a single composite index of economic insecurity by taking the first principal component, rescaled to vary between 0 (least insecure) and 1 (most insecure). With this measure we are agnostic about the specific factor causing economic insecurity. It clearly captures exposure to globalization (emphasized by Rodrik (2017), Colantone and Stanig, (2017) and Autor et al (2017)), but also other forces that may have been at work, including the obsolescence of job-specific skills, labor displacement due to rapid automation (Acemoglu and Restrepo, 2017) and enduring disruptions in personal savings and investment returns caused by the 2008 financial crisis. The point is that one single measure - e.g. unemployment - is unlikely to really capture voters' economic insecurity. Using unemployment alone, for instance, it would be difficult to explain the rising populist vote in Germany where the jobless rate is low (under 4% as of September 2017) and declining (since 2010).

Economic insecurity may also be produced by labor market competition due to immigration. Unfortunately, there are no data on immigration inflows by country of origin and region of destination, which would enable us to obtain intra-country variation in individ-

ual exposure to labor market pressure⁹. To capture fear of displacement in the labor market due to the possible arrival of cheap labor, we use a measure of sentiments towards immigrants: whether the voter would like fewer immigrants from low-wage countries, with answers ranging from 1 to 4 increasing in degree of support for immigration quotas. The ESS also collects people’s attitudes towards quotas on immigrants from countries of the same race/ethnicity and from countries of different race and ethnicity, as well as whether people agree with the statement that immigrants make their country worse. We will use all these measures in studying the effects of economic insecurity on attitudes and beliefs in Section 5.5; but our results on voting are invariant to the measure used, so Section 5 reports the results using the first measure.¹⁰

Trust in traditional politics and institutions. The ESS has several proxies for confidence in institutions, governments and political parties, all on a scale between 0 (no trust) and 10 (full trust). These indicators tend to be closely correlated and thus hard to tell apart. In analyzing individual voting behaviour we use trust in political parties, which speaks directly to our model. In studying the link between economic insecurity and trust in Section 5.2, we use all the measures.

Perception of long-run costs. We use two proxies for voters’ ability to foresee the pitfalls of the populist platforms. The first is

⁹Caliendo et al. (2017) make an estimate of immigrants by country of origin and country –not region– of destination using the EU labor force survey which reports gross flows of workers into a country by nationality and over time. The only data available at regional level are net population flows, a gauge that is unlikely to capture competitive pressure on local labor markets due to intense immigration. For instance, a zero net flow may reflect an inflow of immigrants of 100 and an equal outflow of displaced local workers: competitive pressure is high but net flow does not reflect it.

¹⁰Using synthetic panel data we document that people who experience an increase in the index of economic insecurity become more supportive of limiting immigration from low-wage countries (see Section 5). This justifies taking adverse attitudes towards immigrants as a gauge of economic insecurity.

education, measured by the number of years of full-time schooling completed . Education can capture the ability to infer the future costs of current populist policies (e.g. because the highly educated are more likely to be aware of the government inter-temporal budget constraint).

The second proxy is a measure of attention to politics, captured by two variables: how many hours per week people devote to watching TV in general and how many of these hours are spent watching news or programs about politics and current affairs. Watching TV in general is taken as a proxy for little interest in politics, and thus as a proxy for poor information. Watching news and programs about politics, given the time spent watching TV, is used to proxy for information level.¹¹ *Ceteris paribus*, we expect better educated people and people who watch TV programs on politics to be better able to anticipate the cost consequences of populist policies and accordingly less likely to vote for their proponents.

Time discounting and risk aversion. The weight placed on the uncertain future costs and benefits of current policies depends on the subjective discount factor, and the degree of risk aversion. The ESS has no direct measure of people’s patience. We use age as a proxy for subjective discounting, on the presumption that older people are less likely to have to bear for the future cost of current policies (assuming they care about future generations less than they care about themselves). The ESS is richer in terms of proxies for risk tolerance. We use the ESS indicator of whether people consider it important to avoid taking risks.

In all regressions we control for gender and political orientation, measuring the latter with a dummy for “right” (scale from 0 (far

¹¹It may well be that someone who spends 100 percent of his/her time on TV watches only one-sided news. This may be the reason why it turns out not to be significant in the regression on party choice, but is significant for the decision to participate, since watching political news correlates with mobilization.

left) to 10 (far right)). Needless to say, some of the variables can proxy for more than one of the dimensions of heterogeneity that we have listed. For instance gender may also reflect risk preferences as may age. Table 1 panel A shows summary statistics for these variables.

[TABLE 1 HERE]

4.3 Identifying populist parties

To identify populist parties in Europe, we rely on the classification proposed in the recent, comprehensive study by van Kessel (2015) which studies all the parties that gained parliamentary representation in national elections in Europe between 2000 and 2013.¹² The period and the countries covered match those in the ESS data. Van Kessel defines a party as populist if it a) portrays “the people” as virtuous and essentially homogeneous; b) advocates popular sovereignty, as opposed to elitist rule; c) defines itself as against the political establishment, which is alleged to act against the interest of the people. These features reflect the first component of our three-part definition of populism, the “supply rhetoric”. To detect their presence van Kessel uses primary sources such as party manifestos and speeches. To make sure that the classification is meaningful, he also asks a pool of country experts to validate or reject his classification by answering an ad hoc questionnaire. Using these criteria, the author identifies 57 populist parties in 26 of the 31 countries examined.¹³ There are several advantages to this classification. First, it uses a clear set of political strategy attributes,

¹²The countries covered are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, UK.

¹³Van Kessel’s definition is very similar to that of Cas Mudde (2007), and in fact the parties identified by the two authors are essentially the same.

rather than subjective judgements. That is, the “supply rhetoric” is observable and can be detected from official documents.¹⁴ Second, van Kessel’s classification covers all the relevant European countries. And third, it allows the definition to be time-varying, so that a non-populist party may turn populist in a certain year, a feature which is important for studying the supply side of populism.

Despite these merits, the classification unavoidably contains a certain amount of subjective judgement. More importantly, it does not reflect the other two components of our conceptually more complete three-part definition of populist policies - protection and the concealment of long-term costs. However, the three components of our definition turn out to be complementary and correlated, and hence making use of a measure based on only one dimension does not entail a major loss. Using the 2014 Chapel Hill Expert Survey (CHES), in which national experts rate European parties on a range of positions, policies and salient issues (see Section 6 for more details on CHES) we construct measures of each of our three dimensions (anti-elite and anti-corruption rhetoric, protectionism, concealment of long-term costs) for all the parties in the CHES database. The rhetoric variable averages the scores assigned to a measure of the salience of anti-establishment and anti-elite rhetoric and of reducing political corruption, on a scale from 0 (not important at all) to 10 (very important). The protectionism measure is the average of the scores for the position on five policies that may offer economic

¹⁴Donald Trump’s inauguration speech reads “..we are transferring power from Washington D.C. and giving it back to you, the people.. For too long, a small group in our nation’s Capital has reaped the rewards of government while the people have borne the cost. Washington flourished – but the people did not share in its wealth. Politicians prospered – but the jobs left, and the factories closed. The establishment protected itself, but not the citizens of our country...”. The anti-elite and anti establishment rhetoric, as well as the concept of “the people” as a uniform body, which according to political scientists distinctly characterizes populist parties, is easily spotted and measured in observable speeches.

protection in different domains: deregulation (10 strongly opposes deregulation of markets); immigration (10 strongly in favor of tough policy); tax policy: (10 strongly favors tax cuts vis-a-vis improving government services); economic intervention (10 fully in favor of state intervention); cosmopolitanism (0 strongly advocates cosmopolitanism, 10 strongly advocates nationalism); redistribution of wealth (10 fully in favor of redistribution). To capture the third dimension we average parties' positions on two long-term issues: the environment and international security or peace-keeping. Policies on these issues will pay off in the long run, the first by limiting global warming, the second by guaranteeing a stable international order. We interpret a high score on downplaying the importance of these issues as the gauge of a strategy of hiding the long-term costs of protectionism. Table 2 shows regressions of each of the three indexes on the van Kessel populist party identifier, *after* controlling for the political orientation of the party (0, far left, 10 far-right).

[TABLE 2 HERE]

Independently of political orientation, populist parties as defined by van Kessel all score higher in each of the three indeces. The difference between populist and non-populist parties is sharpest on the anti elite/anti corruption dimension (59% above the sample average) but it is substantial for the other two (34% and 27% above average). This evidence not only validates van Kessel's definition but also supports the consistency of our three-part (or 3D in short) definition of populism: what left and right-wing populists have in common are the three dimensions we posit. Political orientation, as argued in Section 3 and documented empirically in Section 6, is chosen strategically by the nascent populist parties depending on voters prevalent orientation and the salient political cleavages in the country. To summarize the three dimensions in a single 3D index of populism, we extract the first principal component of each.

The last column of Table 2 shows the correlation of this measure with van Kessel’s populist identifier.

Despite the conceptual merits of the 3D measure, our analysis relies primarily on the van Kessel classification. This for two reasons. First, the CHES dataset does not survey all parties in all countries, sharply reducing the number of observations (from 136,000 using van Kessel to 88,500 using the 3D definition, a drop of around 35%, see Table 1, top panel). Second, because some of the positions used to build the components of the dimensions are collected in only one or two of the CHES surveys, unlike van Kessel the 3D measure has no time variation. And time variation is very well suited to our goal of tracing populist supply over the years. However, we report robustness regressions using the 3D definition.¹⁵

4.4 Validating survey data on voting

Since we cannot observe true behaviour we analyze voting decisions as reported. Obviously, response to the ESS do not necessarily correspond to what people actually did in the voting booth. Apart from recall bias, people may be reluctant to tell their voting choice truthfully. The correlation between turnout in the ESS and actual turnout is quite high, 80%. Furthermore, in a country-level regression of ESS on actual turnout the slope coefficient is not sta-

¹⁵Inglehart and Norris (2016), also use the 2014 (CHES) data to identify populist parties. They classify as populist a party that scores more than 80 on a standardized 100-point scale built using thirteen selected indicators contained in the CHES, including support for traditional values, for liberal lifestyles, and for multiculturalism, as well as the stance towards market deregulation, state management of the economy, and preferences between tax cuts and public services. Some of these dimensions are the same as those we use to build our 3D measure, but Inglehart and Norris (2016) make no distinction between the three dimensions. Rather, they emphasize the cultural traits of populist parties. Of Van Kessel’s 57 populist parties, 25 are defined as populist in their stringent classification. Table A1 in the Appendix lists the populist parties based on the two definitions.

tistically different from 1, though there is tendency of the ESS to exceed actual turnout on average. The correlation between ESS votes for populist parties conditional on participation and actual voting is lower, at 63%. This is not surprising. Apart from reluctance to reveal voting choice, the survey may be representative of the country's adult population but not necessarily of the electorate. Furthermore, the low correlation can be traced to seven observations out of 79 in which the ESS understates actual vote for the populist party by more than 25 percentage points. Dropping these observations, the correlation is 85% and a regression of the average populist vote in the ESS on actual votes yields a slope of 0.86 and a negative constant of 4.3 percentage points. The joint hypothesis that the slope is 1 and the constant 0 is rejected, suggesting that the ESS sample participants tend to systematically understate the populist vote. However, if this measurement error were positively correlated with preferences for voting populist, our estimates of the effect of economic insecurity on voting would be a conservative estimate of the true effect.

4.5 Data on supply

We use the ESS mostly to study individual voting behavior - what we call the demand side of populism. For the supply side, we complement the ESS with several other datasets. Data on national political institutions come from the World Bank Database of Political Institutions. Data on trade with China, India and the rest of the world are drawn from the World Bank WITS statistics (UN Comtrade). Finally, the five waves (1999, 2002, 2006, 2010, 2014) of the CHES serve to determine whether populism, once it appears, spills over to non-populist parties. For each of the 246 parties included, which belong to all the countries in our sample, CHES gives a measure of the position on a set of relevant issues, which we use to

obtain measures of distance between the position of a non-populist party from that of the populist party in the same country. Table 1, panel D, shows summary statistics of these measures, described in detail in Section 6.

5 Demand: the empirics of voters' behavior

We first show results on the drivers of the vote for a populist party using the ESS data. We model voting as a two-step decision: a) whether to participate in an election (the participation decision); and b) conditional on participation, which party to vote – in particular, whether or not to vote for a populist party (the voting decision). Estimating the two decisions simultaneously is important for two related but distinct reasons: to get consistent estimates of the voting decision if unobserved components of the participation decision are correlated with unobserved components of the voting decision; and second, to pin down the channels through which voters' characteristics impact on the voting choice. Let $\pi^C(x) = \pi^J(x)/\pi^V(x, z)$ denote the probability of preferring a populist party conditional on voting, which is defined as the ratio of the joint probability of voting and preferring a populist party, π^J , and that of participating in the election, π^V . The effect of a change in x , say an increase in economic insecurity, is $\pi_x^C = (\pi_x^J \pi^V - \pi_x^V \pi^J)/(\pi^V)^2$ or, in percentage, $\pi_x^C/\pi^C = (\pi_x^J/\pi^J - \pi_x^V/\pi^V)$ which is clearly affected by the effect of x on the participation decision. By a joint estimation of the voting and participation decisions we retrieve consistent estimates of π_x^C and π_x^V and can assess the economic role of turnout in the voting results. In frequencies, π^C represents the populist party's share of the vote – our dependent variable.

5.1 Turnout and identification

Given that the party choice only applies to those who vote in the election, itself a choice variable, we estimate a two-step Heckman probit model, estimating first the probability of participation, and then the probability of voting for the populist party. As observed in Section 3, electoral participation depends on the same set of variables as the choice of party, possibly with opposite signs: that is, the characteristics that increase the likelihood of voting populist may also discourage participation. For identification, we need a personal characteristic that affects the net benefit of voting (benefit less cost), but not the choice of the party conditional on participation. As instruments we use the mean temperature and total rainfall on the day of the elections in each region-year. The identification assumption is that meteorological conditions affect the cost of going to the polls but not the preference for voting for a specific party. Because the effect of rain or heat on the cost of going to the polls may be stronger in countries where it rains infrequently (or where temperatures are frequently low) we also include interactions between rainfall and temperature with a dummy variable for southern countries.

5.2 Estimation results

We estimate our Heckman probit model for the sample of countries that have a populist party in the ESS waves. In all specifications we control for gender and political orientation, on a scale from 0 (far left) to 10 (far right), and for the size (population) of the voter's region; we also include country-level fixed effects and ESS wave effects. Importantly, country-fixed effects capture all the features of the country that may affect the success of populist platforms: the electoral system, the responsiveness of the established parties to salient political issues (such as labor market pressure from im-

migrants), and the level of corruption.¹⁶ For brevity, these controls are not reported. We run regressions using sampling weights to account for differences in national's sample size. In all regressions, standard errors are clustered at the regional level. Our final dataset consists of 134,834 observations from 24 European countries when estimating the specification with all controls.

Table 3 reports the estimates of several specifications, with a progressively augmented set of controls. The bottom part shows the parameter estimates of the meteorological instruments on the participation decision. In general, rainfall on election day discourages participation in southern countries, while high temperatures significantly discourage it in Nordic countries. This conforms with intuition: going to the polls when the temperature is high is a heavy toll in a Nordic country (where hot days are rarer), while going to vote in the rain is costly in southern countries where people are less equipped for it. Conditional on the controls and the instruments there is no sign of selection bias, as is shown by the low and insignificant correlation between the residuals in the voting and the participation regressions in all specifications.

The general estimation equation (varying among columns) is:

$$\text{Populist Vote}_{iwc} = \beta EI_{iwc} + \gamma X_{iwc} + FE_w + FE_c + \epsilon_{iwc}$$

where (i, w, c) indicates individual, wave, and country, respectively; EI indicates the individual economic insecurity (either as a single principal component variable obtained with a factor analysis, or as individual variables - see below); X are individual characteristics, and in the last specifications also measures of trust towards institutions and attitudes against immigrations. All the variables are described below.

¹⁶These are some of the context variables that studies of populism (e.g. van Kessel, 2015) consider critical in explaining populists' success.

The first two columns show results of participation and voting decisions controlling for risk and time preferences, education, political information, and the three proxies for economic insecurity. The proxy for risk aversion has a significant positive effect on participation: people who consider it important to avoid taking risks are more likely to vote. This measure has no effect on the choice to vote for a populist party. Hence, we find no support in the data for the thesis that since the populist choice entails risk, it is more appealing for risk-tolerant voters. Age affects participation positively but has no effect on voting populist.¹⁷

Education - our proxy for people's ability to foresee the long-term costs of current policies - has a positive and precisely measured effect on voting and, conditional on participation, a negative effect on support for a populist party. This is consistent with Hypothesis 1. Increasing education by 4 years (one sample standard deviation) raises participation probability by 19 percentage points (35% of the sample mean) and lowers the probability of voting for a populist party by 1.75 percentage points - as much as 22% of the sample mean. The proxy for political information has a significant impact on turnout - more politically informed citizens are more likely to participate - but it has no effect on voting for a populist party (see the brief discussion on the reasonableness of these findings in footnote 11).

Economic insecurity is our key determinant of the demand of populism, consistent with Hypothesis 1. Unlike the papers that ignore turnout (e.g. Inglehart and Norris, 2016), our study confirms the effectiveness of the economic insecurity mechanism. Economic

¹⁷Interestingly, women are less likely to participate, and when they do, they are also less likely to support populist platforms. The politically right-leaning are more likely to participate and to vote for a populist party - a finding that is robust to specification and consistent with the right-wing orientation of most populist parties in Europe (see Section 6.2 as well as van Kessel, 2015 and Mudde, 2007).

insecurity acts on two margins: it discourages participation and increases the likelihood of a populist vote among those who do decide to vote. The effect on the participation margin is precisely estimated and highly responsive to unemployment, income loss and exposure to globalization. It is this margin, in our interpretation, that creates the basis for the appearance of populist platforms. The populist party vote is more likely among those who suffer an income loss and are exposed to globalization. But having lost a job has no statistically detectable effect on the vote for a populist party, possibly because, as documented, those who have lost jobs refuse to participate rather than vote against the incumbent.

To facilitate interpretation of the magnitude of the effects of economic insecurity, the second set of regressions replaces the three measures of economic insecurity with their principal component. The Index of economic insecurity significantly affects electoral participation and voting for the populist party. At sample means, increasing economic insecurity by one standard deviation lowers turnout by 6.2% of the sample mean and increases the populist vote by 4.3%. For an individual who transits from no economic insecurity to economic insecurity, the probability of voting for a populist party increases by 14.5% of the unconditional sample mean, while the probability of voting falls by as much as 21 percentage points, equivalent to 27% of the sample mean. These are substantial effects.

The third pair of columns have trust in political parties as an additional explanatory variable. Consistent with the prediction of the model (see Hypothesis 1), people with greater confidence in political parties are more likely to vote and to vote for a non-populist party. Those who have lost faith in political parties are more likely to abstain, but if they do vote, they are more likely to choose a populist party. Trust in political parties is on a scale of 0 to 10; a drop of 5 points increases the probability of voting for a populist

party by 7.7% of the sample mean. The effect on electoral participation is similarly strong: a drop of 5 points lowers the chance of participating in elections by 8.8 percentage points, almost 11% of the unconditional mean electoral turnout.

[TABLE 3 HERE]

The last pair of columns add, as a control, a measure of attitudes towards immigrants, used as a proxy for fears of competition in the labor market. The specific measure is support for policies that limit immigrants from non-EU countries; if instead we use a measure of support for limiting immigrants of the same race/ethnicity or immigrants of other race/ethnicity than that of the respondent or an average of the three measures, the results are basically unaltered. People who are more adverse to immigrants are less likely to vote and more likely to vote for a populist party if they do. A 1-standard-deviation increase in hostility to immigrants lowers turnout by 1 percent of the sample mean; the effect on voting for a populist party is more pronounced: it increases by 9.2% of the sample mean. The effects of the other variables, particularly economic insecurity and trust in political parties, are unchanged.

Table 4, first column, summarizes the direct effect on the conditional probability of voting for a populist party of a 1-standard-deviation increase in economic insecurity, trust in political parties, and fear of immigrants. The second column shows the contribution of these variables to the conditional probability of a populist vote through their effect on the probability of voting at all. Economic insecurity and trust in political parties affect the conditional probability of voting for a populist party mostly through their effect on turnout. Accounting for the effects on the decision whether or not to vote is crucial to understand how the drivers of populist voting operate.¹⁸

¹⁸From the expression $\pi_x^C \sigma_x = ((\pi_x^J \pi^V - \pi_x^V \pi^J)/(\pi^V)^2) \sigma_x$, where σ_x is the

[TABLE 4 HERE]

A summary illustration of the fact that economic insecurity affects populism demand through the participation effect is given in Figure 2, where we see that panel A and panel B have the same share of citizens who prefer to vote for the populist option, but panel B displays a larger fraction of abstainers, with the disillusionment affecting traditional party supporters more strongly.

[FIGURE 2 HERE]

5.3 Robustness

Table 5 reports a number of robustness exercises. To save on space, the estimates of the instruments in the turnout regressions are shown in Appendix C. The first two columns run the estimates of the Heckman probit using all the sample countries, not only those that have a populist party. That is, the turnout equation is estimated using observations for countries both with and without populist parties. The endogenous presence of populist parties is fully captured by the country dummies. The results are unaffected. Economic insecurity lowers participation and increases the populist vote; the effects are significant and of the same order of magnitude as those in Table 3. The same holds true for the effects of trust in parties and the other controls. The second set of estimates, run on all countries, adds a dummy for countries in the euro-area. This has no effect on turnout but significantly raises the consensus for populist parties, possibly reflecting the dismal performance of euro-area countries during the Great Recession. The other estimates are unaffected. The next two columns add country-wave fixed effects, capturing changes in populist manifestos and rhetoric. Again the

standard deviation of x , the contribution through the effect on turnout is $(-\pi_x^V \pi^J / (\pi^V)^2) \sigma_x$.

results are unchanged. One last concern is that, the populist vote may actually be capturing voting for a new party as such. To address this, in the last two columns we run the estimates after dropping individuals who voted for any new party - i.e. a party present in the election for the first time. The results are basically unaffected, except that economic insecurity has a somewhat stronger effect on voting populist. As a final robustness exercise, we run the estimates again, using a different exclusion restriction in the Heckman selection model. This is not because weather on the election day fails to be orthogonal to the voting choice, but because one may doubt its power. As an alternative instrument we use the voters' self reported health status, on the assumption that people in weaker health face a higher turnout cost.¹⁹ All results (not reported for brevity) hold if we use this alternative instrument (see working paper version, Guiso et al., 2017).

[TABLE 5 HERE]

5.4 The three-part definition of populism

As discussed, our theoretical framework leads naturally to a three-part definition of populism. In Section 4 we showed that this is a good fit with the van-Kessel classification, although protectionism and concealment of its long-term costs are harder to measure empirically. Table 6 reports the basic estimates using our empirical implementation of the three-dimensional measure of populism. Again the estimates of the instruments in the participation regressions are given in Appendix C. The first two columns show the estimates of a Heckman selection model taking as dependent vari-

¹⁹Health status is invalid as an instruments if it affects people's preferences for populist or non-populist parties via differences in healthcare policies. This may apply in the US presidential elections, where dismantling Obama care was part of the Trump program, but, it is not an issue in Europe, where populist versus non-populist programs do not differ on health policy

able in the main specification a 3-D measure of populism; this index is a continuous measure of a political party's degree of populism, and free of the unavoidable arbitrariness of the dichotomous classification into "populist" and "non-populist" parties. Because of the lower coverage of the CHES survey the number of censored observations increases considerably (from 36,000 to 68,000) compared with Table 3. Even so, confirming the previous results, economic insecurity lowers the likelihood of voting and increases support for more populist parties. Moving from economic security to insecurity increases the preference for a party along the 3D scale by 4.7% of the sample mean. Trust in political parties affects participation positively and the preference for more populist parties negatively, but the latter effect is not statistically significant. The other variables have effects qualitatively similar to those produced using van Kessel definition. The second set of estimates use a binary definition of populist parties defined as those above the 75th percentile of the 3-D index. The results are similar to those in Table 3. Economic insecurity increases the probability of voting for a populist party, while trust in political parties decreases it; both effects are precisely estimated. The next two columns add attitudes towards immigrants finding that fear of immigration lowers participation and boosts populist votes. The results are invariant to the more stringent definition of populist parties (3D index above the 80th percentile, last two columns).

[TABLE 6 HERE]

To sum up, the evidence reported in Tables 3, 5 and 6 is consistent with the implications of the model (Hypothesis 1). Voting for populist parties is more likely among people who are affected by economic insecurity, those who have lost faith in political parties, and those who are less able to foresee the future costs of populist policies. The role of risk preferences is unclear. A populist vote is

a risky option - one that might require high risk tolerance. But one may also argue that gambling on resurrection is the only option that loss-averse citizens who have already suffered economic loss can perceive.

Economic insecurity plays a quantitatively important *direct* role in explaining the voting decisions of those who vote, as well as in explaining the decision to vote itself. However, economic insecurity plays also a role through at least two important *indirect* channels: via its effect on people's trust in established parties, and via its effect on attitudes towards immigrants. Next we discuss these channels.

5.5 Economic insecurity, trust in political parties and attitudes toward immigrants

5.5.1 Testing Hypothesis 2

Economic insecurity can affect both electoral participation and populist vote also indirectly, because it influences people's confidence in political parties and attitudes towards immigrants. This is what our theoretical framework (Hypothesis 2) suggests. As Figure 1 shows, the sharp drop in income in Italy in 2009 and the dismal performance of the economy since then are closely correlated with a sharp loss of confidence in political parties. In principle, causality can run either way. A negative shock to confidence in politics, for whatever reason, may produce a sudden economic slowdown, for instance if debt holders reduced financing to the government. This channel has been analyzed in the literature on the systematic and persistent international differences in per capita GDP (see e.g. Zak and Knack, 2001; Algan and Cahuc, 2010). This literature considers the relevance of trust not in politics but in people, a slow-moving trait. A recent strand of work emphasizes instead the

decline in confidence caused by sharp drops in economic activity. This literature focuses on changes in trust over time at business-cycle frequencies, not on persistent differences in levels of trust between different communities. There is some evidence that recessions undermine people’s trust. Ananyev and Guriev (2016) are able to isolate the causal effect of economic downturns on people’s trust during the 2009 recession in Russia, exploiting regional variations in the industrial structure inherited from the Soviet Union, and noticing that capital-intensive and oil-related industries are more responsive to shocks to GDP. They find that a decline in GDP causes a sizeable drop in trust in other people. The same logic applies, even more plausibly, to falls in trust in political parties, politicians and governments, say because citizens blame incumbent parties (and the government) for poor economic performance. The same logic can be extended to argue that negative attitudes towards immigrants may be exacerbated when people, faced with economic insecurity, feel more threatened by labor market competition.

In fact, economic insecurity and trust in political parties are negatively correlated, when gauged using cross sectional variation in the pooled ESS. Similarly, economic insecurity is correlated positively with hostility to immigrants from non-EU countries. And these correlations hold even controlling for observable and country and wave fixed effects. Of course the correlations may just reflect unobserved heterogeneity - i.e. some individual characteristics that drive both economic insecurity and people’s trust in politics and attitudes towards immigrants. To address this problem, we follow Deaton (1985) and construct a pseudo-panel from the sequence of ESS waves. We group the data into eleven 5-year age cohorts of men and women in each country, respectively, and estimate the following model

$$y_{jct} = \beta_1 \mathbf{x}_{jct} + \beta_2 EI_{jct} + f_j + f_{cT} + u_{jct} \quad (1)$$

where y_{jct} denotes the generic belief/attitude of cohort j in country c in year t , $\mathbf{x}_{jct}$ the vector of controls, EI_{jct} the index of economic insecurity, and u_{jct} an error term. Unobserved heterogeneity is controlled for by the cohort-specific fixed effects f_j .²⁰ Country-specific trends in beliefs/attitudes and economic insecurity are captured by country-year fixed effects f_{cT} . The latter pick up any country aggregate variable that affects changes in beliefs over time, including any effect of populist party rhetoric.

Figure 3, left panel, shows a simple bivariate correlation between the change in trust in political parties and that in economic insecurity among the pseudo-panel cohorts. In all cases, an increase in the economic insecurity of the age cohorts leads to a decrease in trust in political parties. The right panel shows the bivariate correlation between changes in attitudes towards EU immigrants and changes in economic insecurity for the same cohorts. This second correlation is strongly positive.

[FIGURE 3 HERE]

The first two columns of Table 7 report controlled fixed-effect pseudo-panel regressions of trust in political parties and attitudes to non-EU immigrants on our summary measure of economic insecurity and individual time-varying controls (risk aversion, age, exposure to the media) as well as country-specific time effects common to all cohorts. Economic insecurity has a negative and highly significant effect on trust in political parties and a positive and highly significant effect on hostility towards immigrants.

The economic effects are substantial: a 1-standard-deviation increase in economic insecurity lowers trust in political parties by 8%

²⁰Our pseudo-panel consists of 784 age/country/year-of-birth groups. Cohorts are relatively large, with 294 observations on average. This reassures us that measurement error in the cohort means is likely to be negligible. Dropping cohorts with fewer than 50 observations (8% of the total) does not alter the results.

of its sample standard deviation and increases hostility to non-EU immigration by 8.7% of its sample standard deviation. Because these are fixed-effects regressions, the results cannot depend on unobserved heterogeneity.²¹ The results confirm the thesis that a deterioration in individual economic security causes a loss of confidence in political parties as well as a change in attitudes towards immigrants, lending support to Hypothesis 2.²²

[TABLE 7 HERE]

The rest of the table expands the evidence by regressing several measures of trust (in politicians, in the national parliament, in the European parliament, and an index of satisfaction with the government) and attitudes towards immigrants (preference for fewer immigrants of different race/ethnicity; for fewer immigrants of same race/ethnicity; agreement that immigrants make the country worse). Economic insecurity can be seen to cause people to lose confidence in politics, institutions and governments and to increase aversion to immigrants across the board.²³

²¹The pseudo-panel regressions identify the causal effect of economic insecurity on trust in political parties and on attitudes towards immigrants that is due to: a) individuals in the cohort changing their attitudes when they experience insecurity directly; b) changes in trust towards parties/attitudes towards immigrants in that cohort reflecting group effects: say, an individual in a given cohort who loses confidence in political parties because he/she observes that other members of the same cohort have experienced economic insecurity.

²²Reverse causality - people who lose trust in parties and because of this are more likely to lose their jobs or to suffer income losses - is not plausible, particularly in light of the fact that any effect that a generalized loss of confidence in politics has on the economy is already picked up by the time fixed effects and similarly for a change in attitudes towards immigrants.

²³Our interpretation is supported by the results in Algan et al. (2017) who show that in regions of Europe where unemployment increased more sharply following the 2008 crisis, trust in parties and political institutions fell more and sentiments towards immigrants deteriorated. An IV analysis suggests that the causality runs from changes in unemployment to changes in trust and sentiments.

5.5.2 Direct, indirect, and total effects of economic insecurity

We use the estimates in the first two columns of Table 7 together with those in Table 3 to obtain an estimate of the total effect of an increase in economic insecurity on the probability of voting for a populist party among those who vote and on electoral turnout rate.²⁴ The estimates are shown in Table 8.

[TABLE 8 HERE]

In total, an increase in economic insecurity by 1 standard deviation increases populist voting by 7.4% of the sample mean. Around 81% of this increase stems from the direct effect on voting and the rest from the indirect effect through lower trust (6%) and fears of immigrants (13%). An increase of the same magnitude in insecurity lowers electoral turnout by 6.6% of the sample mean (5.1 percentage points); 92% of the drop is due to the direct effect, while 6% to the indirect effect through lower trust in political parties and a marginal 2% to increased fear of immigrants.

6 Supply: the empirics of populist parties and policies

6.1 Presence and entry of populist parties

Populist parties are not always present. Figure 4 (left panel) shows the share of countries with at least one populist party among the 26 European countries in our sample. In 2000, the proportion was

²⁴The magnitude of the effects of economic insecurity on trust and anti-immigrant sentiments is taken from the pseudo-panel estimates; the effect of trust and immigrant sentiments (as well as the direct effect of economic insecurity) on both voting populist and turnout are taken from the Heckprobit main specification.

less than 70%; by 2009 it rose to 100%. Our model suggests that the presence of populist parties is heavily affected by the magnitude of the potential demand: if underlying support is sufficiently large, a populist platform is more likely to emerge (and to disappear if support fades). In Section 5 we showed that economic insecurity undermines confidence in political parties and creates political space for a populist platform. Our model accordingly predicts that economic insecurity will be a major explanatory factor for the presence of populist parties, where the scale of electors' disappointment due to insecurity exceeds the cost of setting up a party, which depends on context-specific variables, a populist party should emerge.

To test this implication we estimate the following model:

$$np_{ct} = \alpha d(e_{ct}) - \beta z_{ct} + u_{ct}$$

where np_{ct} is the number of populist parties in country c in year t , $d(e_{ct})$ is the level of voters' disappointment - an increasing function of the level of economic insecurity in country c in year t ; z_{ct} is a feature of the institutional and political system, possibly time-varying, that affects the cost of setting up a party with a populist platform; and u_{ct} an error term. We measure heterogeneity in the supply of populist parties with a discrete variable - the number of parties in each country defined as populist by van Kessel, in the years from 2000 to 2015. Figure 4 (right panel) shows the distribution of this variable. We capture economic insecurity with two measures. The first is simply the mean in the ESS sample in country c , year t , of our principal component measure of individual economic insecurity used in Section 5. Because the ESS is run every two years, for the country/years when the ESS measure of economic insecurity is not available we extend that of the nearest wave. Clearly, this limits the time variability of this measure. Our second measure is the share of imports (total imports over popula-

tion), to capture exposure to globalization. Because this measure is available every year, it adds variation in economic insecurity. As a proxy of the cost of forming a populist party, we have experimented with several political/institutional features, including an index of checks and balances, the nature of the electoral system, and party-political fragmentation. Though these measures all effect the presence of a populist party in the expected direction (populist parties are less likely to be present in countries with stronger checks and balances, a less fragmented political system and a proportional electoral system),²⁵ the factors with the greatest predictive power are the strength of the opposition parties and of non-aligned parties (both captured by vote in the last election). We report the results using these measures in Table 9, where we estimate a Poisson model controlling for year fixed effects, to account for the common trend in populist parties documented in Figure 4 and clustering standard errors at country level, as some countries have more than one populist party. The first column shows the results proxying z_{ct} with the share of the votes going to opposition party. The supply of populism is greater where economic insecurity is more widely diffused among the population and in countries more highly exposed to globalization. It is smaller where opposition parties are strong. All the effects are statistically significant; they are also economically relevant. A country with an index of individual economic insecurity 1 standard deviation above the sample mean is predicted to have 0.2 more populist parties. The same effect obtains for a country with a share of world imports 1 standard deviation above the sample mean. Countries with an opposition vote 1 standard deviation above the sample mean have on average 0.22 fewer populist

²⁵In principle, a proportional system should encourage the supply of populist parties by lowering the entry costs; but because lower entry costs facilitate the entry of other parties as well, they may dilute the benefit of offering a populist platform, by leaving a smaller share of the vote on the table. In our data this effect seems to prevail

parties. Since the average number of populist parties per country in our sample is 1.5, these effects amount to about 13% of the sample mean. The second column shows that the results are very similar proxying z_{ct} with the share of the votes going to non-aligned parties. The measures of economic insecurity are somewhat stronger and more precisely estimated. The negative effect of our proxies for z_{ct} lends support to our thesis that a populist platform has a better chance of winning consensus, and thus of inducing a party to propose it, when people lose faith in all the established parties. A strong opposition party or the presence of strong non-aligned parties weakens the anti-elite pillar, rendering a populist strategy less attractive.

[TABLE 9 HERE]

6.2 The choice between left and right

In Section 3 we have argued that a populist who enters the political scene will actually have very similar characteristics (in terms of our three-part strategy components) regardless of whether it entered on the left or the right, this contention is supported empirically in Section 4. Our theoretical framework implies that the choice of entering on the left or on the right should depend on the *relative entry space* (Hypothesis 3).²⁶ The latter, in turn depends on the ideological orientation of the electorate and, as Rodrik (2017) observes on the salient features of the particular form taken in a given country by the crisis from which economic insecurity originates – e.g. a large inflow of immigrants (a globalization shock), or a marked increase in income concentration and inequality. In turn, these factors are likely to be differentially salient for left- or

²⁶It maybe worth noting that in political science the concept of entry space often refers to spatial measures, whereas our notion of "entry space" is based exclusively on relative abstention.

right-oriented voters, pulling the populist party's orientation choice one way or the other depending on the relative weight of left- and right-wing voters and the relative salience of left-versus right-wing factors. To test Hypothesis 3 on our European data, we estimate the model:

$$r_{jct} = \delta_0 + \delta_1 s_{lct} \times L_{ct} + \delta_2 s_{rct} \times R_{ct} + v_{ct}$$

where r_{jct} is the orientation of populist party j in country c at t , increasing in orientation to the right; s_{ct}^L and s_{ct}^R the shares of left- and right-oriented voters, L_{ct} and R_{ct} the left-salient and right-salient factors and v_{ct} an error term. The party orientation is observed in the CHES survey and measured on a scale from 1 (far left) to 10 (far right), so our data are limited by the CHES coverage. The shares of left-oriented and right-oriented voters, also a 1-to-10 scale, are obtained from the waves of the ESS. As a measure of left-salient factors we use the Gini coefficient of income inequality (from the World Bank World Income Inequality Database) and as a measure of the right-salient factor the share of immigrants from Muslim countries in the total population. This variable, obtained from the World Bank Bilateral Migration Matrix, is available for three years (1999, 2010 and 2013). Hypothesis 3 predicts $\delta_1 < 0$ and $\delta_2 > 0$.

Of course, as we observed in Section 3.4, relative entry space should be a critical determinant of the orientation choice whenever the individual characteristics of left-leaning and right-leaning voters are similarly distributed in terms of the key variables of economic insecurity, trust and ability to assess populist policies that drive the consensus for populist parties, as shown in Section 5. Table 10 confirms that this is indeed the case. Left-oriented and right-oriented voters differ mainly in relative share of the electorate. The distribution of proxies for the determinants of voting, summarized

by mean and standard deviation, are extremely similar between left-oriented and right-oriented voters.

Figure 5 shows that in the CHES data, the distribution of the orientation of populist parties is sharply different from that of non-populist parties: populists have a much higher density on the right.

[FIGURE 5 HERE]

[TABLE 10 HERE]

Table 11 shows that the heterogeneity in populist party orientation can be explained at least in part by our model. Income inequality weighted by the population share of left-oriented voters tends to pull orientation of populist parties to the left, and the effect is statistically significant. 1-standard-deviation increase in this factor shifts orientation to the left by almost one unit in the scale, or 18.5% of the sample mean. The share of immigrants from Muslim countries weighted by the share of right-oriented voters has a positive and highly statistically significant effect, pulling populist parties' orientation to the right. A 1-standard-deviation increase in this factor increases the score by 1.45 points, or 27.9% of the sample mean orientation. Interestingly, it is not immigration per se that affects the populist orientation but its origin from Muslim countries. If we replace immigration from Muslim countries with the population share of all immigrants or of immigrants from EU countries, the immigration variable (weighted by the share of right-oriented voters) is not statistically significant. This strengthens our interpretation of the results, as it strongly suggests that the orientation chosen is the one most susceptible to effective populist rhetoric (see Rodrik 2017).

In sum, the results set out here and in the previous section fully support our interpretation. Populist parties and platforms appear when the popular disappointment is sharp enough to raise realistic

hopes of winning a share of the total vote - *a scale effect* - large enough to outweigh the entry cost. Conditional on entry, the party chooses its political orientation strategically, tilting towards voters ideology and where the factors behind the crisis are more salient - *a relative size effect*.

As a general remark on these major findings of our paper, we want to emphasize two points: (i) disappointment and the attendant turnout effects are as important on the supply side as they have been proven to be on the demand side of populism; (ii) there may well be other ideological and cultural reasons, both historical and contemporary for the orientation choice of a new party, but we have shown that even the most standard office-seeking motivation can explain the observed variation.

6.3 Non-populist parties' reaction to populism

One possibility is that non-populist parties may adapt their own platforms in imitation of a successful populist party. To test this hypothesis we use the five waves of the Chapel Hill Expert Survey (CHES). For each of a list of issues (see Appendix B for the full description), the CHES reports the position of the party on a scale of 0 to 10 (for some issues, the CHES scale is 1 to 7, but we rescale them to 0-10). To assess the party position CHES questions a pool of experts in each country. For instance, on the issue of deregulation /regulation the position of the party is gauged by a number, running from 0 (strongly opposed to deregulation) to 10 (strongly in favor). We disregard issues present in only one or two survey, considering only those that are assessed in at least three and preferably all five surveys. We group the positions into four families: overall European integration (P_EI); European policy (P_EU, obtained summing the scores on three issues: powers of European institutions, European cohesion policy, and EU foreign and secu-

rity policy); ideology (P_ID, obtained summing the scores on three issues: general ideological stance (left/right), stance on intensity of government intervention in the economy, libertarian versus traditional/authoritarian stance); and an index of the positions on a set of eleven policy issues (P_PD: government expenditure versus taxation, deregulation, redistribution of wealth, civil liberties versus law and order, social lifestyle, religious principles in politics, immigration policy, multiculturalism, urban versus rural interests, political decentralization to regions/cities and position towards ethnic minorities). The first three indeces are available for all surveys, the fourth for the last three waves. In addition, we construct an overall measure of the party position (P_total), summing the scores on the four indeces (for the last three waves, only, of course).

To compare platforms we proceed as follows. Let y_{icjt} denote the position of party i in country c on issue j (EI, EU, ID, PD, Total) in year t . We distinguish between platforms of populist parties, P, and non-populist, NP, and let $D_{ijct} = (P_{ijct}^{NP} - P_{jct}^P)^2$ denote the distance between the platform of non-populist party i and the main populist party in its country, if there is one. Let s_{t-1}^P denote the share of the vote going to the populist party or parties in the last election before the survey. We test the electoral competition hypothesis by running the regression:

$$D_{icjt} = f_T + f_{NP} + \gamma s_{t-1}^P + u_{icjt}$$

where f_T are time fixed effects, f_{NP} are non-populist party fixed effects and u_{icjt} an error term. Because parties are country-specific, the party fixed effects also capture systematic national differences across countries. A Downsian model predicts a negative value for γ , that is, the platforms of non-populist parties should move closer to that of the populist party as the latter becomes more successful.

[FIGURES 6 HERE]

Figure 6 plots the relation between the distance of the platforms of non-populist parties from those of the populist and the populist share of the vote in the most recent election for each of the issues and for the overall index. To pick up possible non-linearities, we plot a local polynomial regression, with the 95% confidence band. In all the issues the distance decreases as populist parties gain support, which jibes with the thesis that populist policies are more palatable to the electorate at times of systemic crisis. Table 12 shows the estimates of the linear regression specified above, confirming the visual inspection of Figure 6: as populist parties gain support, their non-populist adversaries appear to adapt their platforms to reduce the distance from the populists. The effects are substantial: increasing the share of votes to the populist party by 1 standard deviation (16 percentage points) shortens the distance between the non-populist and populist platforms by 33% of the sample mean. Table 13 rules out the possibility that it is the populist party that moves closer to the traditional parties as it gains consensus. To show this, we regress the change in populist positions on the populist share of the vote. We find that populist parties do not revise their position as their share of votes increases. Overall, this evidence means that simply counting the number of populist parties, or tallying their share of votes/seats, understates the supply of populist policies in a country.

[TABLE 12 HERE]

[TABLE 13 HERE]

7 Conclusions

We have described the situation of Western countries in the last decade as one of global crisis that has affected both markets and sovereign states, leaving many people with unprecedented fears.

This has not been the case previously: the crisis of the 1970s was mainly a market crisis, while various crises in the 1990s were government crises in a context of thriving markets. The rare combination of inability of markets and governments to provide security has shaken the confidence in traditional political parties and institutions, fostering fears that are aggravated by threats such as mass immigration. This paper describes how this dual global crisis affects the demand for, and supply of, populism systematically. The factor that we highlight as key for the understanding of both demand and supply of populism is electoral participation. We show that the abstentionism, disillusionment effect, which the literature generally ignores, makes economic insecurity appear to be the real driver of populism on the demand side. And, these same abstention effects determine the timing, the quantity, and the orientation choice of populist parties on the supply side. Beside the primary role of the voter turnout effects, the paper makes it clear that any populist entrant, on the left as well as on the right, can be characterized as using a three-dimensional strategy that always includes short-term protection, concealment of future costs and anti-elite rhetoric. Examination of the interaction between this rhetoric (the key element of populist supply strategy) and economic insecurity (the key driver of populist demand) has been shown to be very useful in understanding how trust and attitudes towards migration evolve. Populism does not have a *cultural cause*, but rather an *economic insecurity cause*, with an important and traceable *cultural channel*.

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Appendix

A Populist parties

Table A1 lists parties that are defined as populist by van Kessel (2016) on the one hand and by Norris & Inglehart (2016) on the other.

[TABLE A1 HERE]

B Political platforms

We obtain information on parties political platforms from the five waves of the Chapel Hill Expert Survey (CHES). For each of a list of several issues the CHES reports the position of the party on a scale either between 1 and 7 or between 0 and 10. Positions are grouped in four families: i) overall European integration (P_EI); ii) 11 issues on European policy (P_EU); 3 positions on ideological issues (P_ID) and 17 positions on policy issues (P_PD). Table A2 lists the issues covered for each family, the scale on which the position is reported and the survey years it is available in CHES. To make sure we have enough coverage over time, we build the EU index P_EU using the position on the three issues covered in all 5 surveys (three issues, highlighted in italics in the table) and construct the P_PD index using the 11 positions covered in three surveys (again highlighted in italics in the table).

[TABLE A2 HERE]

C First stages for robustness and 3D measure

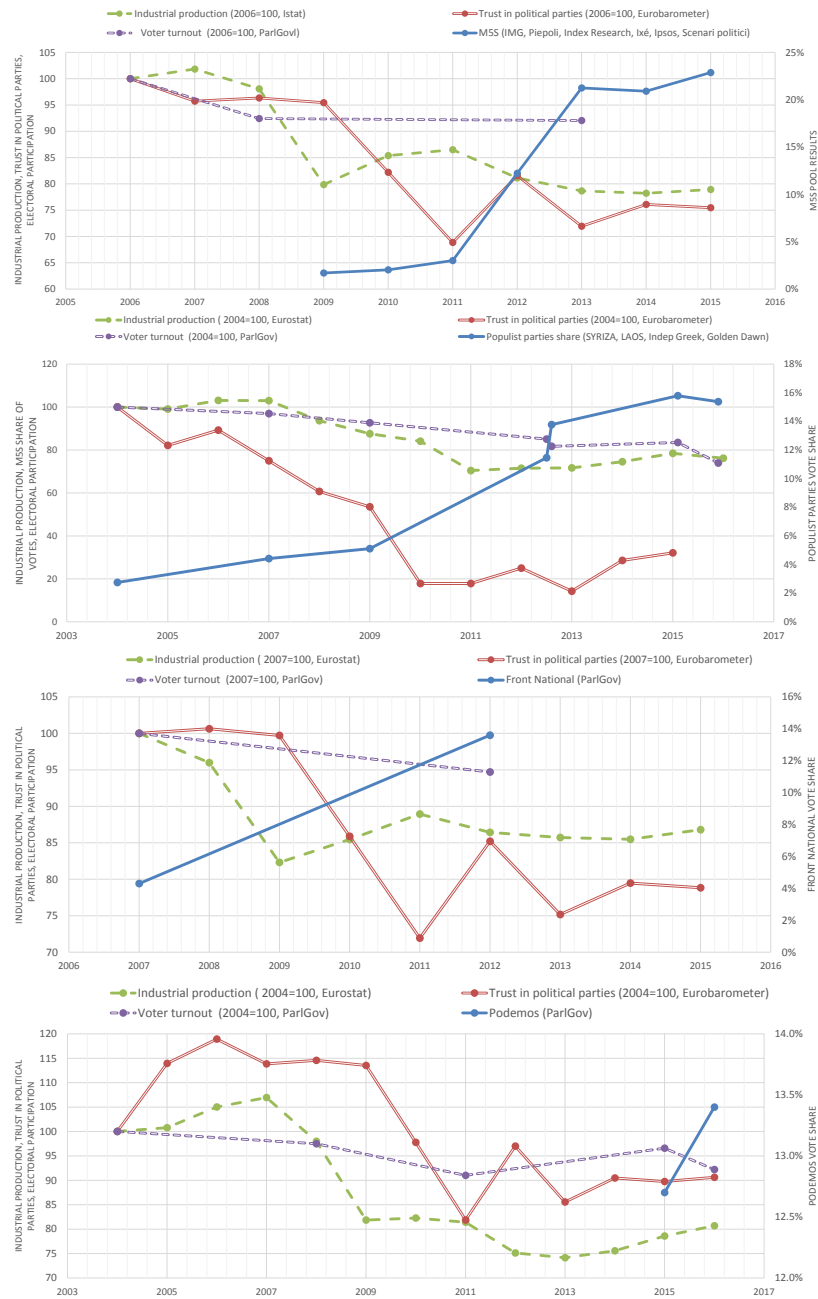
Here we present the estimates of the instruments in the turnout regressions for section 5.3 and 5.4.

[TABLE A3 HERE]

[TABLE A4 HERE]

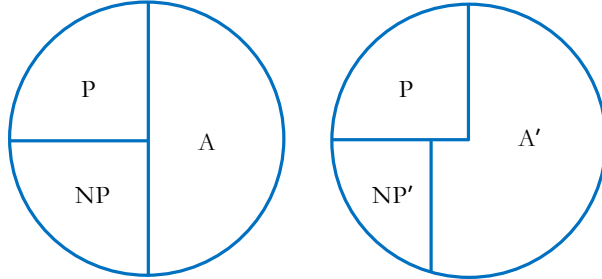
Figures

Figure 1: Populism, Economics, Electoral participation and Trust



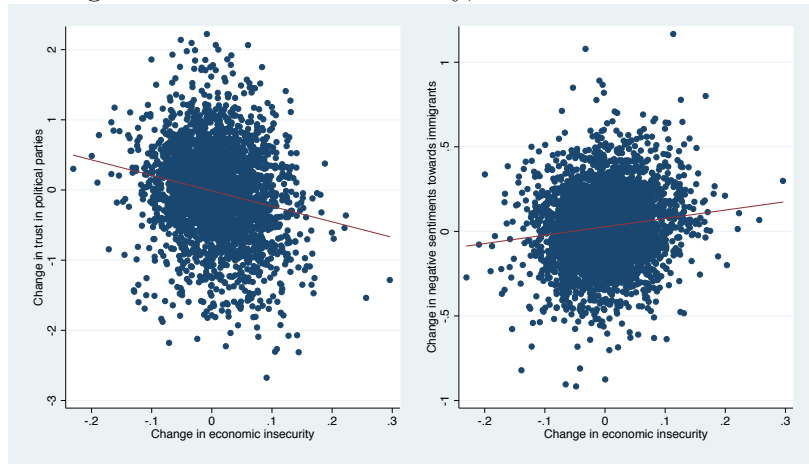
The figures show the evolution of economic activity, trust in political parties, electoral participation and consensus to populist parties in Italy, Greece, France, and Spain. Economic activity (measured by the index of industrial production), the share of the vote going to the populist parties and voter turnout are on the left scale; trust in political parties on the right scale.

Figure 2: Economic insecurity and populist demand



The figure shows Venn diagrams of the distribution of the population of voters between abstainers (A), populist voters (P) and non-populist voters (NP) before (left figure) and after (right figure) an increase in economic insecurity. It shows the case where economic insecurity leads to disappointment with traditional parties and thus to abstention by their supporters.

Figure 3: Economic insecurity, trust and sentiments



The figure shows scatterplots and linear regressions of the change in economic insecurity (x-axis) and the change in trust in political parties (y-axis, left figure) and hostility to immigrants (y-axis, right figure) in the synthetic cohorts panel.

Figure 4: The Rise of Populism

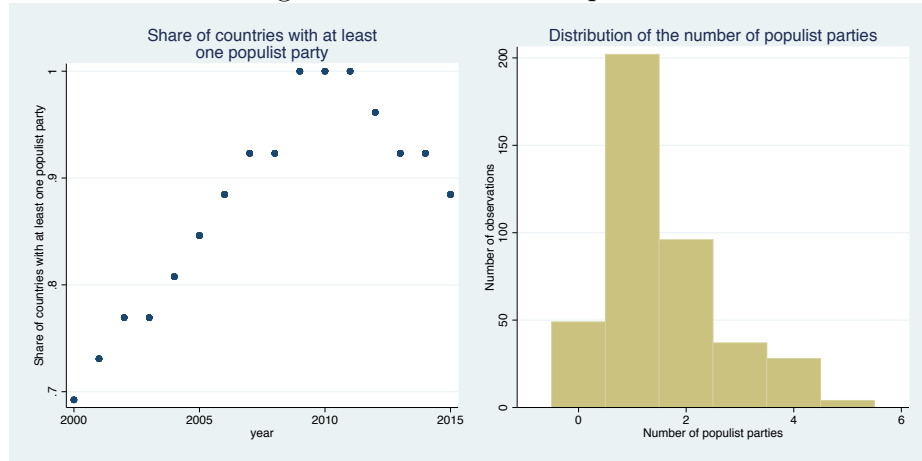


Figure 5: Left/right orientation

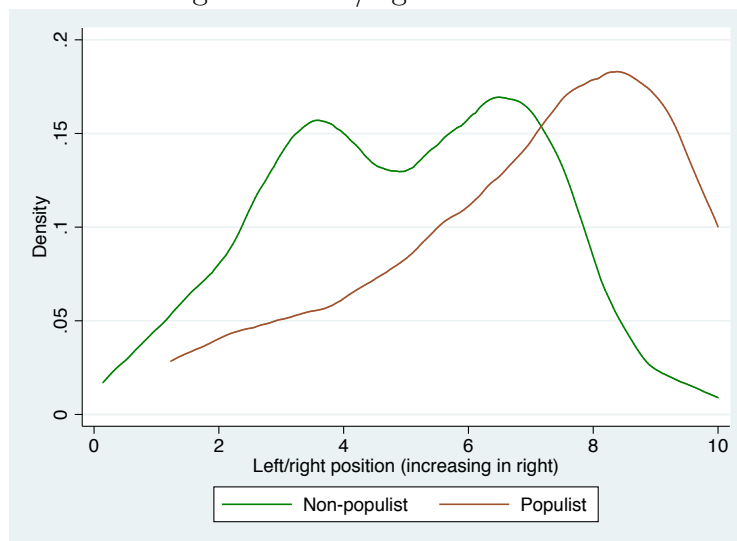
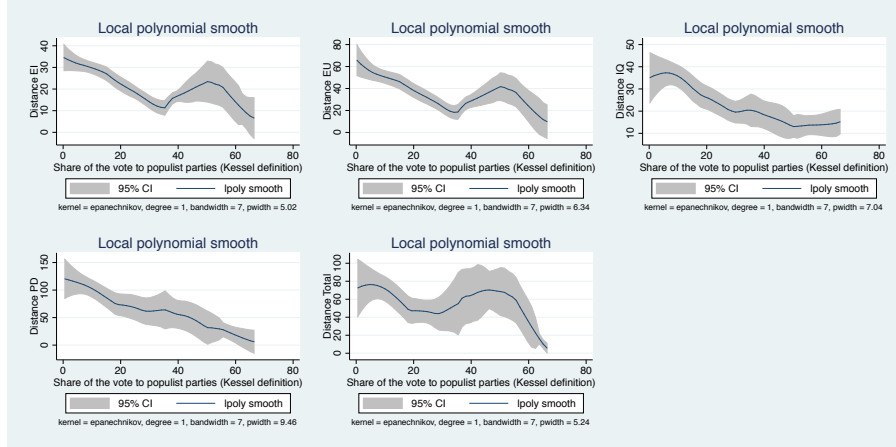


Figure 6: Distance from populist platform and share of vote to populist parties



The figures show the local polynomial smooth relation between measures of distance of non-populist from populist platforms and the share of the vote that went to populist parties in the last most recent election. The relation is shown for distance in the position on four issues (first four panels) and one aggregate measure (last panel).

Tables

Table 1: Descriptive statistics

Variable	Obs.	Mean	St. Dev.	Min	Max
A. Demand analysis					
Voted	199,095	0.78	0.41	0	1
Vote for populist party	136,243	0.07	0.26	0	1
Risk aversion	200,485	3.92	1.42	1	6
Age	210,590	48.93	17.82	18	100
Education	211,439	12.75	3.94	0	25
TV total	211,010	4.24	2.05	0	7
TV politics	203,296	2.01	1.32	0	7
Female	211,170	0.53	0.50	0	1
Right wing	188,090	5.13	2.16	0	10
Regional population (1000)	194,612	2,294	2,845	28	17,900
Unemployment	210,352	0.13	0.34	0	1
Income difficulties	206,503	0.96	0.87	0	3
Exposure to globalization	192,783	0.28	0.45	0	1
Economic insecurity (PC)	188,070	0.25	0.23	0	1
Trust in political parties	180,227	3.66	2.36	0	10
Want fewer non-EU immigrants	203,830	2.51	0.89	1	4
Daily total rain fall	200,685	3.03	5.05	0	35
Daily mean temperature	200,758	10.62	6.48	-7	25
Daily average sea level pressure	199,310	1,014	9.17	976	1,036
3D measure of populism	88,564	30.99	14.67	0	99
B. Pseudo-panel analysis					
Risk aversion	4,842	4.12	0.56	2	6
Age	4,899	54.92	16.60	22	88
Education	4,899	11.48	2.32	3	18
TV total	4,899	4.43	0.78	2	7
TV politics	4,899	2.15	0.51	1	7
Female	4,899	0.50	0.50	0	1
Right wing	4899	5.16	0.64	0	9
Regional population (1000)	4111	2270	2184	118	10800
Economic insecurity (PC)	4842	0.27	0.10	0	1
Trust in political parties	4283	3.42	1.12	0	7
Want fewer non-EU immigrants	4899	2.65	0.38	1	4
Trust politicians	4899	3.49	1.11	1	7
Trust national parliament	4898	4.34	1.25	1	8
Trust European parliament	4898	4.38	0.81	0	9
Satisfaction with government	4871	4.18	1.20	0	9
Want fewer immigrants different race/ethnicity from majority	4899	2.56	0.36	1	4
Want fewer immigrants same race/ethnicity from majority	4899	2.21	0.33	1	4
Immigrants make country worse	4899	5.24	0.88	2	9
C. Supply analysis					
Populist party	416	1.53	1.09	0	5
Economic insecurity (PC)	338	1.21	0.32	1	2
Import p.c.	368	10.69	7.09	1	40
Vote share opposition parties	325	41.41	13.74	0	74
Vote share non-aligned parties	307	0.39	2.08	0	15
D. Chapel Hill Expert Survey					
Distance European integration	706	23.01	22.54	0	91
Distance European policy	704	37.15	43.57	0	239
Distance ideological issues	706	27.35	38.20	0	184
Distance policy issues	501	79.36	106.26	0	510
Total distance	500	51.78	85.12	0	521
Gini coefficient (percentage points)	686	29.51	4.01	23	39
Immigrants from Muslim countries (percentage points)	557	1.61	1.35	0	5

The table shows summary statistics of the variables used to study demand (Panels A and B) and supply (Panel C and D) of populism. The construction of the single variables is discussed in the text and in Appendix A and B.

Table 2: 3D and Kessel

	(1) Rhetoric	(2) Protection	(3) Concealment	(4) Populist 3D
Populist party	2.651*** (0.210)	1.840*** (0.116)	1.247*** (0.0958)	34.54*** (1.848)
Left/Right control	YES	YES	YES	YES
Observations	742	609	828	609
Percentage of sample mean	59%	34%	24%	96%

The table shows OLS regressions of the each of the three indexes of parties of the 3D measure of populism (Anti-Elite Rhetoric, Protection, and Concealment of the long-term costs of short-term protection) as well as of the principal component of three measures - the Populist 3D measure - on the van Kessel dummy identifying populist parties. Each regression controls for the left/right orientation of the party. The last row shows the difference in the score of populist parties from the sample mean.

Table 3: Main specification - Heckman probit estimates of populist party vote and participation in voting

	(1) Heckprobit		(2) Heckprobit		(3) Heckprobit		(4) Heckprobit	
	Populist	Vote	Populist	Vote	Populist	Vote	Populist	Vote
Risk aversion	0.00313 (0.0120)	0.0228*** (0.00550)	0.00480 (0.0121)	0.0227*** (0.00550)	0.00455 (0.0128)	0.0245*** (0.00560)	0.00659 (0.0126)	0.0240*** (0.00563)
ln(Age)	-0.0985 (0.0670)	0.835*** (0.0274)	-0.0907 (0.0706)	0.831*** (0.0279)	-0.0555 (0.0878)	0.850*** (0.0293)	-0.121 (0.0792)	0.859*** (0.0296)
ln(Education)	-0.264*** (0.0593)	0.473*** (0.0304)	-0.305*** (0.0602)	0.471*** (0.0301)	-0.247*** (0.0661)	0.462*** (0.0315)	-0.249*** (0.0616)	0.456*** (0.0310)
TV total	0.00884 (0.00842)	-0.0277*** (0.00476)	0.00979 (0.00837)	-0.0276*** (0.00478)	0.0118 (0.00891)	-0.0269*** (0.00489)	0.00590 (0.00915)	-0.0258*** (0.00487)
TV politics	-0.00236 (0.0151)	0.0608*** (0.00633)	-0.00486 (0.0155)	0.0606*** (0.00638)	-0.00633 (0.0159)	0.0533*** (0.00703)	-0.00263 (0.0160)	0.0514*** (0.00699)
Unemployment	-0.0416 (0.0468)	-0.186*** (0.0198)						
Income difficulties	0.0767** (0.0305)	-0.148*** (0.0108)						
Explosure globalization	0.127*** (0.0412)	-0.101*** (0.0158)						
Economic insecurity (PC)			0.316*** (0.115)	-0.696*** (0.0331)	0.257** (0.121)	-0.659*** (0.0353)	0.279** (0.121)	-0.650*** (0.0353)
Trust in pol. parties					-0.0259** (0.0114)	0.0541*** (0.00410)	-0.0229** (0.0102)	0.0525*** (0.00411)
Fewer non-EU immigrants							0.116*** (0.0214)	-0.0292*** (0.00884)
Controls, Wave FE, Country FE	YES		YES		YES		YES	
Rho	-0.109		-0.161		-0.108		-0.210	
Cluster SE	Region		Region		Region		Region	
Countries	With P		With P		With P		With P	
Observations	136,634		136,634		126,569		124,458	
Censored observations	40,441		40,441		37,260		36,353	
<i>Selection</i>								
Rain		0.000315 (0.00186)		0.000341 (0.00185)		0.00295 (0.00223)		0.00153 (0.00188)
Rain * South		-0.0175** (0.00856)		-0.0174** (0.00864)		0.00439 (0.0134)		-0.0181** (0.00811)
Av. Temperature		-0.00490** (0.00216)		-0.00478** (0.00214)		-0.00442** (0.00222)		-0.00551** (0.00219)
Av. Temperature * South		0.0250 (0.0179)		0.0237 (0.0181)		0.0631** (0.0293)		0.0327* (0.0181)

The table shows Heckman probit estimates of the decisions to vote (Vote) and to vote for a populist party conditional on participation (Populist). Left-hand side variables: a dummy if a voter has chosen a populist party in the columns Populist and a dummy if (s)he has participated in the election in the column Vote. The excluded instrument in the populist regression is an indicator of weather condition on election day. All regressions include country and wave fixed effects. Robust standard errors clustered at the region level are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 4: Direct effects and effects via turnout

	Effect on conditional prob of 1SD increase in economic insecurity (ratio of sample mean)	Contribution via turnout
Economic insecurity (PC)	0.059	0.062
Trust in pol. parties	-0.050	-0.051
Fewer non-EU immigrants	0.129	0.011

The table shows the direct effect on voting for a populist party of a 1-standard-deviation increase in Economic insecurity, Trust in political parties and attitudes towards immigrants respectively (first column) and the contribution through the change induced in turnout. Calculations use estimates in Table 3, column 4.

Table 5: Main specification - Robustness

	(5) Heckprobit		(6) Heckprobit		(7) Heckprobit		(8) Heckprobit	
	Populist	Vote	Populist	Vote	Populist	Vote	Populist	Vote
Risk aversion	0.00375 (0.0130)	0.0240*** (0.00503)	0.00353 (0.0130)	0.0240*** (0.00503)	0.00705 (0.0133)	0.0235*** (0.00566)	0.00771 (0.0134)	0.0234*** (0.00565)
ln(Age)	-0.0733 (0.0794)	0.809*** (0.0281)	-0.0719 (0.0806)	0.809*** (0.0281)	-0.0557 (0.0762)	0.849*** (0.0292)	-0.0847 (0.0708)	0.844*** (0.0290)
ln(Education)	-0.257*** (0.0633)	0.457*** (0.0355)	-0.256*** (0.0640)	0.457*** (0.0355)	-0.260*** (0.0629)	0.467*** (0.0308)	-0.280*** (0.0597)	0.456*** (0.0308)
TV total	0.0126 (0.00900)	-0.0291*** (0.00437)	0.0115 (0.00900)	-0.0291*** (0.00437)	0.00593 (0.00923)	-0.0269*** (0.00486)	0.0104 (0.00931)	-0.0259*** (0.00491)
TV politics	-0.00777 (0.0158)	0.0567*** (0.00630)	-0.00745 (0.0159)	0.0567*** (0.00630)	0.00680 (0.0167)	0.0529*** (0.00688)	-0.00573 (0.0162)	0.0530*** (0.00700)
Economic insecurity (PC)	0.280** (0.125)	-0.684*** (0.0361)	0.287** (0.125)	-0.684*** (0.0361)	0.291** (0.123)	-0.654*** (0.0355)	0.312*** (0.118)	-0.657*** (0.0351)
Trust in pol. parties	-0.0272** (0.0111)	0.0543*** (0.00366)	-0.0266** (0.0111)	0.0543*** (0.00366)	-0.0215** (0.0107)	0.0536*** (0.00411)	-0.0249** (0.0103)	0.0550*** (0.00411)
Euro area				0.420*** (0.0788)				
Controls	YES		YES		YES		YES	
Wave FE	YES		YES		NO		YES	
Country FE	YES		YES		NO		YES	
Wave * Country FE	NO		NO		YES		NO	
Rho	-0.154		-0.152		-0.102		-0.164	
Cluster SE	Region		Region		Region		Region	
Countries	All		All		With P		With P	
Observations	152,001		152,001		127,095		126,240	
Censored observations	46,643		46,643		37,424		37,424	

The table shows robustness Heckman probit estimates of the decisions to vote and to vote for a populist party. Left-hand side variables: a dummy if a voter has chosen a populist party in the columns "Populist" and a dummy if (s)he has participated in the election in the column "Vote". The excluded instrument in the populist regression is an indicator of weather conditions on election day. The first set of regressions includes all countries, not only those with a populist party; the second uses the all countries but adds a Euro-area dummy; the third set controls for interacted country-wave fixed effects; the last set runs the regressions dropping observations of individuals who voted for a new party. All regressions include country and wave fixed effects. Robust standard errors clustered at the region level are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 6: 3D definition of populism

	(9) Heckman		(10) Heckprobit		(11) Heckprobit		(12) Heckprobit	
	Populist 3D (0-100)	Vote	Populist 3D d.v. (>75p)	Vote	Populist 3D d.v. (>75p)	Vote	Populist 3D d.v. (>80p)	Vote
Risk aversion	0.0530 (0.0608)	0.0299*** (0.00582)	-0.00368 (0.00992)	0.0300*** (0.00582)	-0.00369 (0.0100)	0.0308*** (0.00586)	-0.0174* (0.00993)	0.0307*** (0.00585)
ln(Age)	0.213 (0.272)	0.736*** (0.0334)	-0.135** (0.0641)	0.737*** (0.0334)	-0.149** (0.0645)	0.749*** (0.0343)	-0.122** (0.0583)	0.749*** (0.0343)
ln(Education)	-1.177*** (0.280)	0.334*** (0.0292)	-0.125*** (0.0423)	0.333*** (0.0290)	-0.105** (0.0438)	0.319*** (0.0288)	-0.0253 (0.0457)	0.320*** (0.0288)
TV total	0.0508 (0.0535)	-0.0247*** (0.00458)	0.00657 (0.00949)	-0.0248*** (0.00458)	0.00599 (0.00959)	-0.0237*** (0.00457)	0.0145 (0.00971)	-0.0237*** (0.00456)
TV politics	0.0412 (0.0579)	0.0482*** (0.00632)	-0.0117 (0.0107)	0.0482*** (0.00630)	-0.0109 (0.0108)	0.0467*** (0.00628)	0.00275 (0.0101)	0.0468*** (0.00629)
Economic insecurity (PC)	1.396*** (0.480)	-0.516*** (0.0460)	0.350*** (0.0645)	-0.516*** (0.0459)	0.344*** (0.0669)	-0.507*** (0.0459)	0.215*** (0.0711)	-0.507*** (0.0459)
Trust in pol. parties	-0.000905 (0.0440)	0.0592*** (0.00515)	-0.0197** (0.00819)	0.0592*** (0.00516)	-0.0180** (0.00828)	0.0563*** (0.00502)	-0.0164* (0.00858)	0.0564*** (0.00501)
Fewer non-EU immigrants					0.0381** (0.0162)	-0.0444*** (0.00988)	0.0390*** (0.0149)	-0.0443*** (0.00988)
Controls, Wave FE, Country FE	YES		YES		YES		YES	
Rho	-0.0426		-0.0426		-0.425		-0.314	
Cluster SE	Region		Region		Region		Region	
Countries	With P		With P		With P		With P	
Observations	127,095		127,095		124,458		124,458	
Censored observations	69,947		69,947		68,326		68,326	

The table shows robustness Heckman probit estimates of the decisions to vote and to vote for a populist party when the latter is defined using the 3D definition. The first two columns use the continuous measure of the 3D definition of populism. The second set defines as populist all parties with a 3D score above the 75th percentile; the third set uses this definition but expands the set of controls; the last set uses a tighter threshold to define a party as populist (3D score $\geq$ 80 percentile). All regressions include country and wave fixed effects. Robust standard errors clustered at the region level are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 7: Pseudo Panel

	(1) Trust parties	(2) Fewer non-EU immigrants	(3) Trust politicians	(4) Trust national parliament	(5) Trust European parliament	(6) Satisfaction with government	(7) Fewer immigrants of different race/ethnicity	(8) Fewer immigrants of same race/ethnicity	(9) Immigrants make worse
Risk aversion	-0.104*** (0.0400)	0.00856 (0.0143)	-0.0422 (0.0345)	-0.0144 (0.0407)	-0.133*** (0.0438)	-0.0378 (0.0399)	-0.00171 (0.0157)	-0.00822 (0.0156)	0.0575 (0.0357)
ln(Age)	-0.126 (0.312)	-0.105 (0.108)	0.0438 (0.246)	-0.240 (0.295)	-0.728** (0.309)	-0.588* (0.316)	0.256** (0.109)	0.321*** (0.108)	-0.0593 (0.272)
ln(Education)	0.321* (0.171)	-0.257*** (0.0616)	0.513*** (0.179)	0.592*** (0.217)	0.259 (0.277)	0.515** (0.259)	-0.326*** (0.0631)	-0.353*** (0.0724)	-0.998*** (0.162)
TV total	-0.0376 (0.0290)	0.0114 (0.0108)	-0.0215 (0.0272)	-0.0629* (0.0330)	-0.0590* (0.0355)	-0.00865 (0.0303)	0.00762 (0.0108)	0.0154 (0.0108)	0.0584** (0.0288)
TV politics	0.0832* (0.0479)	-0.00766 (0.0167)	0.0295 (0.0392)	0.0865* (0.0490)	-0.0292 (0.0569)	-0.0182 (0.0491)	0.00905 (0.0167)	-0.0192 (0.0193)	-0.0703 (0.0448)
Economic insecurity (PC)	-0.828*** (0.231)	0.310*** (0.0847)	-0.976*** (0.212)	-0.956*** (0.228)	-1.000*** (0.254)	-1.209*** (0.253)	0.286*** (0.0848)	0.281*** (0.0891)	0.446*** (0.219)
Controls	YES	YES	YES	YES	YES	YES	YES	YES	YES
Cohort FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Number of cohorts	784	784	784	784	784	784	784	784	784
Wave*Country FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Countries	All	All	All	All	All	All	All	All	All
Observations	3,438	3,774	3,774	3,774	3,774	3,746	3,774	3,774	3,774

The table shows pseudo-panel fixed effect regressions of trust and attitudes towards immigrants on economic insecurity and controls. All regressions include country and wave fixed effects. Robust standard errors are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 8: Effect of economic insecurity

Effect of (1 SD) economic insecurity (share of sample mean)	Direct effect	Indirect effect: trust	Indirect effect: hostility towards immigrants	Total effect
Voting populist (% of total effect)	0.060 81%	0.004 6%	0.010 13%	0.074 100%
Turnout (% of total effect)	-0.061 92%	-0.004 6%	-0.001 2%	-0.066 100%

The table reports the effect of a 1-standard-deviation increase in economic insecurity on voting for a populist party and on voter turnout. It shows the direct effect, the indirect effect through the impact of economic insecurity on trust in political parties and attitudes towards immigrants, and the total effect - the sum of the direct and indirect effects.

Table 9: Explaining the Rise of Populist Parties

	Populist parties	Populist parties
Economic insecurity (PC)	2.219* (1.216)	2.663** (1.352)
Import p.c.	0.0298*** (0.0082)	0.0359*** (0.0100)
Vote share opposition parties	-0.0146** (0.00585)	
Vote share non-aligned parties		-0.0368*** (0.0143)
Controls	YES	YES
Year FE	YES	YES
Observations	262	251

The table shows regression results for the number of populist parties in a country as a function of measures of voters' insecurity and countries' institutional characteristics. The left hand side is the number of populist parties in a country in a given year. Voters' characteristics are those in the most recent ESS survey. All regressions include year fixed effects. Robust standard errors are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 10: Comparison left/right oriented

Variable	Left-oriented					Right-oriented				
	Obs.	Mean	St. Dev.	Min	Max	Obs.	Mean	St. Dev.	Min	Max
Share of people of [left/right] orientation	573	0.58	0.07	0.44	0.74	573	0.71	0.07	0.59	0.85
Share of people of [left/right] orientation * [left/right] turnout	573	0.27	0.08	0.14	0.46	573	0.39	0.08	0.24	0.61
Education	573	2.50	0.07	2.20	2.64	573	2.48	0.07	2.14	2.60
Economic insecurity	565	0.27	0.08	0.14	0.50	565	0.27	0.08	0.13	0.52
Fewer non-EU immigrants	573	2.48	0.31	1.69	3.30	573	2.62	0.29	1.85	3.36
Trust parties	451	3.38	1.01	1.52	5.43	451	3.45	1.07	1.35	5.70

The table reports summary statistics of characteristics of left-oriented and right oriented voters in our sample.

Table 11: Populist parties' orientation choice

	Left/right orientation (increasing in right)
Share of left oriented * Left-salient factor	-0.564* (0.319)
Share of right oriented * Right-salient factor	2.410*** (0.550)
Observation	46

The table reports regressions of the orientation of the populist parties in our sample on measures of relative entry space. The measure of party orientation is defined on a scale from 1 (extreme left) to 10 (extreme right). Standard errors clustered at the country level, are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 12: Distance from populist platform and populist share of the vote

Dependent variable	Coefficient	Std. Err.	Year FE	Obs.	R2
(1) P_EI	-0.430***	(0.1206)	YES	397	0.907
(2) P_EU	-0.165	(0.2168)	YES	396	0.895
(3) P_IQ	-0.380**	(0.1865)	YES	397	0.913
(4) P_PD	-1.255*	(0.7067)	YES	286	0.927
(5) P_total	-0.432	(0.7410)	YES	286	0.914

The table shows the regression of the distance between the positions of non-populist and populist party on four separate issues and the share of the vote that went to the populist parties in the last past election. The last row shows the regression results for an overall measure of distance. All regressions include year fixed effects. Robust standard errors are shown in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table 13: Who moves

Dependent variable	Coefficient	Std. Err.	Year FE	Obs.	R2
(1) P_EI	0.083*	(0.0415)	YES	70	0.871
(2) P_EU	0.072	(0.1151)	YES	70	0.889
(3) P_IQ	0.108	(0.0927)	YES	70	0.904
(4) P_PD	0.343	(0.3521)	YES	56	0.945
(5) P_total	0.559	(0.4869)	YES	56	0.927

The table shows results of regressions testing for the presence of effects of populist rhetoric on several measures of trust in politics and institutions and attitudes towards immigrants using the synthetic cohort panel data. Robust standard errors in parenthesis. *** significant 1% or less; ** significant at 5%; * significant at 10% confidence level.

Table A1: Comparison Kessel (K) and Norris & Inglehart (N&I)

Country	Party	Kessel	N&I
AT	FPO	1	1
AT	Alliance for the Future of Austria	1	0
AT	Team Stronach	1	0
BE	Vlaams Blok	1	1
BE	FRONT NATIONAL	1	0
BE	List Dedecker	1	0
BG	NDSV	1	0
BG	Coalition Ataka	1	1
BG	Law, Order and Justice (Red, Zakonnost, Spravedlivost)	1	0
BG	Citizens for European Development of Bulgaria (GERB)	1	0
BG	VMRO-BND Bulgarian National Movement	0	1
BG	NFSB National Front for the Salvation of Bulgaria	0	1
BG	HSS Croatian Peasants Party	0	1
CH	Swiss People's Party	1	1
CH	Swiss Democrats	1	0
CH	Lega dei Ticinesi	1	0
CH	Geneva Citizen's Movement	1	0
CZ	ANO	1	0
CZ	Public Affairs (Veci Verejne)	1	0
CZ	Usvit	1	1
DE	Die Linke (The Left)	1	0
DE	NPD National Democratic Party	0	1
DE	AfD Alternative for Germany	0	1
DK	Dansk Folkeparti	1	1
ES	Podemos	-	1
FI	True Finns	1	1
FR	FN (Front National)	1	1
FR	MPF Popular Republican Movement	0	1
GB	British National Party	1	1
GB	UK Independence Party	1	0
GB	NF National Front	0	1
GR	SYRIZA	1	1
GR	ANEL	1	1
GR	XA Golden Dawn	0	1
GR	LAOS Popular Orthodox Rally	0	1
GR	ND New Democracy	0	1
HR	HSP-AS	1	1
HR	HSS Croatian Peasants Party	0	1
HR	HDSSB Croatian Democratic Alliance of Slavonia and Baranja	0	1
HR	HSP Croatian Party of Rights	0	1
HR	HDZ Croatian Democratic Union	0	1

The table compares the classification of populist parties according to van Kessel with that in Inglehart and Norris. The sign "-" indicates that the country is not covered.

Country	Party	Kessel	N&I
HU	FYD-HDF Fed.of Young Democrats&Hungarian Dem.Forum	1	1
HU	Justice and Life Party (MIEP)	1	0
HU	Movement for a Better Hungary	1	1
HU	FIDESZ-MPSZ	1	1
IE	Sinn Fein	1	-
IS	Citizen's Movement (BF)	1	-
IT	Forza Italia	1	0
IT	Lega Nord	1	1
IT	Movimento Cinque Stelle	1	1
IT	Il Popolo della Libertà (PdL)	1	0
IT	Fdl Brothers of Italy	0	1
LT	Labour Party (DP)	1	0
LT	Party "Order and Justice" (TT)	1	0
LT	DK The Way of Courage	0	1
LU	Alternative Democratic Reform Party	1	1
LV	For Fatherland and Freedom/ LNNK	1	0
LV	All for Latvia	1	0
LV	NA National Alliance	0	1
NL	List Pim Fortuyn	1	0
NL	Liveable Netherlands	1	0
NL	Geert Wilders' Freedom Party (PVV)	1	1
NL	SGP Political Reformed Party	0	1
NO	Progress Party (FrP)	1	1
NO	Democrats	1	0
PL	Samoobrona Rzeczypospolitej Polskiej	1	0
PL	Prawo i Sprawiedliwosc	1	1
PL	SP United Poland	0	1
PL	KNP Congress of the New Right	0	1
RO	Greater Romania Party	1	0
RO	People's Party	1	1
SE	Sweden Democrats	1	1
SI	Slovene National Party (SNS)	1	0
SI	SDS Slovenian Democratic Party	0	1
SI	SDS Slovenian Democratic Party	0	1
SK	HZDS Movement for a Democratic Slovakia	1	0
SK	SMER	1	0
SK	KDH Christian Democratic Movement	1	1
SK	Slovak National Party (SNS)	1	1
SK	Ordinary People and Independent Personalities (OLaNO)	1	0
TR	MHP National Action Party	-	1

The table compares the classification of populist parties according to van Kessel with that in Inglehart and Norris. The sign "-" indicates that the country is not covered.

Table A2: Chapel Hill Expert Survey

Issue	Scale	Availability	N. waves asked
General question			
1. European Integration	1 (SO) -7 (SF)	1999-2014	5
EU Policy			
1. Powers of European Parliament	1 (SO) -7 (SF)	1999-2014	5
2. Tax Harmonization	1 (SO) -7 (SF)	1999	1
3. Internal Market	1 (SO) -7 (SF)	2002-2014	4
4. Common Employment Policy	1 (SO) -7 (SF)	1999, 2014	2
5. EU authority over member state budgets	1 (SO) -7 (SF)	2014	1
6. EU agriculture spending	1 (SO) -7 (SF)	2002	1
7. EU cohesion on region al policy	1 (SO) -7 (SF)	1999-2014	5
8. Common policy on environment	1 (SO) -7 (SF)	1999, 2002	2
9. Common policy on political asylum	1 (SO) -7 (SF)	1999, 2002	2
10. EU foreign and security policy	1 (SO) -7 (SF)	1999-2014	5
11. EU enlargement to Turkey	1 (SO) -7 (SF)	2006, 2010, 2014	3
Ideological position			
1. Overall stance	0 (Left)-10(Right)	1999-2014	5
2. Stance on economic issues	0 (Left)-10(Right)	1999-2014	5
3. Stance on democratic freedoms	0 (Libertarian)-10(Traditional)	1999-2014	5
Policy issues			
1. Increase gov exp/reduce taxes	0(Favor gov exp)-10(Favor reduc taxes)	2006-2014	3
2. Deregulation	0(Oppose der)-10(Favor Der)	2006-2014	3
3. Redistribution of wealth	0(Favor)-10(Oppose)	2006-2014	3
4. State intervention in economy	0(Favor)-10(Oppose)	2014	1
5. Civil liberties vs law&order	0(Promote liberties)-10(Support L&O)	2006-2014	3
6. Social lifestyle	0(Support liberal pol)-10(Oppose lib pol)	2006-2014	3
7. Role of religion in politics	0(Oppose)-10(Support)	2006-2014	3
8. Immigration policy	0(Oppose tough policy)-10(Support tough pol)	2006-2014	3
9. Integration of immigrants	0(Favor multicul. policy)-10(Support multicul pol)	2006-2014	3
10. Urban versus rural interest	0(Support urban)-10(Support rural)	2006-2014	3
11. Environment	0(Support environment)-10(Support growth)	2010, 2014	2
12. Cosmopolitanism	0(Support cosm.)-10(Support nationalism)	2006	1
13. Regional decentralization	0(Support political decentr.)-10(Oppose decentr.)	2006-2014	3
14. International security and peace keeping	0(Support int. sec)-10(Oppose int. sec.)	20,102,014	2
15. Position towards US power in world affairs	0(Oppose)-10(Support)	2006	1
16. Rights to ethnic minorities	0(Support more rights)-10(Oppose)	2006-2014	3

The table lists the CHES questions that we use to define the average positions of the political parties on each of the four domains we consider (European integration, EU policy, Ideological positions; Policy issues). It shows the years in which these items are covered by CHES and the range over which the party position is defined.

Table A3: First stage Robustness

	(5) Vote	(6) Vote	(7) Vote	(8) Vote
Rain	0.00452** (0.00205)	-0.00129 (0.00294)	0.00146 (0.00188)	0.00452** (0.00206)
Rain * South	-0.0172** (0.00701)	-0.0149* (0.00871)	-0.0173** (0.00834)	-0.0172** (0.00701)
Av. Temperature	-0.00285 (0.00257)	-0.00360 (0.00649)	-0.00517** (0.00216)	-0.00287 (0.00256)
Av. Temperature * South	0.00607 (0.0102)	0.0266 (0.0193)	0.0283 (0.0181)	0.00606 (0.0102)
Pressure	0.00219* (0.00122)	0.0021* (0.00121)		
Pressure * South	-0.00121 (0.00478)	-0.0012 (0.00478)		
Wave FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Wave * Country FE	NO	NO	NO	NO
Cluster SE	Region	Region	Region	Region
Countries	All	All	With P	With P (no new P)

The table shows the instruments in the voter turnout regressions in Table 5 in the text.

Table A4: First stage on 3D

	(9) Vote	(10) Vote	(11) Vote	(12) Vote
Rain	-9.42e-05 (0.00263)	4.30e-05 (0.00276)	-5.48e-05 (0.00282)	-0.000108 (0.00275)
Rain * South	0.00313 (0.00956)	0.00302 (0.00958)	0.00213 (0.00936)	0.00218 (0.00934)
Av. Temperature	-0.0132*** (0.00292)	-0.0146*** (0.00297)	-0.0152*** (0.00304)	-0.0142*** (0.00299)
Av. Temperature * South	0.0463 (0.0308)	0.0476 (0.0308)	0.0481 (0.0305)	0.0472 (0.0305)
Wave FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Cluster SE	Region	Region	Region	Region
Countries	With P	With P	With P	With P

The table shows the instruments in the voter turnout regressions in Table 6 in the text.

Globalisation and Conflicts: the Good, the Bad, and the Ugly of Corporations in Africa

Tommaso Sonno

Université catholique de Louvain, LSE, and F.R.S.-FNRS

Abstract: Using georeferenced data on the affiliates and headquarters of multinational enterprises together with georeferenced conflict data, this work is the first to establish a causal link between the activities of multinational enterprises and violence. The results indicate that activities which increase local human capital decrease the probability of civil conflict, while the activity of exploitative sectors, in particular agriculture and forestry, increases conflict. The increase in the likelihood of conflict is amplified in areas with politically unrepresented ethnic groups, and/or groups targeted for large-scale land acquisition.

Keywords: Conflict, FDI, trade, ethnic groups

JEL Codes: D74, Q34

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1 Introduction

This paper investigates the impact of multinational enterprises (MNE) on civil conflict. While this is a key determinant of underdevelopment, the role of multinationals in triggering conflicts has received surprisingly limited attention in the literature. I tackle this question by merging geolocalized information on conflict events with novel data on MNE affiliates and their headquarters for all African countries from 2007 to 2015. MNE activity is found to have significant and heterogeneous effects on the probability of conflict. In particular, activities that increase local human capital (e.g. in education and health) significantly decrease conflict probability, while affiliates in exploitative sectors (e.g. those intensive in scarce resources, such as agriculture and forestry) have the opposite effect. The increase in conflict caused by the activities of multinationals in exploitative sectors appears to be amplified where there are politically unrepresented ethnic groups and/or groups targeted for large-scale land acquisition.

The empirical analysis involves an original ad hoc dataset, that combines the Bureau van Dijks *Orbis Historical Ownership Dataset* on the worldwide location and activities of both MNE affiliates and their headquarters with the *Armed Conflict Location Events Data (ACLED)* on the location and type of conflict events and the actors involved. The units of analysis are cells of 0.5×0.5 degree latitude and longitude (approx. $55\text{km} \times 55\text{km}$ at the equator) covering the entire African continent. The use of georeferenced information, together with an instrumental variables strategy, country $\times$ year fixed effects, and cell fixed-effects, permits causal identification. The unique dataset on multinationals overcomes measurement and endogeneity problems, and makes it possible to instrument MNE activities in a specific cell-year with several measures of the headquarters worldwide performance over time.

To illustrate the magnitude of the phenomenon investigated, an emblematic case is agriculture and forestry sectors in Mozambique. The country gained its independence from Portugal in 1975, after centuries of resistance, establishing the ideal of “la liberté de l’homme et de la terre” (freedom of man and land). Yet in April 2011, in the Nacala Corridor, in the north, Mozambique signed an ambitious and highly controversial trilateral cooperation programme, the ProSavana project, to promote “sustainable and inclusive agricultural development” together with Japan and Brazil. The project involved well-known multinational agribusiness enterprises, including the Portuguese Espirito Santo Group. The program targets 19 districts in three provinces, covering a total of 10.7 million hectares, of which 930,000 are cultivated annually by 692,000 rural families (MASA, 2015).¹ Case studies have accused this project, like many others, of violating local people’s rights (e.g. expropriation of villages, threats to food security, intensive use of water depriving people in the surrounding areas) with little if any compensation, and often producing conflict situations (Arslan et al., 2011; von Braun and Meinzen-Dick, 2011; Meinzen-Dick and Markelova, 2009; Oakland Institute, 2013; Thaler, 2013).

The first part of this paper documents the correlations between MNE activities and conflict. A first finding is that only some specific types of MNE affiliate activity are correlated with the probability of conflict. This is demonstrated by exploiting variations in MNE presence over time at the cell level. The use of cell fixed effects allows identification of a significant role of multinationals

¹The population of the target area was estimated at 4.3 million in 2011, most of them in rural areas and depending on agriculture for their subsistence. More specifically, the average rural household in the region has 5 members, so close to 3.5 million people in the area (more than 80% of total) live in the countryside and are engaged in agriculture. Note that small-holder farming is practised by 99% of all rural households in the region, the typical farm averaging 1.34 hectares in size (MASA, 2015).

in the risk of conflict if and only if there is sufficient entry/exit of affiliates *within* the same cell over time. In other words, I detect within-cell variations in the number of MNE affiliates. For this reason, some of the sectors the literature has pinpointed as strongly correlated with conflict, such as the resource sector, are endogenously excluded because they do not display such variation.

The second part of the paper argues for the causal nature of the correlations found using an instrumental variable approach. Relying on the internal capital market literature, and exploiting the headquarter-affiliate credit link (Boutin et al., 2013), I instrument MNE activities at the local level using historical financial data at headquarters level and credit availability. More specifically, I interact pre-period headquarters dependence on external credit with credit availability in the headquarters' home countries, in order to obtain an exogenous variation of MNE activities over time. The intuition is straightforward: some affiliates, in any given cell-year, are part of a relatively healthy and robust multinational, not dependent on external credit, while others had weaker parent corporations. The latter are expected to be hit significantly harder by the 2008-2009 credit crisis, and therefore to reduce their activities substantially more sharply.

In the third part of the paper I provide evidence of the main mechanisms underlying the results. First, the impact of MNE activities in the exploitative sectors in the likelihood of conflict is shown to be amplified in areas characterized by the presence of powerless ethnic groups, i.e. groups not represented in the local government. Merging data on the *Geo-Referencing of Ethnic Groups (GREG)*, together with data on all politically relevant ethnic groups and their access to power, *Ethnic Power Relations (EPR)*, one finds that MNE activities play an especially important role in the probability of civil conflict in areas where the leading ethnic group(s) can place the burden of land deals on unrepresented groups. Second,

I show how MNE activities in the agriculture and forestry sectors increase conflict probability particularly in locations of large-scale land acquisitions (land grabs). Data from *LandMatrix*, which registers land deals bigger than 200 hectares in developing countries, are used to show that the deals are not harmful everywhere, but only where exploitative multinationals are active.

This paper makes three main empirical contributions: first, this is the first systematic study of the impact of multinational enterprises on civil conflict. Second, to my knowledge, it this is the first paper that instruments MNE activities using the headquarter-affiliate ownership link. Third, it presents an original dataset mapping the worldwide population of MNE affiliates and headquarters in a panel framework. Moreover, it also provides a potentially generalizable rationalization for the different effects in different sectors, with a clear link with the literature on ethnic conflict.

The paper is organized as follows: section 2 discusses the existing evidence and the conceptual framework. Section 3 describes the data. Section 4 presents the empirical analysis. In section 5 the main mechanisms are examined. Section 6 concludes.

2 Existing evidence and conceptual framework

2.1 Evidence

In the last decade the literature has debated the complex link between trade and conflict. Examining both international and domestic conflicts, a first cluster of papers use country-level aggregate trade data (imports plus exports) as the measure of trade.²

²Two opposing views of international conflict have characterized the debate: the “liberal” view, in which economic ties are seen as opportunity costs of conflict (Oneal and Russett, 1997, 1999, 2001), and the “realist view”, according

However, global value chains now represent the main mechanism of international trade, in which multinationals are the main players. Despite this predominant role, significantly less attention has been paid to the relation between foreign direct investment (FDI) and conflict. [Polachek et al. \(2012\)](#) develop and empirically test a two-country, one-period model, with homogeneous multinationals, showing that FDI can improve international relations. This result is confirmed empirically by [Bussmann \(2010\)](#).³ [Morelli and Sonno \(2017\)](#) show how country-level asymmetries in foreign value added,⁴ a proxy for global value chains, can be relevant in conflict analysis.

Recent works use disaggregated data to study the determinants of intra-state conflicts. These works seek to avoid country-level aggregation so as to overcome the attenuation bias implicit in loss of within-country variations. [Dube and Vargas \(2013\)](#) exploit exogenous price shocks in international commodity markets to assess how different income shocks affect conflict, finding that a sharp fall in coffee prices lowers wages and increases violence more sharply in municipalities where more coffee is cultivated. On the other hand, a rise in oil prices increases both municipal revenue and violence differentially in the oil regions. Two works study the role of multinationals in violence, one on conflict and one on protest, but both on the mining sector alone. [Berman et al. \(2017\)](#) analyse the impact of mining on conflict. Among their results, they also provide preliminary evidence that in the mining sector a larger presence of foreign firms (with headquarters not located in the former colonial power) amplifies the impact that mineral price shocks have on con-

to which trade dependence implies future insecurity, increasing the incentive to avoid dependence by force ([Barbieri, 1996, 2002](#)). [Martin et al. \(2008b\)](#) analyse the impact of international trade on conflict probability at country level, and then at the intra-state level, [Martin et al. \(2008a\)](#).

³FDI sales are used in these works as a proxy of MNE activities, owing to the lack of data on the actual location of MNE affiliates.

⁴Foreign value added indicates how much one country's exports depends on other countries' inputs.

flicts, while they find no statistically significant effect for domestic firms. My own empirical analysis essentially fits this framework. Christensen (mimeo) finds that the probability of protest is twice as great in the case of foreign mining investment. The intuition is that in a setting of asymmetrical information, when communities' expectations exceed what mining companies can pay, protests result.

To the best of my knowledge, the literature offers no systematic analysis studying the impact of MNE activity (in all sectors) on conflict. This paper has the additional advantage of overcoming one of the main limitations of the proximity-concentration trade-off literature⁵ by using actual MNE affiliate activity rather than FDI shares (used as a proxy in the past owing to the lack of a database of physical presence of affiliates).

3 Conceptual framework

A simple framework describing the individual decision to engage in conflict can help formalising the possible mechanisms at work. I adapt Becker (1968) to individual choices between employment in either a productive sector or a violent sector, depending on whether wages exceed the return to violent activity. This framework can be applied to the civil war context if conflict is conceptualized as a tool for violently siphoning resources from the economy (civil war arises from theft, as in Grossman, 1999). The utility in case of conflict is equal to:

$$U_C = pr - (1 - p)c - m$$

where p is the probability of winning the conflict; r is the appropriate rent; c is the absolute value of the cost of losing the conflict;

⁵This strand of work focuses on the implications of the firm's choice between foreign direct investment (FDI) sales and arm's-length trade in deterministic models. See Markusen (1984), Brainard (1997), Helpman et al. (2004).

m is the absolute value of the cost of conflict. On the other hand, the utility of working activity is equal to:

$$U_W = \alpha_l l + \alpha_\omega \omega$$

where l is the income from land; ω is the income from non-agriculture activity (i.e. a proxy of education and/or human capital); α_l and α_ω are parameters in $[0, 1]$ reflecting how much the individual (i.e. the relevant ethnic group) is represented in the government.⁶ Therefore, conflict occurs if and only if:

$$U_C \geq U_W$$

Without losing generality, we can assume U_C to be equal for all individuals in the same area,⁷ and hence can be controlled by cell fixed effect. In general, the following hypothesis arise:

Hypothesis 1: MNE activity in sectors that reduce land income (l) increases the probability of conflict; activities that increase the income from non-agricultural activity (ω) decrease the probability of conflict.

Hypothesis 2: The less individuals are politically represented in the government, α_i with $i = \{l, \omega\}$, the higher the probability of conflict.

⁶For example, in the case of land expropriation, you can think of α_l as $\alpha_l = 1 - e + k$, where e is the fraction expropriated by the government and $k \leq e$ is the government compensation. More generally, you can think of informal taxes (τ), e.g. $\alpha_\omega = 1 - \tau$.

⁷For example, p can indicate the pushback of the government, c the legal/physical strictness rebels are subjected to by local authorities; m the cost of buying weapons to trigger conflict; r the appropriable rent from the area and from gaining power. Allowing r to depend on either $(l, \omega, \alpha_l, \alpha_\omega)$, leaves the results qualitatively unchanged.

3.1 Channels

The simple framework just described relies on several simplifying assumptions. This section presents the mechanisms in greater details, relating them to the literature. For more realistic intuitions concerning the mechanisms, we need a deeper analysis of the link between income and conflict. We know that this relationship is theoretically ambiguous. On the one hand, a rise in income may reduce conflict by increasing wages and reducing the supply of manpower to crime or conflict (Becker, 1968; Grossman, 1991). In this account, wages are the *opportunity cost* (OC) of fighting.⁸ On the other hand, more income increases the amount of resources that may be expropriated (Hirshleifer, 1991; Grossman, 1999). So, a rise in income could increase conflict probability by accentuating *rapacity* (R) for these resources.

To translate these well established channels into the terms used in this paper, think of each MNE sector as a point in a graph where the vertical axis measures the exploitative nature (EX) of multinationals (e.g. whether they rely on a fixed stock of non-tradeable resources) and the horizontal axis indicates the extent to which the sector enhances locals human capital ($H.C.$), producing positive spillovers.⁹ The sectors in the lower-right of Figure 1 (high $H.C.$ and low EX) are sectors where multinationals create positive spillovers, such as technology transfers, higher labour standards, or more education. These effects raise the value of the outside option for the local population with respect to criminal activities

⁸See Collier and Hoeffler, (1998, 2004), Fearon and Laitin (2003), Miguel et al. (2004), or Sambanis (2002), for a comprehensive review of this literature.

⁹This division can be related to that of Acemoglu and Robinson (2012) (following Diamond and Renfrew, 1997, and McNeil, 1963), where political institutions are described as *extractive* (where a small group of individuals exploit the rest of the population), and *inclusive* (where many people are in the process of governing).

(OC), thus decreasing the probability of conflict.¹⁰ These sectors may also generate growth, and hence a bigger pie, so there may be a greater incentive to trigger conflict (R). One could also argue that multinationals pay higher wages, on average, increasing local workers income (Dhingra and Thenreyro, mimeo).¹¹ Given the OC effect, we should observe a reduction in conflict. Therefore, the impact of human-capital-enhancing sectors on conflict is ambiguous: it depends on the balance between the three effects. On the other hand, sectors on the top-left (high EX and low $H.C.$) impose intensive use of scarce capital. Multinationals can either buy these resources on the market, pushing up prices for locals (OC),¹² or obtain them through exchange with the government (usually by long-term lease), expanding the appropriable pie (R). In both cases, the MNE activity increases conflict probability. As before, the possibility of higher wages (OC), also makes the impact of this second group of multinationals on conflict not trivial. Figure 2 offers a schematic representation of these and the following mechanisms. Sectors less polarized in terms of EX and $H.C.$, mixing the effects just described, can have both positive and negative effects on conflict probability and are accordingly located closer to the diagonal in Figure 1.¹³

¹⁰For a detailed discussion, see the analysis of FDI spillovers in Sub-Saharan Africa proposed by the World Bank (2012).

¹¹Also in the framework proposed by the authors, farming by large agribusinesses increases farmers incomes through productivity transfers, but they also increase competition for scarce capital, which is necessary for marketing farm produces.

¹²For example, see fixed-resources congestion models, such as Helpman (1998).

¹³The simple distance of a sector from the diagonal is not the only relevant characteristic in this setting. Take, for example, the manufacturing sector; it may use scarce capital such as land, but significantly less than the agriculture or forestry, and usually not particularly fertile either (e.g. close to a production area). Thus, manufacturing should not impact on average land value and price, at the same time it does not make a particularly large investment in local human capital. Sectors like manufacturing do not affect conflict significantly,

Considering the key role of ethnic groups in developing countries,¹⁴ what happens to the effects just described in areas characterized by the presence of politically excluded minorities?¹⁵ Unrepresented minorities could increase conflict probability owing to their exclusion from the benefits generated by MNE activities (both exploitative and human capital). In the case of exploitative sectors, the presence of ethnic minorities can also increase conflict likelihood through additional channels. Assume the government decides to redistribute the transfer received from the multinational; if representatives of the local communities sit in the government, the relation between the two agents (government and locals) will resemble a repeated game.¹⁶ In this case the government makes a compensation offer that is incentive-compatible, so we always observe civil peace. Instead, when the local population is poorly represented, several channels could lead to conflict: for example, asymmetric information or commitment problems (Fearon, 1995). To illustrate information problems, the government can be assumed not to know how strongly the ethnic groups are attached to their land, and therefore how much compensation they need to be given. Differently from the previous case, here the government faces uncertainty, so conflict takes place with more than zero probability.¹⁷ Or this situation can

not because the effects are mutually offsetting, but because they do not have an impact on conflict in either direction. Thus, they are located next to the origin of the graph in Figure 1.

¹⁴See for example Walter (2006) on the importance of group concentration; Cederman and Girardin (2007), Reynal-Querol (2002), Saideman et al. (2002) on the relevance of ethnic discrimination; and Morelli and Rohner (2015) on the importance of natural resource concentration and regional ethnic concentration for ethnic conflict.

¹⁵That is, ethnic groups without any representation in the national government.

¹⁶In other words, the more locals are represented, the better informed the government is on their beliefs concerning their land (e.g. the value of expected agricultural output), and no worries of unfulfilled promises will induce the group to start a conflict because their members in the government will ensure their fulfilment.

¹⁷Another example of asymmetric information can be a more behavioural

be seen as a commitment problem. In this multi-period framework, conflict is not game-ending but establishes a temporary distribution of the transfer payment, which will be reviewed at the start of the next period. For example, the government might offer the locals a certain transfer today and promise to increase the number of jobs tomorrow. Locals can believe this promise or not, in any case increasing the probability of conflict to more than zero.

Considering the growing literature that points to the behaviour of private firms in agriculture and forestry as a cause of violence,¹⁸ and considering that these sectors are particularly land-intensive, what happens to the effects described above if the areas analysed are the target of large-scale land acquisitions? We should not observe any effect related to human-capital-enhancing MNE activity, in that considering they do not rely on land for their activity, while large-scale land acquisition should increase conflict probability when managed by an exploitative multinational. The channels for the latter effect might be forced relocation, say, or water scarcity due to agricultural activities.¹⁹

explanation. Assume the locals do not have information on the transfer the multinational gives to the government, because they are not represented. They are only able to observe what they are offered, using this to estimate the original transfer to the government. If, after accepting the offer, they learn the original value of the transfer, they may feel betrayed and start a conflict. In real life you can think of this signal as the locals seeing the machinery and the magnitude of the investments targeted on what was their land.

¹⁸NGOs like Global Witness, think tanks like the Oakland Institute, research projects like Environmental Justice (former EJOLT - Environmental Justice Organizations, Liabilities and Trade), financed by the European Commission and the European Research Council, or research centres like the Environmental Science and Technology Institute of the Autonomous University of Barcelona (ICTA-UAB) or Business and Human Rights. For example, see the exhaustive analysis of the Liberian case by NGO Global Witness in its report *Holding the line* (2017), which documents in detail all the links between local government, multinationals and large logging contracts, with the emblematic case of the Samling Global.

¹⁹See Arslan et al. (2011), von Braun and Meinzen-Dick (2011), Meinzen-Dick and Markelova (2009), Oakland Institute (2013), Thaler (2013).

All the channels described above are studied in the empirical analysis that follows.

4 Data

4.1 Data description

The dataset is structured as a full grid of Africa divided into sub-national units of 0.5×0.5 degrees latitude and longitude. This level of aggregation is used instead of administrative boundaries in order to ensure that the unit of observation itself is not endogenous to conflict events.²⁰

Conflict data. I use the *Armed Conflict Location and Event Dataset* (Raleigh et al., 2014), whose main characteristic is information on geo-located conflicts *with and without fatalities* for all African countries. In other words, it records all political violence, whether part of a civil conflict or not, and with no threshold of battle-related deaths. The sample period is 2007-2015, which overlaps with the available data on multinationals. The data comprise the latitude, longitude and the date of conflict events, the actors involved, and their intensity, e.g. the number of fatalities. Information is also provided on the precision of the geo-referencing of the events, which is at least the municipality level in more than 96% of the cases and even finer (town or village) for more than 80%. Following Berman et al. (2017) the only events considered are those that are geolocalized with the finer precision level, and I drop duplicate events.²¹ ACLED uses several sources, including

²⁰See e.g. Berman et al. (2017), Besley and Reynal-Querol (2014), or Michalopoulos and Papaioannou (2016) for papers using similar grid-cell level data and combined with the same conflict data.

²¹This cleaning choice does not affect the dependent variable, which is *conflict incidence*.

press accounts from regional and local news, humanitarian agencies and research publications. I aggregate the data by year. A dummy variable is constructed which equals 1 if at least one conflict happened in the cell during the year. This represents the cell-specific conflict incidence. As in [Berman et al. \(2017\)](#) and previous works using the same methodology, this is my main dependent variable throughout the paper. ACLED is not immune to potential bias and measurement errors. For example, we cannot rule out the possibility that the reporting of conflicts is biased towards certain countries, regions or type of events; in particular, some areas might have better media coverage. However, the empirical methodology makes it unlikely that the results are affected, since structural differences in media coverage or more generally in the reporting of events are captured by cell and country-year (or, alternatively, region-year) fixed effects.

Multinational enterprise data. To my knowledge this is the first systematic study of the actual decisions of multinationals to locate affiliates in foreign countries, covering all sectors and all countries of the world, in a panel setting. The main constraint of any analysis studying the trade-off between exports and opening an in-country affiliate has been the “dearth of internationally comparable measures of the extent of FDI across both industries and countries” ([Helpman et al., 2004](#), pp. 306). In this paper I overcome this limitation using a novel algorithm. Two different sorts of data are combined: worldwide ownership connections (provided by the *Historical Ownership Database* by Bureau Van Dijk) and firm-level financial accounts (from *Orbis* by Bureau van Dijk). The first dataset provides daily information on ownership of all firms connected through an ownership link, for the entire world, from 2007 to 2015.²² The second dataset provides full financial statement in-

²²For example, it will report that, from a give date onward, firm A is owned

formation, the industry (to 4 digits), and additional data such as the location of the firm (latitude and longitude, or zip code). Because ownership data are only available from 2007, I take 2007-2015 as my sample period.

Having defined a multinational as a combination of firms with autonomous legal status under some form of hierarchical control, I define control according to international standards for multinational corporations (OECD, 2005; UNCTAD, 2009; Eurostat, 2007), i.e. a parent-company holding (directly or indirectly, i.e. via another subsidiary) of the majority (50.01%) of voting rights of the affiliate, making it the ultimate controlling institution or beneficial owner. See Figure 3 for a schematic representation. This methodology allows the key distinction between domestic and foreign affiliates. Domestic affiliates are defined as those located in the same country as their headquarters; foreign affiliates are located in a different country.

There are three main datasets that systematically map multinationals (both headquarters and their affiliates) worldwide and for all sectors. Two are based on Bureau van Dijk’s data and are for the year 2010 (UNCTAD, 2011; Altomonte and Rungi, 2013). The third is based on data from Dun & Bradstreet, for 2005 (Alfaro and Charlton, 2009). As Bureau van Dijk’s *Historical Ownership Database* is only available starting from 2007, these data can be collated only with the first two datasets. Following Alfaro and Charlton (2009), to check the validity of my data I compare them with the UNCTAD (2011) report, and in addition also to the Altomonte and Rungi (2013) dataset. The dataset obtained for this paper corresponds for over 90% to the two foregoing cross-sections. See Appendix A for further details on the MNE data and validation. I focus on the subset of affiliates located in Africa and their (directly or indirectly, see details below) by firm B, for 60%.

relative headquarters around the world. The final sample covers 52 countries and the MNE affiliates operating in these countries, with information on location and sector of activity. Knowing the geolocation of each affiliate, I aggregate them at the cell-year level. A limitation of the data is the poor coverage of affiliates' financial information. That is, I have full balance-sheet data for the headquarters, but for the affiliates I cannot deduce useful information - even, say, their size. I record only where and when they are active. Presence thus serves as a proxy for MNE activity.²³

Other data. The second part of the paper tests the main mechanisms outlined in the theoretical framework: the presence of politically unrepresented ethnic groups and large-scale land acquisitions (LSLA).

The first mechanism relates to ethnic composition and representation at the local level. I obtain ethnic group location data, in the form of polygons, from the GREG, *Geo-Referencing of Ethnic Groups* (Weidmann et al., 2010), which geo-localizes ethnic groups around the world, relying on maps and data drawn from the classical Soviet Atlas Narodov Mira. I merge these data with information on politically relevant ethnic groups and their access to state power, drawn from the *Ethnic Power Relations* (EPR) database, which includes annual data on over 800 groups and codes their degree of executive-level state power, ranging from total control of the government to overt political discrimination (Vogt et al., 2015).

²³The low coverage of affiliates' balance sheet information might decrease estimations' precision. However, the majority of MNE sectors which will be key in the analysis (i.e. forestry and agriculture) will have an impact on conflict through their presence in a specific area. In other words, land-grabbing activity can be done independently from the number of employees in the local affiliate. Future research could integrate balance sheet information to verify whether the intensive margin of affiliates' activity (e.g. size) has a role on determining conflict likelihood, and also if this effect is heterogenous depending on MNE sectors, as just discussed.

As I document later, land acquisitions represent another key mechanism inducing violence. To test this thesis, data from *LandMatrix* are used. This dataset uses media and reports from think tanks, international organizations, and non-governmental organizations, plus a crowd-sourcing approach followed by cross-checking. A deal is defined as an intended, concluded or failed attempt to acquire land through purchase, lease or concession that meets at least the following criteria: (i) a transfer of rights to use, control or ownership of land through sale, lease or concession; (ii) an area of at least 200 hectares; (iii) the potential conversion of the land from small-holder production, local community use or important ecosystem service provision to commercial use. LandMatrix provides information on investors, their countries, and the location (at regional level) of the deal. At present, Land Matrix includes complete information on 1024 LSLA deals in the sample of 41 African countries covered in 2007-2015.²⁴

Finally, a number of cell-specific data are added, including climate (rainfall and temperature), distance from the border, whether the cell is in a capital city, and population.

4.2 Descriptive statistics

Table 1 reports some descriptive statistics. Figure 4 and Figure 5 show maps with averages over the period. We observe over 10,000

²⁴There are two key variables to describe the status of a land deal: negotiation status and implementation status. Although logically the two are linked (a contract needs to be signed before a project can enter the start-up phase), in the database they are independent, and various combinations are possible for different projects. Negotiation status can be “intended” (expression of interest, under negotiation), “concluded” (oral agreement, contract signed) or “failed” (negotiations failed, contract cancelled). Implementation status can “not started”, “start-up” phase (no production), “in operation” (production), or “abandoned”. I focus on deals either concluded or intended, that are either start-ups or in-operation.

cells in 9 years.

A few elements are worth mentioning. First, the unconditional probability of finding a conflict in a given cell and a given year is low, around 10%. In most cells no conflict event occurs during the entire period. The probability of observing a foreign MNE affiliate is also very low, at 2%, and domestic MNE affiliates are even rarer, at the cell-year level of 1%. Second, affiliates tend to be spatially clustered: conditional on observing at least one affiliate in a cell, the average number of affiliates is 9.63 and 12.33, respectively, for foreign and domestic. Finally, conflict probability is much higher in cells with at least one MNE affiliate, around 52%.²⁵ Of course, these descriptive statistics do not take into account key variables at the cell-year level, such as population, something which is dealt with in detail in the empirical analysis. Just to give an idea of the magnitude, even weighting these probabilities by a proxy for population (nighttime lights from NOAA), conflict probability in cell-years with MNE affiliates is 3.2 times greater than the sample mean.²⁶

In the sample period the ACLED dataset records 64,468 conflict events. Table 2 shows descriptive statistics at the event-day level, and Table 3 aggregates the data at the cell-year level.²⁷ As

²⁵And 54% for cells with at least one foreign MNE affiliate (obs. 1661).

²⁶The nighttime lights variable measures average nighttime light emission from the DMSP-OLS Nighttime Lights Time Series Version 4 (Average Visible, Stable Lights, & Cloud Free Coverages), calibrated to account for intersatellite differences and inter-annual sensor decay using calibration values from Elvidge et.al. (2013). In other words, they are suitable for time-series analysis. The times-series are only available for 1992-2012, which reduces the number of our observations. The sample weighted probability of conflict (ratio of conflict probability at the cell-year level over nighttime lights) is 1.83 (obs. 62,000); restricting to cell-years without MNE affiliates it decreases to 1.68 (obs. 60,814); for cell-years with at least one foreign affiliate it raises to 5.64 (obs. 1,186).

²⁷Conditioning on observing a conflict event (9,170 cell-year observations), the median number of conflicts is 2, as shown in Table 1, while at the 25th and 75th percentiles the number of conflicts events are respectively 2 and 5. Among all cell-year (92,999 observations), the percentage of cells with always peace

we can see, more than 86% of cells where at least one conflict was reported show at least one violent event. As stated by the ACLED itself, “a politically violent event is a single altercation where often force is used by one or more groups for a political end, although some instances - including protests and non-violent activity - are included in the dataset to capture the potential pre-cursors or critical junctures of a conflict” (ACLED, 2015). Even if the preferred specification includes all events in order to capture key developments leading to conflicts, the sensitivity analysis shows that all results are robust to dropping non-violent events.

Table 4 shows annual aggregates of the number of MNE affiliates and headquarters in the African sample. The rate of growth of the number of affiliates drops sharply owing to the crisis. Before 2009, the average rate of growth of African affiliates was 21%,²⁸ but less than 10% after 2009. The +24% jump in 2015, after years of growth below 10%, is subject to robustness checks, to make sure that the overall results are not driven by this single sharp increase.

Table 5 reports cell-year observations of MNE affiliates by sector. Agriculture and forestry are among the most numerous, with 436 observations and an average of 1.67 affiliates. Education, health and social security activities are rarer, with just 102 observations.

5 Impact of multinationals on conflict

In this section the heterogeneous effects that MNE activity has on the probability of conflict are examined. The correlations between the variables are presented and an instrumental variable approach is proposed to overcome endogeneity problems and to demonstrate

is 69% (standard deviation 0.46), while with always conflicts is 1% (standard deviation 0.10).

²⁸Due to data limitations this statistic is computed only from 2007 onward, but other data sources (in flows, not stocks) confirm this growth also before 2007 (UNCTAD, 2009).

causality.

5.1 Correlations

First, let us estimate a specification of the following form:

$$CONFLICT_{k,t} = \sum_{s \in S} \beta_s \times Affiliates_{k,t}^s + FE_k + FE_{r,t} + \gamma X_{k,t} + \epsilon_{k,t} \quad (1)$$

where (k, t, r) denote respectively cell, time, region (or country), s indicates the sector, FE_k are cell fixed-effects, $FE_{r,t}$ is an additional battery of fixed effects that can vary at different levels depending on the specification (e.g. country $\times$ year, region $\times$ year),²⁹ X_{kt} are time-varying controls that always include the number of affiliates of domestic headquarters. The dependent variable, $CONFLICT_{kt}$, is violent events at cell-year level, violence being measured in terms of incidence, i.e. a binary variable coding events in the ACLED dataset as non-zero. The main explanatory variables, namely the vector of covariates $Affiliates_{kt}^s$, are the number of foreign MNE affiliates in each sector in cell-year. Given the nature of the data, particularly its high spatial resolution, the spatial correlation is important. As both conflicts and affiliates are clustered in space, standard errors are estimated with a spatial HAC correction allowing for both cross-sectional spatial correlation and location-specific serial correlation, applying the method developed by [Conley \(1999\)](#) and [Hsiang et al. \(2011\)](#).³⁰

The first column of Table 6 shows the correlations between sectoral MNE activity (number of affiliates) and conflict probabil-

²⁹Border cells are assigned to the country or region that represents the largest share of their territory.

³⁰This empirical strategy imposes no constraint on the temporal decay for the Newey-West/Bartlett kernel that weights serial correlation across time periods. The time horizon for vanishing of serial correlation is assumed infinite (100,000 years). A radius of 500km is set for the spatial kernel - close to the median internal distance in my sample of African countries according to the CEPII geodist dataset, and following other works in the literature ([Berman et al., 2017](#)).

ity.³¹ Exploiting the within-cell variation of affiliates, and controlling for cell fixed effects, we observe that: activity in agriculture, forestry and some support sectors (such as leasing of agricultural and forestry machinery) are positively and significantly correlated with conflicts; while activities in education, human health and social security, are negatively and significantly correlated. Affiliates operating in the resources sector show a positive between-cell impact on the probability of violence net of cell fixed effects, but when the latter effects are accounted for the correlation loses significance, because these affiliates have extremely low within-cell variation over time. This very low level of entry/exit of resource-sector affiliates does not allow within-cell identification.

In line with the literature ([Berman et al., 2017](#)), the presence of affiliates of corporations headquartered within the country do not have a significant effect on conflict.³² For this reason, hereafter, the number of domestic affiliates is controlled for in all specifications, and foreign affiliates are simply called affiliates.

A critique to this approach relates to the possibility of reverse causality in cells with affiliates in the resource sectors (mining and quarrying, oil, gas, etc.). Some recent literature ([Caselli et al., 2015](#); [Berman et al., 2017](#)) finds a causal link between the presence of resources and violence. [Guidolin and La Ferrara \(2007\)](#) find evidence that conflicts increase the value of exploitative firms.³³ For these reasons, column (2) restricts the sample to cells without resources

³¹This specification uses the High-level SNA/ISIC sector aggregation, but the results are robust to different aggregations, such as NACE Revision 2. See Appendix C for the replication of Table 6 with NACE Revision 2 aggregation.

³²For readability, in Table 6 domestic affiliates are grouped in a single indicator. However, as appendix B shows, even taken at sector level the number of domestic affiliates is not significantly correlated with conflict probability.

³³They give several explanations: during conflict, (i) entry barriers might be higher; (ii) the bargaining power of governments might be lower and hence licensing cheaper; (iii) lower transparency leads to more unofficial deals which are profitable to the firms; (iv) the manufacturing sector leaves the country, forcing it to specialize in natural resources.

(gold, diamonds, oil). Column (3), instead, excludes particularly conflict-rife cells, in countries such as Nigeria, Libya, Sudan, South Sudan, and Somalia.

For easier readability and to deal with potential measurement errors related to the independent key variables (number of affiliates, in each cell-year, in each sector), affiliates are grouped following the two clusters proposed by the literature, confirmed by Table 6. The sectors included in the *Exploitative Affiliates* group are agricultural, forestry and support activities,³⁴ while *Human Capital Affiliates* covers education, human health and social security. Table 7 shows the results of the following specification:

$$\begin{aligned} CONFLICT_{k,t} = & \alpha \textit{ExploitativeAffiliates}_{k,t} + \\ & \omega \textit{HumanCapitalAffiliates}_{k,t} + \\ & FE_k + FE_{r,t} + \Gamma X'_{k,t} + u_{k,t} \end{aligned} \quad (2)$$

In this specification the cell time-varying controls, $X'_{k,t}$, comprise, in addition to domestic affiliates, the number of foreign affiliates in *Other sectors*, i.e. those not belonging to either of the two main clusters. In the first column of Table 7 the two variables *ExploitativeAffiliates* (*dv*) and *HumanCapitalAffiliates* (*dv*) are dummies assuming value 1 if in cell k and year t there is at least one affiliate in the respective sector. In columns (2)-(4) the two variables *ExploitativeAffiliates* and *HumanCapitalAffiliates* represent the actual number of affiliates in the respective clusters, always at the cell-year level. The results confirm those of Table 6: the activity of exploitative affiliates is strongly and significantly correlated with conflict probability, while that of affiliates investing in human capital are negatively correlated.³⁵

³⁴All the results hold whether this group is restricted to agriculture and forestry only or expanded also to the resource sectors.

³⁵In Appendix D I study whether the effect of MNE affiliates is proportional by clustering them in groups of 1, 2, 3, or 4 and more affiliates, for each sector.

These results are robust to a battery of controls: different sample compositions (e.g. excluding capital cities, examining only cells with affiliates, or counting only violent conflict events), additional controls (region $\times$ year fixed effects, rainfall and temperature, population), and estimation methods (fixed effect logit) - all presented in details in Appendix E.

5.2 IV strategy

In the specifications proposed above, but also more generally, assessing the impact of MNE activities on violence, poses a series of methodological difficulties, chief of them the potential reverse causality from local violence to MNE activity. Excluding resource-intensive areas, the direction of this bias is most likely negative; that is, the existence of conflict incidence might decrease the likelihood of an affiliate's being active. However, we cannot completely rule out the possibility that conflicts may affect MNE affiliate presence in a non-trivial way. Accordingly, in order to demonstrate causality, I instrument multinational activities in each cell-year.

5.2.1 Methodology

Multinational activities can work their effects through several channels, both at the extensive margin (e.g. opening/closing of affiliates) and at the intensive margin (e.g. number of employees). The data available allows work only on number of affiliates; the coverage of size variables, like number of employees, is particularly poor. So we instrument multinational activities with only one dimension of its realizations, i.e. number of affiliates.

The basic empirical strategy exploits the fact that some affiliates within a cell-year were part of relatively healthy and robust multinationals, whereas others belonged to less healthy groups, which were affected more severely by the crisis. More specifically, pre-

period data on the parent corporation's exposure to external credit is used, together with the amount of credit given in the headquarters country. I use this within-cell-year variation to identify how the probability of conflict changes with the (exogenous) change in multinational activity. The idea is that when a shock hits the parent company, especially a credit shock like that of 2008-2009, if some constraint on the amount of borrowing or any general financial help is imposed on affiliates by the parent, this will have an impact on the affiliates' activities. This thesis has found extensive support in the internal capital market literature (see, for example, [Boutin et al., 2013](#)).

Given the credit mechanism behind the 2008-2009 crisis, I follow [Autor et al. \(2013\)](#)³⁶ in exploiting parent corporations' heterogeneity in dependence on external finance in the decade before my analysis. I interact this with a year-country variable for the level of credit the parent company receives in its home country. The intuition is that the credit crisis hits parent firms differently depending on their reliance on credit; to avoid endogeneity I compute a headquarters-level measure of access to credit from the previous decade.

Years of credit shortage had a clear impact on multinational activities in Africa. Figure 6 shows the aggregate number of affiliates in Africa and its rate of increase. Note the sharp drop in the growth rate following the crisis, from 20% previously to an average of 5% in the first few years after 2009. In some countries, such as South Africa, the number of affiliates actually declined (Figure 7).³⁷

³⁶They instrument the exposure to import competition from China with the exposure to import competition from developed countries in the previous decade.

³⁷The dataset elaborated for this work only covers two years before the crisis due to data availability difficulties. However UNCTAD's data on FDI flows confirm that before 2009 there was stable and rapid growth of FDI worldwide and in Africa (UNCTAD, 2009), and this growth diminished sharply with the 2008-2009 crisis.

Considering that the analysis is performed at the cell-year level, I need one instrument (at least) for each of the two sectors (exploitative and human capital), for each cell-year. The procedure is as follows:

1. I first measure the “role” of each parent company in each cell in the base year, 2007, considering the share of each parent m ’s affiliates in the two sectors in the cell. Specifically, $w_{k,2007}^{E,m}$ represents the parents m ’s share of affiliates in cell k year t in the exploitative sector. This is measured as the ratio between the number of m ’s affiliates in the exploitative sector in cell k year t , and the total number of affiliates in the exploitative sector in this cell-year. And analogously for the human capital sector, $w_{k,2007}^{H,m}$.
2. Second, I estimate the parent corporation’s dependence on external credit in the previous decade (1997-2006),³⁸ in the headquarters home country, o , denoted by $Debt_{o,97-06}^m$.
3. I then interact this firm-specific (time-invariant) variable with measures of credit availability at the home country-year level, $Cre_{o,t-1}$.³⁹

Figure 8 is a visual representation of the IV approach. For each cell-year, therefore, we have two instruments, for *ExploitativeAffiliates* $_{k,t}$ and *HumanCapitalAffiliates* $_{k,t}$ respectively:

$$z_{k,t}^s = \sum_{m \in s} w_{k,2007}^{s,m} (Debt_{o,97-06}^m \times Cre_{o,t-1}) \quad \text{with } s = \{E, H\} \quad (3)$$

where I keep as constant the initial share of multinationals, in each sector and in each cell, as weighting strategy ($w_{k,2007}^{s,m}$) for exogeneity.

³⁸Measured as debt over equity, see Rajan and Zingales (1998) and [Manova \(2013\)](#).

³⁹World Bank data: (i) Domestic credit provided by financial sector (% of GDP), (ii) Domestic credit to private sector (% of GDP). The first is used in the main specification, i.e. $Cre_{o,t-1}$, the second is an alternative measure of credit in the robustness checks.

5.2.2 Baseline results

Table 8 reports the baseline results for various sample compositions. The estimation is the same as for equation 2, but here the variables *ExploitativeAffiliates_{k,t}* and *HumanCapitalAffiliates_{k,t}* are instrumented respectively with $z_{k,t}^E$ and $z_{k,t}^H$. The dependent variable is the incidence of conflict. We can see that in every column, the coefficients of interest are significant at the 1% level. In particular, an increase in MNE activity in the exploitative sectors increases conflict probability, while in sectors that enhance local human capital it decreases it. All specifications include cell and country×year fixed effects. The former controls for time-invariant co-determinants of violence and MNE activity at cell level (a particular land conformation, say, distance to borders or to the capital, or ethnic cleavages). The latter cleans country features that impact both on conflicts and on MNE activity (e.g. property rights, change of political representation). All specifications also control for the number of foreign affiliates in other sectors, and for the domestic multinationals' number of affiliates.

Column (1) of Table 8 replicates column (2) of Table 7 to facilitate comparison of the instrumented and non-instrumented results. Columns (2)-(4) present the instrumented results for various samples: the entire sample in column (2); column (3) excludes cells with natural resources; column (4) excludes those with a particularly high level of conflict⁴⁰.

A few points are worth understanding. First, that the IV approach confirms the downward bias of the linear probability model (LPM), which underestimates the effect of MNE activity on violence, because of the lower probability of observing MNE activities in cells where there is violence. Second, the magnitude of the effects is very substantial. The mean (and standard deviation)

⁴⁰Those located in Nigeria, Libya, Sudan, South Sudan, and Somalia.

of the two explanatory variables *in cells with some MNE activity* are 0.83 (1.721) for exploitative affiliates and 0.09 (0.395) for human capital affiliates; and the probability of a conflict in these cells is 0.54. Therefore, given the results of Table 8, column (2), a 1-standard-deviation increase in MNE activity in the exploitative sectors increases conflict probability by 29% of the mean. And a 1-standard-deviation increase in MNE activity in human capital affiliates decreases conflict probability by 10% of the mean.

5.2.3 Sensitivity analysis

The baseline estimates of Table 8 prove to be robust to a large battery of checks. Table 9 presents these results.

Different samples. First let us examine the robustness of the main result to changes in the sample. Having only 2% of our observations with some MNE activity could be seen as problematic. However, the fact that the sample does not consist only of cells with MNE activity but also has a large number of cells without MNE, conveys information that is essential to correctly estimating the effect we are interested in. In Table 9 we first exclude cells in capital cities (row 1), in order to exclude the possibility that the results are driven by the legally-driven location of affiliates in big cities. Next, we restrict the sample to cells with some MNE activity during the period (row 2). Needless to say, this reduces the sample size drastically. This exercise is particularly important to test the strength of the instrument. In fact, in cells that have no affiliates in 2007 and do not add any during the period under analysis, the instrument perfectly predicts the correct number of affiliates - zero. So, restricting the sample to cells where there is MNE activity in at least one year tests whether the instruments correctly predict MNE activities in the two sectors. With this very demanding restriction,

the Kleibergen-Paap rk Wald F statistic decreases, but always remains higher than 12, indicating that the instrument is not weak even excluding all cells with no affiliates initially. Next, we exclude 2015 (row 3) as a sort of outlier, given the sharp rise in number of affiliates that year (see Table 4). South Africa too is excluded (row 4), to be sure the results are not driven by a single country (one with a considerably higher number of affiliates). Last, the thesis is tested for an alternative dependent variable, i.e. violent events only (row 5), following the ACLED definition. I also add to the group of exploitative affiliates the affiliates belonging to the mining and quarrying sectors (row 6).

Additional controls. Where agriculture is largely rain-fed, i.e. countries that lack extensive irrigation systems and are not heavily industrialized, weather is crucial, and is also a key to conflict probability (Miguel et al., 2003; Hendrix and Salehyan, 2012). For this reason, the results are checked after controlling for rainfall and temperature (row 7). Further, to control for possible indirect effects of the crisis on specific areas within a country (if the textile industry, say, was particularly hard-hit, this might be expected to impact on specific African areas), I add region×year fixed effects (row 8), and also de-trend cells by cell-year trends (row 9). The results are also robust if controlling for population data, proxied by nighttime lights at cell level (row 10). In row 11, headquarters country fixed effects are added, with dummy variables taking value 1 where a cell-year shows at least one affiliate of a parent corporation located in a specific country.⁴¹

Different instruments. I also replicate the IV results using

⁴¹In Appendix F I show that we do not observe a specific “ugly” cluster of countries - namely a group of countries amplifying the effects of MNE affiliates on conflict probability

different instrumental variables. First, we use of two instruments for each variable, instead of one (row 12). Specifically:

$$z_{k,t}^{Debt,s} = \sum_{m \in s} w_{k,2007}^{s,m} (Debt_{o,97-06}^m \times Cre_{o,t-1}) \quad \text{with } s = \{E, H\}$$

$$z_{k,t}^{IFP,s} = \sum_{m \in s} w_{k,2007}^{s,m} (IFP_{o,97-06}^m \times Cre'_{o,t-1}) \quad \text{with } s = \{E, H\}$$

where IFP is an Index of Financial Pressure (Nickell and Nicolitsas, 1999) measured as

$$IFP = \frac{\text{Interest payments}}{\text{Profit before tax} + \text{Depreciation} + \text{Interest payments}}$$

$Cre'_{o,t-1}$ is domestic credit (provided by financial sector) as a % of GDP, and $Cre_{o,t-1}$ measures domestic credit to private sector also as % of GDP. These two different credit aggregates serve to reduce multicollinearity. The results are robust to this procedure. In addition, the use of two instruments allows us to perform the Hansen-J test, which yields a non-significant p-value (0.488), confirming the exogeneity of the instruments. The IV procedure is also applied using a different measure of credit (row 13): in IV strategy presented in equation 3, the variable $Cre_{o,t-1}$ is replaced by $Cre'_{o,t-1}$ (described above). And the results also hold using a modified version of the instrument, in which both the values of the independent variables of interest and the instruments of the cells without affiliates are replaced by the corresponding values of the closest cell with some MNE activity, divided by the distance between the two cells (row 14).⁴² This methodology also enables us to test the strength of the IV strategy again, not assigning zero to all cells without affiliates. The full results of this check are presented in Appendix G,

⁴²In cases where a cell with no affiliates is equidistant from more than one cell with affiliates, the average of the variables of interest in these cells is taken.

together with additional tests on the role of affiliates in neighbouring cells.

Test of the identification assumption. A potential concern is the instrument’s ability to actually predict the probability of the parent company’s closing affiliates in a given cell-year. For this reason, to test the identification assumption we can regress the probability of each parent (m), in each cell-year (k, t), closing at least one of its affiliates ($CloseAff_{kt}^m$) on my instrument, controlling for cell fixed effects and other headquarters-specific fixed effects. More specifically, I estimate the following equation:

$$CloseAff_{kt}^m = \beta (Debt_{o,97-06}^m \times Cre_{o,t-1}) + FE_k + FE_t + \gamma X_m + u_{mkt} \quad (4)$$

Table 10 shows that an increase in credit in the home country does in fact decrease the probability of closing affiliates, and this result is robust to headquarters-country fixed effects, sector fixed effects, and both of these simultaneously.

Selection. Despite the IV approach, another potential problem with this methodology is that the parent multinational may selectively decide, in crisis periods, to close specific affiliates, presumably those that are more costly or problematic (e.g. those in conflict areas). Figure 9, however, which compares the number of affiliates in cells where conflict was always absent with that in cells with some conflict (>0) during the period, shows that this would not happen to be the case, as the trends in cells with and without conflicts are parallel.

A more formal test can be performed by replicating equation 4 controlling for whether a conflict event in the cell has a significant role per se in the corporation’s decision to close affiliates, or whether such a role emerges when the effect is interacted with

the instrument. Formally, the following specification addresses this concern:

$$\begin{aligned} CloseAff_{kt}^m = & \beta (Debt_{o,97-06}^m \times Cre_{o,t-1}) + \gamma Conflict_{k,t} + \\ & \omega Debt_{o,97-06}^m \times Cre_{o,t-1} \times Conflict_{k,t} \\ & + FE_k + \gamma X_m + u_{mkt} \end{aligned}$$

As we can see from Table 11, the relevant coefficients, namely γ and ω , are never significant, and they remain non-significant even if the variable $Conflict_{k,t}$ is replaced by its lagged version $Conflict_{k,t-1}$. In other words, Figure 9 and Table 11 confirm that there are no signs of selection in the parent company’s decision to close affiliates.

6 Mechanisms

In this section the two main mechanisms presented in the theoretical framework are tested, namely the political representation of ethnic groups and large-scale land acquisitions.

6.1 Ethnic representation

As noted in section 2, there are several channels whereby ethnic political representation can be linked with conflict probability. To test these channels, assume that in each country j there are p_j ethnic groups in the power coalition, and hence $n_j - p_j$ groups out of power. The *Ethnic Power Relations (EPR)* database gives information on each group in power in each country, with 7 classifications (monopoly, dominance, senior partner, junior partner, powerless, discrimination, self-exclusion). A group is considered to be “in power” if it belongs to one of the first four classes; this time-varying classification of power is then merged with the static *Geo-Referencing of Ethnic Groups (GREG)* database on groups’

location.⁴³

Now consider that each country j is divided into cells, and that exploiting the foregoing data we can determine, for each cell, which subsample of groups p_j and groups $n_j - p_j$ are present. Hence, the following index is computed for each cell k :

$$c_k^j = \frac{n_k^j - p_k^j}{n_k^j} * 100$$

where $n_k^j - p_k^j$ is the number of groups not in power in country j that are located in cell k , while n_k^j is the total number of groups located in cell k of country j . Table 12 shows some descriptive statistics of the relevant variables of interest. The average number of ethnic groups (time-invariant in the data) is 2, while the average number of politically unrepresented groups is 0.41 in the entire sample. The share of ethnic minorities, c_k^j , has a mean of 22.83 and a standard deviation of 37.61 in the full sample, and 7.62 and 23.23 respectively in the sample with some affiliates.

The hypothesis is that activity in exploitative sectors is more likely to induce conflict in cells with a high c_k^j . Intuitively, in those cells land grabs are more likely to be to the detriment of the powerless groups. Table 13 shows the estimations of the following specification:

$$\begin{aligned} CONFLICT_{k,t} = & \sigma ExploitativeAffiliates_{k,t} + \\ & \tau HumanCapitalAffiliates_{k,t} \\ & + \theta EthnicMinorities_{k,t} \\ & + \eta ExploitativeAffiliates_{k,t} \times EthnicMinorities_{k,t} \\ & + \rho HumanCapitalAffiliates_{k,t} \times EthnicMinorities_{k,t} \\ & + FE_k + FE_{r,t} + \Gamma X'_{k,t} + u_{k,t} \end{aligned}$$

where $EthnicMinorities_{k,t}$ is the index c_k^j described above. As Ta-

⁴³The coverage of these datasets is limited with respect to the full sample: about 8,000 of our 10,000 cells and the EPR data are not available after 2013.

ble 13 shows, the coefficient η is always positive and significant, while interestingly, the coefficient σ loses its significance when we introduce the interaction with the ethnic minority share. This suggests that the main channel through which exploitative MNE sectors increase conflict is the presence of politically unrepresented ethnic groups. The magnitude of this effect is large: a 1-standard-deviation increase in the number of exploitative affiliates in cells with some affiliates (1.721), together with a 1-standard-deviation in the share of ethnic minorities in cells with some affiliates (23.25) increases the probability of conflict by 5 percentage points, or nearly 10% of the sample mean in these cells.

One could argue that this result is driven not by the share of excluded ethnic groups, but by ethnic fragmentation. Appendix H replicates Table 13 substituting $EthnicGroups_k$ (the total number of ethnic groups in cell k) for $EthnicMinorities_{k,t}$. This variable is time-constant, so when not interacted with a time-varying variable it will be absorbed by the cell fixed effect. The results confirm that ethnic fragmentation is not driving the results.

6.2 Large-scale land acquisitions

The past decades have been characterized by a vast increase in large-scale permanent or temporary land acquisitions (LSLA) in developing countries. The projects are usually aimed at export agriculture, and the acquisitions are usually made by national sovereign wealth funds or corporations based in wealthier, more developed countries. The phenomenon, known in the literature and by activists as “land grabbing” (Borras and Franco, 2012; Daniel, 2011; Thaler, 2013) is by far more widespread in Africa than in any other continent (Nolte et al., 2016).

Several reasons link LSLA to conflict. Land grabs directly threaten the local population food security by taking agricultural

land away from small farmers. In Africa, locals almost exclusively depend on own agriculture for food. In many countries where food insecurity is already high, large portions of the total arable land have been sold or leased to foreign investors (GRAIN, 2012). Moreover, intensive farming in these lands often involve an intense use of water, depriving people in the surrounding areas of this very scarce resource. In fact, water control may well be the primary objective of a land grab (Rulli et al., 2013; Woodhouse and Ganho, 2011; Woodhouse, 2012). Furthermore, LSLA clash head-on with the ideal of food sovereignty, “the right of communities, peoples and states to independently determine their own food and agricultural policies” (Beuchelt and Virchow, 2012).

For all these reasons, scholars and activists have argued that land grabs cause or are likely to cause nonviolent or violent social conflict: protests, riots, even small-scale rebellion in response to this accumulation and enclosure of land (Arslan et al., 2011; von Braun and Meinzen-Dick, 2011; Meinzen-Dick and Markelova, 2009; Oakland Institute, 2013; Thaler, 2013).⁴⁴ Although there have been case-by-case analyses of LSLA deals and the conflicts they have brought about (Hall, 2011), no systematic study of the impact of LSLA on conflicts, in particular in areas where large multinationals are active, has yet been done.

Below I show that land grabs constitute one of the mechanisms of increases in conflict probability when exploitative MNE activities

⁴⁴A study on Southeast Asia finds that LSLA lead to increased conflicts over land, resulting in violent actions (Forest Peoples Programme, 2013). In Africa continent, the emblematic case of the mentioned deal signed between the government of Madagascar and Daewoo Logistics is often mentioned: a 99-year lease covering almost half of Madagascar’s arable land, with the aim of producing maize and palm oil for export. This astonishing deal is often cited as a cause of the coup that toppled President Marc Ravalomanana (Meinzen-Dick and Markelova, 2009; Thaler, 2013).

are carried out. We use the following specification:

$$\begin{aligned}
CONFLICT_{k,t} = & \sigma ExploitativeAffiliates_{k,t} + \\
& \tau HumanCapitalAffiliates_{k,t} \\
& + \rho ShareLandGrabbing_{r,t} \\
& + \phi ExploitativeAffiliates_{k,t} \times ShareLandGrabbing_{r,t} \\
& + \mu HumanCapitalAffiliates_{k,t} \times ShareLandGrabbing_{r,t} \\
& + FE_k + FE_{r,t} + \Gamma X'_{k,t} + u_{k,t}
\end{aligned} \tag{5}$$

where $ShareLandGrabbing_{r,t}$ is the percentage of region r which is targeted for land grabbing in year t , the year when the production of the LSLA, at the year when the production of the LSLA starts.⁴⁵ Formally:

$$ShareLandGrabbing_{r,t} = \frac{Area\ of\ region\ r\ target\ of\ LSLA}{Total\ area\ of\ region\ r} * 100$$

For example, $ShareLandGrabbing_{r,t} = 3$ means that in year t , in region r 3% of the territory began to be subject to productive activity under a land grab deal. Table 14 provides descriptive statistics on the LSLA data.⁴⁶ Panel A shows 230 completed LSLA in LandMatrix, with an average size of 57 square kilometres (5,700 hectares), with the highest share of region coverage of 5.47%. Panel B presents statistics at the cell-year level: 2,670 cell-year observations show a LSLA.

In Table 15 we can see that coefficient ϕ , i.e. the interaction term we are interested in, is always positive and significant at the 5% or 10% level (columns 1, 3, 4). In terms of magnitude, in *cells with some MNE activity and target of a LSLA*, the joint effect of

⁴⁵ “Production” means the start of activities on the land, not the year of the first harvest.

⁴⁶ The full dataset of deals during the period covers 1024 LSLA, but dropping deals not concluded but only intended, and those abandoned or never started, the final sample covers 230 deals.

both a 1-standard-deviation increase in the number of exploitative affiliates (1.721) and a 1-percentage-point increase in the share of regional land under LSLA increases conflict probability by 2 percentage points. As expected, the interaction between the number of human capital enhancing affiliates and the land grab measure, namely μ , is never significant, because these sectors do not require land for their activities.

The *production* phase is different from the *concluded* phase, which describes the state of the contract (e.g. when it is signed).⁴⁷ Interestingly, in the estimation described in equation (5), replacing the variable $ShareLandGrabbing_{r,t}$ with a dummy variable indicating for the specific year t in which a LSLA targeting region r is signed, namely $ContractSigned_{r,t}$, we find no effect on the interaction term, confirming the hypothesis that it is only when the locals are forcefully removed from the lands (at the start of production), or alternatively, when they have a signal on the real value of the land they sold (observing the amount of machinery involved in the investment, say, or the land transformation), that the conflict occurs (columns 2, 5, 6).

7 Conclusion

This paper offers a systematic analysis of the activity of multinational enterprises on the likelihood of civil conflict in Africa, using novel and fine-grained panel data. I document a significant and quantitatively important impact of multinationals' activity on the likelihood of conflict, the nature of the effect depending on the sector of activity. Exploitative sectors, i.e. agriculture and forestry, increase conflict probability, while activity in local human capi-

⁴⁷Remember that *LandMatrix* provides information only on the year of the action (e.g. year of contract signing or year of start of production), not the duration.

tal enhancing sectors decreases it. A battery of sensitivity tests confirms that the results are robust to a variety of alternative specifications and additional controls. This disaggregated study of the causal impact of multinational corporations' activities on conflict also illuminates the mechanisms through which these activities can lead to the escalation of violence. In particular, the increase in the likelihood of conflict is magnified in areas characterized by a high share of politically unrepresented ethnic groups. Finally, I show that large-scale land acquisitions are a key channel through which multinationals' activities increase conflict.

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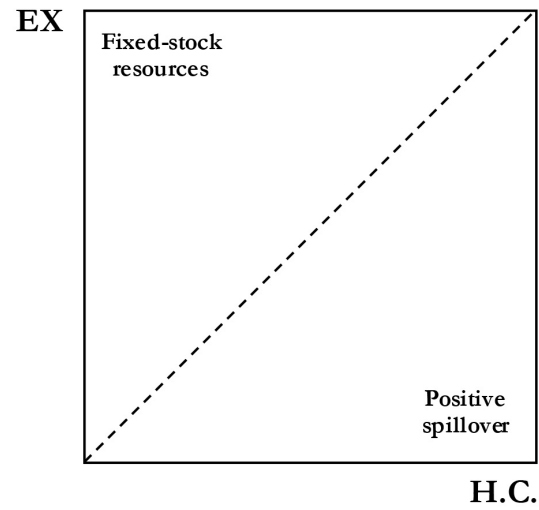
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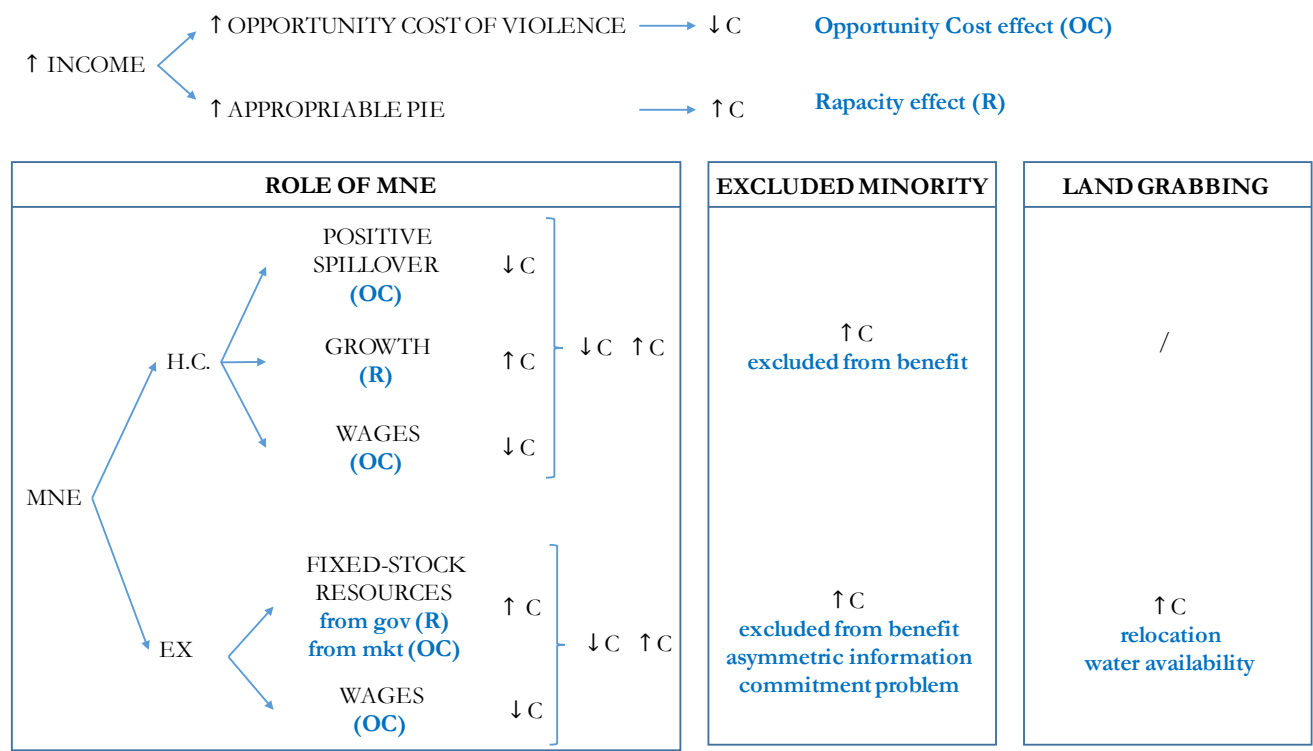
Figures

Figure 1: Exploitative and human capital enhancing sectors



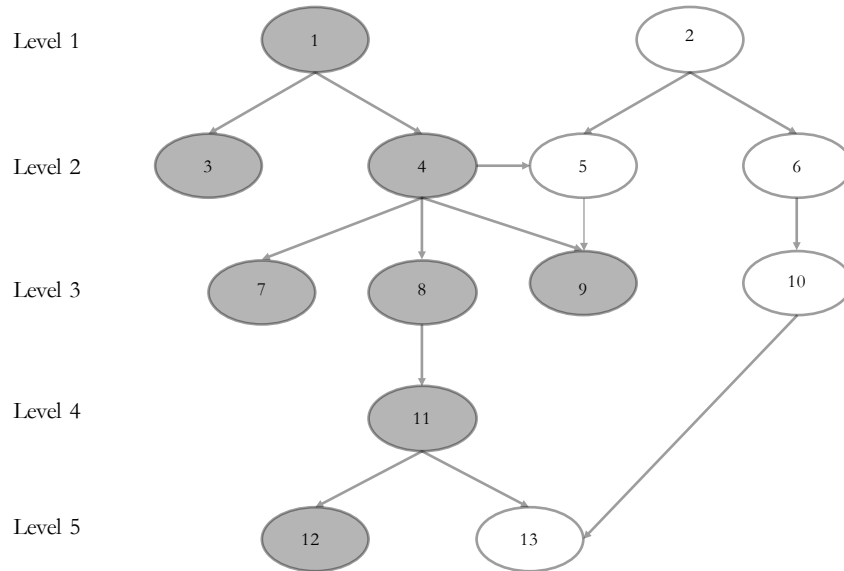
Notes: The vertical axis is increasing in the level of exploitative nature of MNE sectors. The horizontal axis is increasing in the locals' human capital enhancing level of MNE sectors.

Figure 2: Conceptual framework



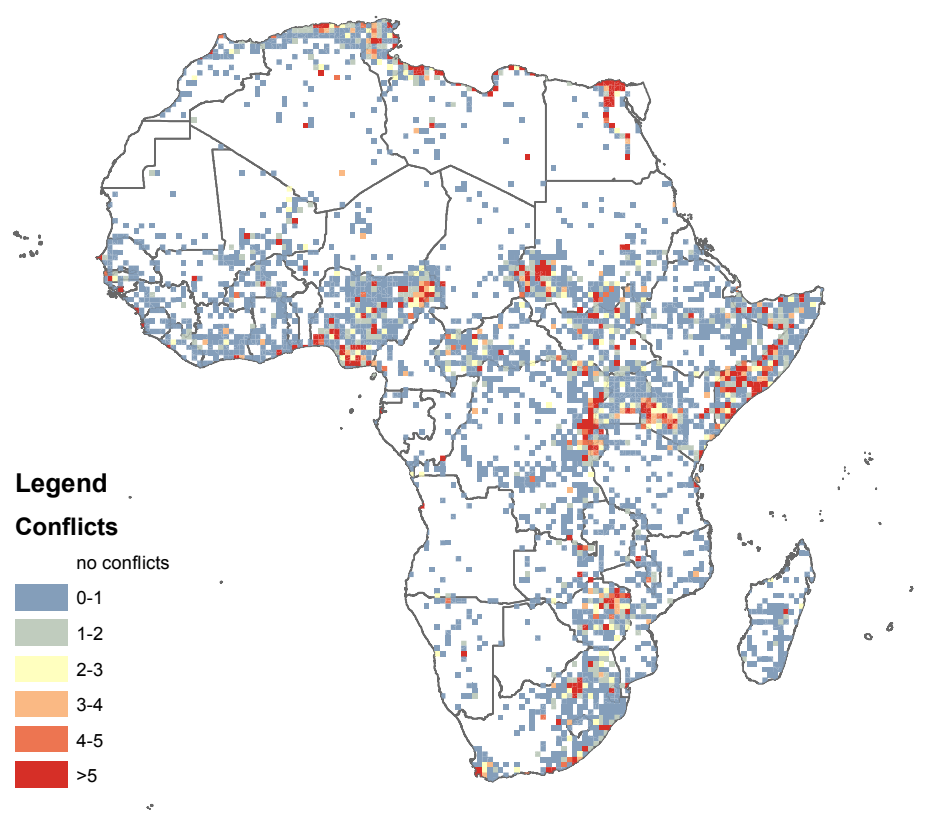
Notes: This scheme summarises the possible mechanisms described in section 2.

Figure 3: MNE as hierarchical graphs



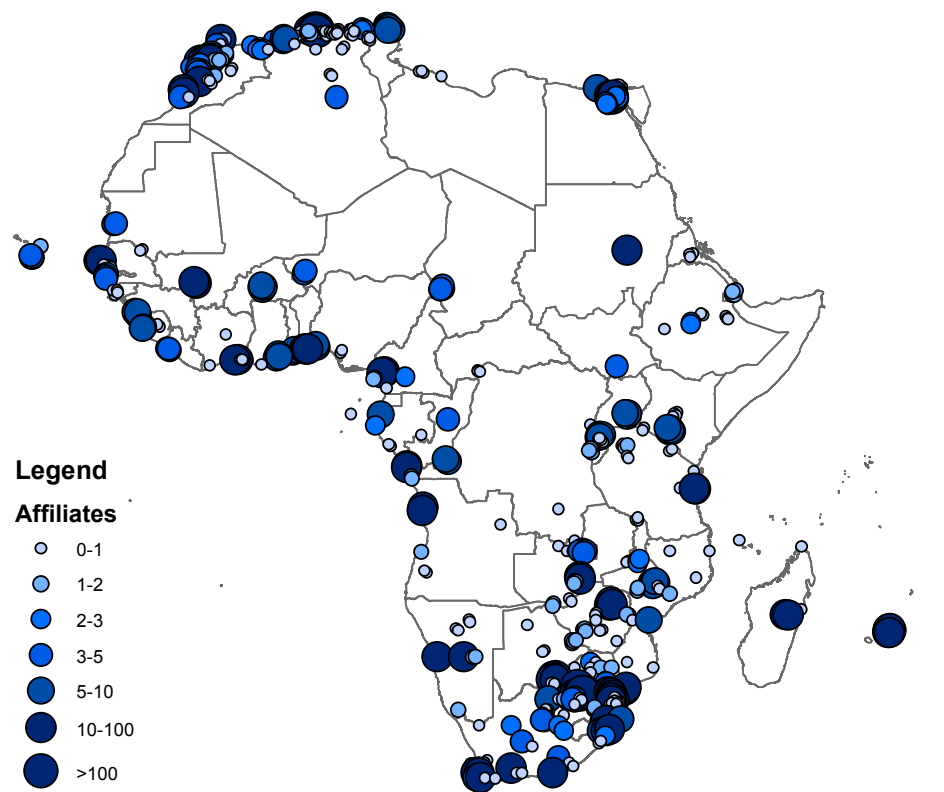
The upper shaded node (1) represents the headquarters (or parent company), conventionally placed at level 0 of the hierarchy. The lower shaded nodes below level 0 represent the affiliates considered to be inside the boundaries of the same group, on their different hierarchical levels, with the edges connecting the nodes representing participation links. The white nodes are instead firms possibly participated by the considered MNE, but excluded from its boundaries on the basis of the majority ownership threshold.

Figure 4: Conflict events



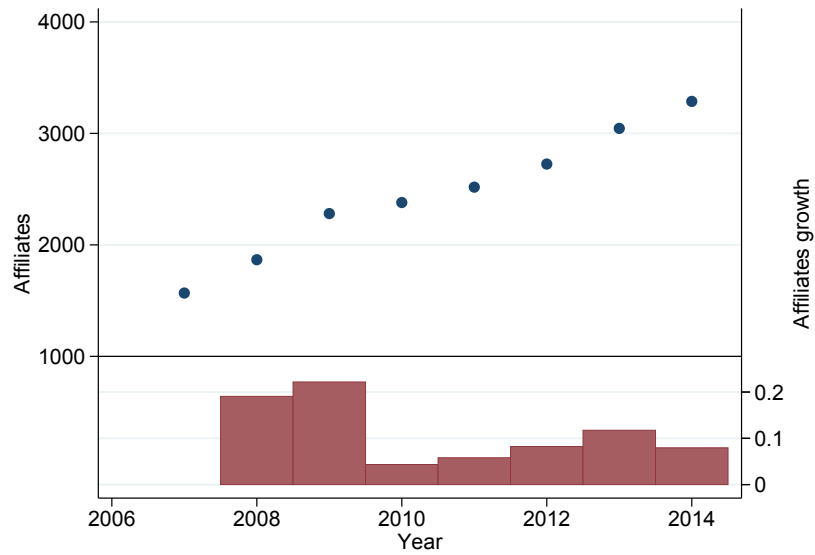
Notes: The map shows the average number of conflicts (ACLED) in each cell over the years 2007-2015.

Figure 5: MNE affiliates



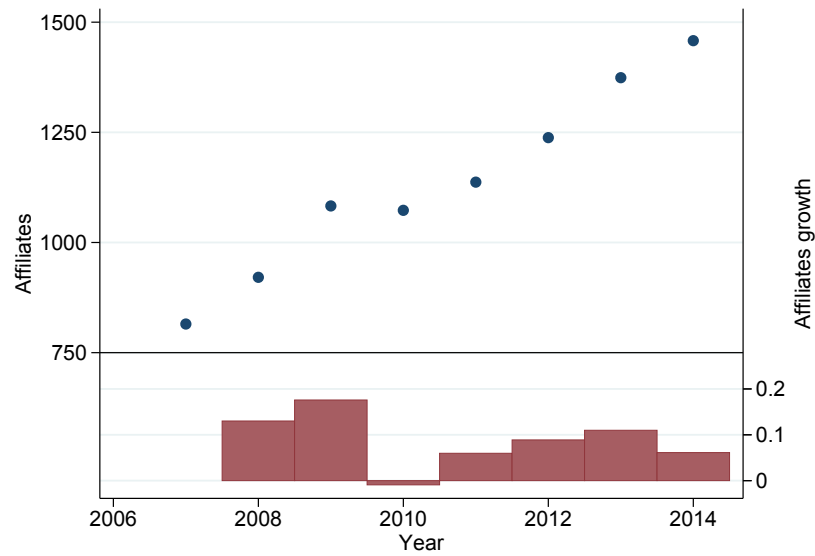
Notes: The map shows the average number of MNE affiliates in each cell over the years 2007-2015.

Figure 6: African affiliates



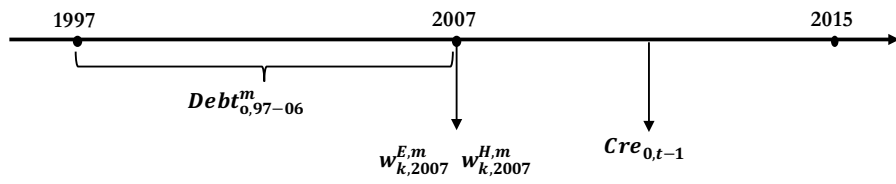
Notes: The graph shows aggregate numbers of South African affiliates by year. The histogram below shows changes in number of affiliates.

Figure 7: South African affiliates



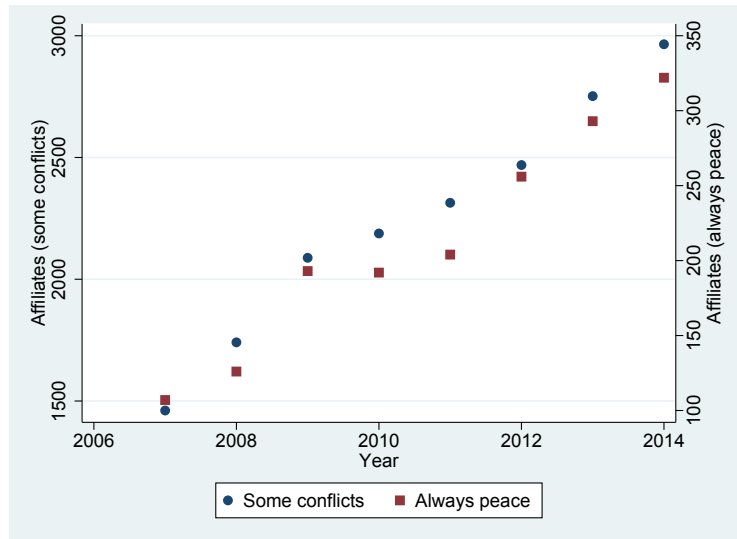
Notes: The graph shows aggregate numbers of African affiliates by year. The histogram below shows changes in number of affiliates.

Figure 8: IV data timeline



Notes: The graph shows the time coverage of the data used for the IV strategy.

Figure 9: Conflict cells and the crisis



The graph shows the aggregate number of affiliates by year, for all Africa, comparing cells always in peace with cells in which at least one conflict takes place during the period analysed.

Tables

Table 1: Descriptive statistics

		Obs.	Mean	S.D.	Median
Pr(Conflict>0)					
	all cells	92,999	0.10	0.30	0
	if affiliates = 0	91,072	0.09	0.28	0
	if affiliates > 0	1,927	0.52	0.50	0
# Conflicts					
	all cells	92,999	0.66	9.03	0
	if > 0	9,170	6.72	28.06	2
Pr(Foreign affiliate>0)					
	all cells	92,999	0.02	0.13	0
# Foreign affiliate					
	all cells	92,999	0.17	2.96	0
	if > 0	1,661	9.63	19.96	2
Pr(Domestic affiliate>0)					
	all cells	92,999	0.01	0.09	0
# Domestic affiliate					
	all cells	92,999	0.11	3.23	0
	if > 0	815	12.33	32.27	2

Notes: Author's computation from ACLED and the MNE dataset elaborated for this work. There dataset is composed of 10,334 cells in a panel from 2007 to 2009. Affiliates with headquarter in their same country are defined domestics affiliates, otherwise foreign affiliates.

Table 2: Event-date level conflict statistics

Type of event	Frequency	Percent
Battle	16,752	25.99
Riots	8,104	12.57
Violence against civilians	15,761	24.45
Remote violence	4,513	7.00
Headquarter or base establishment	166	0.26
Non-violent transfer of territory	458	0.71
Protest	14,901	23.11
Strategic development	3,813	5.91
Total	64,468	100.00

Notes: The unit of observation is a single event recorded in the ACLED dataset. The first four types of events are classified as violent.

Table 3: Cell-year level conflict statistics

Type of event	Mean	St. Dev.
Only violent	0.54	0.49
Both violent and non-violent	0.32	0.35
Only non-violent	0.14	0.46

Notes: The unit of observation is a cell-year. The sample is limited to cell-year showing at least one event recorded in the ACLED dataset.

Table 4: MNE affiliates and headquarters - Aggregate statistics

Year	Affiliates	Headquarter
2007	1571	871
2008	1878	1012
2009	2297	1212
2010	2396	1250
2011	2534	1299
2012	2741	1371
2013	3063	1482
2014	3312	1603
2015	4117	1976

Notes: Author's computation from the MNE dataset obtained from Orbis Historical Ownership Database, Bureau Van Djik. The sample is limited to African affiliates, with their headquarters worldwide.

Table 5: African MNE affiliates by sector

Sectors (cell-year)	Obs	Mean	St. Dev.	Perc. 25	Median	Perc. 75
Agriculture Forestry	436	1.67	1.10	1	1	2
Fishing	32	1.09	0.30	1	1	1
Resources	508	2.05	1.75	1	1	2
Manufacturing Industries	805	4.14	6.16	1	2	4
Construction	284	2.65	3.48	1	1	2
Wholesale Accomodation	877	4.74	7.61	1	2	4
Information Communication	315	2.16	2.09	1	1	2
Finance Insurance	575	5.36	9.94	1	3	6
Real Estate	107	1.97	1.48	1	1	2
Professional Activities	373	2.77	3.57	1	1	3
Administrative Activities	154	1.71	1.32	1	1	2
Support Activities	330	1.96	2.32	1	1	2
Education - Health - Social Security	102	1.46	0.74	1	1	2
Other Services	134	2.27	2.53	1	1	2

Notes: The unit of observation is the cell-year. Sectors are aggregated following the High-level SNA/ISIC sectors aggregation.

Table 6: MNE and conflict - All sectors

Estimator	(1)	(2)	(3)
Dep. Var.		LPM	
Sample	All	Conflict incidence No resources areas	No belliger. areas
Agriculture - Forestry	0.0373** (0.0161)	0.0416** (0.0172)	0.0374** (0.0163)
Fishing	-0.0477 (0.0772)	-0.0476 (0.0765)	-0.0470 (0.0774)
Resources	-0.00728 (0.0122)	-0.000652 (0.0152)	-0.00641 (0.0133)
Manufacturing - Industries	-0.000102 (0.00619)	-0.00127 (0.00595)	-0.000352 (0.00618)
Construction	0.0180 (0.0147)	0.0290** (0.0116)	0.0177 (0.0147)
Wholesale - Accommodation	-0.000903 (0.00695)	0.000968 (0.00800)	-0.000971 (0.00710)
Information - Communication	0.0181 (0.0146)	0.0271 (0.0185)	0.0224 (0.0149)
Finance - Insurance	-0.00308 (0.00374)	-0.00847* (0.00448)	-0.00409 (0.00376)
Real estate	-0.0137 (0.0156)	-0.0208 (0.0190)	-0.0136 (0.0157)
Professional activities	0.0150 (0.0139)	0.0273* (0.0153)	0.0145 (0.0140)
Administrative activities	0.0143 (0.0180)	0.0170 (0.0249)	0.0137 (0.0179)
Support activities	0.0488*** (0.0149)	0.0416** (0.0171)	0.0472*** (0.0146)
Education - Health - Social Security	-0.101*** (0.0306)	-0.119*** (0.0338)	-0.0974*** (0.0314)
Other Services	-0.0144 (0.0170)	-0.00582 (0.0185)	-0.0137 (0.0171)
Domestic affiliates	-0.000782 (0.000727)	-0.00164* (0.000966)	-0.000778 (0.000735)
Country*Year FE	YES	YES	YES
Cell FE	YES	YES	YES
Cluster SE	Spatial	Spatial	Spatial
Observations	92,999	89,588	75,152

Notes: LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. Each variable indicates the number of MNE foreign affiliates in its specific sector. *Domestic affiliates* indicates the number of affiliates with a headquarter located in their same country. In column (2) cells with natural resources are excluded. In column (3) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

Table 7: MNE and conflict - Exploitative and Human Capital sectors

Estimator Dep. Var. Sample	(1)	(2)	(3) LPM Conflict incidence No resources areas	(4) No belliger. areas
Exploitative affiliates (dv)	0.100*** (0.0298)			
Human capital affiliates (dv)	-0.0877** (0.0438)			
# Exploitative affiliates		0.0436*** (0.0110)	0.0444*** (0.0119)	0.0428*** (0.0110)
# Human capital affiliates		-0.0932*** (0.0253)	-0.109*** (0.0250)	-0.0915*** (0.0258)
Country*Year FE	YES	YES	YES	YES
Cell FE	YES	YES	YES	YES
Other sectors affiliates	YES	YES	YES	YES
Domestic affiliates	YES	YES	YES	YES
Cluster SE	Spatial	Spatial	Spatial	Spatial
Observations	92,999	92,999	89,588	75,152

Notes: LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. *Exploitative affiliates (dv)* is a dummy variable taking value 1 if at least one foreign affiliate operating in an extractive sector (agriculture and forestry) is recorded in the cell. *Human capital affiliates (dv)* is a dummy variable taking value 1 if at least one foreign affiliate operating in a sector enhancing locals' human capital (education, health, and social security) is recorded in the cell. *Exploitative affiliates* and *Human capital affiliates* indicate the number of foreign affiliates in each of the two groups. *Other sectors affiliates* indicates the number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups. *Domestic affiliates* indicates the number of affiliates with a headquarter located in their same country. In column (3) cells with natural resources are excluded. In column (4) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

Table 8: IV results

Estimator	(1)	(2)	(3)	(4)
Dep. Var.	LPM	IV	IV	IV
Sample	All	All	Conflict incidence No resources areas	No belliger. areas
# Exploitative affiliates	0.0436*** (0.0110)	0.0896*** (0.0266)	0.0883*** (0.0274)	0.0883*** (0.0272)
# Human capital affiliates	-0.0932*** (0.0253)	-0.1345*** (0.0316)	-0.1406*** (0.0334)	-0.1323*** (0.0324)
Country*Year FE	YES	YES	YES	YES
Cell FE	YES	YES	YES	YES
Other sectors affiliates	YES	YES	YES	YES
Domestic affiliates	YES	YES	YES	YES
Kleibergen-Paap Wald F statistic		19.16	17.93	18.63
First stages				
# Exploitative affiliates				
E.A. Debt * Credit		5.221***	5.155***	5.286***
H.A. Debt * Credit		1.892	2.019	2.052
# Human capital affiliates				
E.A. Debt * Credit		-0.258	-0.382	-0.258
H.A. Debt * Credit		4.033***	4.182***	4.088***
Cluster SE	Spatial	Cell	Cell	Cell
Observations	92,999	92,990	89,579	75,143

Notes: LPM estimation in column (1), IV estimation in columns (2)-(4). Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation, in column (1). In columns (2)-(4) standard errors are clustered at the cell level. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). The last two variables are instrumented how explained in Section 5.2.1. *Other sectors affiliates* indicates the number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups. *Domestic affiliates* indicates the number of affiliates with a headquarter located in their same country. In column (3) cells with natural resources are excluded. In column (4) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded. The section *First stages* reports coefficients of the first stage estimations formalized in equation (3).

Table 9: IV - Sensitivity analysis

	# Exploitative affiliates		# Human capital affiliates		K-P F stat	Obs.
	Coeff	Std. Err.	Coeff	Std. Err.		
Different samples						
(1) Excluding cells with capitals	0.0772***	(0.0219)	-0.108***	(0.0284)	57.50	92,396
(2) Only cells with ever affiliates	0.0752**	(0.0321)	-0.135***	(0.0478)	15.41	2,243
(3) Excluding year 2015	0.0846***	(0.0305)	-0.135***	(0.0301)	13.41	82,658
(4) Excluding South Africa	0.0805**	(0.0334)	-0.180***	(0.0655)	12.22	88,787
(5) Only violent events	0.0766***	(0.0278)	-0.159**	(0.0640)	19.16	92,990
(6) Exploitative affiliates adding resources	0.0408**	(0.0161)	-0.106***	(0.0291)	31.42	92,990
Additional controls						
(7) Precipitations and temperature (both log)	0.0837***	(0.0304)	-0.136***	(0.0297)	13.41	82,638
(8) Region * Year FE	0.0858***	(0.0246)	-0.119***	(0.0302)	49.30	91,197
(9) Region * Year FE and cell-year trends	0.0745**	(0.0369)	-0.159***	(0.0778)	43.60	91,197
(10) Population (Nighttime Lights, till 2012)	0.118***	(0.0450)	-0.196***	(0.0308)	12.92	61,994
(11) Headquarter(s) country fixed effects	0.045**	(0.0207)	-0.087**	(0.0402)	49.61	92,990
Different instruments						
(12) Two instr.: Debt & IFP (H-J p-value=0.488)	0.0856***	(0.0258)	-0.125***	(0.0310)	11.84	92,990
(13) Diff. measure of credit (to all from finance)	0.0883***	(0.0314)	-0.136***	(0.0290)	15.34	82,638
(14) Instr. of closest cell with aff. >0 / distance	0.0539***	(0.0198)	-0.118***	(0.0295)	17.83	92,990

Notes: The table reports IV estimation results from 11 different specifications described in Section 5.2.3. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Only coefficients of the variables *Exploitative affiliates* are and *Human capital affiliates* reported. The first indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. The second indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). *K-P F stat* stands for the Kleibergen-Paap Wald F statistic.

Table 10: Instrument and affiliates' closing

	(1)	(2)	(3)	(4)
Estimator	LPM			
Dep. Var.	Headquarter closing affiliate in cell k year t			
Sample	Only cells with some affiliates			
$Debt_{o,97-06}^m \times Cre_{o,t-1}$	-0.0395*** (0.0103)	-0.0491*** (0.0140)	-0.0383*** (0.0121)	-0.0477*** (0.0151)
Cell FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Headquarter country FE	NO	YES	NO	YES
Headquarter sector FE	NO	NO	YES	YES
Cluster SE	Cell	Cell	Cell	Cell
Observations	10,353	10,351	10,293	10,291

Notes: LPM estimation. Dependent variable: headquarter closing at least one affiliate in cell k year t . ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. $Debt_{o,97-06}^m \times Cre_{o,t-1}$ indicates the instrument used in the main specification, at the headquarter level. It is computed as the interaction between the headquarter's level of dependence on external credit in the decade before the analysis (Bureau Van Dijk), $Debt_{o,97-06}^m$, and an index of credit provided to firms in the headquarter's country (World Bank), $Cre_{o,t-1}$.

Table 11: The impact of conflict on affiliates' closing

	(1)	(2)	(3)	(4)
Estimator			LPM	
Dep. Var.			HQ closing affiliate	
Sample			Only cells with some affiliates	
$Debt_{o,97-06}^m \times Cre_{o,t-1}$	-0.0397** (0.0191)	-0.0515** (0.0234)	-0.0362* (0.0192)	-0.0483** (0.0243)
$Conflict_{k,t}$	0.00679 (0.00421)	0.00656 (0.00421)	0.00666 (0.00434)	0.00625 (0.00438)
$Debt_{o,97-06}^m \times Cre_{o,t-1} \times Conflict_{k,t}$	0.000616 (0.0215)	0.00374 (0.0227)	-0.00239 (0.0218)	0.00117 (0.0235)
Cell FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Headquarter country FE	NO	YES	NO	YES
Headquarter sector FE	NO	NO	YES	YES
Cluster SE	Cell	Cell	Cell	Cell
Observations	10,353	10,351	10,293	10,291

Notes: LPM estimation. Dependent variable: headquarter closing at least one affiliate in cell k year t . ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. $Debt_{o,97-06}^m \times Cre_{o,t-1}$ indicates the instrument used in the main specification, at the headquarter level. It is computed as the interaction between the headquarter's level of dependence on external credit in the decade before the analysis (Bureau Van Dijk), $Debt_{o,97-06}^m$, and an index of credit provided to firms in the headquarter's country (World Bank), $Cre_{o,t-1}$. $Conflict_{k,t}$ is a dummy variable taking value 1 when in cell k at year t at least a conflict event is recorded in the ACLED dataset.

Table 12: Ethnic groups descriptive statistics

	Obs.	Mean	S.D.	Median
# Ethnic groups	86,519	2.07	1.69	1
# Ethnic minorities	56,164	0.41	0.63	0
Share ethnic minorities	53,804	22.83	37.61	0
if affiliates > 0	1,073	7.62	23.25	0

Notes: Author's computation from GREG and EPR.

Table 13: MNE and ethnic minorities

	(1)	(2)	(3)
Estimator		LPM	
Dep. Var.		Conflict incidence	
Sample	All	No resources areas	No belliger. areas
# Exploitative affiliates	0.0238 (0.0157)	0.0258 (0.0160)	0.0206 (0.0158)
# Human capital affiliates	-0.0926*** (0.0339)	-0.115*** (0.0348)	-0.0903*** (0.0350)
Share ethnic minority	0.000362*** (0.000132)	0.000319** (0.000135)	0.000302** (0.000140)
# Exploitative affiliates * Share ethnic minority	0.00126*** (0.000422)	0.00123*** (0.000425)	0.00133*** (0.000419)
# Human capital affiliates * Share ethnic minority	-0.000494 (0.000439)	-0.000364 (0.000521)	-0.000504 (0.000444)
Country*Year FE	YES	YES	YES
Cell FE	YES	YES	YES
Other sectors	YES	YES	YES
Domestic affiliates	YES	YES	YES
Observations	53,789	51,515	45,503

Notes: LPM estimations. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). *Share ethnic minorities* indicates the share of politically unrepresented ethnic groups present in the cell. *Other sectors affiliates* indicates the number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups. *Domestic affiliates* indicates affiliates with a headquarter located in their same country. In column (2) cells with natural resources are excluded. In column (3) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

Table 14: Large-scale land acquisition descriptives

	Obs.	Mean	S.D.	Median	Min	Max
A. Land deal level						
Size of land deal (sq. km)	230	57.39	103.94	20	0.02	620
Share of region under land deal (percentage points)	230	0.30	0.68	0.03	0.00	5.47
B. Cell-year level						
Share of region under land deal (percentage points)						
all cells	92,999	0.0031	0.0687	0	0	5.4740
if land deal > 0	2,670	0.1095	0.3911	0.0155	0.0004	5.4740

Notes: Author's computation from LandMatrix data.

Table 15: Large-scale land acquisition

Estimator Dep. Var. Sample	(1)	(2)	(3)	(4)	(5)	(6)
			LPM Conflict incidence			
	All	All	No resources areas	No resources areas	No belliger. areas	No belliger. areas
# Exploitative affiliates	0.0436*** (0.0121)	0.0435*** (0.0122)	0.0445*** (0.0126)	0.0428*** (0.0121)	0.0443*** (0.0127)	0.0427*** (0.0123)
# Human capital affiliates	-0.0928*** (0.0254)	-0.0926*** (0.0258)	-0.109*** (0.0261)	-0.0911*** (0.0258)	-0.109*** (0.0266)	-0.0906*** (0.0262)
Land deal (% of region area)	-0.0156 (0.0168)		-0.0269 (0.0169)	-0.0112 (0.0168)		
# Exploitative affiliates * Land deal (% of region area)	0.00608** (0.00265)		0.00716*** (0.00261)	0.00554** (0.00268)		
# Human capital affiliates * Land deal (% of region area)	-1.986 (2.118)		-1.776 (2.315)	-2.077 (2.130)		
Contract signing		-0.00412*** (0.00150)			-0.00391*** (0.00150)	-0.00371** (0.00151)
# Exploitative affiliates * Contract signing		0.00102 (0.00742)			0.000867 (0.00752)	0.00181 (0.00735)
# Human capital affiliates * Contract signing		-0.0164 (0.0237)			-0.0119 (0.0284)	-0.0246 (0.0270)
Country*Year FE	YES	YES	YES	YES	YES	YES
Cell FE	YES	YES	YES	YES	YES	YES
Other sectors	YES	YES	YES	YES	YES	YES
Domestic affiliates	YES	YES	YES	YES	YES	YES
Observations	92,990	92,990	89,579	75,143	89,579	75,143

Notes: LPM estimations. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). *Land deal (% of region area)* indicates the share (in percentage points) of the cell's region which is target of land grabbing, at the year when the production of the LSLA starts. *Contract signed* is a dummy variable taking value 1 if the cell is in an area target of a large-scale land acquisition signed in the same year. *Other sectors affiliates* indicates the number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups. *Domestic affiliates* indicates the number of affiliates with a headquarter located in their same country. In columns (3) and (4) cells with natural resources are excluded. In column (5) and (6) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

Appendix

A MNE data

Here I provide some additional data on MNE affiliates and on the validity of the dataset. Table A1 shows the distribution of MNE affiliates by African countries. South Africa represents a large share of the sample, therefore I perform robustness exercises excluding it to be sure my results are not driven by this single country.

To the best of my knowledge, there are only two dataset, both cross-section for the year 2010, mapping the worldwide population of MNE, both at the headquarter and affiliates level (UNCTAD, 2011; Altomonte and Rungi, 2013). Here I provide evidence of the validity of the novel dataset I elaborated for this work, which consist in the panel version of these two previous datasets. Figure A1 shows the comparison between the datasets Altomonte and Rungi (2013) and UNCTAD (2011). Each point represent a country, in 2010. On the x-axis there is the (log of) number of MNE headquarters, while on the y-axis the corresponding number of MNE headquarters in that specific country. A perfect correlation would be visualized by a straight 45° line. In this case the correlation between the two datasets is 0.93. On the right panel, instead, with the same logic, I plot the number of affiliates. In this case the correlation is 0.94.

Figure A2 repeats the same exercise, but comparing the dataset elaborated for this work and UNCTAD (2011). Here the correlations are respectively 0.91 and 0.94.

Table A2, instead, compares the aggregate numbers between my dataset and Altomonte and Rungi (2013).

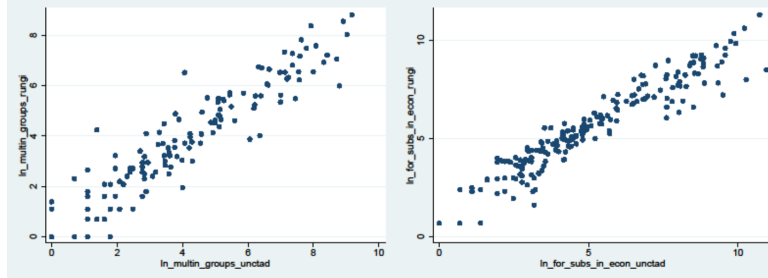
The possible sources of differences between these three dataset are: (i) UNCTAD (2011) refers to data in 2009, Altomonte and Rungis data are updated to 2010, my data are updated to 2015; (ii) Bureau Van Dijk changes a significant amount of information

Table A1: Affiliates country-year

Country	2007	2008	2009	2010	2011	2012	2013	2014	2015
Algeria	81	110	146	172	184	180	171	163	186
Angola	29	40	44	55	55	55	56	82	91
Benin	8	7	13	12	8	9	13	15	15
Botswana	10	9	9	11	13	12	10	19	29
Burkina Faso	4	4	6	6	7	11	13	15	15
Burundi	0	1	1	2	1	3	1	1	3
Cameroon	31	31	39	38	36	33	41	34	37
Cape Verde Is.	7	12	11	13	9	11	8	13	14
Central African R	0	0	0	0	0	1	0	1	1
Chad Republic	3	5	3	3	4	4	5	6	7
Comoros	0	0	0	0	0	1	2	2	2
Congo	8	9	11	14	14	16	18	20	27
DR Congo	5	7	10	10	10	14	15	12	18
Djibouti	1	2	2	2	0	0	2	2	2
Egypt	33	48	49	55	66	79	91	104	121
Equatorial Guinea	1	1	1	2	2	2	3	2	3
Eritrea	1	1	1	1	1	1	1	1	1
Ethiopia	1	1	0	0	3	4	7	8	8
Gabon R	4	9	9	10	14	17	20	19	20
Gambia	3	3	3	5	5	6	7	7	6
Ghana	6	6	8	6	5	7	8	7	8
Guinea	3	6	4	7	10	15	14	13	12
Guinea-Bissau	0	1	1	1	1	1	0	0	1
Ivory Coast	24	21	32	32	31	32	39	34	58
Kenya	8	7	6	3	5	5	11	10	11
Liberia	1	4	2	4	4	3	4	5	7
Libya	0	0	0	0	0	2	1	4	4
Madagascar	4	6	10	9	9	11	17	18	22
Malawi	7	7	10	11	11	7	11	12	16
Mali	9	11	12	9	8	8	13	12	16
Mauritius	44	53	96	82	106	130	161	178	223
Mauritania	2	2	3	3	3	5	5	4	3
Morocco	218	287	363	422	447	461	531	623	692
Mozambique	29	35	42	50	51	56	55	67	71
Namibia	20	30	41	36	42	49	42	48	52
Niger R	4	7	4	6	2	3	5	5	8
Nigeria	5	8	6	6	6	10	10	9	9
Principe	0	1	1	0	1	1	1	2	2
Rwanda	3	4	3	3	4	5	7	10	11
Senegal R	37	41	58	59	65	66	62	56	60
Seychelles	0	1	1	1	2	1	3	3	3
Sierra Leone	6	7	7	8	7	9	8	8	9
South Africa	815	922	1086	1074	1137	1241	1380	1462	1973
South Sudan	1	1	3	3	2	2	3	3	4
Sudan	7	9	13	12	13	13	14	14	19
Swaziland	21	25	30	30	29	33	36	36	39
Tanzania	12	13	18	19	17	21	24	33	31
Togo	3	5	8	9	9	7	13	14	19
Tunisia	5	6	7	9	7	6	7	10	10
Uganda	5	7	6	8	6	7	6	6	6
Zambia	27	28	38	42	40	43	65	59	74
Zimbabwe	15	17	20	21	22	22	23	21	38

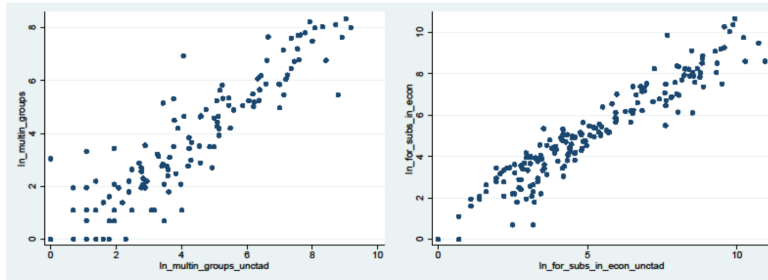
Notes: The table presents the number of foreign affiliates by country and year.

Figure A1: Comparison Altomonte and Rungi (2013) - UNCTAD (2011)



Notes: On the horizontal axis of the left panel we have the (log of the) number of MNE recorded in the UNCTAD (2011) dataset, while on the vertical axis the same variable, but from the dataset elaborated by Altomonte and Rungi (2013). On the right panel, the horizontal axis is again the (log of the) number of affiliates in the UNCTAD (2011) dataset, while on the vertical axis the same variable elaborated by Altomonte and Rungi (2013).

Figure A2: Comparison Sonno - UNCTAD (2011)



Notes: On the horizontal axis of the left panel we have the (log of the) number of MNE recorded in the UNCTAD (2011) dataset, while on the vertical axis the same variable, but from the dataset elaborated for this paper. On the right panel, the horizontal axis is again the (log of the) number of affiliates in the UNCTAD (2011) dataset, while on the vertical axis the same variable elaborated for this paper.

Table A2: Aggregates Altomonte and Rungi (2013) - Sonno

Altomonte and Rungi (2013)	Sonno
270,374 headquarters	272,729 headquarters
1,519,588 affiliates	1,837,630 affiliates
207 countries	212 countries

providers in the last years, also for very large countries like the US and Canada; (iii) Altomonte and Rungi have excluded the data point on China, since the country does not adopt the international standard definition of control ($>50.01\%$) in reporting the number of affiliates, preferring a less committal criterion of foreign-funded enterprises, leading to non-comparable figures.

B Role of domestic affiliates

Here I replicate Table 6 and Table 7 focusing on domestic affiliates, namely those affiliates having the headquarter in the same country where they are located.

Table A3: Domestic MNE and conflict - All sectors

	(1)	(2)	(3)
Estimator		LPM	
Dep. Var.		Conflict incidence	
Sample	All	No resources areas	No belliger. areas
Agriculture - Forestry	-0.0138 (0.0112)	-0.0140 (0.0136)	-0.0119 (0.0112)
Fishing	-0.0195 (0.0576)	0.0160 (0.0491)	-0.0215 (0.0576)
Resources	0.0138 (0.0171)	0.0102 (0.0181)	0.00538 (0.0175)
Manufacturing - Industries	0.00353 (0.00430)	0.00312 (0.00539)	0.00332 (0.00431)
Construction	-0.0122 (0.0124)	-0.00764 (0.0157)	-0.0128 (0.0125)
Wholesale - Accommodation	0.0140** (0.00707)	0.0153 (0.01898)	0.0133* (0.00693)
Information - Communication	0.0116* (0.00702)	0.0132 (0.0119)	0.0119* (0.00712)
Finance - Insurance	-0.0111** (0.00459)	-0.0107 (0.01592)	-0.00927** (0.00444)
Real estate	-0.00149 (0.0101)	-0.00668 (0.0128)	-0.00224 (0.0100)
Professional activities	-0.0239** (0.00995)	-0.0245** (0.0117)	-0.0234 (0.02000)
Administrative activities	0.0348* (0.0200)	0.0110 (0.0194)	0.0338* (0.0204)
Support activities	-0.0317** (0.0160)	-0.0248 (0.0199)	-0.0298* (0.0163)
Education - Health - Social Security	-0.0303* (0.0170)	-0.0239 (0.0151)	-0.0295* (0.0169)
Other Services	0.00892 (0.00841)	0.000427 (0.0110)	0.00808 (0.00848)
Foreign affiliates	0.00156 (0.00154)	0.00206 (0.00191)	0.00161 (0.00153)
Country*Year FE	YES	YES	YES
Cell FE	YES	YES	YES
Cluster SE	Spatial	Spatial	Spatial
Observations	92,997	89,586	75,150

Notes: LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. Each variable indicates the number of MNE domestic affiliates in its specific sector. In column (2) cells with natural resources are excluded. In column (3) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

Table A4: Domestic MNE and conflict - Exploitative and Human Capital sectors

	(1)	(2)	(3)	(4)
Estimator			LPM	
Dep. Var.			Conflict incidence	
Sample	All	All	No resources areas	No belliger. areas
Exploitative affiliates (dv)	0.00219 (0.0387)			
Human capital affiliates (dv)	-0.0249 (0.0511)			
# Exploitative affiliates		0.000202 (0.00461)	0.000551 (0.00487)	0.000440 (0.00460)
# Human capital affiliates		-0.0186 (0.0114)	-0.0151 (0.0114)	-0.0185 (0.0113)
Country*Year FE	YES	YES	YES	YES
Cell FE	YES	YES	YES	YES
Other sectors	YES	YES	YES	YES
Foreign affiliates	YES	YES	YES	YES
Cluster SE	Spatial	Spatial	Spatial	Spatial
Observations	92,997	92,997	89,586	75,150

Notes: LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. *Exploitative affiliates (dv)* is a dummy variable taking value 1 if at least one domestic affiliate operating in an extractive sector (agriculture and forestry) is recorded in the cell. *Human capital affiliates (dv)* is a dummy variable taking value 1 if at least one domestic affiliate operating in a sector enhancing locals' human capital (education, health, and social security) is recorded in the cell. *Exploitative affiliates* and *Human capital affiliates* indicate the number of domestic affiliates in each of the two groups. *Other sectors affiliates* indicates the number of domestic affiliates operating in sectors neither belonging to the extractive or human capital groups. *Foreign affiliates* indicates the number of affiliates with a headquarter located in a different country. In column (3) cells with natural resources are excluded. In column (4) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

C Different sectors aggregation

In Table A5 I replicate the correlations presented in Table 6, but applying the Nace sectors aggregation. As we can see, the results are confirmed.

Table A5: MNE and conflict - Nace aggregation

Estimator Dep. Var. Sample	All	LPM Conflict incidence	
		No resources areas	No belliger. areas
Agriculture and forestry	0.0378** (0.0162)	0.0431** (0.0174)	0.0380** (0.0165)
Fishing	-0.0386 (0.0810)	-0.0333 (0.0810)	-0.0367 (0.0813)
Mining and quarrying	-0.00693 (0.0125)	-0.000312 (0.0154)	-0.00590 (0.0137)
Manufacturing	0.00104 (0.00610)	0.000290 (0.00594)	0.00107 (0.00608)
Electricity, gas, steam and air conditioning supply	-0.00857 (0.0476)	-0.0154 (0.0463)	-0.0112 (0.0481)
Water supply; sewerage, waste management and remediation activities	-0.000281 (0.0409)	-0.0221 (0.0461)	-0.00229 (0.0411)
Construction	0.0190 (0.0143)	0.0324*** (0.0117)	0.0185 (0.0143)
Wholesale and retail trade; repair of motor vehicles and motorcycles	-0.00252 (0.00656)	0.000712 (0.00800)	-0.00313 (0.00664)
Transportation and storage	0.00345 (0.0205)	0.00282 (0.0188)	0.00458 (0.0207)
Accommodation and food service activities	-0.00769 (0.0124)	-0.00867 (0.0138)	-0.00625 (0.0125)
Information and communication	0.0217 (0.0147)	0.0336* (0.0188)	0.0269* (0.0150)
Financial and insurance activities	-0.00315 (0.00396)	-0.00998** (0.00488)	-0.00419 (0.00399)
Real estate activities	-0.0100 (0.0168)	-0.0219 (0.0195)	-0.00978 (0.0168)
Professional, scientific and technical activities	0.0162 (0.0135)	0.0283* (0.0154)	0.0158 (0.0136)
Support activities	0.0471*** (0.0151)	0.0415** (0.0170)	0.0459*** (0.0148)
Administrative activities	0.0149 (0.0191)	0.0237 (0.0260)	0.0139 (0.0189)
Public administration and defence; compulsory social security	-0.259*** (0.0258)	-0.262*** (0.0250)	-0.261*** (0.0258)
Education	-0.132*** (0.0478)	-0.179*** (0.0528)	-0.131*** (0.0482)
Human health and social work activities	-0.0538* (0.0301)	-0.0424 (0.0297)	-0.0413 (0.0310)
Arts, entertainment and recreation	0.0143 (0.0401)	0.0241 (0.0390)	0.0142 (0.0400)
Other service activities	0.0110 (0.0780)	0.0788 (0.0971)	0.0138 (0.0784)
Activities of households as employers	-0.0344** (0.0153)	-0.0291 (0.0184)	-0.0340** (0.0153)
Activities of extraterritorial organisations and bodies	0.0195 (0.0571)	0.0246 (0.0577)	0.0201 (0.0570)
Domestic affiliates	-0.000975 (0.000701)	-0.00204** (0.000946)	-0.00102 (0.000705)
Country*Year FE	YES	YES	YES
Cell FE	YES	YES	YES
Observations	92,999	89,588	75,152

Notes: LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. Each variable indicates the number of MNE foreign affiliates in its specific sector. In column (2) cells with natural resources are excluded. In column (3) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

D Proportional effect?

In Table A6 I study whether the effect described in Table 7 are proportional with respect to the number of MNE affiliates. To do so, I create dummy variables (for both sectors *exploitative* and *human capital*) assuming value one when the number of affiliates are either 1, 2, 3, or 4 and more than 4. As the results show, the effect of exploitative affiliates seems to be concentrated around the cell-years with one or three affiliates, while the effect of human capital affiliates is present in any cluster, with a magnitude proportional with the number of affiliates.

Table A6: Proportionality of the effect

Estimator	(1)	(2)	(3)
Dep. Var.		LPM	
Sample	All	Conflict incidence No resources areas	No belliger. areas
Exploitative affiliates = 1	0.0677* (0.0368)	0.0628 (0.0385)	0.0704* (0.0380)
Exploitative affiliates = 2	0.0493 (0.0495)	0.0384 (0.0558)	0.0456 (0.0526)
Exploitative affiliates = 3	0.146** (0.0581)	0.194*** (0.0578)	0.144** (0.0583)
Exploitative affiliates ≥ 4	0.00945 (0.0523)	0.0117 (0.0629)	0.00772 (0.0526)
Human capital affiliates = 1	-0.0976** (0.0414)	-0.125*** (0.0449)	-0.0954** (0.0435)
Human capital affiliates = 2	-0.162*** (0.0349)	-0.157*** (0.0364)	-0.163*** (0.0353)
Human capital affiliates = 3	-0.209*** (0.0475)	-0.208*** (0.0530)	-0.209*** (0.0476)
Human capital affiliates ≥ 4	-0.281** (0.133)		-0.285** (0.134)
Observations	92,990	89,579	75,143

LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). Controlling for: Cell FE, Country $\times$ Year FE, other sectors affiliates (number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups), domestic affiliates (number of affiliates with a headquarter located in their same country). In column (2) cells with natural resources are excluded. In column (3) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.

E MNE and conflict correlations robustness

Table [A7](#) presents a set of robustness checks to Table [7](#). First, one could argue that MNE might decide to locate their affiliates all in the capital, therefore I exclude cells withing the capitals. I then restrict the sample only to cells where there is at least one affiliate during the period analyzed. I exclude the year 2015, to be sure results are not driven by the sharp increase in affiliates in the latter year. Being South Africa the country with the higher number of affiliates, I exclude it from the analysis to be sure results are not driven by this single country. I then focus only on violent events. Results are robust also if I control for (the log of) precipitation and (the log of) temperature, at the cell-year level. I then control for population changes using nighttime lights data. In the last set of robustness checks I first replicate the results with a different estimation procedure, namely a MLE logit strategy, then with the same methodology I exclude cells with resources and particularly belligerent cells.

Table A7: MNE and conflict - Exploitative and Human Capital sectors robustness

	# Exploitative affiliates		# Human capital affiliates		Cluster SE	Obs.
	Coeff	Std. Err.	Coeff	Std. Err.		
Different samples						
Excluding cells with capitals	0.0609***	(0.0149)	-0.0989***	(0.0272)	Spatial	92,414
Only cells with ever affiliates	0.0305**	(0.0123)	-0.0709*	(0.0386)	Spatial	2,396
Excluding year 2015	0.0416***	(0.0109)	-0.0933***	(0.0224)	Spatial	82,666
Excluding South Africa	0.0445***	(0.0129)	-0.0959*	(0.0497)	Spatial	88,796
Only violent events	0.0343**	(0.0143)	-0.0946**	(0.0375)	Spatial	92,999
Additional controls						
Precipitations and temperature (both log)	0.0414***	(0.0109)	-0.0933***	(0.0225)	Spatial	82,646
Region * Year FE	0.0342*	(0.0197)	-0.0890***	(0.0309)	Spatial	92,999
Population changes (Nighttime Lights, till 2012)	0.0505***	(0.0128)	-0.104***	(0.0381)	Spatial	62,000
Different estimation procedure						
MLE (xtlogit)	0.579***	(0.175)	-1.910*	(1.066)	Cell	27,450
MLE (xtlogit) in no resources cells	0.628***	(0.184)	-2.644**	(1.183)	Cell	26,217
MLE (xtlogit) in no belligerent cells	0.523***	(0.169)	-1.892*	(1.037)	Cell	20,331

Notes: The table reports eight IV (rows 1-8) and three fixed-effect logit (rows 9-11) estimation results from different specifications described above. Dependent variable: conflict incidence (ACLEDE). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Only coefficients of the variables *Exploitative affiliates* are and *Human capital affiliates* reported. The first indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. The second indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). *K-P F stat* stands for the Kleibergen-Paap Wald F statistic.

F Who is the Ugly?

In Table A8 I study whether the results are driven from some specific clusters of headquarters' countries. Following the ISO 3166 sub-region classification I present interactions with the sub-regions where the headquarters are based (Western Asia, Northern Asia, Northern Europe, Western Europe, Northern America). The variables (e.g. *HQ Western Asia*) used for the interactions are dummy assuming value one if at least one affiliate in the cell-year has an headquarter in the respective sub-region. As the results show, there results are not particularly driven by specific groups of countries.

Table A8: Who is the Ugly?

Estimator Dep. Var. Sample	(1)	(2)	(3) LPM Conflict incidence All	(4)
# Exploitative affiliates	-0.0873*** (0.0253)	-0.101*** (0.0266)	-0.0870*** (0.0228)	-0.0925*** (0.0345)
# Human capital affiliates	0.0415*** (0.0125)	0.0422*** (0.0130)	0.0431*** (0.0126)	0.0487*** (0.0126)
# Exploitative affiliates * HQ Western Asia	0.0346 (0.0687)			
# Human capital affiliates * HQ Western Asia	0.0353 (0.0516)			
# Exploitative affiliates * HQ Northern Europe		0.00329 (0.0110)		
# Human capital affiliates * HQ Northern Europe		0.0404 (0.0413)		
# Exploitative affiliates * HQ Western Europe			0.00531 (0.0462)	
# Human capital affiliates * HQ Western Europe			-0.139 (0.109)	
# Exploitative affiliates * HQ Northern America				-0.0122 (0.0108)
# Human capital affiliates * HQ Northern America				-0.000324 (0.0256)
Observations	92,990	92,990	92,990	92,990

LPM estimation. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). These two variables are instrumented how explained in Section 5.2.1. Controlling for: Cell FE, Country×Year FE, other sectors affiliates (number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups), domestic affiliates (number of affiliates with a headquarter located in their same country).

G Neighbouring cells

In Table A9 I present the full result of the specification using as instrument for cells without affiliates the values of affiliates and of instruments of the closest cell with a number of affiliate greater than zero divided by the distance between the two cells. More specifically, below the full results of the specification of row (14) of Table 9 are presented.

In Table A10 I study the impact of neighbouring cells on conflict probability. To do so, I compute the number of exploitative/human capital affiliates in the neighbouring cells divided by their distance. In column (1) we can see that the effect of the number of exploitative/human capital affiliates in the cell remains significant even when we control for the number of affiliates in the two groups of sectors in the neighbouring cells (divided by their distance). Interestingly, only the number of human capital affiliates in the neighbouring cells shows a significant impact on conflict likelihood. This is in line with the evidence presented in the paper. In other words: if some agriculture or forestry activity (e.g. involving land-grabbing) is performed in a cell next to where people live, the latter will not start a conflict, because they are not expropriated of their properties. On the other hand, if a school or an hospital is opened in a cell near the cell where I live, the positive spillover effects of this opening spread around neighbouring cells (e.g. allowing locals to travel to study or to receive medical assistance).⁴⁸ In column (2) the impact of both the number of affiliates in the specific cell and the number of affiliates in the neighbouring cells is analysed (al-

⁴⁸Despite the absolute magnitude of the variable *# Human capital affiliates (neighbouring cells)* is larger, note that one standard deviation increase in the number of human capital affiliates in the neighbouring cells (0.0149) decreases conflict probability by 8% of the sample mean, a smaller effect than one standard deviation increase in the number of human capital affiliates in the cell.

ways weighted by affiliates' distance). Note that, given dimension of the cells, this exercise is the same as analysing the number of affiliates located within a radius of around 100km with respect to the centroid of each cell. All results are confirmed.

Table A9: IV results with closest cell with affiliates > 0 weighted by distance

Estimator	(1)	(2)	(3)	(4)
Dep. Var.	LPM	IV	IV	IV
Sample	All	All	Conflict incidence No resources areas	No belliger. areas
# Exploitative affiliates	0.0436*** (0.0110)	0.0539*** (0.0198)	0.0568*** (0.0207)	0.0544*** (0.0202)
# Human capital affiliates	-0.0932*** (0.0253)	-0.118*** (0.0295)	-0.124*** (0.0301)	-0.118*** (0.0304)
Country*Year FE	YES	YES	YES	YES
Cell FE	YES	YES	YES	YES
Other sectors affiliates	YES	YES	YES	YES
Domestic affiliates	YES	YES	YES	YES
Kleibergen-Paap Wald F statistic		17.83	16.45	17.10
First stages				
# Exploitative affiliates				
E.A. Debt * Credit		7.010***	6.848***	6.965***
H.A. Debt * Credit		2.232	2.056	2.077
# Human capital affiliates				
E.A. Debt * Credit		-0.226	-0.249	-0.278
H.A. Debt * Credit		4.119***	4.217***	4.065***
Cluster SE	Spatial	Cell	Cell	Cell
Observations	92,999	92,990	89,579	75,143

Notes: LPM estimation in column (1), IV estimation in columns (2)-(4). Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation, in column (1). In columns (2)-(4) standard errors are clustered at the cell level. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). The last two variables are instrumented how explained in Section 5.2.1. *Other sectors affiliates* indicates the number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups. *Domestic affiliates* indicates the number of affiliates with a headquarter located in their same country. In column (3) cells with natural resources are excluded. In column (4) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded. The section *First stages* reports coefficients of the first stage estimations formalized in equation (3).

Table A10: Neighbouring cells

Estimator Dep. Var. Sample	(1)	(2)
		LPM
		Conflict incidence
		All
# Exploitative affiliates (cell)	0.0589** (0.0246)	
# Human capital affiliates (cell)	-0.0860*** (0.0288)	
# Exploitative affiliates (neighbouring cells)	-0.348 (0.603)	
# Human capital affiliates (neighbouring cells)	-3.228** (1.255)	
# Exploitative affiliates (cell + neighbouring cells)		0.0655** (0.0278)
# Human capital affiliates (cell + neighbouring cells)		-0.0975*** (0.0342)
Observations	85,916	85,916

LPM estimation in column (1) and (2), IV estimation in column (3). Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry). *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). The last two variables are instrumented how explained in Section 5.2.1. Controlling for: Cell FE, Country×Year FE, other sectors affiliates (number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups), domestic affiliates (number of affiliates with a headquarter located in their same country).

H Ethnic groups fragmentation

In this section we analyse whether the result obtained in section 6.1 is driven by the ethnic group fragmentation characterizing each cell, instead of the share of politically non-represented ethnic groups. To test this hypothesis, we replicate the analysis presented in section 6.1, but substituting the variable $EthnicMinorities_{k,t}$ with the variable $EthnicGroups_k$, which indicates the number of ethnic groups in cell k . Formally, we estimate the following specification:

$$\begin{aligned} CONFLICT_{k,t} = & \sigma ExploitativeAffiliates_{k,t} + \tau HumanCapitalAffiliates_{k,t} \\ & + \omega EthnicGroups_k \\ & + \eta ExploitativeAffiliates_{k,t} \times EthnicGroups_k \\ & + \phi HumanCapitalAffiliates_{k,t} \times EthnicGroups_k \\ & + FE_k + FE_{r,t} + \Gamma X'_{k,t} + u_{k,t} \end{aligned}$$

We expect the effect of the variable $EthnicGroups_k$ alone to be absorbed by the cell fixed-effects, while we want to test whether the ethnic fragmentation has a role when interacted with the number of exploitative affiliates (η), and/or with the number of human capital affiliates (ϕ). Table A11 confirms that both effects are not statistically significant.

Table A11: Ethnic groups fragmentation

Estimator	(1)	(2)	(3)
Dep. Var.		LPM	
Sample	All	Conflict incidence No resources areas	No belliger. areas
# Exploitative affiliates	0.0353* (0.0181)	0.0307* (0.0186)	0.0306* (0.0179)
# Human capital affiliates	-0.120*** (0.0329)	-0.103*** (0.0389)	-0.114*** (0.0339)
# Ethnic groups	-	-	-
# Exploitative affiliates * # Ethnic groups	0.00387 (0.00740)	0.00619 (0.00826)	0.00593 (0.00743)
# Human capital affiliates * # Ethnic groups	0.00877 (0.0122)	-0.00663 (0.0171)	0.00705 (0.0124)
Country*Year FE	YES	YES	YES
Cell FE	YES	YES	YES
Other sectors	YES	YES	YES
Domestic affiliates	YES	YES	YES
Observations	86,510	83,189	70,049

Notes: LPM estimations. Dependent variable: conflict incidence (ACLED). ***, **, * = indicate significance at the 1, 5, and 10% level, respectively. Conley (1999) standard errors in parenthesis, allowing for spatial correlation within a 500km radius and for infinite serial correlation. *Exploitative affiliates* indicates the number of foreign affiliates operating in an extractive sector (agriculture and forestry) in the cell. *Human capital affiliates* indicates the number of foreign affiliates operating in a sector enhancing locals' human capital (education, health, and social security). *Ethnic groups* indicates the number of ethnic groups present in the cell. *Other sectors affiliates* indicates the number of foreign affiliates operating in sectors neither belonging to the extractive or human capital groups. *Domestic affiliates* indicates affiliates with a headquarter located in their same country. In column (2) cells with natural resources are excluded. In column (3) cells belonging to Nigeria, Libya, Sudan, South Sudan, and Somalia are excluded.