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Firm Responses to Violent Conflicts

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February 2021

Abstract

We estimate dynamic treatment effects of violent political conflicts on firm decisions to purchase inventory. We analyze monthly purchase data of 431 clients of a multinational beverage firm in Mozambique, as well as annual survey data. Firms respond to increases in conflict by decreasing purchases of inventory by up to 15%. This effect is significantly more pronounced for smaller firms. Firms exposed to violent conflicts also show greater intention to expand to less violent locations. The eruption of violent conflicts have significant short-term economic impact for small firms however, these do not persist beyond 2 months.

Keywords: Conflicts, Inventory Management, Working Capital Management, Developing Countries

JEL Classifications: D22, D74, G31, I32, O12

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1 Introduction

A large fraction of the world’s population lives in regions affected by violent conflicts and instability. In 2016, more countries experienced violent conflicts than at any point in the last 30 years (United Nations, 2020). Violent conflicts such as war and terrorism can severely disrupt economic activity and determine the way economic agents behave. At the macro level, the economic causes and consequences of armed conflicts are documented by Collier (1999), Abadie and Gardeazabal (2003), Cerra and Saxena (2008) and Compaore et al. (2020). At the micro-level, the effort to understand the economics of violent conflicts has mostly focused on individuals, households and local communities (Verwimp et al., 2019). In particular, researchers have studied the impact of violent conflicts on health, education, and individuals’ attitudes towards risk (Blattman and Miguel, 2010, Voors et al., 2012, Brown et al., 2019, Jakiela and Ozier, 2019). Very rarely have researchers focused on the impact for the business sector (Guidolin and La Ferrara, 2007, Klapper et al., 2013).

This paper studies the impact of violent conflicts on firms’ decisions in the context of developing countries. We use monthly variation in violent political conflicts at the province level in Mozambique to estimate dynamic treatment effects on firm decisions to purchase inventory. Episodes of violence are one of the biggest challenges of central and local governments, and are a permanent source of instability in the country. Managers in Mozambique have identified instability as one of the biggest barriers to business activity (England, 2015).¹ This reality is not circumscribed to Mozambique as other African countries struggle to contain the eruption of violent political conflicts (figure A1).²

The analysis of inventory purchases is relevant to understand the impact of conflict on business activity and investment as inventory may represent a significant part of firms’ working capital investment.³ Firms might respond to violent conflicts by purchasing less inventory in anticipation of a decrease in consumer demand, for precautionary reasons as violence might lead to property destruction, or because their operations are disrupted. Instead, in the short, run firms might decide to increase their inventory despite an expected decrease in consumer demand if they anticipate the conflict to escalate and disrupt supply chains in the future. Overall, the magnitude and persistence of these effects are unknown. The heterogeneity of the impact across firms of different size is also unclear. Larger firms are expected to be more sophisticated responding to demand changes and for this reason manage inventories more actively. Smaller firms might be

¹Similarly, the World Bank Enterprise Survey (2018) reports “Crime, Thefts and Disorder” as one of the greatest obstacles for firms in Mozambique. Around 10% of participating managers identify this obstacle as the most impactful out of 15 different obstacles. “Corruption”, “Access to Finance”, and “Practices of the Informal Sector” are also mentioned as important.

²Although less frequent, politically motivated conflicts also take place in developed countries and may carry adverse consequences to the business sector, such as the “yellow vests” movement in France or the “Black Lives Matter” protests after George Floyd’s killing in the US.

³Investment in inventories has been shown to respond to macroeconomic trends (Gertler and Gilchrist, 1994, Kashyap et al., 1994), but also to changes in local demand (Blinder, 1982), the adoption of information technologies (McCarthy and Zakrajšek, 2007), financial constraints (Carpenter et al., 1998, Mendes, 2020, Kim, 2021) or an increase in financial literacy of managers (Custodio et al., 2020).

more exposed to violence and crime, and face more severe disruption. In addition, firm size can be correlated with other factors such as financial constraints, risk management and mark-ups (Klapper et al., 2013), which may exacerbate the impact of conflict.

To understand firm responses to violent conflicts, we run firm fixed effects regressions of monthly purchases of 431 client firms of a large multinational beverage firm on one-month lagged *Occurrence of political conflicts*. Conflict measures use data from *The Armed Conflict Location and Event Data* that is defined at the province-month level. We control for average temperature, monthly inflation and GDP quarterly growth, as these variables may be correlated with consumer demand for beverages and the occurrence of conflicts. We also estimate treatment effects using leads and lags of the occurrence of political conflicts in each province. This approach addresses the concern that treatment status of each province changes over time as the conflicts occur, which may cause traditional difference-in-differences estimates to be biased.

We find that firms exposed to conflicts on a given month significantly reduce their inventory purchases in the following month when compared to control firms. Our results are economically relevant: we find a reduction of 11% to 15% in inventory purchases following the occurrence of at least one violent conflict. These results are robust to different *time* fixed effects specifications, which capture time trends and the seasonality of the consumption of beverages. This effect is driven by smaller firms, which experience a 18-20% stronger decline when compared to large firms. This finding does not seem consistent with violent conflicts impacting firms through disruptions in supply (e.g. delayed or cancelled deliveries). Under that hypothesis, one should expect a negative impact on large firms as well.⁴ Similarly, our results suggest that reductions in purchases are not driven by an aggregate decrease in demand at the province level, as only small firms are affected. It may still be the case though that smaller firms are located in areas within the province that are particularly affected by the conflicts and local demand is driving these heterogeneous results.

Next, we investigate whether the impact persists over time. We find that the negative effect of the occurrence of political conflicts on small firms persists for two months, period beyond which we do not observe any difference between affected and unaffected firms. This evidence suggests that the impact of violent conflicts on small firms' outcomes is significant but short-lived, and most likely due to increased uncertainty rather than capital or property destruction. This interpretation is consistent with Bloom (2009), who finds that uncertainty reduces investments because firms assume a "wait and see" attitude or Abadie and Gardeazabal (2008) who show that terrorism may impact the mobility of productive capital even if it destroys only a small fraction of the stock of capital in a country. We also find that firms do not adjust inventory purchases in anticipation of future conflicts.

⁴This interpretation relies on the assumption that the multinational beverage company does not apply differentiated distribution policies to small and large firms in conflict areas.

We complement the previous analysis with data from *The Survey of Mozambican Manufacturing Firms* to test the validity of the findings in other sectors of activity. This survey was conducted in 2017 for more than 500 manufacturing firms in 7 Mozambican provinces. By analyzing the manufacturing sector, we extend the analysis from a setting based on finished goods inventory (beverages) to one where intermediate inputs inventory have more relevance.⁵ First, we document a negative impact of violent political conflicts on small firms' total revenue. An increase in conflicts from 2015 to 2016 is associated with a drop in total revenues of 11.7 percentage points. This outcome is important as it measures the economic impact of conflict on firms' turnover (including potential changes in consumer demand or prices). We also find that an increase in the number of violent political conflicts affects negatively the purchase of intermediate inputs in small firms (21.5 percentage points lower relative to larger firms). Thus, we find consistent evidence that smaller firms' inventory purchases are more affected by conflicts in both data. This result persists after controlling for changes in revenue to capture the correlation between total input value and product demand. This evidence suggests that firms adjust purchases for precautionary motives and not only due to decreased demand. Last, we find that managers of firms exposed to an increase in violent conflicts are more likely to express their will to expand to less violent areas, which suggests that managers incorporate the occurrence of conflicts in their strategic decisions.

The literature on the economic consequences of violent conflicts at the micro level is not very extensive. Klapper et al. (2013), Collier and Duponchel (2013) and Mishra and Ongena (2020) are among the few studying the impact of violent conflicts directly on firm outcomes. Collier and Duponchel (2013) propose that the loss of workers' skills is a possible channel through which firm performance is affected, while Mishra and Ongena (2020) document that interest rates increase following shelling incidents in Indian border areas. Other studies focus on stock market returns to circumvent data limitations. For instance, Abadie and Gardeazabal (2003) find that the cease-fire announcement by the Basque Terrorist group ETA led to positive excess returns of firms in the region, while Guidolin and La Ferrara (2007) find that the end of Angolan civil war in 2002 had a negative effect on local diamond mining firms' stock prices. They propose that conflicts might benefit incumbent firms because they helped to deter new entrants. Verdickt (2018) provides indirect evidence on the economic impact for corporations by showing that the anticipation of war conflicts results in decreased stock market returns over the period 1885-1913. A limitation with this approach is that stock market data is usually scarce in developing countries, as only few firms are listed. A broader body of research have been focusing on the determinants of conflicts: war and terrorism financing (Abadie, 2006, Shapiro, 2007, Dube and Vargas, 2013, Limodio, 2019, Crost and Felter, 2020), potential triggers of violent conflicts,

⁵The effect of conflicts on purchases of these two different types of inventory is non-trivial, as in the case of intermediate inputs there might be a longer period between purchase and market placement, and thus a lower sensitivity to changes in demand.

such as social media propaganda (Yanagizawa-Drott, 2014), ethnic divisions (Esteban et al., 2012), unequal access to development projects (Crost et al., 2014), trade shocks (Martin et al., 2008), scarcity of natural resources (Berman et al., 2017, Armand et al., 2020, McGuirk and Nunn, 2020), or childhood exposure to illegal activities (Sviatschi et al., 2018).

We contribute to the literature on the economic consequences of violent conflicts with new evidence on firms’ responses. Understanding the impact of conflict on firm outcomes is important because the private sector is an important driver of growth in developing countries (OECD, 2007). The data used in this paper allow to study how firms adjust their inventory purchases at a very granular level and with high frequency. Such effects are difficult to estimate using annual financial data, traditionally more readily available. Another important aspect of the purchases data is that it is not self-reported, but rather disclosed by a reliable source (in this case by Barclays Bank Mozambique). Our findings are particularly relevant given the lack of evidence on firms’ inventory investment decisions under uncertainty, particularly in developing countries affected by violent conflicts.

2 Data and Methodology

We combine data on monthly purchases of client firms from a large multinational beverage company operating in Mozambique, with data on local violent political conflicts. We exploit geographical occurrence of violent conflicts over time to study whether firms respond to this type of shocks by adjusting their inventory purchases. In addition, we use annual data from the *Survey of Mozambican Manufacturing Firms* to study additional firm-level outcomes and a broader set of industries.

2.1 Inventory Purchases

We use panel data on monthly purchases of more than 650 client firms of a large multinational beverage company between January 2016 and October 2017.⁶ This dataset is property of Barclays Bank Mozambique under an agreement between the bank and the large multinational beverage company. We obtained access to this dataset through Barclays. Its administrative nature, in particular because it is prepared by a large multinational company, contrasts with census or self-reported information common in projects in developing countries (Klapper et al., 2013). We build the variable *Log (Monthly Purchases)* defined as the natural logarithm of one plus the monthly inventory purchases. The firms in our sample operate in wholesale/retail trade (warehouses, supermarkets, grocery stores, stalls) and accommodation and food services (restaurants,

⁶Our sample period is in line with other panels used in research in Sub-Saharan African countries (Söderbom and Teal, 2004, Van Biesebroeck, 2005). Monthly purchases are expressed in Meticals (Mts), the official currency of Mozambique.

hotels and cafes and gas stations). Therefore, we analyze a setting whose inventories are almost entirely finished goods (Blinder and Maccini, 1991).

We complement this dataset with information on firms’ location (province). When we are not able to retrieve the location from the firm’s registration name, we extract it via *web search*. We use websites such as yellow pages, *LinkedIn* and *TripAdvisor*. In a few cases, different observations correspond to different establishments of the same business group. We treat these cases as individual firms. We were able to obtain the location of 431 firms.

2.1.1 Political Conflicts

We focus on violent political conflicts: actions involving the use of force by a group with a political purpose or motivation. Politically violent actors include governments, rebels, militias, and organized political groups who interact over issues of political authority. This type of conflicts is a permanent source of instability in many developing countries, especially in Africa (Blattman and Miguel, 2010).

Political conflicts in Mozambique have traditionally been localized low-level armed conflicts. A major source of instability is the permanent conflict opposing RENAMO (the “Mozambican National Resistance” party) and the government party Frelimo. Episodes of violence in Mozambique are one of the biggest challenges of central and local government bodies, and have been identified as one of the biggest barriers to economic growth and business activity (Macuane (2018), World Bank (2018)).

The data on violent political conflicts was obtained from ACLED - *The Armed Conflict Location and Event Data* platform. This database compiles information on violent political conflicts in several regions of the globe, including type, dates, actors, locations, and fatalities. The types of events registered in Mozambique include *Violence against civilians*, *Riots*, *Explosions/Remote violence Battles*, *Strategic Developments* and *Protests*. In figure A2, we present the monthly aggregate number of violent political conflicts in Mozambique between 2010 and 2019. Conflicts have been permanent throughout the last decade and have significantly worsened in recent years.

Since this dataset records events by day, its frequency is suitable to test our hypothesis (as we observe monthly purchases). It contrasts with other existing datasets on instability or crime waves over longer periods of time. We aggregate the number of violent political conflicts per month, by province and build the variable *Occurrence of political conflicts*, a dummy variable taking the value of 1 if at least one conflict was registered in a given province, in a given month.

2.1.2 Methodology

In order to examine the impact of political conflicts on firms' inventory purchases, we run the following firm fixed effects model:

$$\begin{aligned} \text{Log}(\text{monthly purchases})_{i,t} = & \alpha + \beta \times \text{Occurrence of political conflicts}_{j,t-1} + \gamma_1 \times \text{Average monthly} \\ & \text{temperature}_{j,t-1} + \gamma_2 \times \text{Monthly inflation}_{j,t-1} + \gamma_3 \times \text{GDP Quarterly growth}_{q-1} + \delta_i + \delta_t + \epsilon_{i,t} \end{aligned} \quad (1)$$

Where i , j , t and q denote firm, province, month and quarter, respectively. The coefficient of interest is β , as it represents the *ceteris paribus* effect of one-month lagged *Occurrence of political conflicts* on firms' inventory purchases. We analyze the one-month lagged effect of this variable to guarantee that the political conflict (if any) happens before the purchase decision.

We include the monthly average temperature registered in each province as a control for consumer demand for beverages along the year. We extract this data from the *World Weather Online* and use the capital of the province as the reference point. We also account for macroeconomic conditions over time and across provinces in Mozambique. We extract data on the monthly inflation rate of each province from the Mozambican Institute of Statistics. Additionally, we control for the quarterly GDP growth extracted from the same source.⁷ The inclusion of macroeconomic variables mitigates potential endogeneity in our estimates, as both political conflicts and inventory decisions may be driven by macroeconomic conditions.

We run additional specifications including different *time* fixed-effects: quarter of the year, month of the year, or month fixed effects. Since we control for firm and time fixed effects and other observable macroeconomic characteristics, our estimated impact is arguably net of common macroeconomic trends (Klapper et al., 2013).

We also explore the heterogeneity of the impact of political conflicts across firms of different size. Larger firms are expected to be more sophisticated, to be able to anticipate changes in demand and to manage inventories more actively (and thus adjust their purchases). However, smaller firms might be more exposed to related violence and crime, face higher insurance costs (Aunon-Nerin and Ehling, 2008), and suffer more from severe disruption to their activity. Moreover, firm size can be correlated with various factors such as financial constraints and mark-ups (Klapper et al., 2013), which may exacerbate the impact of conflict. Since we do not observe firm's balance sheet, we classify firms based on their relative position in the average monthly purchases distribution. Specifically, we compute the average monthly purchases for each firm in our sample over the available 22 months. Firms with an average value of monthly purchases below (above) the

⁷The lack of data at the province level prevents us from controlling for economic growth at that level, although we acknowledge that it would be the optimal approach.

corresponding province mean are denoted by *small (large) firms*.⁸ The split within province alleviates the concern that smaller firms might be concentrated in provinces with worse economic conditions. We add an interaction term between *Occurrence of political conflicts*_{*i,t-1*} and *Small firm*. Since we use a non-standard method to classify firms according to size, this definition is not comparable to the conventional definitions usually based on total assets, revenues or the number of employees.

A potential concern with the method above is that the treatment status changes over time as provinces do or do not register conflicts, i.e., control units in a given month might have been treated previously.⁹ The standard difference-in-differences approach is not appropriate in such a setting. To estimate this type of dynamic treatment effects, researchers often use event study specifications. Specifically, they track changes in treatment status using lags (and potentially leads) of the treatment variable. We run the following additional regression for both *small* and *large* firms, where we include leads and lags of the occurrence of political conflicts in each province:

$$\begin{aligned} \text{Log}(\text{monthly purchases})_{i,t} = & \alpha + \sum_{k=-3}^2 \beta_k \times \text{Occurrence of political conflicts}_{j,t+k} + \gamma_1 \times \text{Average monthly} \\ & \text{temperature}_{j,t-1} + \gamma_2 \times \text{Monthly inflation}_{j,t-1} + \gamma_3 \times \text{GDP Quarterly growth}_{q-1} + \delta_i + \delta_q + \epsilon_{i,t} \quad (2) \end{aligned}$$

This specification is also useful to understand if the effect of political conflicts persists over time and if firms are able to anticipate future political conflicts. The coefficients on $t+1$ and $t+2$ may indicate whether firms are able to anticipate the occurrence of political conflicts in month t and internalize it in their inventory decisions (Malani and Reif, 2015). The coefficients on $t-1$, $t-2$ and $t-3$ capture the persistence of the impact of political conflicts on the outcome of interest. As for the coefficient on t , we do not know if purchases happen before or after the occurrence of political conflicts (if any) in that month. As such, one should be careful when interpreting this coefficient.

2.2 Survey of Mozambican Manufacturing Firms

To study the effect of conflicts on inventory purchases, we conduct a complementary approach using data from the *Survey of Mozambican Manufacturing Firms*. This is a comprehensive survey about the business sector in Mozambique and includes questions on firms' performance, main financial indicators, enterprise history and employment. The most recent round of this survey was conducted in 2017 in seven Mozambican provinces. After removing firms for which financial data is missing, we end up with a sample of 466 firms.

⁸We use the province mean instead of the median to make the proportion of small firms conditional on the distribution. Indeed, this results in around 72% of firms being considered small firms.

⁹We believe that this fact should bias our estimates downwards and work against finding a statistically significant effect.

Using this alternative setting, we explore further firm outcomes and analyze whether the effect of conflicts on purchase decisions holds in other industries.

First, we focus on the financial reporting module where managers disclosed annual accounting data for 2015 and 2016. We use this data to calculate changes in *total revenue* and in *total input value*. Then, we examine firms' expansion decisions. Measuring potential expansion decisions is typically difficult for small firms as they usually have geographically concentrated operations. As such, the survey included the following question: "If you were considering expanding your business to another province, which one would you choose?". We use the answers to this question to measure managers' intentions to (hypothetically) expand to other provinces. The outcome variable is a dummy variable that takes the value of 1 if the firm expresses its willingness to expand to a province with a lower percentage variation in conflicts between 2015 and 2016 than the one in which it is currently located (*Expansion to lower $\Delta\%$ conflicts*).

We compute the annual percentage variation in political conflicts in each province and build a variable *Increase in conflicts* that takes the value of 1 if the percentage variation in conflicts from 2015 to 2016 is positive in the province where the firm is located, and zero otherwise.

This data allow to analyze whether the effect of conflicts on firm outcomes holds in other industries. Moreover, we extend the analysis from final consumption goods (beverages) to intermediate inputs. The direction of the effect is non-trivial, as in the case of intermediate inputs there might be a longer period between purchase and market placement, and thus a lower sensitivity to changes in demand. However, this broader setting comes at a cost: because the data is available at an annual frequency, it becomes more challenging to establish a link between conflict and firm outcomes.

2.2.1 Methodology

We first focus on the impact of conflicts on firms' *total revenue* and *total input value*, by performing the following regression:

$$y_{i,2016} = \alpha_0 + \beta_1 \times \text{Increase in conflicts}_{i,2016} + \beta_2 \times \% \text{ growth GDP per capita}_{j,2016} + \epsilon_i \quad (3)$$

Where i and j are firm and province indexes, respectively. The outcome variable, is either *% variation total revenue* or *% variation total input value* between 2015 and 2016. In some specifications, we analyze the heterogeneous effects across firms of different size, by adding the interaction term between *Increase in conflicts* $_{i,2016}$ and *Micro/Small Firm*.¹⁰

We evaluate the firms' adaptation process when exposed to political conflicts. Firstly, in order to com-

¹⁰The classification of firms according to size is based on the number of employees: micro (1 to 4 employees), small (5 to 24), medium or large (25 or higher).

plement the analysis on how firms adjust their inventory purchases when facing political conflicts, we repeat equation 3 with *% variation total input value* as outcome variable, but controlling for *% variation total revenue*. This allows us to control for adjustments in inventory purchases driven by demand-side fluctuations. Then, we focus on how firms may internalize political conflicts in their expansion decisions (*Expansion to lower $\Delta\%$ conflicts_{*i*,2016}*). In line with our first approach, we also control for the annual growth of GDP per capita (2015-2016) for each province (*% growth GDP per capita*), as well as of the expansion province (*% growth GDP per capita (expansion province)*).

2.3 Descriptive Statistics

Table 1 presents summary statistics. Panel A focuses on the variables used in the main estimation. The average monthly purchases is MZN 226 387 (approximately US\$ 3 900). Our sample is predominantly composed of small firms (around 72% of the sample). The mean value of *Occurrence of political conflicts* indicates that at least one political conflict occurred in 78% of the firm-month observations. This figure highlights the frequency of conflicts in the Mozambican territory. In figure 1, we present the annual average number of political conflicts based on the years 2016 and 2017. The provinces of Sofala and Manica are the ones more affected by political conflicts, whereas Gaza, Inhambane and Niassa are the ones with the lowest number of occurrences.¹¹ In the figure on the right, we show the human losses associated with these events, which reflects their severity.

Panel B displays statistics on the answers to the *Survey of Mozambican Manufacturing Firms*. Between 2015 and 2016, the average percentage variation in total revenue was negative (-7.84%), while the total input value increased, on average, by 1.49% during this period. Political conflicts increased in provinces where 62% of our sample firms are located. Regarding the decision to expand, 36% of the respondents consider expanding to a province where the percentage variation in conflicts from 2015 to 2016 was lower than the one in which they are located.

3 Results

In table 2, we document the effect of political conflicts on inventory purchases. We find a negative and statistically significant effect at 5% confidence level. The effect is economically meaningful: the occurrence of (at least) one political conflict in a given month is associated with a 11% reduction in the following month's inventory purchases (column 1 and 5). The effect becomes more sizable (around 15%) when we use month

¹¹For instance, the main Mozambican opposition party RENAMO is responsible for perpetrating a large percentage of political conflicts in Manica (including lootings, killings, property destruction, and vehicles attacks).

of the year fixed effects (column 3).

We investigate if the occurrence of conflicts affects small and large firms differently. In column 2, we find that the overall negative effect is driven by small firms. Small firms reduce purchases by 18.6% more than large firms following the occurrence of a political conflict in their province. Using alternative *time* fixed effects specifications, our results vary from 18 to 20% and are statistically significant at 5% confidence level (columns 4 and 6). These heterogeneous effects suggest that violent conflicts did not disrupt the supply chain distribution at the province level (e.g., delayed or cancelled deliveries to the whole province). In case supply-chain channels were disrupted at the province level we would expect to observe a negative impact on large firms too. It may still be the case though that smaller firms are mostly located in areas within the province that are more affected, and disruption occurs at a local level. We report results using robust standard errors, but our estimates are robust to alternative clustering (table A1).

We then estimate equation 2 where we include leads and lags of the occurrence of political conflicts in each province to address the concern that treatment status changes over time as provinces do or do not register conflict occurrences. This allows to understand if the effect of conflicts persists over time. We plot the coefficients of interest and respective confidence intervals for small and large firms in figure 2. The negative effect of a political conflict persists for two months after its occurrence, period beyond which we do not observe any difference between affected and unaffected firms. Consistent with results in table 2, this result holds for small firms and we do not observe a statistically significant effect for large firms (figure 2b). The evidence of a temporary effect suggests that the impact of violent conflicts on firm outcomes is significant, but short-lived. This suggests the effect of political conflicts to be mostly due to increased uncertainty rather than capital or property destruction as it would likely take longer than two months to replace destroyed capital. This interpretation is consistent with Bloom (2009), who finds that uncertainty reduces investment because firms assume a “wait and see” attitude.

Next, we investigate the effect of political conflicts on firm outcomes using survey data on a sample of manufacturing companies. In panel A of table 3, we show the impact of an increase in conflicts on firms’ total revenues over a one year period. We find a negative non-significant correlation between the increase in conflicts and change in total revenue (column 1). The effect becomes meaningful and statistically significant at 10% level for small firms in column 2. When compared to large firms, an increase in conflict is associated with a decrease in revenues of 11.7 percentage points on average among small firms. Next, we focus on the total value of inputs. Consistent with our previous results, an increase in conflicts over one year period is associated with a negative effect in total input value, although non-statistically significantly. When we analyze the heterogeneous effects of conflict across firm size, we observe a drop in total input value of 21.5 percentage points following an increase in conflict for small firms (comparing to large firms). These results

are consistent with results in table 2, and suggest that the occurrence of conflicts may affect small businesses decisions and performance in several industries.

The change in total input value may not be due to occurrence of conflict but rather due to changes in consumer demand. Although we are not able to perfectly account for potential demand effects unrelated to the conflicts, we control for the change in total revenues in the first two columns of the panel B of table 3. By including this contemporaneous regressor in the analysis, we expect to be able to capture the correlation between total input value and movements in demand, and mitigate the potential omitted variable bias in the coefficient of conflict. We find a more moderate estimate of the impact of conflict on total input value, but the negative effect of conflict on small firm is still statistically significant and sizable (-11.5 percentage points). This result also suggests that firms adjust their inputs beyond the potential demand effects driven by the conflicts, and supports the idea that they reduce their investment in working capital, namely inventory, for precautionary reasons.

Last, we examine non-financial corporate outcomes (columns 3 and 4 of table 3 panel B). We look at the decision to expand operations to other geographical areas analysing managers' answers to a question about an hypothetical geographical expansion. We find that firms in provinces where conflicts increased over one year are 66 to 73% more willing to expand to regions where conflict has not increased as much. In this case, managers of small firms do not behave differently from the ones of large firms. Although large firms do not seem particularly affected by conflict in our previous analysis, managers of these firms also incorporate the occurrence of conflicts in their strategic decisions.

3.1 Interpretation and discussion

One possible challenge to our interpretation that firms respond to conflicts by reducing purchases of inventory is the fact that local economic conditions may correlate both with political conflicts and firms' inventory decisions. Monthly inflation rates at the province level and GDP quarterly growth at the country level in our regression analysis are expected to capture, at least partially, these effects. The monthly frequency of our data allows to link conflict occurrences to firm responses in the short term, which contributes to the internal validity of our estimates. To account for demand-side fluctuations and seasonality, which is likely to impact firm's inventory purchases, we include weather outcomes, as well as different specifications of *time* fixed effects.

If the purchasing pattern of firms in provinces with different likelihood of political conflicts were evolving at a different pace, or if firms in provinces with different likelihood of political conflicts were able to anticipate those and adjusted accordingly our estimates may be biased. By looking at the coefficients for the periods

preceding each conflict, we find no statistically significant difference between these firms, consistent with the parallel trend assumption not being violated (2).

A related concern is that the heterogeneous effects across firm size suffer from a selection bias if smaller firms are located in areas with worse economic conditions, and thus, more prone to violent conflicts. To address this concern, we split firms according to size within province. Thus, we investigate the differences between the smallest and largest firms within each province.

Last, because we only observe purchases from one supplier, our measure may correspond to a small share of each firm’s total input. Nevertheless, by observing purchases from a single supplier, we expect to mitigate the bias arising from heterogeneity in supplier-customer relationships. This could result in different trade conditions such as product quality and trade credit terms. Moreover, because the supplier is fixed, we can reject alternative explanations that are supplier driven (e.g., if the supplier’s central operations or headquarters were affected by the conflicts).

The extent to which our findings can be generalized in terms of timing, geographical focus and sector of activity is not obvious. On the time series dimension, our sample period covers only two years. However, the pattern of conflicts during this period is not qualitatively different from other periods over the last decade (figure A2). We focus on Mozambique as localized political conflicts are on the rise, and involve non-state actors such as political militias and terrorist groups. Many African countries, especially in West and sub-Saharan Africa, exhibit conflicts very similar to Mozambique in type and frequency. Moreover, Mozambique displays a business sector and challenges which in many dimensions resemble other sub-Saharan African economies (World Bank, 2018). Though more developed economies also experience episodes of violent conflicts more work is needed to understand if firms are affected and respond in similar ways.

4 Conclusion

This paper estimates the impact of violent political conflicts on firms decisions to purchase inventory. Using monthly inventory purchase data over two years of clients of a large multinational beverage firm in Mozambique, we find evidence of a significant impact of violent conflicts for firms in developing economies. We document that firms respond to violent conflicts by reducing their purchases of inventory. The effect is economically relevant. Affected firms reduce their purchases in the month following the occurrence of a conflict by as much as 15%. This result is mainly driven by small firms, for which the estimated decrease in inventory purchases is 18% to 20% more pronounced when compared to larger firms. This effect persists for 2 months.

We find consistent evidence using an alternative sample of manufacturing firms. An increase in conflicts from 2015 to 2016 is associated with a decrease in total revenue and total input value, in particular for small

firms. We also find that managers of firms in provinces where conflicts increased from 2015 to 2016 are more likely to hypothetically expand to regions where the change in conflicts is lower.

Our results suggest that small firms are particularly affected in their economic outcomes by violent conflicts when compared to large firms, which might exacerbate already existing differences in performance between them. While previous research on the economic impact of conflicts mostly provides aggregate estimates of these effects, we are able to provide micro-level evidence of such impact. Further research is needed to deepen our understanding of the channels through which violent conflicts affect business decisions.

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5 Tables and Figures

Figure 1. Political conflicts in Mozambique 2016-2017

The figures below show the annual average number of violent political conflicts and associated fatalities, for each province of Mozambique. The annual average is computed using conflicts data of 2016 and 2017, retrieved from *The Armed Conflict Location and Event Data (ACLED)* platform. These include violence against civilians, riots, explosions/remote violence, battles, strategic developments and protests. We aggregate the provinces of Maputo and Maputo city.

Figure 2. Anticipation and persistence of political violence effects on firms' monthly purchases

The figures below depict the estimated coefficients and the 90% and 95% confidence intervals on the coefficients associated with *Occurrence of political conflicts*, based on the specification presented in equation 2. They depict the impact of a political conflict happening at time t on the outcome variable at time $t+k$, where $k \in [-2, 3]$, for both *small* and *large* firms. The coefficients on $t+1$, $t+2$ and $t+3$ show posterior effects of the conflicts and intend to illustrate the persistence of this shock. The coefficients on $t-2$ and $t-1$ intend to illustrate potential anticipation of conflicts. We winsorize monthly purchases at the 1% and 99% percentiles.

(a) *Small Firms*

(b) *Large Firms*

Table 1. Descriptive Statistics

	Obs.	Mean	Std. Dev.	p25	p50	p75
Panel A: Monthly inventory purchases						
Log(monthly purchases)	5578	12.33	2.45	10.82	12.59	14.13
Small firm	5578	0.72	0.45	0.00	1.00	1.00
Ocurrence of political conflicts	5578	0.78	0.41	1.00	1.00	1.00
Average monthly temperature	220	24.00	3.13	22.00	24.00	26.50
Monthly inflation	220	1.07	1.47	0.11	0.85	1.85
GDP quarterly growth (country)	8	0.01	0.08	-0.07	-0.01	0.09
Panel B: Survey of Mozambican Manufacturing Firms						
% variation in total revenue 2015-2016	464	-7.84	35.68	-30.77	-10.00	11.88
% variation in total input value 2015-2016	462	1.49	45.67	-25.00	0.00	22.62
Positive variation in conflicts 2015-2016	465	0.62	0.48	0.00	1.00	1.00
Expansion to a province with lower $\Delta\%$ in conflicts 2015-2016	466	0.36	0.48	0.00	0.00	1.00
Micro/Small firm	466	0.85	0.36	1.00	1.00	1.00
% growth GDP per capita	470	4.14	0.63	3.84	4.27	4.80

This table presents summary statistics for the variables used throughout the paper. Panel A refers to the sample of firms in the dataset disclosed by the Barclays Bank Mozambique (monthly purchases data). *Average monthly temperature* and *Monthly inflation* are province-month level, whilst *GDP quarterly growth* is country-quarter level. All the other variables in this panel are firm-month level. Panel B is composed of firms that answered the *Survey of Mozambican Manufacturing Firms*. All the variables in this panel are firm level.

Table 2. Political violence and firms' monthly inventory purchases

	Log(monthly purchases)					
	(1)	(2)	(3)	(4)	(5)	(6)
L.Occurrence of political conflicts	-0.110 [0.050]	0.017 [0.051]	-0.147 [0.056]	-0.013 [0.054]	-0.110 [0.060]	0.008 [0.056]
L.Occurrence of political conflicts Small firm		-0.186 [0.082]		-0.200 [0.083]		-0.181 [0.083]
L.Average monthly temperature	0.042 [0.014]	0.043 [0.014]	0.066 [0.029]	0.066 [0.029]	0.061 [0.031]	0.061 [0.031]
L.Monthly inflation	0.014 [0.016]	0.015 [0.016]	0.009 [0.018]	0.009 [0.018]	-0.011 [0.050]	-0.011 [0.050]
L.GDP quarterly growth	-0.733 [0.404]	-0.734 [0.404]	0.960 [1.546]	0.954 [1.547]		
Quarter of the year FE	✓	✓				
Month of the year FE			✓	✓		
Month FE					✓	✓
No. Observations	5292	5292	5292	5292	5292	5292

This table presents the results of the model presented in equation 1. For all columns, the dependent variable is $\text{Log}(\text{Monthly purchases})$. Columns 2, 4 and 6 include the interaction term between *L.Occurrence of political conflicts* and *Small firm*, to capture the heterogeneous size effects. Different specifications of *time* fixed effects are estimated: in columns 1 and 2, we include quarter of the year fixed effects; in columns 3 and 4 we include month of the year fixed effects; finally, in columns 5 and 6, we estimate the model using month fixed effects. The distinction between the later two can be illustrated as follows. In the month of the year fixed effects, January 2016 is 1 as well as January 2017. In the month fixed effects, January 2016 is 1 and January 2017 is 13. We winsorize monthly purchases at the 1% and 99% percentiles. All specifications include firm fixed effects. Robust standard errors are reported in brackets.

Table 3. Impact of political conflicts on total revenue, total input value and expansion decisions

Panel A: Revenue and total input value				
	% variation total revenue (1)	% variation total revenue (2)	% variation total input value (3)	% variation total input value (4)
Increase in conflicts	-1.700 [5.902]	8.302 [7.741]	-1.096 [7.681]	17.366 [9.760]
Increase in conflicts Micro/Small Firm		-11.654 [6.340]		-21.464 [7.534]
% growth GDP per capita	3.963 [4.838]	3.769 [4.814]	-1.913 [6.200]	-2.214 [6.083]
No. Observations	464	464	462	462
Panel B: Adaptation & expansion decisions				
	% variation total input value (1)	% variation total input value (2)	Expansion to lower $\Delta\%$ conflicts (3)	Expansion to lower $\Delta\%$ conflicts (4)
Increase in conflicts	-0.050 [6.082]	9.856 [7.094]	0.660 [0.077]	0.729 [0.103]
Increase in conflicts Micro/Small Firm		-11.527 [6.392]		-0.080 [0.084]
% variation total revenue	0.845 [0.057]	0.838 [0.058]		
% growth GDP per capita	-5.798 [4.769]	-5.926 [4.746]	0.143 [0.065]	0.143 [0.065]
% growth GDP per capita (expansion province)			0.119 [0.027]	0.117 [0.027]
No. Observations	462	462	433	433

Panel A of this table shows the correlation between the rise in political conflicts and changes in firms' total revenue and total input value. Both the independent and dependent variables refer to the variation from 2015 to 2016. Panel B shows whether firms adapt to political conflicts either by i) adjusting their inventory purchases (1 and 2); ii) expanding to lower conflict zones (3 and 4). In both panels, we run additional specifications including the interaction term between *Increase in conflicts* and *Micro/Small firm*, to capture the heterogeneous size effects (columns 2 and 4). Robust standard errors are reported in brackets.

6 Online Appendix

Figure A1. Political conflicts in the African continent

The figures below show the annual average number of violent political conflicts in African countries. The annual average is computed using conflicts data over the last decade (2010-2020), retrieved from *The Armed Conflict Location and Event Data (ACLED)* platform.

Figure A2. Evolution of violent political conflicts in Mozambique and GDP growth

This figure plots the monthly aggregate number of violent political conflicts in Mozambique between 2010 and 2019, and also its corresponding centered 5-month moving average (left axis). Additionally, we plot the Mozambican annual GDP growth rate (right axis). The grey-shaded area corresponds to our sample period.

Table A1. Clustered standard errors

Panel A: Province-month level clustered SE	Log(monthly purchases)					
	(1)	(2)	(3)	(4)	(5)	(6)
L.Occurrence of political conflicts	-0.110*	0.017	-0.147**	-0.013	-0.110	0.008
	[0.064]	[0.051]	[0.074]	[0.059]	[0.071]	[0.058]
L.Occurrence of political conflicts * Small firm		-0.186**		-0.200**		-0.181**
		[0.084]		[0.085]		[0.085]
Panel B: Firm level clustered SE						
	(1)	(2)	(3)	(4)	(5)	(6)
L.Occurrence of political conflicts	-0.110*	0.017	-0.147**	-0.013	-0.110	0.008
	[0.062]	[0.058]	[0.073]	[0.060]	[0.076]	[0.061]
L.Occurrence of political conflicts * Small firm		-0.186*		-0.200*		-0.181*
		[0.099]		[0.102]		[0.101]
Quarter of the year FE	✓	✓				
Month of the year FE			✓	✓		
Month FE					✓	✓
No. Observations	5292	5292	5292	5292	5292	5292

This table reports the main coefficients of the regressions used in table 2 with different specifications of clustered standard errors: standard errors clustered at the province-month level (panel A) and standard errors clustered at the firm level (panel B). The remaining controls are omitted. For all columns, the dependent variable is *Log(Monthly purchases)*. Columns 2, 4 and 6 include the interaction term between *L.Occurrence of political conflicts* and *Small firm*, to capture the heterogeneous size effects. Different specifications of *time* fixed effects are estimated: in columns 1 and 2, we include quarter of the year fixed effects; in columns 3 and 4 we include month of the year fixed effects; finally, in columns 5 and 6, we estimate the model using month fixed effects. All specifications include firm fixed effects. Significance Levels: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.