Making Do with What You Have:
Conflict, Firm Performance and Input Misallocation in Palestine*

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Abstract

This paper investigates one specific mechanism through which conflict a ects economic activity. We study the operations of Palestinian firms during the Second Intifada. Using a unique establishment-level dataset, we compare firms' outcomes and input usage over time across districts experiencing differential changes in conflict intensity. We find that firms operating in high conflict districts have significantly lower total and per-worker value of output compared to other firms in the same sector. We show how these same firms are systematically di erent in their relative demand for inputs, as they substitute domestically produced materials for imported ones. Evidence is supporting of the hypothesis that the conflict generates distortions in the functioning and accessibility of markets for inputs, which are disproportionally higher for imported materials. We also find that the conflict a ects disproportionally more those sectors which were more intensive in imported materials and had higher average output value in pre-conflict years. Conflict is thus shown to be particularly harmful for the most productive sectors of the economy.

Keywords: conflict, firms, misallocation, Palestine, Second Intifada.

JEL Codes: D22, D24, N45, O12.

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1 Introduction

Old and new violent conflicts hinder the economic development of countries and a ect the life of millions of people in every region of the world. Half of world nations su ered from civil conflict after 1960, with dramatic negative e ects for their populations on a number of outcomes, including health, education, and psychological well-being (Blattman and Miguel 2010). There is also robust evidence of a negative relationship between conflict and aggregate economic activity (Alesina, Özler, Roubini, and Swagel 1996; Collier, Elliott, Hegre, Hoe er, Reynal-Querol, and Sambanis 2003). Yet, our understanding of the microeconomic mechanisms behind such aggregate e ects is still scarce. Specifically, there is a lack of empirical evidence on how conflict a ects the backbone of the economy, namely the firm. Which firm-level outcomes are impacted by violent conflicts? What are the actual mechanisms behind these e ects?

Providing the answers to these questions is challenging for three main reasons. First, violent conflicts usually take place in developing countries, where micro-level data on firms' activities are often unavailable, with the conflict itself making firm-level data collection even harder (Ksoll, Macchiavello, and Morjaria 2014). Second, the identification of the e ect of conflict on firms' performance crucially relies on the (often low) accuracy of the data used to measure conflict exposure. Finally, conflicts are often short-run and geographically localized. As a result, identification lacks of credible sources of variation in the intensity of conflict.

In this paper, we study the operations of firms and their outcomes in the Occupied Palestinian Territories (OPT) during the Second Intifada.[1] The Israeli-Palestinian conflict has some unique features that make it particularly suitable for the analysis of the e ects of a violent conflict on the operations of firms. First, establishment-level data for a representative sample of firms in the OPT are available for the entire period. Second, the conflict has been characterized by meaningful time and geographical variation in violence, with detailed information being available since its very beginning. Third, it is a conflict that - with di erent ups and downs - can be considered as long term and low-intensity when compared to other conflicts. This implies that - di erently from what happens in countries a ected by extremely violent conflicts and genocide episodes - the economy never collapsed in either the West Bank or the Gaza Strip during the Second Intifada, even if its functions were severely a ected.

The objective of this paper is to shed light on one precise mechanism through which violent conflicts can a ect economic activity. We think about conflict as possibly a ecting the functioning and accessibility of the markets where firms buy their production inputs and/or sell their final goods. If that's the case, the demand for inputs should change accordingly, with those firms which find it harder to access the market for one specific input using that input less intensively in production. We develop this intuition within the conceptual framework proposed by Hsieh and Klenow (2009). In their formalization of the economy, firms in the same sector are endowed with the same production technology. In absence of distortions, they all

[1] The Occupied Palestinian Territories include the West Bank and the Gaza Strip. The Second Intifada is a period of intensified violence which took place between 2000 and 2006. Section 2 provides extensive background information on the Israeli-Palestinian conflict and the Second Intifada in particular.

use inputs in the same proportions, while differences in total factor productivity determine the size of the firm. The presence of firm-level distortions in the accessibility of markets changes the marginal product of inputs, and the allocation of production factors across firms. It follows that heterogeneity arises within sectors in the proportions in which firms combine their inputs.

The model guides us in the empirical analysis and interpretation of results. In particular, it illustrates how within-sector differences in the production choices of firms which are differentially exposed to conflict can be informative of the relative extent of conflict-induced distortions in the accessibility of markets.

We take these considerations to the data by combining establishment-level information from the OPT for the years 1999 to 2006 with information on conflict-related Palestinian fatalities. Taking the latter as a proxy for conflict intensity, we compare the outcomes and operations of firms in the same sector over time across districts experiencing differential changes in conflict intensity. We are thus able to net out both overall time trends and unobserved time-invariant sources of heterogeneity in firms' operations at the district level, possibly correlated with conflict intensity. Comparing establishments within the same 2-digit sector, we find that a one standard deviation increase in the yearly number of Palestinian fatalities in the establishment's district of location to be associated with a significant 6 to 9% in the firm's value of output. Our conceptual framework guides us in investigating to what extent such fall in output value is the result of conflict-induced distortions in accessibility of markets for inputs. While the total value of materials as relative to other production inputs does not vary systematically with conflict exposure, we find that firms operating in high conflict environments employ a lower value of imported materials with respect to that of domestically produced materials. In other words, firms which are differentially more exposed to conflict tend to substitute domestically produced materials for imported ones. We find the conflict to induce distortions in the accessibility of markets for imported material inputs which are more than three times bigger than the ones for markets for locally produced materials, and significantly higher than those for labor and capital markets. Aggregate foreign trade figures further validate this finding. Furthermore, we find that distortions are larger for firms operating in those sectors which were more intensive in imported materials and had higher average output value in the years prior to the Second Intifada, i.e. in the absence of conflict. Evidence thus shows how conflict affects disproportionally more the most productive sectors of the economy.

The validity of our interpretation of the empirical results rests on the credibility of the proposed conceptual framework and its assumptions. We explicitly question these assumptions and undertake a number of robustness checks. First, we investigate whether there is any evidence of within-sector differences in production choices of firms which are unrelated to conflict exposure. In particular, we are interested in ruling out the possibility that such heterogeneity is correlated with firm size, i.e. that production functions are non-homothetic. Using data from the no-conflict period, we identify those sectors for which the assumption of homothetic production functions finds support in the data. We can thus show that our results are unchanged if we focus on such sample. Therefore, evidence is in favor of the hypothesis that the observed changes in production technology are due to distortions within the supply

side of the economy rather than endogenous to a fall in demand. Second, we make sure that our results are not driven by systematic di erences in firm-level prices. Third, we check the extent to which our results can be explained by the e ect of closures of the Israeli-Palestinian borders, possibly correlated with conflict intensity. The concern is that firms located closer to the border with Israel may be at same time more intensive in imported material inputs and more exposed to changes in conflict intensity. Our results show this is not the case. While conflict intensity is positively correlated with the monthly number of days of closure of the Israeli-Palestinian border, it is not significantly so. Moreover, the explanatory power of our measure of conflict intensity is only partially a

workers across sectors and fall in productivity. They also show that the trade exposure of the sector matters: reliance on imported inputs is correlated with a decline in sector productivity while the share of exporting does not. Finally, Klapper, Richmond, and Tran (2013) focus on civil unrest in Côte d'Ivoire following the coup detat in 1999, and investigate its impact on firm performance. Using census data for the period 1998-2003, they find that the conflict led to a drop in firm productivity, with the decrease being significantly larger for firms owned by or employing foreign individuals. Moreover, they find that the negative e ect on TFP is relatively higher in import oriented industries. As for the channels, they suggest that results may be driven by the increase in the operating costs (including the cost of imported inputs) rather than by demand-side e ects.

Our paper improves over the existing literature on the microeconomics of conflict along three dimensions. First, while the majority of previous studies have considered only one sector or some specific group of firms, we build our study sample starting from a representative sample of the whole population of establishments in the manufacturing sector. Second, our detailed establishment-level data allow us to look at a wide range of firm-level figures, including total and per-worker output value and input usage. Third, we specifically investigate one precise mechanism behind our main negative result on output value, namely conflict-induced distortions in the functioning and accessibility of markets for imported material inputs.

We also contribute to the empirical literature on factor misallocation. Starting with the seminal work of Wasmer and Weil (2004), several contributions have investigated how market frictions and distortions can a ect aggregate output and productivity. A number of studies focus on capital market distortions (Buera, Kaboski, and Shin 2011; Banerjee and Duflo 2012; Midrigan and Xu 2014), while others address the specific impact of labor and size-dependent policies (Hopenhayn and Rogerson 1993; Guner, Ventura, and Yi 2008). More generally, Restuccia and Rogerson (2008) show how di erences in the prices faced by individual producers in the United States can result in sizeable decreases in aggregate output and total factor productivity. Hsieh and Klenow (2009) compare the relative extent of aggregate factor misallocation across India, China and the United States, and investigate its negative e ect on aggregate output. We contribute to this literature by identifying conflict as a source of factor misallocation. In the

corroborate this view, as conflict is found to negatively a ect output value through its distortionary e ect on imported inputs market access, forcing establishments to substitute imported inputs with domestically produced ones.

Finally, our paper contributes to the literature on the e ect of the Second Intifada on the Palestinian economy. Previous contributions have analyzed the impact of the conflict on a number of di erent outcomes: child labor (Di Maio and Nandi 2013), child health (Mansour and Rees 2012), labor market (Miaari and Sauer 2011; Cali and Miaari 2013), politics (Jaeger, Klor, Miaari, and Paserman 2012), asset prices (Zussman, Zussman, and Morten Orregaard 2008) and psychological disorders in non-combatants living in the West Bank and the Gaza Strip (Mataria, Giacaman, Stefanini, Naidoo, Kowal, and Chatterji 2009). While several reports have discussed the aggregate economic impact of the Second Intifada on the Palestinian economy (see for instance World Bank 2004), there are no empirical estimates of such e ect at the micro level. To the best of our knowledge, ours is the first contribution to provide evidence of the e ect of the Second Intifada on the behavior of Palestinian firms in both the West Bank and the Gaza Strip.

The rest of the paper is organized as follows. In Section 2, we provide an overview of the Israeli-Palestinian conflict, focusing in particular on the period of the Second Intifada. We present our conceptual framework and derive testable empirical implications in Section 3. In Section 4, we describe the dataset and the main variables of interest. In Section 5, we present the empirical strategy, our results and the evidence on the main mechanism. Robustness checks are discussed in Section 6. Section 7 concludes.

2 Background: The Israeli-Palestinian Conflict and the Second Intifada

The Israeli-Palestinian conflict has been for a long time one of the most politically relevant violent conflict in the world. The conflict dates back to 1948, when the creation of the State of Israel led to the first Arab-Israeli war. DuringDuringlevel. warcap 0 Td [(dw7nAangel)-284(fi

episodes from both parties. This relatively peaceful period came to an end in September 2000, with the beginning of the so-called Second Intifada.[3] The Second Intifada (also called the Al-Aqsa Intifada) has been a period of intensified violence between the Israeli Defense Force (IDF) and the Palestinians.[4] This phase of the conflict has been characterized by numerous violent events on both sides, including Palestinian attacks in Israel, assassination of Palestinians leaders in Palestine and demolitions of Palestinian houses by the IDF. Since the beginning of the Second Intifada, there have been frequent and ongoing clashes in the OPT between Palestinians and the IDF that have often culminated with some killings. The causes of these clashes were the most varied, ranging from communication misunderstandings between Palestinian civilians and IDF at the checkpoints, to skirmishes between young Palestinians throwing stones and the IDF, up to actual armed fighting between Palestinian militants and the Israeli Army (Sletten and Pedersen 2003). Given that the Second Intifada has been essentially a period of violent resistance of di erent sectors of the Palestinian population against the Israeli occupying force, it not surprising that violence between the two parties has been highly asymmetrical. Between 2000 and 2006, Palestinians killed 234 Israeli civilians and 226 IDF personnel in the OPT while the IDF caused more than four thousand Palestinian fatalities, with the majority of the killed being non-combatants (B'TSELEM 2007, Ajluni 2003). While the intensity of violence varied over time and localities in both the West Bank and the Gaza Strip, with also periods of relative calm in di erent areas, the conflict situation has persisted during the whole period. Even if long-term, the low-intensity of the conflict implied that the Palestinian economy never completely collapsed, as opposed to what often happens to countries experiencing genocide episodes or interstate wars. Nonetheless, continuous exposure to conflict-related violence have been shown to have negative consequences on health (Mansour and Rees 2012), education (Brück, Di Maio, and Miaari 2014), and psychological well-being (Mataria, Giacaman, Stefanini, Naidoo, Kowal, and Chatterji 2009) of the Palestinians.

Since the outbreak of the Second Intifada, the IDF also severely scaled up the restrictions on the mobility of goods and people within the OPT as well as across the borders with Israel, Jordan and Egypt.[5] In particular, the IDF has increased the imposition of the closures of borders between Israel and the OPT and the use of check-points to restrict the movement of goods and people between areas within the West Bank and the Gaza Strip (Cali and Miaari 2013). Internal and external movement and access restrictions have been a key constraint to Palestinian economic development (e.g. World Bank 2010 and UNCTAD 2011). On the one hand, World Bank (2007b) argues that internal movement restrictions imposed by Israeli authorities stifle economic activity by raising transaction costs, the cost of doing business and increasing uncertainty.[6] On the other hand, the e ects of external closures have been quite dramatic for the Palestinian economy (PCBS 2001, United Nations 2002, World Bank 2004,

[3] For a thoughtful discussion about the causes of the Second Intifada see Pressman (2003).

[4] For a detailed description of the di erent periods of violence during the Second Intifada see Jaeger and Paserman (2008).

[5] According to the Israeli Army, this system has been devised as a security measure to protect its citizens (both in Israel and inside Israeli settlements in the West Bank) from surges, or expected surges, in the Israeli - Palestinian conflict (Miaari and Sauer 2011; IDF Military Advocate General 2012.)

[6] In 2000, nearly 60 percent of firms made a relevant share of their sales outside of their home city; by 2006, this had fallen to around 40 percent (World Bank 2007b).

B'TSELEM 2007, World Bank 2007b). While closures were intended to be a security measure, they had negative impact on the labor market, child labor and school attendance (Miaari and Sauer 2011; Di Maio and Nandi 2013). Closures also severely a ected Palestinian foreign trade. Since there are no ports or airports in the OPT, import and export goods need to travel through Israel, Jordan or Egypt. Israel currently controls all checkpoints and trade access routes, so that Palestinian trade flows heavily depend on the state of the conflict with Israel, which decides the imposition of closures and other restrictions. World Bank (2008) points at closures as a key obstacle for the Palestinian economy: they limit producers access to imported inputs required for production and the maintenance of the capital stock and - by increasing uncertainty - inflate the cost of imported inputs and reduce output.[7] As a result, Israeli security measures and cumbersome custom procedures have imposed extremely high transaction costs on Palestinian exporters and importers. The negative impact of this situation is likely to be very sizable considering that the Palestinian economy is highly dependent on foreign trade, which constitutes about 80% of its gross domestic product, and in particular on trade with Israel which represents more than 80% of the total value of trade (UNCTAD 2006).

The Israeli occupation of the West Bank and the Gaza Strip continued until September 2005 when the Israeli Army unilaterally withdrew from the Gaza Strip. The results of the 2006 elections caused a *de facto*

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equal to w for labor, R for capital, and z for materials. The firm maximizes profits as given by

$$(1 - \tau_{Yi})P_{si}Y_{si} - w(1 + \tau_{Li})L_{si} - R(1 + \tau_{Ki})K_{si} - z(1 + \tau_{Mi})M_{si} \tag{5}$$

The single representative firm for sector s takes the price P_s a given. Cost minimization determines the allocation of sector-level demand Y_s across the firms operating in the sector. The first order conditions imply

$$Y_{si} = Y_s \left(\frac{P_{si}}{P_s}\right)^{-\sigma} \Leftrightarrow P_{si} = P_s \left(\frac{Y_s}{Y_{si}}\right)^{\frac{1}{\sigma}} \tag{6}$$

for each firm i in sector s. Given product di erentiation, in monopolistic competition each firm enjoys a certain degree of market power, so that P_{si} is endogenous to Y_{si}. Since P_s and Y_s are exogenous to firm i and determined by the sector-level allocation, we can substitute $P_{si} = P_s (Y_s/Y_{si})^{\frac{1}{\sigma}}$ in the firm's profits expression in equation 5 and maximize with respect to each input. From the corresponding first order conditions we get

$$K_{si} = \frac{\sigma - 1}{\sigma}\frac{\alpha_s}{R(1 + \tau_{Ki})}(1 - \tau_{Yi})P_{si}Y_{si}$$

$$L_{si} = \frac{\sigma - 1}{\sigma}\frac{\alpha_s}{w(1 + \tau_{Li})}(1 - \tau_{Yi})P_{si}Y_{si} \tag{7}$$

$$M_{si} = \frac{\sigma - 1}{\sigma}(1 - \alpha_s - \beta_s)\frac{1}{z(1 + \tau_{Mi})}(1 - \tau_{Yi})P_{si}Y_{si}$$

Equation 7 clearly shows that output and input distortions have a di erent impact on the demand for each input and their marginal product. An increase in output distortion τ_{Yi}, such as lack of access to the market for final products, proportionally decreases the demand for *all* inputs and increases their marginal product. While the firm becomes smaller, input relative marginal products and demand do not change. On the contrary, an increase in the distortion faced by input X (τ_{Xi}), such as lack of access to the input X market, reduces the demand for that input *disproportionally more* and increases its marginal product.

Rearranging 7, we obtain the following expressions for the ratios of input values

$$\frac{RK_{si}}{zM_{si}} = \frac{\alpha_s}{1 - \alpha_s - \beta_s}\frac{1 + \tau_{Mi}}{1 + \tau_{Ki}}$$

$$\frac{wL_{si}}{zM_{si}} = \frac{\beta_s}{1 - \alpha_s - \beta_s}\frac{1 + \tau_{Mi}}{1 + \tau_{Li}} \tag{8}$$

$$\frac{RK_{si}}{wL_{si}} = \frac{\alpha_s}{\beta_s}\frac{1 + \tau_{Li}}{1 + \tau_{Ki}}$$

These equations provide a number of useful results for our analysis. First, they show that input value ratios are invariant with respect to output distortion $_{Yi}$, but not to input distortions $_{Xi}$. Moreover, they are also invariant with respect to the firm-level price P_{si}. This implies that they do not depend on the competition environment faced by the firm. As a result, we can use these equations - without needing to know the exact market structure of each sector s - to infer firm-level conflict-induced distortions through comparing input value ratios across firms which are differentially exposed to conflict. Indeed, any systematic relationship between conflict intensity and input value ratios across firms in the same sector would provide evidence of conflict-induced relative input distortions. For example, if the input value ratio between capital and materials $\frac{RK_{si}}{zM_{si}}$ was systematically higher for firms in conflict areas, this would indicate that conflict increases relatively more firm-level distortions in materials with respect to capital as measured by $\frac{1+\ _{Mi}}{1+\ _{Ki}}$.

As a final step, we derive firm i's output value. As in Hsieh and Klenow (2009), the optimal firm-level output price under monopolistic competition is a constant mark-up over the marginal cost of production. The price is given by

$$P_{si} = \frac{1}{-1}\frac{1}{A_{si}(1-\ _{Yi})}\left(\frac{R(1+\ _{Ki})}{\ _{s}}\right)^{\ _{s}}\left(\frac{w(1+\ _{Li})}{\ _{s}}\right)^{\ _{s}}\left(\frac{z(1+\ _{Mi})}{1-\ _{s}-\ _{s}}\right)^{1-\ _{s}-\ _{s}} \tag{9}$$

An increase in any firm-level distortion increases the optimal firm-level price. Using the within-sector demand allocation condition in equation 6, we can rewrite input levels as a function of P_{si} only and derive the firm-level demand of inputs given sector-level production and prices. Substituting into equation 4, we have that output value for firm i in sector s can be finally be written as

$$P_{si}Y_{si} = \frac{1}{-1}\frac{1}{1-\ _{Yi}}\left(\frac{1+\ _{Ki}}{\ _{s}}\right)^{\ _{s}}\left(\frac{1+\ _{Li}}{\ _{s}}\right)^{\ _{s}}\left(\frac{1+\ _{Mi}}{1-\ _{s}-\ _{s}}\right)^{1-\ _{s}-\ _{s}}(RK_{si})^{\ _{s}}(wL_{si})^{\ _{s}}(zM_{si})^{1-\ _{s}-\ _{s}} \tag{10}$$

4 Data

For the purpose of this paper, we combine several different data sources.[9] Throughout the empirical analysis, we measure conflict intensity using the yearly number of Palestinians fatalities caused by the IDF at the district level. While several different measures have been used in previous studies, the number of conflict-related Palestinian fatalities provides the most accurate description of conflict intensity in the OPT during the Second Intifada.[10] These data are collected and distributed by the Israeli NGO B'TSELEM. Data are based on a number of sources and validated by several cross-checks. Indeed, these data are considered to be accurate

[9] For more details on the study sample and variables definition please refer to the Data Appendix B.

[10] Other measures used in the literature are: number of Israeli victims of Palestinian attacks in Israel (Eckstein and Tsiddon 2004); number of Palestinian suicide bombings in Israel (Benmelech, Berrebi, and Klor 2012); number of Palestinian houses demolished (Benmelech, Berrebi, and Klor 2010); the number of rockets launched from Gaza toward Israel (Haushofer, Biletzki, and Kanwisher 2010); the number of closure days (Di Maio and Nandi 2013); the number of IDF check points in the OPT (Cali and Miaari 2013).

and reliable by both the Israelis and the Palestinians and have been previously used by other scholars studying the Israeli-Palestinian conflict (see for instance Jaeger and Paserman 2008 and Mansour and Rees 2012). The dataset provides a rich set of information, such as age, gender and place of residence of the killed, the date and place of death, together with a description of the circumstances of the event. This allows us to count in each year the number of fatalities in each of the 16 Palestinian districts (i.e. governorates).[11] In our empirical analysis, we also use the number of closure days, i.e. days in which 8(lah(of)-25Es5Tthe)-23iGo3 0 -1ays, i.e. dam-1ays, i.OPT-342((
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out by small and medium enterprises (SMEs). As for the sector of activity, these appear to be in general evenly distributed across districts, even if some of the smallest sectors are clustered in specific districts. 75% of the establishments in the sample operate in the following five sectors: *Fabricated metal products, except machinery and equipment* (22%); *Furniture* (15%); *Food products and beverages* (14%); *Other non-metallic mineral products* (14%); *Wearing apparel and dressing, and dyeing of fur* (12%).

5 Empirical Strategy and Results

5.1 Preliminary Evidence

We begin by investigating the relationship between conflict intensity and economic outcomes at the aggregate level. Figure 2 plots the value of Palestine GDP over time between 2000 and 2006, together with the total number of Palestinians killed by IDF. Both nominal and real GDP values reach their minimum over the period in the year 2002, when conflict intensity is the highest. Real GDP falls by 20% between 2000 and 2002, mirroring the steep increase in the number of Palestinian fatalities over the period. A downward trend in the number of fatalities in the period thereafter is instead associated with an increase in GDP, with the latter reaching its 2000 values in 2004. Figure 3 shows that similar inversely related trends can be observed between conflict intensity and aggregate output value and real aggregate output value as computed using the data from the Industry Survey. The Figure plots the weighted sum of establishments' output value over time together with Palestinians killed by IDF in the same period. In the bottom graph of Figure 3, establishments' output value is aggregated after adjusting its value using yearly 2-digit sector-level deflators. The evolution of total output value is close to the one previously observed for GDP, and still inversely related to conflict intensity as measured by the total number of Palestinian fatalities.

Establishment-level data allow to investigate further the negative aggregate relationship between conflict intensity and economic outcomes. As a first step, we compute the median of the distribution of the number of fatalities in the 112 district-year pairs. We then split the sample of surveyed establishments into a *high conflict* and a *low conflict* subsample according to the year of interview and district of location. The top graph in Figure 4 shows the distribution of output value for all establishments in the two subsamples, averaging out the overall sample mean. The entire distribution for establishments exposed to high conflict is shifted leftwards with respect to the one for the low conflict ones. Perhaps more importantly, the same pattern holds when we average out 2-digit sector means and focus on within-sector variability, as shown in the bottom graph of Figure 4. When we consider output value per worker, we observe even bigger di erences, as shown in Figure 5. This suggests the amount of input labor to di er systematically across establishments in the two subsamples. While clear and intriguing, evidence from the previous figures needs to be interpreted with caution. Firms surveyed in high conflict years can be systematically di erent from those surveyed in low conflict years. Additionally, surveyed firms located in districts where conflict intensity is systematically higher

may not be comparable to those located in other districts.

We address these identification issues in a systematic way by combining together cross-district and time variation in the number of fatalities and looking at establishment-level figures across districts experiencing di erential changes in conflict intensity. Exploiting both sources of variability at the same time, we can net out a large fraction of unobservable determinants of establishment-level outcomes, possibly correlated with conflict intensity. For this purpose, it is necessary to rely on meaningful variation in the number of fatalities both across and within districts over time. Figure 6 provides a graphical representation of our identifying source of variation. In each map, districts are classified according to the quintile they belong to in the distribution of fatalities in a given year, and of the change in the number of fatalities over two-year time spans. Looking at the top maps, we see that there is large cross-district variation in the number of fatalities. At the same time, the three bottom maps show that there is also meaningful variation in the number of fatalities within each district over time. In particular, di erential changes in conflict intensity across districts constitute a source of variability which does not seem to overlap with the cross-sectional one. This is confirmed by Figure 7 which plots the average number of Palestinians killed by IDF over time across two subsamples of districts. The continuous line refers to those 25% of districts which recorded the highest number of fatalities in the 2002 peak fatalities year, while the dash line shows the same figure for all other districts. Once again, conflict intensity is shown to exhibit meaningful variation over time, with changes being di erent across the two groups of district. We are thus confident that the combination of cross- and within-district variation allows for credible identification of the e ect of conflict on firms' figures.

As a preliminary analysis of the relationship between conflict intensity and output value, we compare average output value figures across high and low conflict districts over time for the same subgroups as identified in Figure 7. Table 2 shows estimates of establishment-level means of log of output value across the two subsamples for the years 1999 and 2002. As shown in the first row, prior to the Second Intifada average output value was already significantly 28% lower in high conflict districts. Conflict is associated with a decrease of output value in both areas, but significantly so only for high conflict districts. As a result, the output value gap across areas widens in 2002, reaching 73%. Di erence-in-di erence estimates reveal such widening to be significant at the 5% level. Table 3 provides the corresponding figures for output value per worker. Similarly to output value, the latter is found to be already significantly 29% lower in high conflict districts in 1999, with such di erence increasing significantly to 67% in 2002.

5.2 Conflict and Output Value

The previous results on output value can be investigated more systematically by implementing the following regression specification

$$\ln (P_{si} Y_{si})_{gt} = \quad _t + \quad _g +$$

where $\ln(P_{si}Y_{si})_{gt}$ is the log of output value of firm i in sector s surveyed in year t and located in district g. The variable $fatalities_{gt}$ is the number of Palestinians killed by IDF in year t in district g, measured in standard deviation units from the district-year distribution. This allows to make coe cient estimates directly interpretable as the increase in the dependent variable associated with a one standard deviation increase in $fatalities_{gt}$. Year and district fixed e ects are captured by $_t$ and $_g$ respectively. The former allow us to net out systematic di erences across establishments surveyed in di erent years, while the latter controls for time-invariant di erences across firms located in di erent districts. We also include 2-digits sector fixed e ects $'_s$, which allows us to investigate within-sector variability in the dependent variable of interest. $\mathbf{Z}_{isgt}$ is a vector of establishment-specific controls, such as the fraction of family workers and that of proprietors over the total number of employees. Finally, u_{isgt} captures any residual idiosyncratic determinant of (log of) output value. The coe cient of interest captures systematic di erences in output value across establishments which are di erentially exposed to conflict.

Table 4 shows coe cient estimates from the above regression specification. Standard errors are clustered along both sector-year and district-year categories. This allows the residuals u_{isgt}

and per-worker output level. Indeed, we have shown in equation 9 in Section 3 that, when firms enjoy a certain degree of market power, any increase in output or input distortion will result in higher firm-level output prices. It follows that, if conflict increases distortions, only a more than proportional decrease in output quantity would generate the negative e ect we find on output value. While this argument provides the theoretical support for our interpretation of the results, we provide a more detailed empirical discussion on the role of output price in Section 6.1, where we also address similar concerns related to input prices.

In the next section, we explore one of the mechanisms responsible for our findings. Guided by the predictions of the conceptual framework, we focus on the supply side of the economy and look for systematic di erences in input usage across establishments which are di

years, districts or sectors.[14] Finally, $\mathbf{Z}_{isgt}$ is a vector of establishment-specific controls such as the fraction of family workers and fraction of proprietors over the total number of employees and $_{isgt}$ is the error term. The coe cient of interest $_{12}$ captures systematic di erences in the corresponding input value ratio across firms which are di erentially exposed to conflict.

Each row of Table 6 reports the corresponding estimates of from the above specification separately for each of the input value ratios. Column 1 reports estimates from a specification where only year, district and sector fixed e ects are included, together with our main variable of interest $fatalities_{gt}$. Rows (a) to (c) consider the values of capital, labor and materials. Input value ratios between the three inputs are found not to di er systematically for firms facing high conflict environments, with estimates of the coe cient being close to zero and insignificant. Conflict seems instead to a ect the use of material inputs. In rows (d) to (h), we consider separately imported materials M^f and domestically produced materials M^d. As shown in row (d), a one standard deviation increase in the number of fatalities is found to be associated with a 1.2 increase in the value of domestically produced materials used in production relative to imported ones, with the estimate being significant at the 1% level. By the same token, the value of capital and labor with respect to imported materials increases significantly with conflict intensity (rows (e) and (f)), while the ratio of capital and labor value over the value of domestically produced materials decreases significantly (rows (g) and (h)). All estimates are significant at the 1% level. In column 2, the fraction of family workers and that of proprietors are added as controls. In column 3, the full set of district-year fixed e ects $_{st}$ is included to allow for sector-specific trends. Finally, column 4 reports estimates from the same sample used in Table 4 so to investigate robustness of results and consistency with those derived for output value. Estimates for all input value ratios are stable across all specifications.

The above results show that the within-district and within-sector variation over time in the input value ratios used by Palestinian establishments is systematically correlated to conflict intensity. We interpret this as evidence that conflict induces distortions which are di erential across inputs: the relative value of imported materials is systematically lower for firms exposed to high conflict environments indicating that firms su er disproportionally higher distortions in such input with respect to the others. Moreover, since the relative value of domestically produced materials is systematically higher for these same firms - while total amount of consumed materials is not - we infer that conflict distortions lead firms to substitute domestically produced materials for imported ones.

As we have seen, our conceptual framework provides a theoretical link between input value ratios and the relative amount of distortions (see equation 8). We use this result and the coe cient estimates of in Table 6 to derive the relative sizes of input distortions associated with a one standard deviation increase in the number of Palestinians killed by IDF. Following equation 12, we have that, for every pair of inputs $(X^1; X^2)$, the relative amount of distortions

[14] This implies that results would be robust to deviations from our conceptual framework where prices are assumed to be the same for all firms. We discuss the role of prices more in detail in Section 6.1.

induced by a one-standard deviation increase in conflict intensity is given by

$$\exp\ \hat{}_{12} = \frac{1 + \quad x_i^2}{1 + \quad x_i^1} \tag{14}$$

Corresponding estimated relative input distortion values are reported in Table 7, together with 95% confidence intervals.[15] We can thus compare the relative size of distortions across inputs. Notice that, as shown in equation 14, a zero estimate of the coe cient of the *fatalities* variable from equation 13 is associated with an implied relative input distortions ratio of one, indicating no di

dependent upon imported goods and services. During the Second Intifada, the total value of Palestinian imports is recorded to be 6 to 8 times the total value of its export, with the negative balance of trade being equal to 40 to 50% of GDP at its current value. Moreover, while Palestinian imports from Israel represent around 70% of the total value of imports in the period, Palestinian exports to Israel represent instead the 90% of total value of exports.[16] Still, volumes are such that trade with the rest of the world appears to be more balanced with respect to trade with Israel, as shown in Figure 8.

The empirical evidence suggests that the evolution of Palestinian foreign trade during the Second Intifada is correlated with conflict intensity. Figures 9 and 10 shows aggregate current and real trade figures for Palestine for the years 2000 to 2006, together with the total number of Palestinians killed by IDF. Both imports and exports decrease with the rise of conflict intensity between 2000 and 2002, reaching their minimum in 2002, which is the conflict peak year. Both values rise in the period thereafter. Perhaps more importantly, the net balance of trade reaches its maximum in 2002, tracking the evolution of fatalities over the period. This shows that, while total Palestinian foreign trade decreases during the Second Intifada, the value of imports decreased disproportionally more with the rise of conflict intensity with respect to the value of exports. We interpret these figures altogether as evidence that the Second Intifada had a disproportional e ect on imports with respect to exports. Indeed, preliminary evidence from the Industry Survey shows that firms' external sales do not change significantly for firms being di erentially exposed to conflict during the period of interest.

Not only the aggregate value of exports and imports changed with the conflict, but possibly also their composition. Figure 11 and 12 show export and import trade composition in 1999 and 2002 respectively. The figures show that export composition does not experience any meaningful change in conflict years. On the contrary, import share are shown to change substantially. In particular, the data show that - in line with our story - the sectors that su er a larger reduction are: *Miscellaneous manufacturing articles*, *Manufactures goods (classified by materials)* and *Machinery and transportation equipments*. As expected, given the overall import reduction and their more inelastic demand, the sectors that increase instead their share of total imports are *Mineral fuel and lubricants* and *Food and live animals*. These results suggest that the conflict had a di erential e ect across sectors. We explore this possibility more in detail in the next section.

5.4 Sector-level Analysis

We now focus on the analysis of the di erential impact of the conflict on the di erent sectors. We start by ranking 2-digit sectors according to the size of conflict-induced relative distortions in imported and domestically produced materials. We run the following regression specification:

$$\ln\left(\frac{z^d M^d_{si}}{z^f M^f_{si}}\right)_{gt} = \alpha_t + \alpha_g + \beta'_s + \sum_{M^d M^f} fatalities_{gt} \times \beta'_s + \mathbf{Z}'_{isgt} + \varepsilon_{isgt}$$

where $z^d M^d$ is the value of domestically produced materials consumed during the year t by firm i operating in sector s and located in district g, and $z^f M^f$ is the corresponding value for imported materials. The only difference with respect to the previously adopted specification is that we now interact 2-digit sector fixed effects with the $fatalities_{gt}$ variable. This allows us to investigate the effect of conflict intensity on the relative distortions for imported vs. domestically produced material inputs separately for each sector, as captured by the set of parameters $\hat{}^{s}_{M^f M^d}$. As before, we can derive the sector-specific implied relative input distortions as

$$\exp\ \hat{}^{s}_{M^d M^f} = \frac{1 + {}^{s}_{M_i^f}}{1 + {}^{s}_{M_i^d}} \tag{16}$$

Table 8 shows the top and bottom 2-digit sectors as ranked in terms of the conflict-induced distortions they suffer. Most affected sectors are: *Manufacture of motor vehicles, trailers and semitrailers*, *Manufacture of coke, refined petroleum products and nuclear fuel* as well as *Manufacture of chemicals and chemical products*. At the opposite side of the spectrum, the least affected sector is *Other mining and quarrying*.

One possible explanation for the sectoral differences in the effect of the conflict is that sectors are different in terms of their technology of production and, in particular, their intensity in imported material usage. To explore this possibility, Figure 13 plots the estimated coefficient for the implied input distortions from the previous regression against the average imported materials value intensity in each sector in 1999, i.e. before the outbreak of the Second Intifada.[17] The results show a positive relationship between the extent of conflict-induced distortion and imported materials value intensity in 1999, as confirmed by the line fitting the relationship between the two. This suggests that sectors which are more intensive in imported materials are also those which have been more affected in terms of relative input distortions, making them substitute imported materials with domestically produced ones relatively more. Additionally, we look at pre-conflict sectoral output value. Figure 14 plots the implied material distortions against the average output value in each sector in 1999. The results show that those sectors which are more vulnerable to the negative impact of the conflict are those which had higher output value before the conflict started. This means that the conflict impacts the most those sectors with the highest productivity as measured by average output value.

6 Robustness Checks

6.1 Output and Input Prices

As we noted before, our analysis of the relationship between output value and conflict intensity

output or input distortions. This implies that the negative effect we find on output value would be in fact only a lower bound for the effect on output level. Furthermore, from an empirical point of view, notice that time, sector and district fixed effect in our regression specification already control for overall price trends and differences in average prices across establishment operating in different sectors or located in different districts. When sector-year fixed effects are included, even sector-specific trend in prices are controlled for.

Still, it is possible that establishment-level output prices may differentially change with conflict intensity at the district-year level. We inspect this issue further by taking advantage of the fact that some sectors appear to be clustered in specific districts. For instance, 70% of establishments operating in manufacture of tobacco products surveyed in the Industry Survey are located in the district of Jenin, while 70% of establishments operating in manufacture of leather products are located in Hebron. In Hebron are also located 43% of establishment manufacturing basic metals. We check for the possibility that establishment-level output prices vary at the district-year level by asking - for these district-clustered sectors - whether the Producer Price Index (PPI) tracks the evolution of Palestinian fatalities in the same district. Figure 15 shows the evolution of PPI in these three sectors over time, together with the evolution of fatalities in the corresponding district. We do not find evidence of a negative relationship between prices and conflict intensity over time in any of these cases. We can thus likely rule out the possibility that the decrease in output value we observe for firms operating in high conflict environments is due to a decrease in prices. If anything, and in accordance with our conceptual framework, evidence suggests that the decrease in firms' output value is due to a decrease in output which more than offsets any increase in output price.

Similarly, our interpretation of the results on relative input distortions rests on the assumption of no differences in relative factor prices faced by firms which are differentially exposed to conflict. Again, despite the fact that part of the across-establishments variation in factor prices is already controlled for by the included sets of fixed effects, we cannot completely rule out the possibility that there are still differences in relative factor prices associated to conflict intensity. For instance, consider the case in which the price of imported materials is constant. If the price of domestically produced materials were to increase more than proportionally in those districts which experienced the highest rise in the number of fatalities, we would be mistakenly attribute the relative price effect to conflict-induced distortions.

We could use our conceptual framework to study the effects of distortions on imported and domestically produced inputs respectively. On the one hand, the conflict could lead to an increase in the price of imported input materials by making access the corresponding market more difficult to achieve. However, given the demand for imported materials, this effect would go against the relative distortionary effect we found (i.e. the reduction in the imported vs domestic inputs value ratio), as the value of imported materials used in production would increase. On the other hand, conflict could have an ambiguous effect on the price of domestically produced inputs. Under perfect competition, the latter are rewarded according to their marginal revenues. Conflict increases output price and increases the demand for domestically produced material inputs, thus reducing their marginal product. The price of

domestically produced input materials would then go up only if the increase in output price were to more than o set the decrease in the input marginal product.

In order to shed light on this last issue, we can investigate the only domestic input for which we have establishment-level factor prices, namely labor. We divide the total value of labor $w_{si}L_{si}$ by the total amount of labor L_{si}, and replace the log of the resulting average wage at the establishment level as outcome in equation 11. Table 9 reports parameter estimates from the corresponding regression specification. Controlling for year, district and sector fixed e ects, an increase in one standard deviation in the number of fatalities is found to be associated with a 7% decrease in average wages, significant at the 5% level. Parameter estimates are robust to the inclusion of the fraction of family workers and that of proprietors as controls in column 2, which are, as reasonable to expect, negatively associated with average wage. The full set of sector-year fixed e ects is included in column 3, while the sample is restricted to only observations for which we have data on output value in column 4. Estimates are stable and equally significant across specifications. Our results are consistent with Mansour (2010), Miaari and Sauer (2011) and Di Maio and Nandi (2013), who show that conflict during the Second Intifada negatively a ected the monthly earnings of Palestinian workers. This is because border closures created an excess supply of labor within the OPT. To conclude, the negative relationship we find between average wage and conflict intensity is reassuring: relative factor prices for establishments facing high conflict environments seem to move in the opposite direction with respect to what happens to input value ratios. Our estimates of the e ect of conflict on relative input distortions are thus likely to be only a lower bound for their true values.

6.2 External and internal mobility restrictions

As we discussed in Section 2, one of the distinctive features of the Israeli-Palestinian conflict is the adoption of external border closures and internal mobility restrictions as means to prevent and/or retaliation against the Palestinian uprisings. We now explore how these military measures may confound the impact of conflict intensity on firms' production choices.

External border closures have been largely used during the Second Intifada as a security measure by IDF to control the border gates to access and exit between Israel and the OPT. During closure days, movements of workers and import and export of goods are interrupted. It follows that firm localization may a ect the plausibility of our proposed mechanism which indicates that the conflict a ects disproportionally more firms processing imported material inputs. First, firms located closer to the borders gates are likely to be more intensive in imported material inputs with respect to other establishments in the same sector. Second, firms located closer to the borders could su er systematically more from the conflict if the closeness to the border makes those localities more likely to have fatalities. The evidence supporting our mechanism could thus be confounded by the di erential e ect on firms of being close to the borders, with no role played by conflict-induced distortions within the OPT. In order to shed light on the issue, first we run our main regression including as an additional set of

controls the distance from border interacted with yearly days of border closure. The results indicates that the coe cient for fatalities remains negatively significant in both the regressions for output value and per-capita output value but its magnitude becomes slightly smaller (see Table 10). This suggests that part of the e ect of conflict on output value may be related to the increased di culties of importing associated with closure of borders. Next, we check whether the magnitude of input distortion is related to firm closeness to the gates. To this end, we saturate our input value ratio regression specifications with the full set of year fixed e ects interacted with a measure of the road distance of the district capital from the closest gate.[18] Corresponding estimated relative input distortions are reported in Table 11. Point estimates are very similar to those reported in Table 7. This suggest that our results on the mechanism are not a ected by whether the firm is located close to a gate or not. Reduction in the use of imported inputs is not larger for firms closer to the gates, as one may expect if the explanation300(the)-299(fir e ect ft closuret inetedinfbort that e fatalities (the)-278(sigr)-277(ft)-278(the)-278(coe)]TJ/F114 10.9091 Tf328.5 lwdaysthe0.278o114(114 10.9091 e8.16y)-265(inpu10.9091 e8.]TJ 0 0 0 rg 1 0 0 RG/F104 7.9701 Tf 4421733 0296 Td [(

foreign produced ones over the log of output value in the year 1999, averaging out sector-level means. Substantial heterogeneity is observed across firms for any given level of output value. Furthermore, the line fitting the scatterplot is downward sloping, with the corresponding coefficient being significant at the 5% level. This means that, prior to the start of the conflict and within sectors, firms with higher output value employed relatively less domestically produced materials with respect to foreign produced ones. As specified above, such result can threaten the validity of our reasoning, and suggest that demand-driven mechanisms may be at work. However, the relationship appears to be not economically significant: one standard deviation increase in the log of imported vs domestic materials input value ratio is associated with a decrease in the log of output value of less than 10% of a standard deviation. Still, we take this point seriously. Further analysis of the data reveals that in 1999 the relationship between input value ratio and output value is non-significant for 15 out of the 25 sectors (to which 903 out of the 1336 surveyed establishments belong to). Figure 16 panel (b) confirms that for these sectors the two variables are orthogonal one to the other, indicating that the homothetic assumption holds in this restricted sample. It is worth noticing that the sample includes the three most conflict-affected sectors and the two largest sectors in the Palestinian economy. Finally, we estimate relative input distortion values using observations belonging to the restricted sample only, where the homotheticity assumption finds support in the data. Point estimates and 95% confidence intervals are reported in Table 14. Results are almost exactly the same as the ones we found previously in Table 7. Under the assumption that the within-sector relationship between factor shares and output value remained constant over time, this suggest that our findings are not driven by the fact that in some sectors production functions could be non-homothetic. Evidence is thus supportive of the mechanism we posit: the effect on input value ratios operates through conflict-induced distortions within the supply side rather than through the demand

Even though this is not the first paper to explore the effect of the conflict on firms' activity, our study contributes to the literature along several dimensions. First, and differently from most of previous contributions, we investigated the effects of conflict using a representative sample of manufacturing firms. Second, this is first paper to focus on the effect of conflict on individual firm's output value, highlighting the role of input distortions in affecting the choice of inputs in production as the relevant mechanism. In this respect, this is the first paper to provide a detailed description and evidence on how firms adapt their production activity to a conflict environment, and thus to identify conflict as a possible additional source of distortion and input misallocation.

The evidence we have discussed and the results we obtained in this paper suggest several other potentially important questions to be explored. How do international trade and development interact during a violent conflict? Does conflict have a differential effect depending on the firm's trade status? Are the most productive firms within sectors also those who suffer the most from conflict? What are the short and long term aggregate consequences of such differential losses on economic development? Answering these questions will motivate our future research.

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Tables and Figures

Table 1: Summary Statistics

	Obs.	Mean	St. Dev.	Min	Max
Palestinians Killed by IDF (District × Year)	112	35.044	42.010	0	210
Log of Output Value	11397	11.741	1.511	0	19.656
Log of Output Value per Worker	11397	10.297	1.165	-2.303	18.023
Log of Value of Capital	14221	10.138	1.942	0.693	18.531
Log of Value of Labor	10243	10.492	1.24	5.994	16.746
Log of Value of Materials	14160	11.308	2.045	3.932	18.769
Log of Value of Local Materials	14160	8.826	3.138	0	18.785
Log of Value of Imported Materials	14160	6.456	4.801	0	18.688
Fraction of Family Workers	14284	0.167	0.247	0	1
Fraction of Proprietors	14284	0.444	0.324	0	1
Log of Value of Capital/Materials	14100	-0.553	1.816	-13.169	6.828
Log of Value of Labor/Materials	10183	-0.856	1.361	-8.593	4.185
Log of Value of Capital/labor	10197	0.223	1.67	-10.786	6.161
Log of Value of Imported/Local Materials	14160	-2.37	6.345	-18.112	18.405
Log of Value of Capital/Imported Materials	14100	3.687	4.645	-12.855	17.751
Log of Value of Capital/Local Materials	14100	1.322	3.198	-13.155	17.231
Log of Value of Labor/Imported Materials	10183	3.117	4.69	-6.367	16.544
Log of Value of Labor/Local Materials	10183	1.046	2.96	-8.699	15.451
Log of Average Wage	10243	8.955	0.779	3.932	12.145

Notes. The table shows summary statistics for the variables used in the empirical analysis. Establishment-level value variables are in Israeli New Sheqel (NIS) (Sources: Industry Survey, Palestinian Bureau of Statistics, B'TSELEM).

Table 2: Log of Output Value 1999-2002

	High Conflict Districts	Other Districts	*Column*

Table 3: Log of Output Value per Worker 1999-2002

	High Conflict Districts	Other Districts	*Column Difference*
1999	10.038 (0.105)	10.323 (0.060)	-0.292** (0.121)
2002	9.596 (0.140)	10.270 (0.057)	-0.674*** (0.150)
Row Difference	-0.442** (0.175)	-0.059 (0.082)	-0.382** (0.193)

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) The table reports average Log of Output Value per Worker in Israeli New Sheqel (NIS) for surveyed

Table 4: Conflict and Output Value

	Log of Output Value, ln(*PY*)				
	(1)	(2)	(3)	(4)	(5)
fatalities	-0.126**	-0.073***	-0.063*	-0.089***	-0.086***
	(0.049)	(0.024)	(0.036)	(0.033)	(0.033)
$\frac{\text{Family Workers}}{\text{Total}}$				-1.522***	-1.533***
				(0.100)	(0.097)
$\frac{\text{Proprietors}}{\text{Total}}$				-2.713***	-2.717***
				(0.112)	(0.112)
District FE	N	Y	Y	Y	Y
Year FE	N	Y	Y	Y	n.a.
Sector FE	N	N	Y	Y	n.a.
Sector × Year FE	N	N	N	N	Y
Observations	10042	10042	10042	10039	10039
R^2	0.007	0.035	0.156	0.434	0.443

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) Standard Errors are clustered along both sector-year and district-year categories. Dependent variable is log of Output Value in Israeli New Sheqel (NIS). Main independent variable is number of Palestinians

Table 5: Conflict and Output Value per Worker

	Log of Output Value per Worker, ln(PY/L)				
	(1)	(2)	(3)	(4)	(5)
fatalities	-0.135***	-0.080**	-0.078**	-0.089***	-0.089***
	(0.043)	(0.032)	(0.036)	(0.034)	(0.034)
$\frac{\text{Family Workers}}{\text{Total}}$				-1.109***	-1.119***
				(0.088)	(0.086)
$\frac{\text{Proprietors}}{\text{Total}}$				-1.355***	-1.359***
				(0.086)	(0.088)
District FE	N	Y	Y	Y	Y
Year FE	N	Y	Y	Y	n.a.
Sector FE	N	N	Y	Y	n.a.
Sector $\times$ Year FE	N	N	N	N	Y
Observations	10042	10042	10042	10039	10039
R^2	0.014	0.047	0.118	0.251	0.262

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) Standard Errors are clustered along both sector-year and district-year categories. Dependent variable is log of Output Value per Worker in Israeli New Sheqel (NIS). Main independent variable is number of Palestinians killed by IDF in the year and district where surveyed establishment is located (measured in standard deviation units) (Sources: Industry Survey, Palestinian Bureau of Statistics, B'TSELEM).

Table 6: Input Distortions - Regression Coefficients

		Coefficient of *fatalities* variable			
		(1)	(2)	(3)	(4)
(a)	$\ln RK_{si}=zM_{si}$	0.005	0.008	0.006	0.008
		(0.043)	(0.044)	(0.046)	(0.043)
(b)	$\ln wL_{si}=zM_{si}$	0.025	0.024	0.010	0.016
		(0.039)	(0.037)	(0.040)	(0.031)
(c)	$\ln RK_{si}=wL_{si}$	-0.018	-0.015	-0.000	0.003
		(0.040)	(0.039)	(0.041)	(0.034)
(d)	$\ln z^d M^d_{si}=z^f M^f_{si}$	1.216***	1.234***	1.243***	1.296***
		(0.272)	(0.270)	(0.270)	(0.307)
(e)	$\ln RK_{si}=z^f M^f_{si}$	0.523***	0.538***	0.551***	0.570***
		(0.122)	(0.119)	(0.127)	(0.141)
(f)	$\ln wL_{si}=z^f M^f_{si}$	0.471***	0.466***	0.484***	0.507***
		(0.138)	(0.140)	(0.150)	(0.179)
(g)	$\ln RK_{si}=z^d M^d_{si}$	-0.690***	-0.692***	-0.690***	-0.727***
		(0.171)	(0.171)	(0.164)	(0.181)
(h)	$\ln wL_{si}=z^d M^d_{si}$	-0.668***	-0.668***	-0.662***	-0.672***
		(0.184)	(0.182)	(0.182)	(0.199)
	$\frac{\text{Family Workers}}{\text{Total}}$	N	Y	Y	Y
	$\frac{\text{Proprietors}}{\text{Total}}$	N	Y	Y	Y
	Sector FE	Y	Y	n.a.	n.a.
	Year FE	Y	Y	n.a.	n.a.
	District FE	Y	Y	Y	Y
	Sector × Year FE	N	N	Y	Y

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) The table reports estimates of the coefficient of the *fatalities* variable. Standard Errors are clustered along both sector-year and district-year categories. Dependent variable is log of ratio of Input Values in Israeli New Sheqel (NIS). Main independent variable is number of Palestinians killed by IDF in the year and district where surveyed establishment is located (measured in standard deviation units). RK_{si} is value of capital; zM_{si} is value of materials; wL_{si} is value of labor; $z^f M^f_{si}$ is value of imported materials; $z^d M^d_{si}$ is value of domestically produced materials; .

Table 7: Input Distortions - Implied Relative Values

		Implied Relative Distortion			
		(1)	(2)	(3)	(4)
(a)	$(1+\tau_M)=(1+\tau_K)$	1.005 [0.919;1.090]	1.008 [0.920;1.095]	1.006 [0.916;1.096]	1.008 [0.923;1.093]
(b)	$(1+\tau_M)=(1+\tau_L)$	1.025 [0.948;1.103]	1.024 [0.950;1.098]	1.010 [0.931;1.089]	1.016 [0.955;1.078]
(c)	$(1+\tau_L)=(1+\tau_K)$	0.982 [0.905;1.059]	0.985 [0.910;1.060]	1.000 [0.919;1.080]	1.003 [0.936;1.071]
(d)	$(1+\tau_{M^f})=(1+\tau_{M^d})$	3.375 [1.578;5.172]	3.434 [1.616;5.252]	3.465 [1.634;5.295]	3.655 [1.459;5.852]
(e)	$(1+\tau_{M^f})=(1+\tau_K)$	1.687 [1.283;2.090]	1.713 [1.314;2.112]	1.736 [1.302;2.169]	1.768 [1.279;2.256]
(f)	$(1+\tau_{M^f})=(1+\tau_L)$	1.602 [1.168;2.036]	1.593 [1.156;2.030]	1.623 [1.147;2.099]	1.660 [1.079;2.241]
(g)	$(1+\tau_{M^d})=(1+\tau_K)$	0.501 [0.334;0.669]	0.501 [0.333;0.668]	0.502 [0.340;0.663]	0.484 [0.312;0.655]
(h)	$(1+\tau_{M^d})=(1+\tau_L)$	0.513 [0.328;0.698]	0.513 [0.330;0.696]	0.516 [0.332;0.700]	0.511 [0.312;0.710]

$\frac{\text{Family Workers}}{\text{Total}}$

Table 8: Sector Ranking by Distortion in Materials

Most Affected		
Rank	*ISIC code*	*Sector name*
1	(34)	Manufacture of motor vehicles, trailers and semitrailers
2	(23)	Manufacture of coke, refined petroleum products and nuclear fuel
3	(21)	Manufacture of paper and paper products
4	(37)	Recycling
5	(24)	Manufacture of chemicals and chemical products

Least Affected		
Rank	*ISIC code*	*Sector name*
25	(20)	Manufacture of wood and of products of wood and cork, except furniture; articles of straw and plaiting materials
24	(36)	Manufacture of furniture; manufacturing n.e.c.
23	(35)	Manufacture of other transport equipment
22	(32)	Manufacture of radio, television and communication equipment and apparatus
21	(14)	Other mining and quarrying

Notes. The table reports most and least a ected 2-digits sectors as defined by deriving sector-level average distortions for domestically produced materials vs. imported materials (Sources: Industry Survey, Palestinian Bureau of Statistics, B'TSELEM).

Table 9: Conflict and Wages

	Log of Wages, ln(W/L)			
	(1)	(2)	(3)	(4)
fatalities	-0.070**	-0.072**	-0.079**	-0.076**
	(0.035)	(0.035)	(0.035)	(0.034)
$\frac{\text{Family Workers}}{\text{Total}}$		-2.014***	-2.015***	-2.032***
		(0.071)	(0.071)	(0.084)
$\frac{\text{Proprietors}}{\text{Total}}$		-2.250***	-2.242***	-2.224***
		(0.081)	(0.081)	(0.075)
Sector FE	Y	Y	n.a.	n.a.
Year FE	Y	Y	n.a.	n.a.
District FE	Y	Y	Y	Y
Sector $\times$ Year FE	N	N	Y	Y
Observations	8891	8891	8891	7302
R^2	0.156	0.443	0.459	0.476

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) Standard Errors are clustered along both sector-year and district-year categories. Dependent variable is log of average wage in Israeli New Sheqel (NIS) as derived by dividing the total wage bill by the total number of employees. Main independent variable is number of Palestinians killed by IDF in the year and district where surveyed

Table 10: Conflict and Output Value: including number of closure days

	Log of Output Value ln(*PY*)			
	(1)	(2)	(3)	(4)
fatalities	-0.071* **	-0.063*	-0.088***	-0.084***
	-0.022	-0.035	(0.031)	(0.031)
*closure days * border distance*	0.000	0.000	0.000	0.000
	0.000	0.000	(0.000)	(0.000)
$\frac{\text{Family Workers}}{\text{Total}}$			-1.522***	-1.533***
			(0.100)	(0.097)
$\frac{\text{Proprietors}}{\text{Total}}$			-2.714***	-2.718***
			(0.113)	(0.113)
Sector FE	N	Y	Y	Y
Year FE	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Sector $\times$ Year FE	N	N	N	Y
Observations	10042	10042	10039	10039
R^2	0.001	0.001	0.330	0.331

Table 12: Border Closures and Palestinian Fatalities during the Second Intifada

	Monthly Days of Border Closure				
	(1)	(2)	(3)	(4)	(5)
$fatalities_t$	0.069	0.123**	0.082	0.065	0.052
	(0.046)	(0.051)	(0.054)	(0.045)	(0.043)
$closures_{t-1}$				0.389***	0.113
				(0.124)	(0.268)
u_{t-1}					0.341
					(0.250)
Year FE	N	Y	Y	N	N
Month FE	N	N	Y	N	N
Observations	75	75	75	75	75
R^2	0.031	0.210	0.364		

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) The table reports coe cient estimates from a regression of monthly days of border closures over the total number of Palestinians killed by IDF in the same month. Estimates in column (4) are from an AR(1) model while estimates in column (5) belong to an ARMA(1,1) model in order to allow for serially correlated residuals (Sources: B'TSELEM).

Table 13: Number of Palestinian Fatalities and Internal Checkpoints during the Second Intifada: West Bank

	Yearly Number of Fatalities				
	(1)	(2)	(3)	(4)	(5)

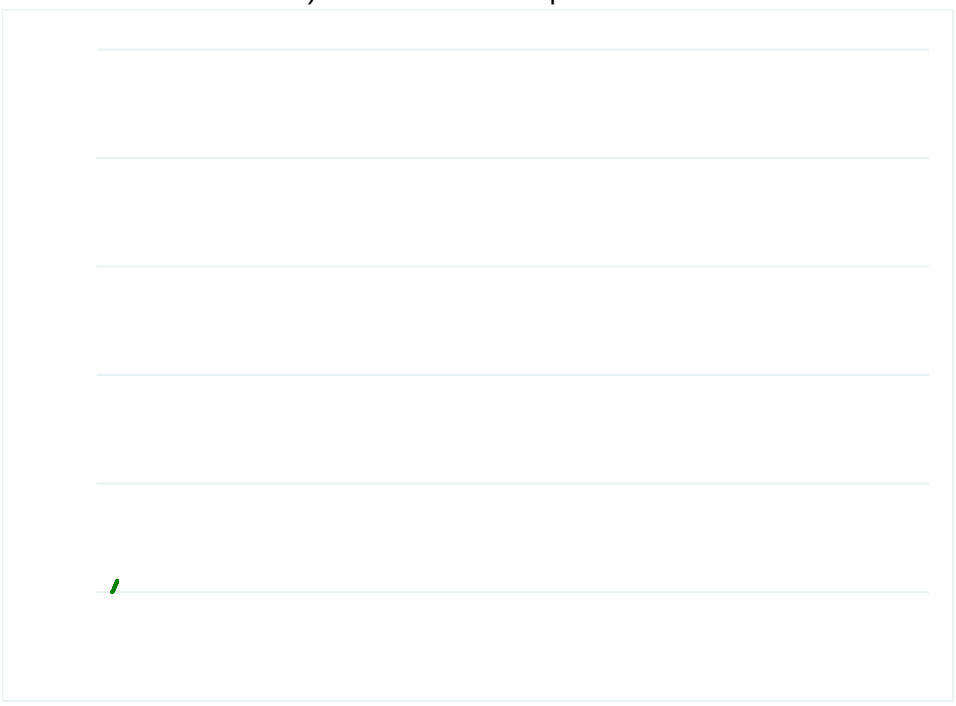
Table 14: Input Distortions - Implied Relative Values: Restricted Sample

		Implied Relative Distortion			
		(1)	(2)	(3)	(4)
(a)	$(1+\ _M)=(1+\ _K)$	1.027 [0.930;1.124]	1.030 [0.931;1.129]	1.022 [0.918;1.126]	1.013 [0.917;1.109]
(b)	$(1+\ _M)=(1+\ _L)$	1.060 [0.964;1.156]	1.059 [0.966;1.152]	1.046 [0.946;1.147]	1.038 [0.963;1.112]
(c)	$(1+\ _L)=(1+\ _K)$	0.988 [0.887;1.088]	0.990 [0.896;1.084]	0.995 [0.897;1.093]	1.000 [0.921;1.078]
(d)	$(1+\ _{M^f})=(1+\ _{M^d})$	3.480 [1.435;5.524]	3.545 [1.491;5.599]	3.536 [1.498;5.574]	3.627 [1.356;5.898]
(e)	$(1+\ _{M^f})=(1+\ _K)$	1.719 [1.256;2.182]	1.750 [1.299;2.200]	1.744 [1.265;2.223]	1.760 [1.273;2.247]
(f)	$(1+\ _{M^f})=(1+\ _L)$	1.645 [1.079;2.212]	1.648 [1.077;2.219]	1.659 [1.061;2.256]	1.680 [1.038;2.321]
(g)	$(1+\ _{M^d})=(1+\ _K$				

Figure 1: Labor and Output

a) Distribution of Employment

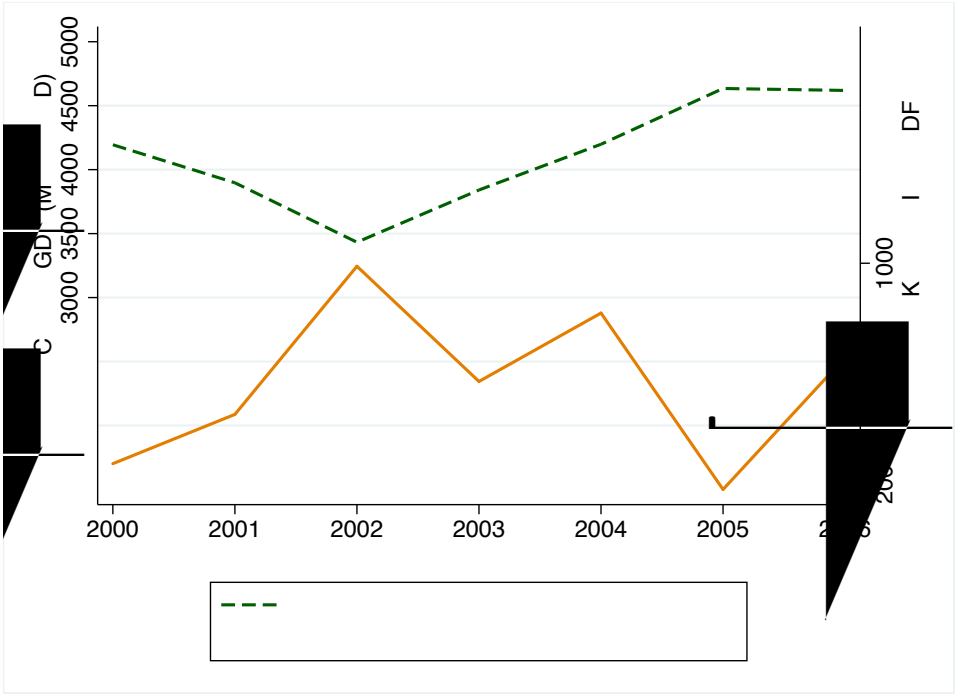
b) Distribution of Output Value



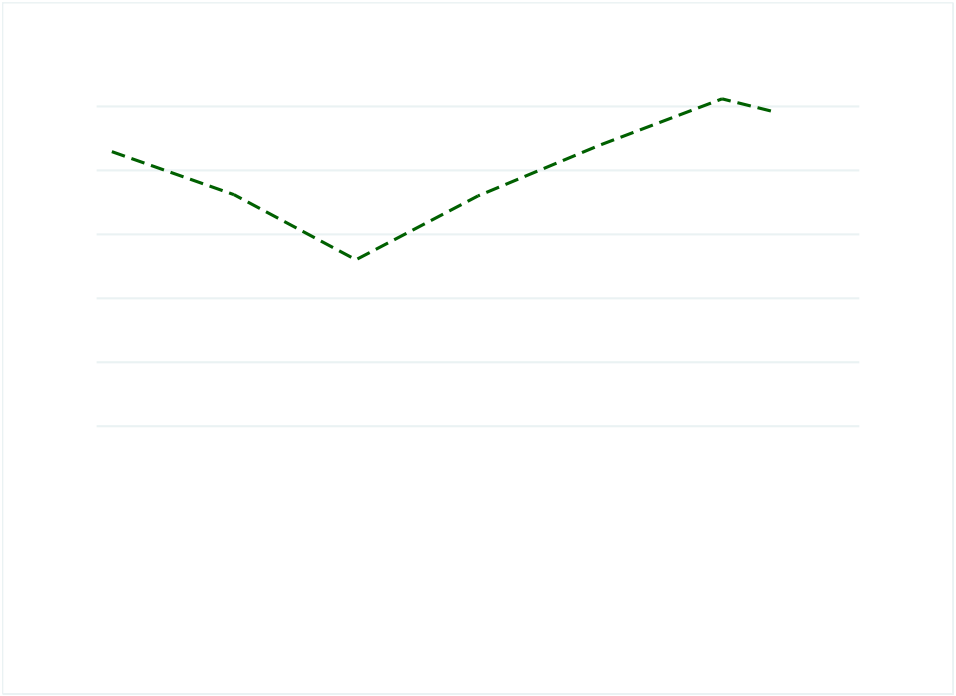
Notes. The top and bottom figures show distribution of number of workers and value of output for Palestinian firms (Sources: Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 2: Conflict and Palestinian GDP

a) Conflict and Nominal GDP



b) Conflict and Real GDP



Notes. The top and bottom figures show the evolution of current and real Palestine GDP (Million USD) respectively over time, together with the evolution of the total number of Palestinians killed by IDF (Sources: Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 3: Conflict and Aggregate Output Value

a) Conflict and Aggregate Nominal Output Value

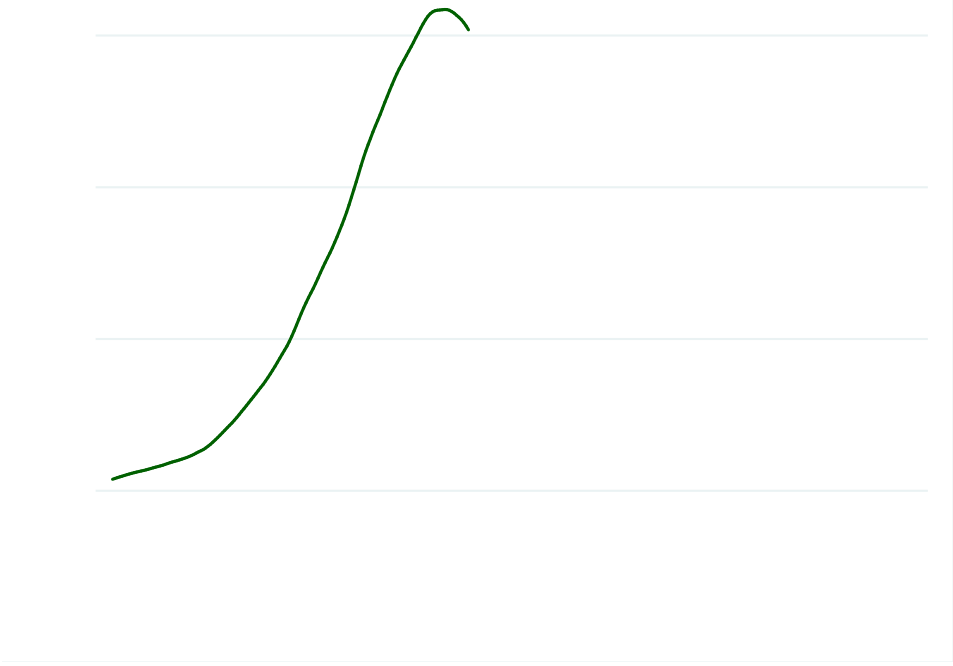
b) Conflict and Aggregate Real Output Value

Notes. The top and bottom figures show the evolution of the total current and real value of production in Israeli New Sheqel (NIS) respectively over time, as derived from the Industry Survey. The figures also plot the evolution of the total number of Palestinians killed by IDF in the same years (Sources: Industry Survey, Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 4: Conflict and Output Value

a) Output Value (Log of)

b) Output Value (Log of, within sector)



Notes. The top figure shows the distribution of residual Log of Output Value in Israeli New Sheqel (NIS) for firms located in high and low conflict areas respectively. High conflict area comprises those districts and years with a total number of Palestinians killed by IDF higher than the median. Low conflict area comprises all other districts-years. The bottom figure shows the distribution of within-sector residual Log of Output Value in the two areas (Sources: Industry Survey, Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 5: Conflict and Output Value per Worker

a) Output Value per Worker (Log of)

b) Output Value per Worker (Log of, within sector)

Notes. Figure (a) shows the distribution of residual Log of Output Value per Worker in Israeli New Sheqel (NIS) for firms located in high and low conflict areas respectively. High conflict area comprises those districts and years with a total number of Palestinians killed by IDF higher than the median. Low conflictLow conflict4(btS7-21(Lollconother)-21(Ldistricts-years.)-339Ctc89TJ -25.015 --318e4V2districts-years.)-33gherled by Ou-

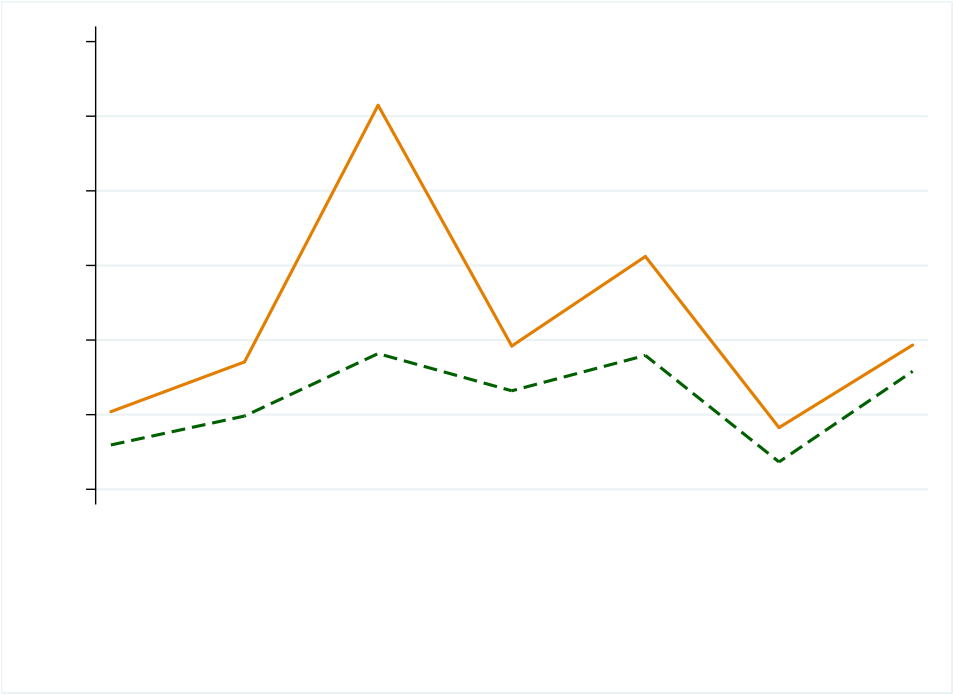
Figure 6: Cross-district and Time Conflict Variability - Maps

a) Cross-district Variability

b) Within-district Variability

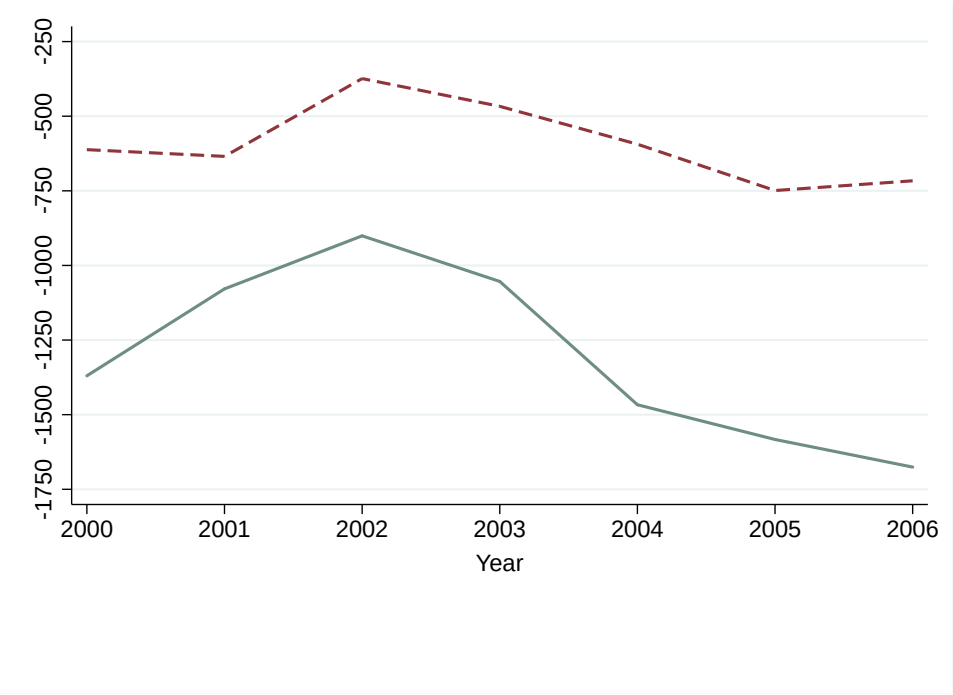
Notes. The maps show the distribution of the number of Palestinians killed by IDF across districts in given years and its changes over given time spans. In each map, districts are colored according to the quintiles they belong to in the distribution of levels and changes respectively (Sources: B'TSELEM).

Figure 7: Cross-district and Time Conflict Variability



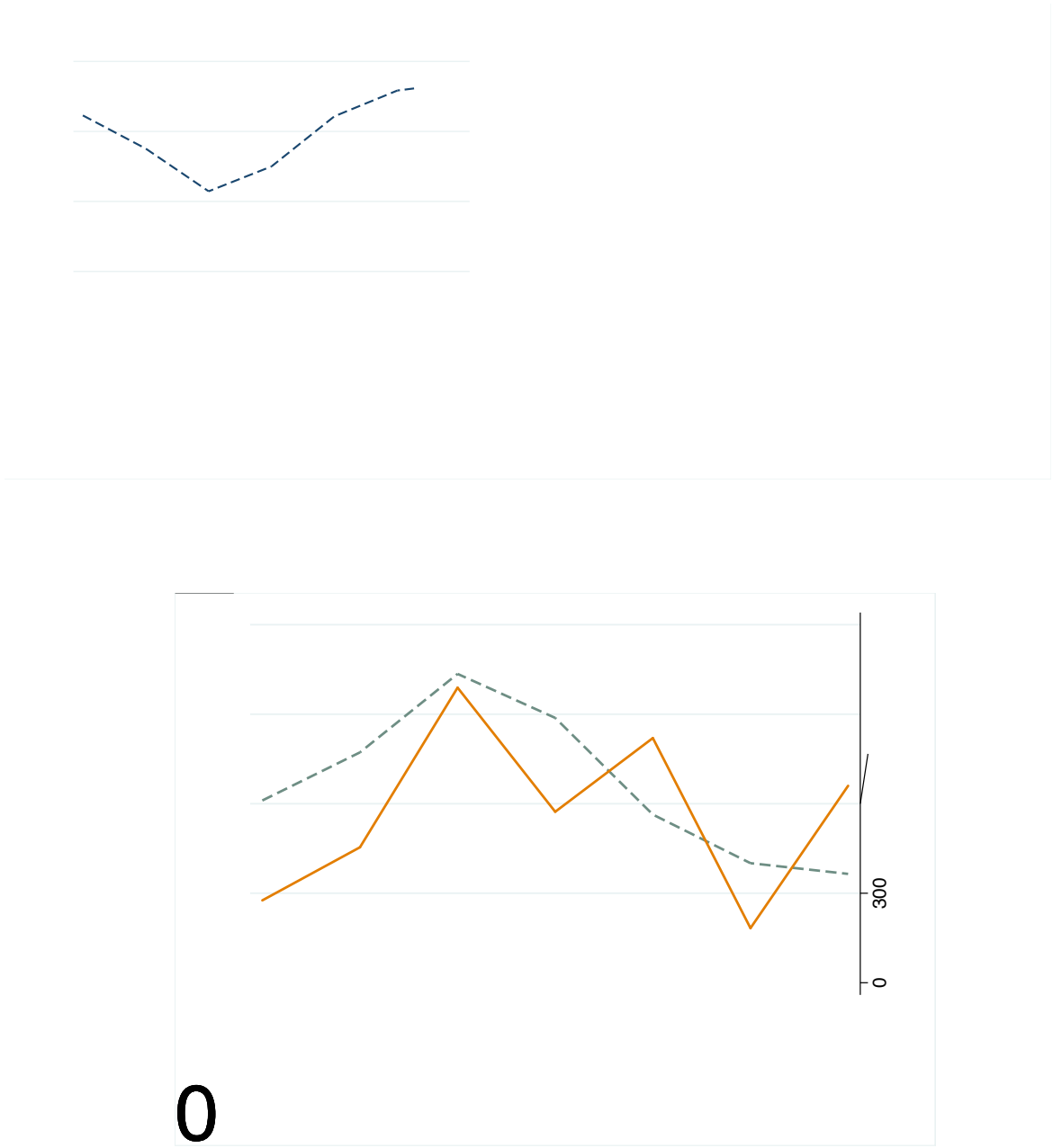
Notes. The figure plots the average number of Palestinians killed by IDF over time in districts as divided according to the number of fatalities in 2002 (Sources: B'TSELEM).

Figure 8: Net Balance of Trade per Group of Countries



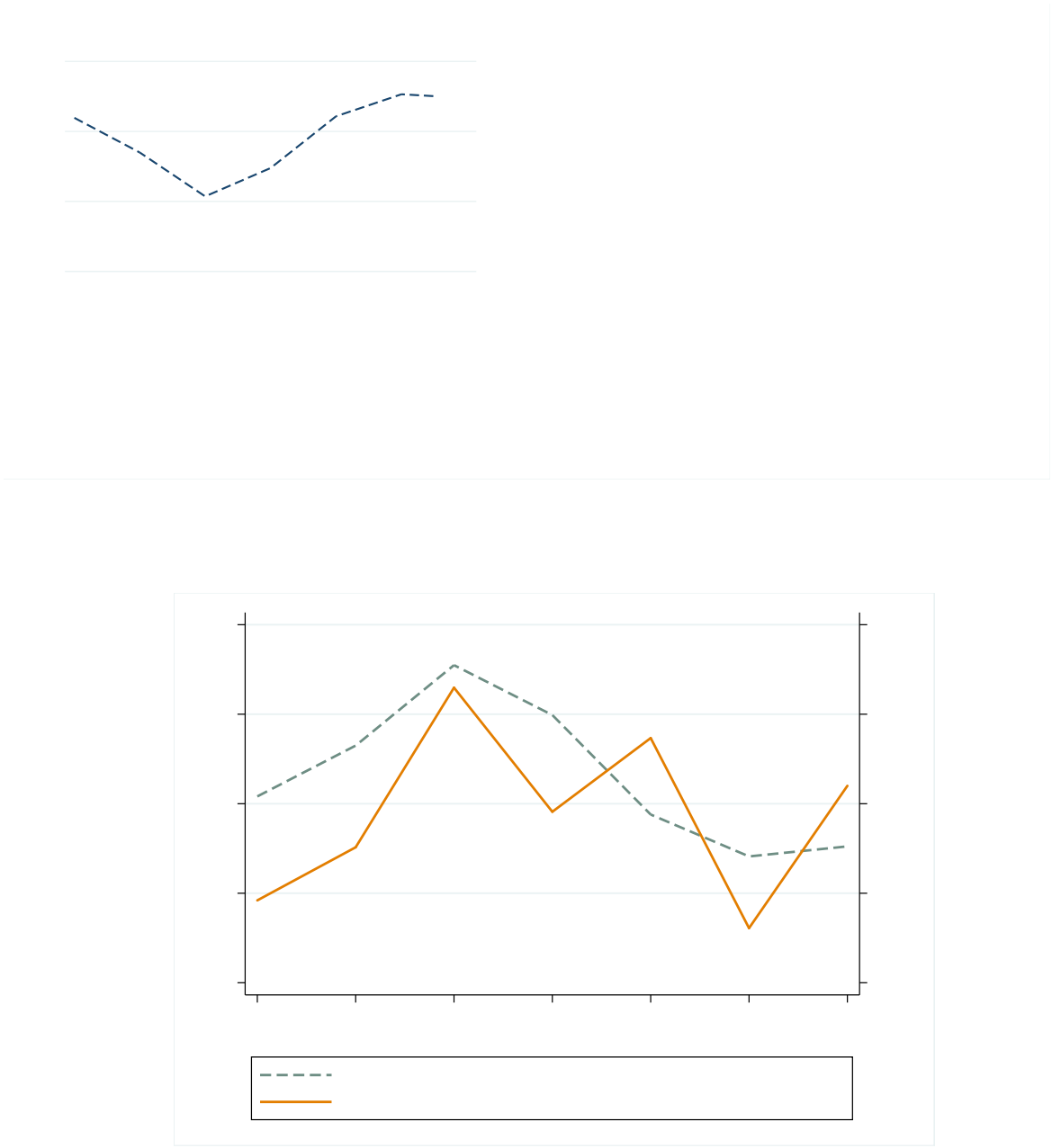
Notes. The figure plots the evolution of the Net Balance of Trade with Israel and Rest of the World separately over time (Sources: Palestinian Central Bureau of Statistics).

Figure 9: Conflict and Current Value of Trade



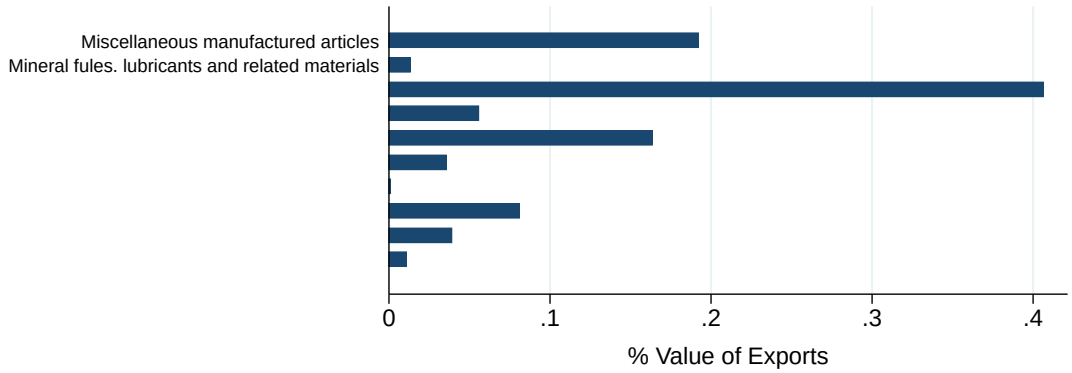
Notes. The figures plot the evolution of the total current value of Imports, Exports and Net Balance Trade over time, together with the evolution of total number of Palestinians killed by IDF (Sources: Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 10: Conflict and Real Value of Trade



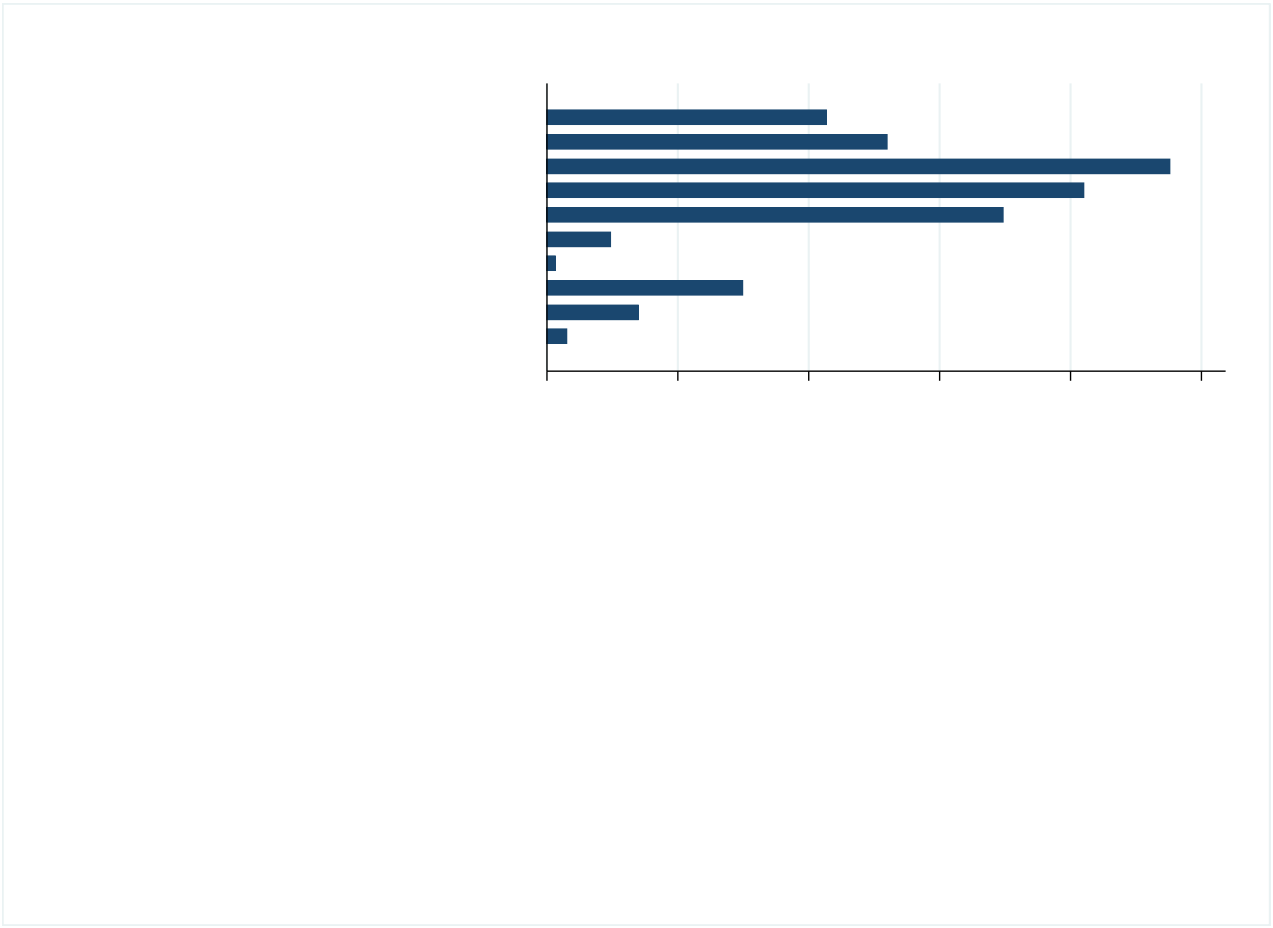
Notes. The figures plot the evolution of the total real value of Imports, Exports and Net Balance Trade over time, together with the evolution of total number of Palestinians killed by IDF (Sources: Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 11: Trade composition: Exports



Notes. The figures plot the export composition (sector share over total export) in 1999 and 2002 (Sources: Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 12: Trade composition: Imports



Notes. The figures plot import composition (sector share over total import) in 1999 and 2002 (Sources: Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 13: Sector-level Distortions and Imported Material Intensity

Figure 14: Sector-level Distortions and Output Value

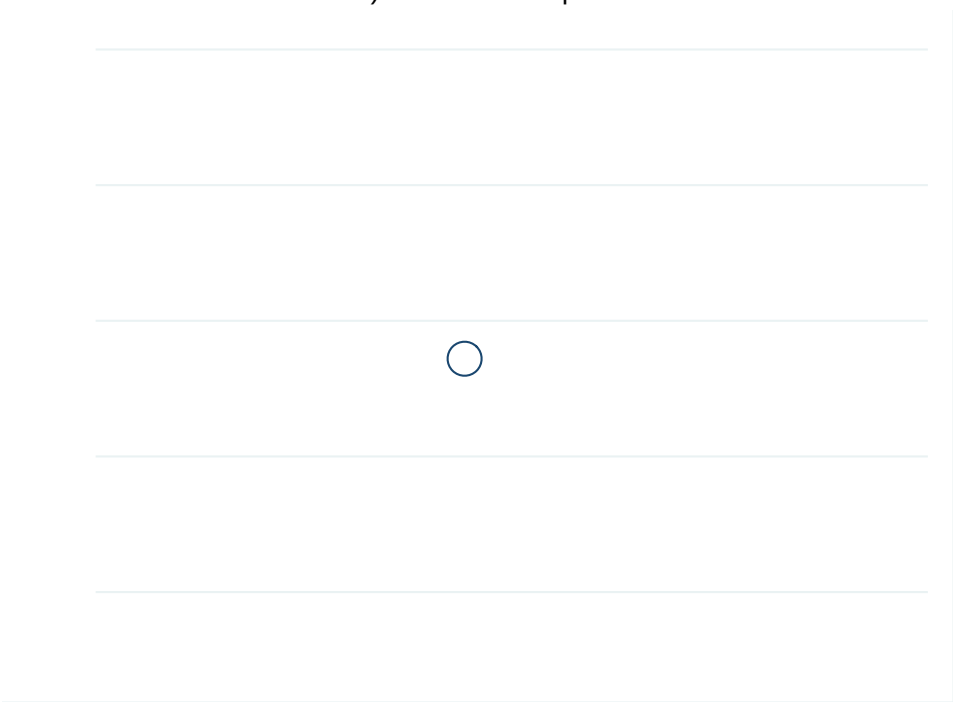
Notes. The figure plots 2-digits sector-level average distortions for domestically produced materials vs. imported materials against average output value as measured in 1999. Sectors for which conflict distorted the domestically vs. imported materials input ratio the most are those with the higher output value in 1999 (Sources: Industry Survey, Palestinian Central Bureau of Statistics; B'TSELEM).

Figure 15: Producer Price Index and C

Figure 16: Within-sector Heterogeneity in Technology and Output Value

a) All Sectors

b) Restricted Sample



Notes. The top and bottom figures plot the within-sector residual log of the ratio between the value of domestically produced materials and imported materials used over the residual log of output value for firms in 1999. Circle size correspond to the observation's weight in the sample. The top figure shows the relationship of interest using all available observations, while the bottom figure considers only those sectors for which the relationship between the two variables is non-significant (Sources: Palestinian Central Bureau of Statistics).

A Appendix

Table A.1: Establishments' Characteristics and Imported Materials

	Not Using Imported Materials	Using Imported Materials	*Difference*
Log of Output Value	11.416	11.896	0.479***
	(0.042)	(0.026)	(0.050)
Log of Output Value per Worker	10.135	10.379	0.244***
	(0.037)	(0.021)	(0.043)
Log of Value of Capital	9.665	10.357	0.692***
	(0.048)	(0.029)	(0.056)
Log of Value of labor	10.296	10.561	0.266***
	(0.034)	(0.023)	(0.041)
Log of Value of Materials	10.284	10.882	0.598***
	(0.042)	(0.026)	(0.050)
Fraction of Family Workers	0.164	0.168	0.005
	(0.007)	(0.004)	(0.008)
Fraction of Proprietors	0.516	0.409	-0.106***
	(0.009)	(0.005)	(0.010)

Notes. (* p-value< 0.1; ** p-value<0.05; *** p-value<0.01) The table reports subsample means and di erence in means for non-importing and importing establishments. Non-importing establishments are defined as those not reporting any positive value of eternally produced materials consumed during the year, while importing establishments are those reporting positive values for the same variable. Figures are computed using all Industry Survey observations from year 1999 to 2006 (Sources: Industry Survey, Palestinian Bureau of Statistics).

B Data Appendix

Value of Capital. Similarly to Hsieh and Klenow (2009), we take the average of the book value of

individuals. As a rule, Palestinians in the West Bank and the Gaza Strip are classified as civilians, in part because Palestinian combat there is not carried out by an organized army of a sovereign state. However, the lists distinguish between civilians who took part in hostilities, and thus lost the protection given to civilians not involved in the hostilities, and civilians who were completely uninvolved in the hostilities. The information on Palestinian fatalities is based on B'TSELEM's investigation into the circumstances of the death in each case. As part of the investigation, B'TSELEM collects eyewitness testimony; gathers medical documents and photographs; and cross-checks its information with IDF Spokesperson announcements, information appearing on websites and blogs of armed Palestinian organizations, information gathered by Palestinian and international human rights organizations, and media reports. B'TSELEM emphasizes that publication of the name of a person among the list of fatalities or mention that the person was a civilian or, alternatively, was killed while taking part in hostilities does not indicate that the agent causing the death violated the law and does not prove this person's innocence (`http://www.btselem.org/statistics/casualties_clarifications`). We create our $fatalities_{gt}$ variable by counting the total number of fatalities recorded in the B'TSELEM database as Palestinians killed by IDF in year t and district t. In most specification, we rescale the variable and divide it by its standard deviation in the distribution of fatalities per district-year.

Border Closures. Data are provided by B'TSELEM at `http://www.btselem.org`, accessed on March 1, 2014. Figures were provided by the IDF Spokesperson's O ce on August 7, 2011 and by the Israeli Ministry of Defense on December 6, 2009. We use these data to construct or variable *closures* as the monthly number of closure days, i.e. the number of days during which the IDF imposed comprehensive closure of the borders between the OPT and Israel and between the West Bank and the Gaza Strip in each year.

B.3 Other Variables

Gross Domestic Product. Data on real and current value of Palestine GDP over the years 2000 to 2006 are provided by the PCBS in the *National Accounts* subsection of the *Statistics* section of their website (`http://www.pcbs.gov.ps/`), accessed on March 1, 2014.

Producer Price Index. Yearly Producer Price Index numbers by classes in Palestine for years 1999 to 2006 (base year 1996) are elaborated by the PCBS using Producer Price Index Survey, 1999 - 2006.

Aggregate Value of Trade. Data on total value of Palestian Imports and Exports over the years 2000 to 2006 are provided by the PCBS in the *Foreign Trade* subsection of the *Statistics* section of their website (`http://www.pcbs.gov.ps/`), accessed on March 1, 2014. We derive real figures by using price deflators as derived by combining information on real and current GDP from the same source. Yearly information on the value of Palestinian Net Trade Balance are derived by subtracting the value of Imports from the value of Exports in each year.