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# Food Trade in Political Conflict: Demand for Differentiated Fresh Fruits in the Palestinian Wholesale Market of Hebron

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**Abstract:**

The bio-economy of developing countries largely focuses on the production and distribution of food given limitations in production inputs and infrastructure. Food security remains a central challenge for development. Additionally, many developing countries in Africa and Asia suffer from recurring political instabilities of varying intensity as highlighted by the 2011 World Development Report which pose further threats by complicating conditions for food production and trade.

We focus on this question by assessing the pricing and demand for apples, an important part of the diet of the local population, subject to the economic impediments resulting from the long-lasting conflict between Israel and the Palestinians. We analyze a unique dataset from the Hebron fruits and vegetable wholesale market by analyzing 4000 daily price and quantity observations of 12 apple varieties in total and an extraordinarily rich set of variables quantifying various aspects of the conflict. We employ an oligopolistic market model and account for product differentiation.

Results suggest that the intensity of the conflict significantly affects the behaviour of traders and consumers being mostly of short-run nature. While days of exceptionally high numbers of fatalities negatively shock both prices and quantities, fatalities in the last 3 days have the opposite effect. Periods of severe crisis as a measure of long-term effects only increase demand. The average demand elasticity of apples is approximately -4 and triples in periods during which restrictions on the movement of Palestinians are imposed. Finally, we do not find evidence for animosity of Palestinian consumers against Israeli produce: Demand and prices of Israeli apples are higher than those of the local Palestinian produce.

**Keywords:** demand for differentiated goods, fruits and vegetables, Israeli-Palestinian conflict, MENA, oligopoly, West Bank

**JEL:** D74, L11, L13, L66, O5, Q11

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## 1 Introduction

The Palestinian Territories belong to the regions worldwide which have been subject to violent political struggle for decades. They consist of the West Bank and the Gaza Strip where 2.7m and 1.6m Palestinians lived in 2012, respectively (PCBS, 2012a). Economic activity and development has been exposed to strong political pressure resulting from the conflict and suffered depending on the varying degree of its intensity. Besides the two major eruptions of violence between December 1987 and September 1993 known as the First Intifada and between the end of September 2000 until the middle of 2005 known as the Second or the Al-Aqsa Intifada, the political situation has never completely calmed down in recent years but was characterized by occasional more or less grave incidences which impaired personal lives and economic activity nevertheless.

The ongoing challenging political situation has manifold effects on the level and the speed of economic development, household income levels and poverty rates in the Palestinian Territories. The Palestinian Poverty Atlas (PCBS, 2013a) provides a comprehensive inside into the heterogeneous regional distribution of poverty on the municipality level. While the center of the West Bank around Jerusalem and Ramallah has the lowest rates, most of the municipalities with the highest relative shares of poverty as well as the highest absolute numbers of poor individuals are found in the Gaza Strip and in the Hebron Governorate at Southern end of the West Bank (PCBS, 2013a, p. 35, 37). The Palestinian Expenditure and Consumption Survey 2011estimates poverty rates of 18% and 29% in the West Bank and the Gaza Strip, respectively (PCBS, 2012b). It, moreover, finds that households which have a large number of children, which are female-headed and which depend on agriculture as the main source of income are most vulnerable. Besides the five governorates in the Gaza Strip, Hebron Governorate has by far the largest average household size of 6.4 people in the Palestinian Territories (Table 2.16).

The highest share of the monthly expenditures of an average Palestinian household of 36% was spent on food in 2011 (PCBS, 2012b) which increased by almost 10% per capita since 2009. Engel's Law stating that the lower a household's income is, the higher its share spent on food, is also confirmed in the regional expenditure shares spent on food. While, for example, the average household in Ramallah spent 600 USD on food in 2011, in Rafah in the Gaza Strip 465 USD and in Hebron 484 USD are spent which corresponds to 34%, 47% and 39% of the total monthly cash expenditures, respectively (PCBS, 2012b, T. 2.16). While households of at most three members spend on average 35% of their expenditures on food, this share accounts for more than 43% for households of more than ten members (PCBS, 2012b, T. 2.6). Most important non-food expenditure items are transport, housing and clothing accounting of 10.6%, 8.4% and 6.3% of total monthly consumption, respectively. Among the important group of food commodities, meat and poultry as well as bread and cereals are the most important items with 8.7% and 5.5%, respectively, fresh vegetables and

fruits account together for 7.1% (PCBS, 2012b, T. 2.2). Large households of more than ten members spend on average 8% on these two items while small households of up to three members spend only 6.7%.

This background of extensive poverty in the context of an ongoing political conflict of varying intensity poses a number of questions concerning the role of the tangible effects of the conflict for the marketing and demand of basic food products which account for significant amounts of the expenditures of a typical household and play a vital role in its food security. For example, are consumer preferences affected by the current political situation? Do the various symptoms of the conflict affect marketing costs and market competitiveness? What implications for food security does this have? Is there evidence that consumers distinguish between local and foreign produce, especially if local supply heavily depends on imports?

For the analysis of the demand and the pricing behavior, we choose a commodity which plays on the one side a significant role in value terms in inter-regional and local wholesale trade and is, on the other, a fundamental component of the diet and, thus, the food security of the civilian population living subject to the conflict. For this end, we apply New Empirical Industrial Organization methodology to estimate Palestinian consumers' preferences for vegetables and fruits - since they constitute not only a traditionally important element of the local diet and are essential ingredients of popular local dishes, but are also the relevant source for vitamins and minerals - and pricing rules at the wholesale level. The Israeli-Palestinian conflict is a particularly suitable case for the analysis of economic effects of violent conflict since it has been attracted considerable attention from local, regional and international media, Israeli, Palestinian and international human rights groups and international organizations in the area of economic development. The course of the conflict, the use of violence and the implementation of any conflict-related policy measures and insurgent activities and behaviors of both conflict parties is therefore well monitored and documented which allows measurement of its intensity as a precondition for quantitative economic analysis.

This paper is the first analysis which quantifies the effects of varying intensities of conflict on demand and pricing decisions. It answers this question by estimating a state-of-the-art discrete choice model for demand and pricing of a staple food commodity in a development economics context by combining a unique dataset of prices and quantities with a rich set of variables quantifying political relations on a very disaggregated temporal scale. Moreover, the paper contributes to the literature of measuring the intensity of violent conflict (e.g. Seybolt, 2002) by suggesting a range of variables quantifying various aspects of violent political conflict on a local scale. Third, we contribute to the literature one of the rare analyses of micro-economic economic effects of violent conflict as called for by Blattman and Miguel (2010). Although the underlying dataset is quite far away from the ideal for empirical analysis in the framework of New Empirical Industrial Organization as described in Nevo (2000), its quality is of extraordinary quality for a development context. In the following, we first present a literature review which is followed by the outline the institutional background of this analysis. Details of the model and the data are presented in sections 4 and 5, respectively. Afterwards, the regression results are presented before we conclude this paper.

# 2 Literature Review

In this study we aim at analyzing the impact of the ongoing Israeli-Palestinian violent political conflict on the consumption patterns and pricing of domestically grown and Israeli imported agricultural produce in Palestine. Furthermore, the unstable economic environment for trade in which almost daily developments in the conflict affect buyers and sellers simultaneously require an equilibrium modeling approach. This estimation is made possible by employing a New Empirical Industrial Organization methodology which consists on aggregate consumer-level data in a structural equilibrium model of oligopolistic industry. Starting with a distribution of consumer preferences over differentiated products, these preferences are aggregated into a market share quantities. Then, oligopolistic pricing equations are added to form the industrial equilibrium model. This is particularly useful when trying to understand firm conduct and measuring their markups in actual and simulated scenarios. Main examples include the ready-to-eat cereals industry (Nevo 2000), the US automobile industry (Berry, Levinsohn and Pakes (1995), consumer's choice of rural tourism (Tchetchik, Fleischer and Finkelshtain, 2008), merger simulation in the US airline industry (Peters 2006) and many others. Noteworthy, this method is particularly valuable to examine how firms change their pricing as a result of changes of market structure or in the economic environment such as a new regulation policy, entry or exit of firms, mergers or relevant to our case, exogenous occurrences during a political conflict which affects consumer demand and the ability to supply fresh food.

Estimating demand system using aggregated data for fresh fruits and vegetables in the framework of the New Empirical Industrial Organization methodology is a challenging task. This is because the large number of agricultural products, the large number of varieties within each product and consequently, the need to account for this number to the power of two for the respected substitution patterns (Nevo 2000). The discrete choice literature offers a solution in which the number of products (and varieties) is narrowed down to the space of relevant market segments (e.g. ready to eat cereals aimed for adult, family and kids, cars divided by sizes, horsepower and gas mileage or a geographical location as a primal choice for rural vacation). Along this line, market segments for agricultural produce may be clustered by their nutrient value, perishability level and country of origin which may reflect in some cases consumer animosity, all of which may be of great relevance for modeling demand in economic environment suffers from violet conflict.

In the last two decades, a number of methodological innovations for estimating demand and supply for differentiated products in oligopolistic markets have been developed and applied to a variety of questions in the context of New Empirical Industrial Organization (NEIO). Berry (1994) suggests a discrete-choice model which allows for endogenous prices in such a nonlinear simultaneous equations setting and can be estimated by using aggregated data and instrumental variable techniques. Berry et al. (1995) develop an empirical approach for estimating the parameters of cost and demand equations which is consistent with theoretical equilibrium in an oligopolistic setting. They analyse the American car market as Verboven (1996) extends this framework to multi-product firms and studies price discrimination and its determinants in the European car market. Nevo (2000) – as well as Nevo (2001, 2010) - studies breakfast cereal markets in the United States and provides an in-detail discussion of

modelling approaches and issues. Dubois et al. (2013) examine with this modelling framework international differences in food purchases by focusing on the US, France and UK.

Several articles applying discrete-choice models to oligopolistic markets with differentiated products have focused on Israel. Fershtman and Gandal (1998) assess the effects of the Arab boycott on the Israeli car market and find a significant dividend for peace. Fershtman et al. (1999) study the effects of various tax regimes on the Israeli car market and show that taxation impacts prices as well as the profile of sold goods. Tchetchnik et al. (2008) examine pricing and demand in the rural tourism industry of Israel and find evidence for synergies between agricultural production and the supply of tourism services. The margin between prices and costs is found to be mainly driven by differentiation and government regulations. Tchetchnik et al. (2011) consider congestion and agglomeration effects in Israel tourism markets and show that the number of units provided can exceed the optimal size. Bar Nahum (2012) finds that governmental price control is effective in the Israeli dairy market which is extended by Bar Nahum et al. (2013) by incorporating market power of diaries and retailers. Our study contributes to this literature by providing the first analysis which applies these methods to varieties of fresh food in the context of a developing economy in order to analyse the effects of violent political conflict on food demand.

First, as discussed earlier, the state of poverty in the Palestinian territories and ongoing political struggle with cycles of violence and security measures may restrict free access to the markets in times of intensified struggle or temporal separation between Israel and Palestine. Berrebi and Klor (2006, 2008) and Caruso and Klor (2012) analyze economic and societal effects of the Israeli-Palestinian conflict. Therefore, it is expected that during these times consumer purchase decisions as well as wholesale traders pricing behavior are altered. Second, it might be that the hostile environment affects consumer attitudes toward products produced by Israeli farmers and marketed in Palestine. Examining consumer attitudes toward foreign products has been studied in two principal streams; one focuses on country of origin and the other on consumer animosity (Nijssen and Douglas, 2004). While the former serves as a signal for consumers regarding the product's quality in the absence of information about a product, the latter is associated only with negative attitudes toward purchase. The term consumer animosity concerns the attitudes of purchasing imported products from a specific country of origin in light of past and/or present problematic bi-national relations between the two countries. Klein, Ettenson and Morris (1998) studied animosity in Nanjing, China where the horrific slaughter of 300,000 civilians took place between December 1937 and January 1938 by Japan. Ever since the novel work on consumer animosity by Klein, Ettenson and Morris (1998), the concept has been studied extensively in various regions. Some examples which share animosity originated in historical violent conflicts and economic rivalry include U.S. consumers' animosity toward Chinese products (Witkowski, 2000), U.S. consumers' animosity toward Japanese products (Klein, 2002); Korean consumers' attitudes toward Chinese products (Shin, 2001); Dutch consumers' animosity towered German products (Nijssen and Gouglas, 2004); and Australian attitudes toward French products due to nuclear testing in the south pacific (Ettenson and Klein, 2005). A more recent example is animosity in buying behavior of Jewish consumers in Israel from Arab Israelis following the advent of the second Intifada (Shoham et al., 2006).

Thus far studies on animosity focused on its impact on consumer behavior alone, which provides better understanding of the demand side of the market. However, in these studies only one side of the market is accounted for. One can also ask how the industry side acts in the presence of animosity, and consequently, what is the overall effect on quantities and prices? This is a meaningful empirical question as it is expected that traders in the wholesale market are aware and also affected from the conflict. For this purpose we employ a discrete choice equilibrium model with product differentiation. In this approach the impact of product characteristics on supplier costs and consumer preferences are jointly estimated. In the context of the wholesale market in Hebron we use the many varieties of apples and their characteristics to identify the markup associated with Israeli products marketed in Hebron marketplace. This study contributes to the literature in several ways. First, to the best of our knowledge, we conduct the first attempt applying the New Empirical Industrial Organization methodology to model market performances under conditions of ongoing conflict. Second, because the violent conflict between Israel and Palestine has not been resolved yet, we are able to question the existence of animosity in light of the hostile day-to-day events within the conflict (e.g. movement restrictions, deadly terror attacks and more). Finally, because we concentrate on prices of food products the implications of this study are important. Our oligopolistic modeling approach will shed light on producer's behavior in Israel and Palestine and their associated markups in times of political unrest.

# 3 Institutional Background

This analysis focuses on Hebron since it is beside the Gaza Strip the economically weakest and the poorest governorate in the Palestinian Territories which is why demand and pricing for staple foods more immediately touch the question of food security.[1] Moreover, the city of Hebron is considered holy both by Islam and Judaism because it is believed to be the place where Abraham and several of his family members are buried. Consequently, it is one focal point of political clashes and struggle, e.g., there is a small Israeli settlement in downtown Hebron which is home to a quarter of a million Palestinians so that the city is split into two zones (for more details see, e.g., B'Tselem, 2013c).

The governorate of Hebron is with an estimated population of 650,000 the most populated of the sixteen governorates (PCBS, 2012c, T. 3) as it accounts for 15% of the Arab population in the Palestinian Territories. Hebron - as its capital the home of almost one third of this number - is the traditional commercial center for the Southern part of the West Bank (B'Tselem, 2013c). The region has the highest unemployment rates and the lowest wage rates in the West Bank since years (PCBS, 2013b). The average household size of 6.4 members is markedly above the West Bank average of 5.5 members (PCBS, 2012b). Additionally, households' own food production in the governorate is among the lowest shares in the West Bank. These characteristics and others result in the above-mentioned increased level of poverty and vulnerability against income shocks. In 2009, the governorate had with a number of 174,000 persons the second highest poverty headcount in the Palestinian Territories after Gaza city which corresponds to 40% or the poor in the West Bank or 17% of the 1m Palestinian poor

[1] Data for the Gaza Strip was not accessible.

(PCBS, 2013a, p. 22; PCBS, 2013c).[2] Income shocks relevant to this group might be caused by price increases resulting from supply shocks or be provoked by conflict-related incidents. Therefore, Hebron governorate is, besides the Gaza Strip, the region in the Palestinian Territories which appears to be most susceptible to economic shifts because households possess least endowments which may allow them to cushion such shocks, in particular concerning basic food commodities.

In 2010, the average total cash expenditure of Palestinian households amounted to 1250 USD per month of which 470 USD were spent on food alone (PCBS, 2011a). On average, 26 USD are spent on fresh fruits and nuts, while households purchase vegetables for approximately 43 USD per month. Among fresh vegetables and fruits, demand focuses on only several commodities which enjoy a traditionally important role in the local diet (PCBS, 2011b). Tomatoes and cucumbers are by far the most important fresh vegetables of which 13kg (13.5 USD) and 7kg (6 USD), respectively, were demanded on average in 2010. Significant amounts of eggplants, squashes and cauliflowers were also purchased (3kg and roughly 3 USD each). Among fresh fruits, bananas and apples play the most prominent role both in terms of quantity as well as in terms of expenditure of which the average Palestinian household consumed in 2010 around 5kg which cost roughly 6 USD each. Moreover, significant amounts of 3.5 USD each are spent on oranges and water melons (PCBS, 2011a, 2011b).

Agricultural production and consumption in the Palestinian Territories are unevenly distributed. While major consumption areas are located in the center of the West Bank, Hebron and Gaza city, production is concentrated around Jenin in the North, Jericho in the Jordan valley and parts of the Gaza Strip. The value of the food produced by the households for own consumption varies between almost zero in the Northern Gaza Strip and almost eight dollars per capita and month in Jericho (PCBS, 2012b, T. 2.17). Trade in fresh produce is carried out via the wholesale markets located in the West Bank governorates. Trade between the West Bank and the Gaza Strip is largely restricted by Israeli authorities since Hamas came into power there. WFP (2009) gives a detailed overview of the marketing structures and further institutional background. Each governorate capital has one mostly centrally located fruits and vegetables wholesale market which consist of a number of separate trader shops and which serve the large numbers of mostly small static, flying or street retail traders in the city as well as in its surroundings. Anecdotal evidence indicates that many young Palestinians who are unemployed engage in fresh produce retail trade on an extremely small scale based on small vehicles self-constructed from wood and bicycle tires or selling produce laid out in the street.

The Hebron fruits and vegetables wholesale market is the largest in the West Bank it serves at least 270,000 residents in the city of Hebron and the neighboring towns and villages (PCBS, 2013b). It had to move from its traditional location in the center of the old city outwards into the suburbs a couple of years ago because the traditional area was closed by the Israeli military due to security consideration around the settlement in downtown Hebron (B'Tselem, 2013c). The market hosts some fifty single wholesale trader shops. On average, 195 tons of

[2] The poverty statistics of the PCBS do not mention the Jerusalem governorate.

vegetables and fruits are traded through 352 transactions in total in this wholesale market. Almost 100 different types of fruits and vegetables are traded there. Cucumbers, tomatoes, zucchinis, cauliflowers, parsley and beans are traded most frequently and make up more than half of the transactions carried out on average. Tomatoes, potatoes, cucumbers, oranges, watermelons and apples account for more than half of the average quantities traded. Main source of vegetables at the Hebron market are Palestinian producers around Jenin and Jericho. Significant shares of the fruits marketed in the Palestinian territories are imported from Israel (for details, see, e.g., Ihle and Rubin, 2013) which also applies to the Hebron wholesale market where, in particular, apples and bananas are imported.

# 4 Model

We apply an oligopolistic model for the demand for differentiated products. We estimate a discrete choice model based on random utility which is a non-nested logit model of the demand for 12 apple varieties traded from wholesalers to retailers or consumer in the fruits and vegetables wholesale market of Hebron. An observation consists in this case of the aggregate daily transactions per apple variety, that is, aggregate daily sales and the daily average price of apple variety $j = 1, \dots, 12$ . Following Nevo (2000), the market is in this case defined by the daily apple transactions in the Hebron market.

*Modeling setup*

In the following, we follow Berry (1994) and briefly describe the framework for modeling fresh fruits demand in wholesale markets. In general, one could think of *R* regionally spread wholesale markets each trading $V_{F_r}$ varieties of $F_r$ fresh fruits and vegetables species each of them serving *N* potential clients.[3] For each variety $j \in \{1, \dots, V_{F_r}\}$ a vector $z_j$ of characteristics is observed which affect demand ($x_j$) and marginal costs ($w_j$) which are complemented by the unobserved characteristics $\xi_j$ and $\omega_j$, respectively. The discrete choice model is defined in the following way. The utility of wholesaler client $i \in \{1, \dots, N\}$ from purchasing variety $j$ is denoted $u_{ij}$ and depends on the variety characteristics according to the following specification:

$$u_{ij} = x_j\beta - \alpha p_j + \xi_j + \varepsilon_{ij}. \qquad (1)$$

The vector $x_j$ quantifies all observed characteristics of a variety $j$ impacting demand. The parameters $\beta$ and $\varepsilon_{ij}$ measure general and consumer-specific taste parameters which are unobserved by the economist. The terms $\xi_j$ refer to the mean of consumers' preferences of unobserved variety characteristics. The term $\varepsilon_{ij}$ can be interpreted as an error which accounts for stochastic taste parameters. Tchetchik et al. (2008) suggest an alternative understanding of these two unobserved quantities as a variety-specific component and *i*-th clients preferences for a variety *j* or the variation in consumer tastes as noted by Berry (1994, p. 246). The mean utility level of variety *j* is therefore:

[3] In the given case, we are only able to regard *R=1* markets. We only regard *F=1* fresh fruits which are apples of *V=12* varieties.

$$\delta_j \equiv x_j\beta - \alpha p_j + \xi_j. \quad (2)$$

A client chooses variety $j^*$ which maximizes her utility $u_{ij}$ which defines a range of utilities and a corresponding set $A$ of unobservable taste parameters $\varepsilon_{ij}$ which results the purchase of variety $j$:

$$A_j(\delta) \equiv \{\varepsilon_{ij} | \delta_j + \varepsilon_{ij} > \delta_k + \varepsilon_{ik}, \forall k \neq j\} \quad (3)$$

which defines the market shares $s_j(\delta) = \int_A dF(\varepsilon)$ where $F(\varepsilon)$ denotes the cdf of $\varepsilon_{ij}$.

The outside good in this case are the fresh fruits and vegetables except of apples which are traded in Hebron. In particular, we follow Fershtman and Gandal (1998) and use the daily potential market size defined by the recommended amount of recommended fruits and vegetable consumption per capita (USDA, 2013) multiplied by the Palestinian population in the Hebron governorate.[4] Its mean utility is normalized to $\delta_0 = 0$. This suggests that consumers preferring not to buy apples are thought of potentially buying any other fresh fruits and vegetables traded. We follow McFadden (1978) as assume an *iid* extreme value distribution of the $\varepsilon_{ij}$.

The wholesale traders are assumed to be price setters in order to maximize their short-run profits given the prices of other traders in the market. The prices at the wholesale level are assumed to follow a Nash equilibrium in a price game. Marginal costs are modeled as a linear function of product characteristics and input prices. The resulting price vector hence satisfies the usual first-order conditions and enables estimation of the demand system.

*Application to Apple Trade in the Hebron Market*

Based on the above model the basic empirical specifications of the demand and the pricing equations are:

$$\ln\left(\frac{s_j}{s_0}\right) = x_j\beta - \alpha p_j + \xi_j \quad (4)$$

and

$$p_j = w_j\gamma + \frac{1}{\alpha(1-s_j)} + \omega_j. \quad (5)$$

The variables $s_j$ and $s_0$ denote the market shares of variety $j$ and the outside good, respectively. The term $\frac{1}{\alpha(1-s_j)}$ quantifies the markup oligopolistic traders are able to realize, that is, their profits additionally to their observable and unobservable marginal costs $w_j\gamma$ and $\omega_j$, respectively.

We encounter the difficulty that we do not observe retail prices, but wholesale prices instead. Retail fruit trade in the West Bank is characterized by an endless number of micro resellers

[4] This is calculated daily based on the average population growth rate of 3.35% and the population estimate of 543,891 for 31 December 2007 (PCBS, 2013d).

which are partly flying sellers on self-constructed vehicles or located at small permanent spots along the main market streets and squares which strongly suggests that the fruits and vegetables retail market can plausibly be assumed to be competitive. Hence, marginal cost of retailers equals the wholesale price plus fixed effects, so that

$$mc^r = p_j \ = p_j^w + c + c_j^v \tag{6}$$

and

$$\ln\left(\frac{s_j}{s_0}\right) = x_j\beta - \alpha p_j^w - \alpha c + \xi_j. \tag{4'}$$

Additionally, in the context of the political conflict between Israel and the Palestinians an additional major exogenous factor is likely to impact demand and marginal costs which is the intensity of the conflict. The waves of fighting which are reiterating temporally inhibit economic activity to a greater or lesser extent because they strongly increase existential uncertainty and threaten the physical integrity of all stakeholders in the marketing chain because of the danger of potential collateral damage for health and life of civilians due to the violence.

Therefore, the usual variety characteristics in $x_j$ such as quality ($D_j^q$), Israeli origin ($D_j^{Is}$) vs. local production), fixed effects of the twelve apple varieties $D_j^{va}$ (following Nevo, 2001) and time effects are complemented by further demand shifters $D_l^{sh}$ such as important Muslim holidays or a set of variables quantifying various aspects of the political conflict $D_m^{conf}$ as outlined in Table 1. The demand equation (4') finally estimated becomes therefore:

$$\ln\left(\frac{s_j}{s_0}\right) = c + \sum_{k=j}^{12}\beta_k D_j^{va} + \sum_{l=13}^{18}\beta_l D_l^{sh} + \sum_{m=19}^{30}\beta_m D_m^{conf} + \beta_{31} D_j^{qua} \tag{7}$$

$$+\beta_{32} D_j^{Isr} - \left(\alpha p_j^w + \alpha^{clo} D^{clo} p_j^w\right) + \xi_j.$$

We additionally add the term $D^{clo}p_j^w$ in order to obtain empirical evidence on the question whether the demand elasticities changed during more intense periods of the conflict which we proxy here by the incidences of the comprehensive closures of the West Bank Barrier which will be explained below. $\xi_j$ is treated as error term.

For the pricing equation (8) similar considerations apply. The usual marginal costs characteristics in $w_j$ contain a similar set of variables as outlined in Table 1 and additionally a set of four cost variables $D^{cost}$. As above, the markup term is again interacted with the incidences of the comprehensive closures of the West Bank Barrier.

$$p_j = c + \sum_{k=j}^{12}\gamma_k D_j^{va} + \sum_{i=13}^{18}\gamma_i D_i^{sh} + \sum_{l=19}^{30}\gamma_l D_l^{con} + \gamma_{31} D_{31j}^{q} + \gamma_{32} D_{32j}^{Is}$$

$$+ \sum_{m=33}^{37}\gamma_m D_m^{cost} + \left(\alpha(1-s_j) + \alpha^{clo} D^{clo}(1-s_j)\right)^{-1} + \omega_j. \tag{8}$$

We aim at estimating Palestinian consumers' preferences for f & v and pricing rules at wholesale level and also regard their preferences for apple varieties and origin. We also consider the questions whether there is evidence for consumer animosity and whether the preferences are impacted by the political situation. Furthermore, we are interested in assessing the impact of the various aspects of the conflict on marketing costs and competitiveness.

**Table 1: Variables Used in the Model**

| Variable group | Demand equation | Pricing equation |
|---|---|---|
| Quality | X | X |
| Israeli origin | X | X |
| Muslim holiday | X | X |
| Ramadan | X | X |
| Palestinian/ Israeli weekend | X | X |
| Yearly fixed effects | X | X |
| Conflict variables & interactions | X | X |
| Variety fixed effects | X | X |
| Cost variables | | X |
| Daily transaction frequency | | X |

# 5 Data

We are in the comfortable situation to have access to a unique dataset of transaction data of the Hebron fruits and vegetables wholesale market (HWM, 2011). It consists of data on prices and quantities of all anonymized daily transactions which have been carried out for all traded commodity varieties at the wholesale market. We calculate daily average prices and total traded quantities per variety and day. We focus on apples since it is one of the most important fruits in the Palestinian diet as expenditure statistics suggest (PCBS, 2011c) and it originates from two main sources which is local Palestinian mainly in the Hebron region vs. Israeli production which is mainly generated by Druze farmers in the Golan Heights which have, since they are also ethnically Arab, close contacts to the Southern part of the West Bank. A third source of minor importance are apple imports of Israel from abroad which are often shipped to the Palestinian Territories via the Tel Aviv wholesale market. The market serves more than half a million Palestinian residents of the city of Hebron and the neighboring towns and villages (PCBS, 2013b).

The dataset consists in its core of a total number of 4009 observations of aggregated daily transactions of the trade of 12 apple varieties between May 2007 and the end of September 2010 which corresponds to a period of 1008 days.[5] During this period, almost 11,000 transactions in apple trade have been carried out in total. The aggregate value of this trade accounted for approx. 37m NIS (10m USD). The average price of the entire set of transactions equals 2.6 NIS/kg and range between 0.5 and 6 NIS. 3.2 tons of apples are traded on average per day. Table 2 shows more descriptive statistics of various characteristics of the observations.

[5] Because not each variety is traded on each day, there are considerably less observations available than $12 \cdot 1008 = 12096$.

Table 2: Characteristics of the Apple Transactions

| | Quantity (kg) per observ. | Price (₪ /kg) per observ. | Value (₪) per observation | Market share per observ. | Transactions per observ. |
|---|---|---|---|---|---|
| Mean | 3,192 | 2.6 | 7,980 | 0.023 | 2.7 |
| Min | 14 | 0.50 | 24 | <0.001 | 1 |
| Max | 80,552 | 6 | 312,508 | 0.61 | 22 |
| S.D. | 4,107 | 0.85 | 11,222 | 0.029 | 2.6 |
| Coef. of var. | 1.29 | 0.33 | 1.41 | 1.29 | 0.95 |

Source: Authors based on HWM (2011).

Additionally we gathered rich data containing the above mentioned variables which are described in Table 3. First, there is a set of date dummy variables denoting years and weekends during which the demand and supply structure can be expected to differ from the rest of the week. The weekend dummy equals unity both for the Palestinian and Israeli weekend, that is, for Thursdays, Fridays and Saturdays because costs and demand may change in Hebron and due to the closure of the Tel Aviv wholesale market, which is a major source for apple imports to the city, during the Israeli weekend. Since food consumption of the majority of Palestinians mirrors Sunni Muslim restrictions and religious customs[6] and the Palestinian traditional diet connected to it, the three mayor celebrations in the Sunni calendar have to be accounted for since these holidays are associated with a particular traditional food which differs from the rest of the year. The *Ramadan* dummy equals one for the 28 days of this fasting month and the *Holiday* dummy accounts both for the Eid Al-Fitr (Feast of Breaking the Fast) at the end of Ramadan and Eid Al-Adha (Feast of Sacrifice). Because consumers prepare for these occasions several days in advance, the dummy takes unity for the holidays and the five days before. The apples traded are grouped into 11 varieties if these were reported; we add also one dummy for apples of unspecified variety. The variables quantifying various aspects of the political conflict will be discussed in more detail below. From trader interviews, we know the quality level and the origin of each of the varieties. Additionally, we have data on four cost variables each of which measuring costs wholesale traders in the West Bank has to incur in their daily businesses which have to be spent on the purchase of apples, transportation, communication and labor commerce sector. Because large parts of the Palestinian apple consumption is grown in Israel and the Tel Aviv fruits and vegetables wholesale market is by far the leading trading hub (Merkle et al., 2013), we consider the average apple price there also as a cost variable. Last, we have a variable which quantifies the daily transaction frequency of each variety which is a measure for competitiveness.

[6] According to the CIA World Factbook, 8% (0.7%) of the population of the West Bank (Gaza) are Christians. The rest of the Palestinian population adheres to Islam.

Table 3: Descriptive Statistics of the Explanatory Variables

| Variable | Mean | Min | Max | Std | CV | Source |
|---|---|---|---|---|---|---|
| Year 2007 | 0.17 | 0 | 1 | 0.38 | 2.19 | Authors |
| Year 2008 | 0.27 | 0 | 1 | 0.45 | 1.63 | Authors |
| Year 2009 | 0.31 | 0 | 1 | 0.46 | 1.50 | Authors |
| Year 2010 | 0.24 | 0 | 1 | 0.43 | 1.76 | Authors |
| Weekend | 0.46 | 0 | 1 | 0.50 | 1.09 | Authors |
| Muslim holiday | 0.04 | 0 | 1 | 0.20 | 4.74 | Authors |
| Ramadan | 0.12 | 0 | 1 | 0.33 | 2.69 | Authors |
| Apples unspecified | 0.21 | 0 | 1 | 0.41 | 1.93 | Authors |
| Apple variety Local | 0.05 | 0 | 1 | 0.23 | 4.20 | Authors |
| Apple variety Grand Green | 0.04 | 0 | 1 | 0.20 | 4.71 | Authors |
| Apple variety Golden Yellow | 0.14 | 0 | 1 | 0.35 | 2.44 | Authors |
| Apple variety Small | 0.1 | 0 | 1 | 0.30 | 3.01 | Authors |
| Apple variety Starking Red | 0.12 | 0 | 1 | 0.32 | 2.75 | Authors |
| Apple variety Orleans | 0.01 | 0 | 1 | 0.12 | 8.51 | Authors |
| Apple variety Gala (reference) | 0.02 | 0 | 1 | 0.13 | 7.42 | Authors |
| Apple variety Medium | 0.09 | 0 | 1 | 0.29 | 3.12 | Authors |
| Apple variety Inferior | 0.09 | 0 | 1 | 0.29 | 3.18 | Authors |
| Apple variety Golden Red | 0.03 | 0 | 1 | 0.17 | 5.71 | Authors |
| Apple variety Starking Yellow | 0.01 | 0 | 1 | 0.11 | 9.21 | Authors |
| Low quality | 0.36 | 0 | 1 | 0.48 | 1.34 | Authors |
| Origin Israel | 0.66 | 0 | 1 | 0.48 | 0.72 | Authors |
| Labor cost index commerce WB | 69.46 | 65.04 | 77.45 | 3.82 | 0.05 | PCBS (LFS, 2012d) |
| Transportation cost index WB | 116.34 | 109.28 | 123.72 | 3.68 | 0.03 | PCBS (PPI) |
| Communication cost index WB | 109.81 | 107.44 | 113.19 | 1.56 | 0.01 | PCBS (PPI) |
| Mean apple price at Tel Aviv | 2.68 | 1 | 22 | 2.56 | 0.95 | IMARD (2011) |
| Daily transaction frequency | 2.69 | 1 | 22 | 2.55 | 0.95 | Authors |

Notes: WB denotes West Bank.

***Conflict indices***

Based on two comprehensive and detailed datasets of comprehensive closures of the West Bank Barrier (B'Tselem[7], 2013a) and of daily fatalities (B'Tselem, 2013b), we develop a number of indices measuring differing aspects of the conflict between Israelis and Palestinians (Table 4) which are likely to affect either marginal costs or demand. Because the conflict may exert both short-term impacts of up to three days and medium-term impacts of up to one month, we also generate variables which quantify such potentially varying temporal impacts.[8] Variable C1 quantifies the existence of a comprehensive closure on the current day which leads to that "all permits previously issued to residents of the Occupied Territories for purposes of work, trade, or medical treatment are invalid. Residents are also not allowed to travel between the West Bank and Gaza." (B'Tselem, 2012). Such closures are imposed by the Israeli army if there are any security concerns which could potentially harm the safety of Israeli citizens on short or without notice on a daily basis for all commodity terminals and

[7] B'Tselem is an Israeli human rights organization and understands itself as the "The Israeli Information Center for Human Rights in the Occupied Territories".

[8] Although the choices of three and thirty days are ad hoc, we believe it is useful to distinguish between different degrees of the endurance of the effects of aspects of the conflict on economic activity.

human crossings which connect the parts of the West Bank under Palestinian control with Israel. It, therefore measures the immediate impact of the conflict on movements of people and goods between Israel and the West Bank which is thus likely to affect economic activity. In the dataset, 14% of the 4909 observations were due to such restrictions. These closures need not to be imposed only during periods of intensive fighting or high number of casualties, they rather represent a perceived existence of a potential security thread and are implemented both for preventive purposes in calm phases of the conflict, e.g., during Israeli holidays, and for control purposes in periods of intense fighting and many fatalities.

In contrast, the variable C2 measures the long-run state of the immediate intensity of the conflict by quantifying whether it is currently in a severe crisis. It equals one if the sum of conflict-related fatalities in Israel and the Palestinian Territories in the 90-days-moving-window before the current date was above the median of the window sum of total fatalities, i.e., 110 fatalities in the last quarter of a year, which was the case in one third of all observations. Additionally, we include the two variables C3 and C4 which measure the short- and the medium-run intensities of the conflict, by signaling whether there were any conflict-related fatalities in the last 3 and 30 days, respectively, because even during periods of severe crisis a few days of relaxation may occur which will temporally lessen the pressures towards economic activity exerted by the conflict. These three aspects of conflict intensity are complemented by two variables signaling extreme short-run events during the conflict which might shock economic activity in a particular fashion and two "peace variables" measuring the degree of the temporal relaxation of the conflict and the associated economic hardships. The variable C5 accounts for days during which more fatalities occurred than the 90% quantile of all days with conflict-related fatalities in Israel or the Palestinian Territories, i.e., it takes one if there were more than eight fatalities on a given day. Variable C6 counts the number of such extreme events in last month.

**Table 4: Descriptive Statistics of the Conflict Variables**

| Variable | Mean | Min | Max | Std | CV | Source |
|---|---|---|---|---|---|---|
| C1: Comprehensive closure | 0.14 | 0 | 1 | 0.35 | 2.43 | B'Tselem (2013a) |
| C2: Severe crisis | 0.33 | 0 | 1 | 0.47 | 1.42 | Authors, B'Tselem (2013b) |
| C3: Dummy for fatalities in last 3 days | 0.49 | 0 | 1 | 0.50 | 1.02 | Authors, B'Tselem (2013b) |
| C4: Dummy for fatalities in last 30 days | 0.93 | 0 | 1 | 0.26 | 0.28 | Authors, B'Tselem (2013b) |
| C5: Dummy for exceptionally deadly day | 0.03 | 0 | 1 | 0.17 | 5.79 | Authors, B'Tselem (2013b) |
| C6: Frequency of deadly days in last 30 days | 0.94 | 0 | 23 | 3.08 | 3.26 | Authors, B'Tselem (2013b) |
| C7: Peace index | 49.98 | 42.9 | 57.6 | 3.54 | 0.07 | IDI (2013a) |
| C8: Share of number of days without fatalities in WB & Israel in last 30 days | 89.84 | 66.67 | 100 | 7.52 | 0.08 | Authors, B'Tselem (2013b) |

Additionally, we consider the most complete series of the set of peace indices published by the The Israel Democracy Institute (IDI, 2013a). It is the so called *negotiations index* (C6 in

Table 4): a time series of monthly representative surveys of the Israeli population, that is, of Jewish, Muslim and Christian religious adherents, of their opinions regarding peace negotiations between Israel and the Palestinian Authority. It is calculated based on "two questions, one focusing on public support for peace negotiations and the other on the degree to which the public believes that such talks will actually lead to peace." (IDI, 2013b). Since it contains some missing values, we employ Harvey's (1989) structural time series model based on a state-space approach in order to impute these. Although it only mirrors the opinion of Israelis from which the Palestinian public opinion might more or less strongly deviate, we believe that this variable has some value in giving a rough measurement of the medium-term willingness to engage in peace talks which depends on recent and medium-term developments of the conflict. Second, variable C8 measures the relaxation of the conflict by the share of days without any fatalities in the West Bank and Israel during the last month.

In order to assess the effects of the conflict regarding the trade in apples with Israel in general and the question of consumer animosity in particular, we add a number of interaction terms of selected conflict variables and the dummy for Israeli origin as shown in Table 5.

**Table 5: Interactions of the Conflict Variables**

| Variable | Conflict variable |
|---|---|
| I1: Closure x Israeli origin | C1 |
| I2: Severe crisis x Israeli origin | C2 |
| I3: Peace index x Israeli origin | C6 |
| I4: Days without fatalities x Isr. origin | C7 |

Moreover, we generate various variables measuring potential dynamic aspects of the effects of aspects of the conflict on economic activity shown in Table 6. Variable C9 indicates the day of the closure since the current one has been implemented. Variables C10 and C11 indicate the three days before the implementation and after the lifting of a closure, respectively. Finally, variable C12 indicates the three days following an exceptionally deadly day.

**Table 6: Dynamic Conflict Variables**

| Variable | Mean | Min | Max | Std | CV | Source |
|---|---|---|---|---|---|---|
| C9: Closure day | 0.63 | 0 | 12 | 1.89 | 3.01 | Authors, B'Tselem (2013a) |
| C10: Pre-closure day | 0.08 | 0 | 1 | 0.26 | 3.50 | Authors, B'Tselem (2013a) |
| C11: Post-closure day | 0.06 | 0 | 1 | 0.25 | 3.80 | Authors, B'Tselem (2013a) |
| C12: Post-exceptionally deadly day | 0.06 | 0 | 1 | 0.23 | 4.06 | Authors, B'Tselem (2013b) |

***Instruments***

Each of the two equations to be estimated contains an endogenous variable, which are the market shares in the pricing equation and the prices in the demand equation. We instrument the markup of the apple varieties traded in Hebron with the quantities of substitutes for apples according to the Palestinian diet traded there which are bananas, oranges and pears. In the demand equation, we instrument the prices of the apple varieties traded in Hebron by prices of three apple varieties in the fruits and vegetables wholesale market of Tel Aviv.

# 6 Estimation Results

The system GMM estimation of equations (7) and (8) with the restrictions imposed on α and $\alpha^{clo}$ yields the following results. Table 7 shows the results of selected explanatory variables mentioned in Table 3. The coefficient α is positive – as expected - and significant. This implies that the demand elasticity for apples will be negative and there is a significant markup in the apple wholesale trade in Hebron. In periods when the comprehensive closures of the West Bank Barrier are implemented, this coefficient changes to $\alpha + \alpha^{clo} = 1.279 + 2.686 = 3.965$ which indicates that conflict constitutes a substantial and negative demand shock significant at the 10% level. For low quality varieties, both prices and demand are significantly smaller. Varieties originating from Israel are, although significantly more expensive by on average 3.2 NIS/kg, also significantly more demanded by consumers in Hebron.

**Table 7: Estimation Results for Selected Explanatory Variables**

| Variable | Pricing equation | | Demand equation | |
|---|---|---|---|---|
| | Coefficient | p-value | Coefficient | p-value |
| Constant | -10.217 | <0.01 | -6.161 | <0.01 |
| α (coeff. of markup and price) | 1.279 | <0.01 | 1.279 | <0.01 |
| $\alpha^{clo}$ (interaction: markup*closure and price*closure) | 2.686 | 0.07 | 2.686 | 0.07 |
| Low quality | -0.511 | <0.01 | -1.378 | <0.01 |
| Origin Israel | 3.228 | <0.01 | 9.011 | <0.01 |
| Year 2007 | 0104 | 0.09 | -0.070 | 0.53 |
| Year 2008 | -0.113 | 0.23 | 0.657 | <0.01 |
| Year 2009 | -0.013 | 0.75 | 0.261 | <0.01 |
| Weekend | 0.065 | <0.01 | 0.748 | <0.01 |
| Muslim holiday | -0.039 | 0.35 | 1.894 | <0.01 |
| Ramadan | 0.202 | <0.01 | 0.017 | 0.89 |
| Labor cost index commerce WB | 0.039 | <0.01 | - | - |
| Transportation cost index WB | 0.014 | 0.03 | - | - |
| Communication cost index WB | 0.040 | <0.01 | - | - |
| Mean apple price at Tel Aviv | 0.361 | <0.01 | - | - |
| Daily transaction frequency | -0.001 | 0.87 | - | - |

Note: "-" means that the variable was not included into the equation.

The year dummies do not indicate significant yearly deviations from 2010 concerning the marginal costs and, therefore, prices of apples in Hebron, but suggest that demand in 2008 and 2009 was somewhat higher. The estimated coefficients of the weekend dummy point to that marginal costs rise slightly but significantly on Thursdays, Fridays and Saturdays relatively to the rest of the week, but a strong demand effect is found. While Muslim holidays expect Ramadan do not affect marginal costs and prices, an even stronger demand increase is found which appears to be consistent with the traditional food served by Palestinian Muslims during them. During Ramadan prices increase significantly while and demanded quantities virtually do not change. Four of the five further components of marginal costs in apple trade have – as expected – positive signs and are mostly significant at the 5 percent level, that is, marginal costs and prices increase as these cost components increase.

Table 8 displays the estimates of the coefficients of the variables quantifying various aspects of the conflict and their interactions with the dummy for Israeli origin. The closures or their interaction with the Israeli origin dummies do not matter for marginal costs. However, they induce a strongly positive demand effect which is significant at the 10% level. Similarly, phases of severe crisis do not impact costs, but exert significantly positive immediate effects on apple demand. While a significant short-run increase in marginal costs due to increased conflict intensity measured by the dummy for fatalities during the last three days is found, no significant medium-term effects appear. Confirming the demand effects of the two preceding variables, consumers again show a significantly raised demand for apples during hot phases of the conflict.

In contrast, the short-run effect of exceptionally deadly days is significantly negative and strong in magnitude. The frequency of such days during the past month does not impact apple prices nor demand in the medium-term. In calmer periods of the conflict, demand for apples significantly increases at a very low magnitude as suggested by the positive estimates of the coefficients of variables C7 and C8 in the demand equation. The effect of phases of severe crisis on costs of Israeli apples in Hebron is significantly positive and appears to by far the largest cost-increasing determinant. This magnitude appears to be plausible given the increased military activity and increased difficulties and costs of shipping apples from Israel to Hebron during such phases. The coefficients of interactions I3 and I4 which quantify the effects of calm conflict phases on costs of and demand for Israeli apples are significant and negative in all cases. This indicates that costs and prices of apples from Israel decrease slightly but significantly during relatively more peaceful phases, which holds also for the demand of such apples.

**Table 8: Estimation Results for the Conflict Variables**

| Variable | Pricing equation | | Demand equation | |
|---|---|---|---|---|
| | Coefficient | p-value | Coefficient | p-value |
| C1: Closure | -0.347 | 0.10 | 5.785 | 0.06 |
| C2: Severe crisis | -0.048 | 0.17 | 0.383 | <0.01 |
| C3: Fatalities in last 3 days | 0.050 | 0.02 | 0.156 | 0.01 |
| C4: Fatalities in last 30 days | 0.071 | 0.13 | -0.105 | 0.28 |
| C5: Exceptionally deadly day | -0.183 | <0.01 | -0.545 | 0.02 |
| C6: Freq. of deadly days in last 30 days | -0.004 | 0.34 | 0.004 | 0.68 |
| C7: Peace index | -0.003 | 0.53 | 0.027 | 0.04 |
| C8: Days without fatalities in last 30 days | 0.005 | 0.05 | 0.026 | <0.01 |
| I1: Closure x Israeli origin | 0.005 | 0.92 | 1.785 | 0.09 |
| I2: Severe crisis x Israeli origin | 0.226 | <0.01 | 0.257 | 0.06 |
| I3: Peace index x Israeli origin | -0.035 | <0.01 | -0.090 | <0.01 |
| I4: Days without fatalities x Isr. origin | -0.007 | 0.03 | -0.043 | <0.01 |

The own price elasticity of apples in general can be calculated in the following way (Nevo, 2000, p. 522):

$$\bar{\eta}_{jj} = -\alpha \bar{p}(1 - \bar{s}_j) = -1.3 * 2.6 * (1 - 0.023) = -3.3 \qquad (9)$$

where $\bar{p}$ and $\bar{s}_j$ are the average price and market share of apples and single apple transactions, respectively, as shown in Table 2. During periods of conflict measured by the incidences of comprehensive closures of the West Bank Barrier (variable C1 in Table 4), this elasticity changes to

$$\bar{\eta}_{jj}^{clo} = -(\alpha + \alpha^{clo})\bar{p}(1-\bar{s}_j) = -(1.3+2.7)*2.6*(1-0.023) = -10.2. \quad (10)$$

# 7 Conclusions

In this study, we investigate whether the intensity of violent political conflict affects pricing and demand of an important food commodity which plays a prominent role in the diet of the population living subject to the political struggle. In particular, we look at the extent and the structure the Israeli-Palestinian conflict affects pricing and consumption patterns of apples marketed in the wholesale market of Hebron, the largest and poorest Palestinian city in the West Bank.

We model the demand-supply system for differentiated apple varieties in the context of a oligopolistic market structure using New Empirical Industrial Organization methodology, namely a structural discrete-choice model which is specified as logit model. This approach proves to be useful for estimating wholesalers' profit margin and the effect of violent conflict and the resulting restrictive security measures on demand and marginal costs. This analysis provides the first micro-economic analysis by applying such a model to fresh food in a developing economy framework in order to analyse the effects of violent political conflict on food demand. Based on datasets of the Israeli human rights organisation B'Tselem, we develop a range of innovative variables which quantify differing aspects of the conflict. We use these in order to explicitly account for the potential impact of the violent struggle on the supply and demand behaviour of economic agents in the model by using them as components which directly impact demand, marginal costs and demand elasticities.

While in times of comprehensive closure, price and markups go down, demand also collapses and demand elasticity triples. At the 5% level, there is no direct impact of the closure variable on demand or marginal costs. Marginal costs are found to be mainly impacted by the conflict in the short-term either by incidents of exceptionally many fatalities on the same day or in the last three days. However, demand is much more impacted by medium-term aspects of the conflict, e.g., it rises slightly and significantly if there was a calm-down of the political situation on a monthly basis. It also appears plausible that demand rises in periods of severe crisis because consumers might fear a deterioration of the situation in the near future why they tend immediately to consume more apples. We find that the Israeli apples are significantly more demanded than the local Palestinian produce although their prices are on average also by more than 3 NIS/ kg higher while low quality varieties are significantly less demanded although cheaper. Israeli produce tends to be less perishable than the local produce hence it is more demanded during periods of markedly increased uncertainty due to higher conflict intensity. Therefore, there is no evidence for consumer animosity in this context. Although the Israeli apples are marketed in distinctive packages in Hebron market, our results show that

Palestinian consumers do not hesitate to purchase them even though their prices are markedly higher. Moreover, we find that the variables indicating positive development (and their interactions) in the conflict have a dampening effect on demand and prices. This finding supports our argument. In times of lower intensity of the conflict, there is less uncertainty in regard the ability to perform trade therefore there is relatively lower urgency to sell, purchase and store fresh food. As data will become available, it will be telling to explore whether the described trend is consistent with other fruits and vegetables traded in Hebron and with respect to their perishability level.

This analysis proves that social science research can substantially profit from the data comprehensive gathering and reporting activities of human rights organizations whose data provide the fundament for quantitative analysis. A few valuable series of raw data allow to construct comprehensive sets of variables which make a multifaceted measurement of conflict intensity feasible. Consumers are found to react considerably more elastic during escalations of the conflict. However, there is barely evidence for medium- or long-term effects of conflict on demand which might suggest that the memory of consumers regarding their purchasing decisions is rather short. Demand increases substantially during phases of conflict escalation although single days of exceptionally high numbers of fatalities yield substantially negative demand shocks. Prices significantly rise during weekends and Ramadan, while demand only increases during weekends and the remaining Muslim holidays. This indicates some evidence for storage before/during holidays because apples are less perishable than other fruits which might explain positive demand of closures. We find some kind of adverse consumer animosity because Israeli apples much more demanded despite their higher prices. Calm periods are found to have slightly negative effects for prices and the demand of Israeli apples.

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