

The Impact of Labor Mobility Restrictions on Social & Economic Welfare: the Case of
the Blockade on Gaza¹

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Abstract

Restrictions on labor mobility across regions have been widely criticized in the literature for reducing social welfare by misallocating labor and increasing inefficiency. Usually, labor mobility is restricted by a variety of legal, social and economic factors; however, although out-migration is sub-optimal, at least out-migration still exists. The case of the Gaza Strip is an anomaly in the literature because out-migration is currently not possible for Gaza workers. Since the blockade became official in June 2007, workers in Gaza have been limited to search for jobs in the domestic sector, as opposed to the pre-intifada period (before September 2000) when approximately 24% of wage earners in the Gaza strip worked in Israel and the settlements. Therefore, the Gaza blockade serves as a natural experiment to pose the following question: What is the impact of ending labor market integration between Gaza and Israel on welfare measures (e.g. GNI) in Gaza? In order to answer this question, this paper estimates a search model with match and bargaining using data from the post-blockade period (2008-2010) and the pre-intifada period (2000Q1-2000Q3) when labor markets were integrated. One contribution of this paper is that it extends the maximum likelihood estimation of the one sector job search model developed by Flinn (2005) in order to estimate the parameters of the two sector model. Another contribution of this paper is to highlight the negative impact of Gaza's economic isolation on Gaza's residents using various welfare measures. The results suggest that the level of welfare (analogous to GNI) during a period of absolute labor market segmentation in Gaza is equivalent to a level of welfare during the open period where there is a joint decrease in real domestic wages by 64% and in foreign wages by 18%.

Introduction

Restrictions on labor mobility across regions have been widely criticized in the literature for reducing social welfare and curbing economic growth by misallocating labor and increasing inefficiency (Hamilton and Whalley (1984), Iregui (2003), Moses and Letnes (2004), Walmsley and Winters (2005)). For instance, as concluded by Hamilton and Whalley (1984), the removal of labor mobility restrictions across regions could double world income and these gains are not only concentrated in developed countries but shared by developing countries as well. Walmsley and Winters (2005) estimate that labor mobility restrictions globally cost over \$150 billion and the misallocation of unskilled labor results in relatively greater costs. In addition, studies investigating the impact of stringent labor mobility restrictions within nations have found similar results. In China, legislation (Hukou system) restricting rural-urban migration is documented as the major cause of under-populated cities, over-populated rural areas, rising rural-urban income inequality and the misallocation of labor (Wu and Treiman (2004), Liu(2005), Whalley and Zang (2007), Chan(2009)).

In some regions, labor mobility may not be legally restricted but due to the financial costs associated with labor mobility, access to social capital is paramount. An invaluable source of social capital to several citizens of impoverished areas are local networks because credit markets are absent and they serve as a partial-insurance arrangement against negative (and sometimes exogenous) income shocks. In Mexico, MacKenzie and Rapaport (2007) find that the strength of migration networks impacts the composition of Mexican migrants so that negatively-selected migrants work in regions of the host country with strong migration networks (which implies overall lower migration costs) while positively selected migrants work in areas of the host country with tenuous migration networks (which implies higher migration costs). In India, rural jati (caste)-based networks restrict labor mobility and eventually deter out-migration (and out-marriage) by terminating the mutual insurance arrangement for those who leave the network (Munshi and Rosenzweig, 2007). In the West Bank, Adnan (2012c) argues that various measures of politically-motivated restrictions such as ID type, valid work permits, the number of closure days per quarter or the number of closure obstacles per

district per quarter played a large role in impeding out-migration from the West Bank to Israel and the settlements².

For all the aforementioned studies, labor mobility was restricted by a variety of legal, social and economic factors; however, although out-migration was sub-optimal level, at least out-migration still existed. The case of the Gaza Strip (see Map 1) is an anomaly in the literature because out-migration is completely prohibited. Prior to the intifada in September 2000, mobility restrictions were rare and workers searched for jobs in both the domestic and foreign (i.e. Israel or the settlements³) sectors but after the intifada in 2000, mobility restrictions increased over the next few years and workers became increasingly limited to searching for jobs in the domestic sector. In June 2007, the Gaza blockade became official and the domestic labor market became the only option for workers in Gaza. Therefore, the current political circumstances in Gaza provide a rare opportunity for a natural experiment: What is the impact of absolute segmentation between the labor markets of Gaza and Israel on welfare measures in Gaza? In order to answer this question, this paper estimates a search model with match and bargaining during the post-blockade period (2008-2010) and the pre-intifada period (2000Q1-2000Q3) when labor markets were integrated.

In the literature, a variety of techniques have been used to assess the impact of labor mobility restrictions on numerous welfare measures such as world income. The technique employed in this paper estimates the parameters of a one sector job search model during the post-blockade period where Gaza workers can search for jobs in only the domestic sector and estimates the parameters of a two sector job search model during the open (pre-intifada) period where workers searched for jobs in both the domestic and foreign labor markets. One contribution of this paper is that it extends the one sector model as well as the estimation procedure developed by Flinn (2005) in order to estimate the parameters for the two sector economy of Gaza during the open period. The

² Closure days include the number of days that the Israeli border and the settlements were sealed off from the West Bank while closure obstacles represent physical deterrents to labor mobility such as checkpoints, roadblocks and earth mounds. Although these politically-determined barriers impede out-migration, there were alternative routes Palestinian laborers took to work or enter Israel/settlements in the West Bank.

³ From this point forward, in this paper, I refer to the foreign sector as “Israel” although it includes Israel and the settlements. This abbreviation is appropriate since the settlements are Israeli land.

parameters of the model are estimated separately for the open and closed periods in order to estimate the net effects of labor market segmentation on various measures of social and economic welfare. Then, the data from both periods are pooled in order to estimate demand-side parameters. To my knowledge, no one has applied such a job search model to evaluate or quantify the impact of labor mobility restrictions on welfare. Therefore, the major contribution of this paper is to estimate the negative impact of Gaza's isolation on its residents in terms of real wages. The results suggest that the level of welfare (analogous to GNI) during a period of absolute labor market segmentation in Gaza is equivalent to a level of welfare during the open period where there is a joint decrease in real domestic wages by 64% and in foreign wages by 18%.

The next section provides an overview of the stylized facts regarding Gaza's labor market while section III describes the data and summary statistics. Section IV reviews the one sector stationary search model and the extension to the two sector case. Section V is a summary of the results and Section VI concludes.

II. Stylized Facts

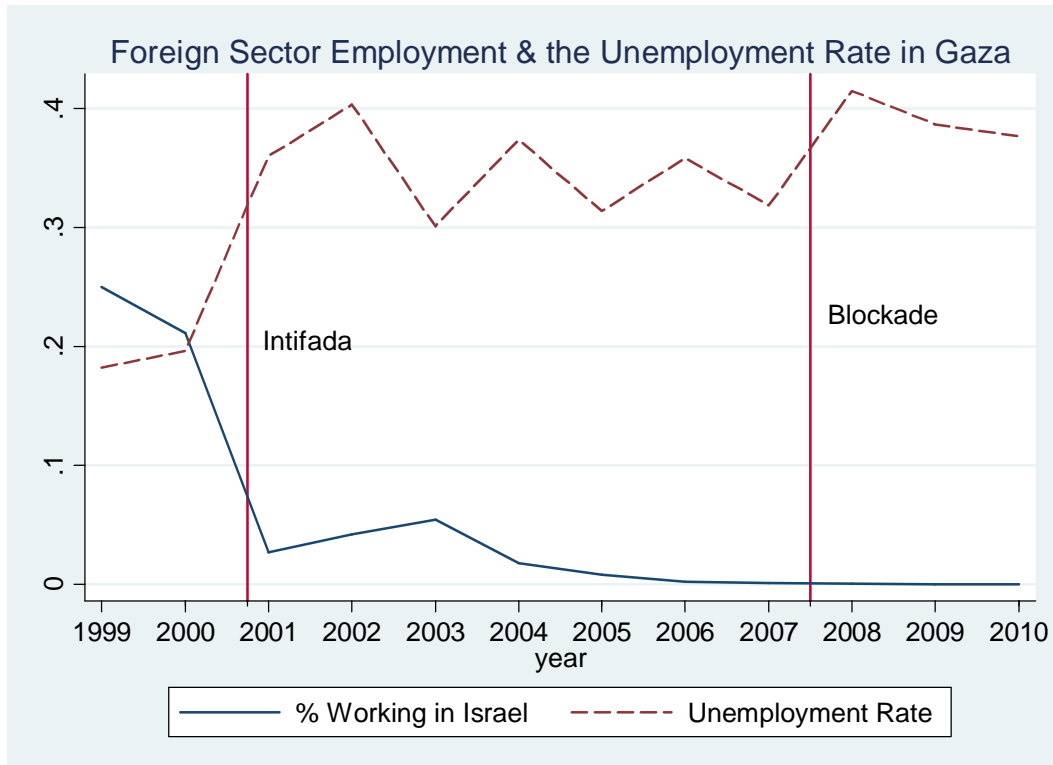
Immediate Consequences of the Second Intifada

This section aims to provide a brief background on the institutional features of Gaza in the past 10-15 years. The model in this paper does not address these features directly; however, by choosing two time periods, one in which Gaza's economy is considered closed and the other in which Gaza's economy is considered open, I aim to indirectly address the institutional differences between the two periods.

In September 2000, there was a Palestinian intifada (uprising) opposing the occupation of Israel. The intifada was followed by a brutal cycle of violence from both sides. An immediate consequence of the intifada was a series of Israeli security measures that resulted in a large decrease in Palestinian labor flows into Israel: the decline in the number of work permits (and renewals) issued to Palestinian workers in Israel, an increase in border control measures (more on this later) as well as an increase in the number of work permits issued for East-Asian migrant workers in the hopes of replacing Palestinian labor. Furthermore, the domestic labor market in Gaza could not absorb

former Palestinian employees in Israel in addition to sustaining its current employees. Therefore, following the intifada, the percentage of Gazan wage-earners in the Israeli labor market plummeted and the overall unemployment rate in Gaza soared, as depicted in Figure 1 below⁴:

Figure 1:



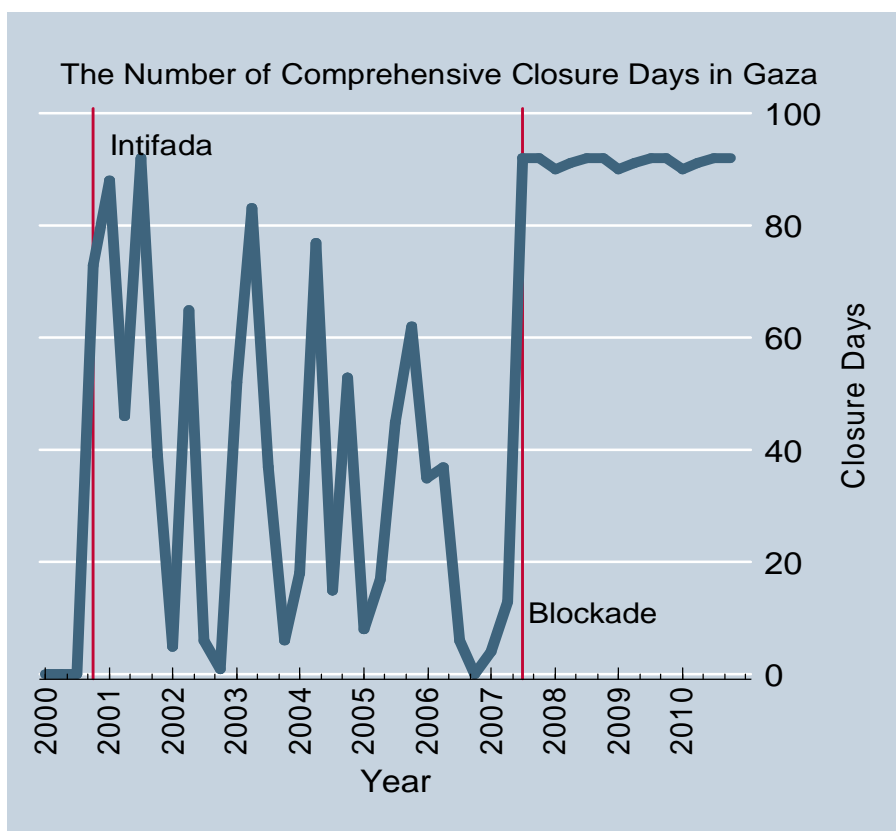
The unemployment rate is defined as the number of individuals seeking work but are unemployed divided by the total number of labor force participants while the employment rate is simply one minus the unemployment rate. Further, foreign sector employment (percentage employed in Israel or the settlements) is defined as the number of people working in Israel or the settlements divided by the total number of employed individuals.

Israeli Border Closures

⁴ These results are consistent with Bulmer (2003) who argues that unemployment rates are negatively correlated with Palestinian employment in Israel.

Comprehensive closure days were implemented by Israel to close off the Israeli border from the Palestinian territories. During closure days, the movement of people and goods are prohibited even if Palestinians have legal documentation to work or enter Israel. The number of Israeli border closures in a given quarter depicts the degree of difficulty in crossing the border to procure employment or search for jobs. Data on comprehensive closure days in the Palestinian territories are obtained from B'tselem, an Israeli human rights organization. Note that this study excludes the West Bank and focuses only on labor market outcomes in the Gaza Strip. The following graph presents the number of comprehensive closure days in each quarter from the year 2000 to 2010 for Gaza residents only:

Figure 2- The Number of Closure Days per Quarter in Gaza (2000-2010)



Source: B'tselem

The figure demonstrates immense volatility from one quarter to the next during the second intifada, which began in the fourth quarter of 2000. Spikes in closure days can be explained by controversial political and economic events that took place. Prior to the

second intifada in September 2000, there were no comprehensive closure days in the Palestinian territories. In contrast, during the year 2001, Gaza residents experienced quarters where the Israeli border was closed off every day. In August 2005, Israel disengaged from the Gaza Strip by dismantling its settlements but after this point, labor and product market integration between the two economies was severely limited; the blockade, however, did not become official until June 2007. The two most important events in Gaza relevant for this study are the second intifada and the blockade, which are both depicted by vertical reference lines in the graph above.

In the stationary model outlined below, the economy is assumed to be in a steady state. Data from the first three quarters of 2000 will be used to analyze the “open” (pre-intifada) period where Gaza's economy is at a steady state; for the next four and a half years, Gaza experiences the intifada and continues to be an open economy but due to immense volatility in the political and economic climate, it is not at a steady state. At the end of the intifada period, disengagement ensues and stronger restrictions are placed on workers seeking jobs in Israel for almost the next two years, suggesting that Gaza during this period is neither an open economy nor at a steady state. Finally, the blockade is official in June 2007 and Gazans are prohibited from working on Israeli land, rendering Gaza a closed economy. Nonetheless, since it takes time for the economy to adjust to a state of autarky, only data from the years 2008-2010 are used to analyze the "closed" period in order to allow an adjustment period of six months after the official date of the blockade (June 2007) to ensure that Gaza reached a new steady state.

Therefore, data on Gaza residents is divided into four periods: the pre-intifada period, the intifada period, the disengagement/ pre-blockade period and the post-blockade period. The table below summarizes the four different periods.

Table 1

Period	Time Period	State of Economy	Steady State?
Pre-Intifada Period	2000Q1-2000Q3	Open	Yes
Intifada Period	2000Q4-2005Q2	Open/Closed	No
Disengagement Period	2005Q3-2007Q2	Closed (in Practice)	No

Post-Blockade Period	2007Q2-2010Q4	Officially Closed	No
	2008Q1-2010Q4	Officially Closed	Yes

Since this paper is concerned with analyzing labor market outcomes and welfare measures before the intifada and after the blockade when the economy is in a steady state only period 1 (2000Q1-2000Q3) and period 4 (2008Q1-2010Q4) are analyzed in the subsequent sections.

III. Data Section

The datasets used in this paper are micro level panel data from the Palestinian Labor Force Survey (PLFS) administered by the Palestinian Central Bureau of Statistics during the period 2000-2010. The Palestinian Labor Force Survey (PLFS) of the West Bank and the Gaza Strip is a quarterly household survey that investigates the labor force characteristics of Palestinians living in the territories. The survey has been administered by the Palestinian Central Bureau of Statistics since 1995, following the establishment of the Palestinian Authority (PA). During each quarter, over 7500 households are visited. Although the target population includes all people over the age of 10, labor market characteristics are only collected for those who meet the minimum work requirement age of 15. The questionnaire is designed such that households are interviewed for two consecutive quarters and then dropped out of the sample for the next two quarters and then brought back for the following two quarters, allowing one to construct short longitudinal panels. In this paper, I restrict the sample to individuals aged 15-64 years that are surveyed between 2000 and 2010.⁵ The response is approximately 90% for the majority of quarters in this time period⁶.

⁵ I exclude years prior to 2000 because the year 2000 was the first year longitudinal data was available. To avoid mixing labor market and retirement behavior, individuals over the age of 64 are not included in the sample.

⁶ One drawback of the data is that during the last two quarters of 2001, respondents the response rate was less than 40% due to the cycle of violence that took place during the second intifada (2000Q3-2003). However, as you will see later in this section, I only use data from the following periods: (2000Q1-2000Q3) and (2008Q1-2010Q4).

Descriptive Analysis

Open Period

During the open period, Gaza residents searched for jobs in the local domestic labor market or Israel's foreign labor market. Table 2 displays relevant summary statistics for Gaza residents during the open period. In column (1) all residents are accounted for and in columns (2)-(7), the data is disaggregated according to gender, skill-level (where skilled individuals have 12 or more years of schooling) and age. According to Table 2, approximately 15% of employed individuals in Gaza worked in Israel or the settlements and the corresponding percentage for wage sector employees is about 20%. This suggests that the Israeli labor market was vital to Gaza's economy. Employment in Israel, however, was not uniform among the different groups. While according to the data, no women worked in Israel during the open period examined here, Israel's labor market employed over one quarter of all wage sector employees over the age of 35 and almost 30% of wage sector employees with less than 12 years of schooling.

Nevertheless, overall labor force participation rates are low and unemployment rates (among labor force participants) are high. The relatively low labor force participation rate in the population is primarily driven by the participation rate for women, which is approximately 13.2%. Less educated and experienced individuals also have low participation rates that amount to less than three quarters of their respective counterparts. The groups that have suffered the most from high unemployment rates are women, individuals less than 35 years old, and individuals with less than 12 years of schooling. The relatively high unemployment rate is primarily attributed to youth unemployment and to a lesser extent unemployment among unskilled individuals since female labor force participants comprise such a small portion of total labor force participants. The duration of ongoing unemployment spells is approximately 2.6 years for the entire sample and is especially large for women (4.9 years) and skilled workers (3.3) years⁷.

⁷ The duration of unemployment spell is imprecisely estimated since the question in the survey asks, "Did...ever work in the past for at least two weeks regularly?" The answer choices during the open period were a.) in the past 12 months, b.) 1-5 years, c.) more than 5 years and d.) No; during the closed period, the

Employment to unemployment flows are measured as the fraction of employed individuals in quarter q who became unemployed in quarter $q+1$. Unskilled workers and workers under the age of 35 were the most represented of the newly unemployed labor force. For a portion of the unemployed individuals in the sample, the unemployment spell ended by the end of the survey date (the relevance of this variable is apparent later). These individuals are now in a state of employment in either the domestic or foreign sector. As can be expected by the percentage of employees working in the foreign sector for each group, unskilled and relatively older men are much more likely than their counterparts to work in the foreign sector after leaving a state of unemployment.

The reservation wage represents the lowest wage at which an individual prefers working to continuing to search for jobs or exiting the labor force. Since there is no minimum wage, the (observed) reservation log wage is defined as the minimum of all (log) wages observed in the sample and subsamples and is denoted separately for domestic and foreign employees. In the domestic sector, all groups have the same reservation wage except older workers, who have a higher reservation wage⁸. In the foreign sector, older workers also have an advantage over other workers but unexpectedly, unskilled workers also have a high reservation wage than other groups and it is equivalent to the reservation wage for older workers in the foreign sector. The distribution of domestic wages for each group shows that more educated and experienced individuals earn higher wages but women earn higher wages than men although the difference is negligible. In the foreign sector, unskilled individuals earn more than skilled individuals although the difference is economically insignificant.

answer choices were a.) in the past 12 months, b.) 1-3 years, c.) 3-5 years, d.) No. For answer choices with an interval, I assume that the duration of unemployment spell for each individual is the midpoint of the interval. For example, for the interval 1-5 years, I assume the duration of unemployment spell is approximately 3 years. For open ended intervals like more than 5 years, I assume the duration of unemployment spell is equal to potential labor market experience (=age-years of schooling -6). This imprecise measure should suffice since for the model's estimation all that is required is that the average of the duration of unemployment spells be accurate.

⁸ The fact that most groups have the same reservation wage is not suggestive of a binding minimum wage. In the data only three people (out of 2341) reported a wage of 0.878 during the open period; however, one individual can belong to more than one group (e.g. all, men, unskilled, young) if the individual is a young unskilled male for example. This is not problematic since 0.878 is not an outlier in the wage data; slight increases/decreases in the reservation wage should not profoundly alter the results; this applies to the foreign sector as well. That said, results may be sensitive to measurement error.

Closed Period

In Gaza, during the closed period 2008Q1-2010Q4, workers could only search for jobs in the domestic labor market. Table 3 presents descriptive statistics for relevant labor market outcomes during this period. The labor force participation rate decreased by four percentage points but unskilled and young individuals were impacted disproportionately with over a 16% decrease in the labor force participation rate. The unemployment rate almost tripled increasing about 25 percentage points and all groups were negatively affected but the groups who suffered the most were unskilled individuals and relatively older individuals. It is a reasonable outcome that the groups who were the most dependent on the foreign sector for employment would suffer the highest unemployment rates when the foreign sector is closed off.

Additionally, the duration of unemployment spells increased by over half a year for the entire sample but decreased sharply for women and skilled workers who had the highest duration of unemployment spells during the open period. Further, labor flows from employment to unemployment increased by over 50% for the entire sample but the sharpest increases were for women, unskilled and inexperienced workers. As during the open period, women, skilled and older individuals earn higher wages than their counterparts in the domestic labor market but men, unskilled, and relatively older individuals had the highest reservation wages.

IV. Theoretical Framework

A. The One Sector Model

The Gaza blockade is implemented in June 2007 and therefore, during the period of 2008-2010, workers in Gaza search for jobs only in the domestic sector. Therefore this section simply reviews the one sector stationary search model with match and bargaining (see Pissarides, 2000 for a comprehensive review). Throughout this section, labor market decisions such as job termination and the division of match-specific surplus between the firm and the worker are made in the absence of the minimum wage since Gaza residents are not paid a minimum wage in Gaza or Israel. Furthermore, the product market is not considered in this model so that the total output of the firm is the sum of the productivity

levels of all workers employed in the firm. Workers can only search for jobs if they are in the state of unemployment, i.e. there is no on-the-job search⁹. The contact rate, the frequency in which workers meet a potential employer, is Poisson distributed. The model is set in continuous time; therefore the value of employment in Gaza's domestic labor market during a short interval of time ε in the closed period is characterized by the following expression:

$$E_{D,c}(w_{D,c}) = (1 + \rho\varepsilon)^{-1}\{w_{D,c}\varepsilon + \eta_{D,c}\varepsilon V_{u,c} + (1 - \eta_{D,c}\varepsilon) * E_{D,c}(w_{D,c}) + o(\varepsilon)\} \quad (1)$$

where the first index represents the sector, D for domestic and F for foreign and the second index represents the accessibility of the Israeli labor market, c for closed or o for open, $E_D(w_{D,c})$ is the value of being employed in the domestic sector during the closed period, $w_{D,c}$ is the wage earned in the domestic sector during the closed period, $(1 + \rho\varepsilon - 1)$ is the discount factor during the interval ε , $\eta_{D,c}$ is the exogenous job extermination rate for domestic jobs during the closed period and $V_{u,c}$ is the value of being unemployed in the domestic sector during the closed period, and $o(\varepsilon)$ is a term such that $\lim_{\varepsilon \rightarrow 0} \frac{o(\varepsilon)}{\varepsilon} = 0$. Combining like terms and taking the limit as $\varepsilon \rightarrow 0$, the value of employment is simplified to the following expression:

$$E_{D,c}(w_{D,c}) = \frac{w_{D,c} + \eta_{D,c}V_{u,c}}{\rho + \eta_{D,c}} \quad (2)$$

This is not a surprising result since expression (2) states that the value of employment in the domestic sector is simply the sum of the domestic wage and the expected value of being unemployed discounted by the discount factor and the job termination rate. Before computing the value of unemployment, define the Nash-bargained wage $w_{D,c}$ as:

$$w_{D,c}(\theta_{D,c}, V_{u,c}) = \arg \max_{w_{D,c}} [E_{D,c}(w_{D,c}) - V_{u,c}]^{\alpha_{D,c}} \left[\frac{(\theta_{D,c} - w_{D,c})}{\rho + \eta_{D,c}} \right]^{1 - \alpha_{D,c}} \quad (3)$$

⁹ This is a limitation of the model since the data shows that approximately 50% of new hires (those who have acquired jobs within one year) were already employed when they received new job offers. However, like studies that use the CPS, because only short panels can be constructed using the *Palestinian Labor Force Survey* data, extending the model to include on-the-job search may not contribute substantially to the analysis (Flinn, 2005).

where $\theta_{D,c}$ is the productivity value of the match which is immediately observed by both parties after contact and $\alpha_{D,c}$ represents the relative bargaining power of workers and takes values in the interval $[0,1]$. If $\alpha_{D,c}=1$, then workers have all the bargaining power and if $\alpha_{D,c}=0$, firms have all the bargaining power. Expression (3) shows that given the bargaining power of workers relative to firms, the worker aims to maximize the difference between the value of being employed and that of being unemployed while the firm maximizes the discounted difference between the productivity of a given worker and the wage offer. Substituting expression (2) into expression (3) and solving the maximization problem yields:

$$w_{D,c}(\theta_{D,c}, V_{u,c}) = \alpha_{D,c}\theta_{D,c} + (1 - \alpha_{D,c})\rho V_{u,c} \quad (4)$$

The value of unemployment in the domestic sector in the interval ε during the closed period is:

$$V_{u,c} = (1 + \rho\varepsilon)^{-1}\{b_{D,c}\varepsilon + \lambda_{D,c}\varepsilon \int \max [V_{u,c}, E_{D,c}(w_{D,c})] + (1 - \lambda_{D,c}\varepsilon) * V_{u,c} + o(\varepsilon)\} \quad (5)$$

where $b_{D,c}$ can be interpreted as search costs or (dis)utility associated with unemployment, $\lambda_{D,c}$ is the contact rate between workers and firms in the domestic sector during the closed period. To solve for the value of unemployment, first the expression $\max[V_{u,c}, E_{D,c}(w_{D,c})]$ is simplified as follows:

$$\begin{aligned} \max[V_{u,c}, E_{D,c}(w_{D,c})] &= \frac{1}{\rho + \eta_{D,c}} \max[(\rho + \eta_{D,c})V_{u,c}, w_{D,c} + \eta_{D,c}V_{u,c}] \\ \max[V_{u,c}, E_{D,c}(w_{D,c})] &= \frac{\eta_{D,c}V_{u,c}}{\rho + \eta_{D,c}} + \frac{\max[\rho V_{u,c}, w_{D,c}]}{\rho + \eta_{D,c}} = V_{u,c} + \frac{\max[0, w_{D,c} - \rho V_{u,c}]}{\rho + \eta_{D,c}} \end{aligned} \quad (6)$$

The expression above highlights the fact that the value of employment exceeds the value of unemployment only if the wage offered $w_{D,c}$ exceeds the value of $\rho V_{u,c}$; thus, the reservation wage $w_{D,c}^*$ is defined as $\rho V_{u,c}$. After substituting expressions (4) and (6) into expression (5), the value of unemployment is now defined as:

$$\rho V_{u,c} = b_{D,c} + \frac{\alpha_{D,c}\lambda_{D,c}}{\rho + \eta_{D,c}} \int_{\rho V_{u,c}} [\theta_{D,c} - \rho V_{u,c}] dG_{D,c}(\theta_{D,c}) \quad (7)$$

where $b_{D,c}$ can be interpreted as search costs or utility associated with unemployment, and $G_{D,c}(\theta_{D,c})$ is the time-invariant CDF distribution of worker-firm productivity levels. While $w_{D,c}^*$ is the reservation wage for workers searching for jobs, $\theta_{D,c}^*$ is the reservation productivity level for firms searching for workers such that workers refuse jobs that pay less than $w_{D,c}^*$ and firms reject workers with productivity levels lower than $\theta_{D,c}^*$. The reservation productivity value is determined by the productivity value $\theta_{D,c}$ of workers that are paid the reservation wage $w_{D,c}^*$. When the wage $w_{D,c}$ is evaluated at $w_{D,c}^*$ in expression (4), the reservation productivity value is $\theta_{D,c}^* = w_{D,c}^* = \rho V_{u,c}$.

B. Empirical Strategy during the Closed Period (2008Q1-2010Q4)

In the one sector model, workers are either employed in the domestic sector or unemployed. For unemployed workers, the durations of unemployment spells are observed while for employed workers, wages are observed. In the context of a stationary labor market environment, it is natural to assume that the labor market is memory less so that the likelihood of receiving an offer is independent of how long it has been since the last offer was received. The likelihood of receiving an offer at time t_c given that an offer has not been received before time t_c is the probability that the firm and worker will make contact and the productivity of the worker is at least equal to the reservation productivity value ($\theta_{D,c} \geq \theta_{D,c}^*$):

$$\frac{q_{U,c}(t_c)}{Q_{U,c}(t > t_c)} = \frac{q_{U,c}(t_c)}{1 - Q_{U,c}(t_c)} = \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) \quad (8)$$

where $\tilde{G}_{D,c}$ is the survivor function $1 - G_{D,c}$, and $Q_{U,c}(t_c)$ and $q_{U,c}(t_c)$ represent the CDF and PDF of the duration of unemployment spells during the closed period. Since $\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)$ is a constant, $Q_{U,c}(t_c)$ takes the form of a negative exponential so that:

$$Q_{U,c}(t_c) = 1 - \exp(-\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) t_c)$$

$$q_{U,c}(t_c) = \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) \exp(-\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) t_c) \quad (9)$$

Since the economy is in a steady state, the ratio of the unemployment rate to the job extermination rate (employment to unemployment flows $\eta_{D,c}$) should equal the ratio of

the employment rate to the arrival rate (the unemployment to employment flows $\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)$). Therefore, the unemployment rate $u_{D,c}$ can be derived by the system of equations:

$$u_{D,c} \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) = e_{D,c} \eta_{D,c} \quad (10)$$

$$u_{D,c} = 1 - e_{D,c} \quad (11)$$

where $e_{D,c}$ is the employment rate. Therefore the unemployment rate can be written as:

$$u_{D,c} = \frac{\eta_{D,c}}{\eta_{D,c} + \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)} \quad (12)$$

The intuition is that the economy is in a steady state and thus the unemployment rate (in the long run) is the employment to unemployment flows (the job extermination rate) divided by the sum of the employment to unemployment flows and the unemployment to employment flows (the probability that a worker and firm make contact and there is a match).

The likelihood of finding an unemployed person in the domestic sector during the closed period with an unemployment spell of duration t_c is:

$$L(t_c, u_{D,c}) = q_U(t_c) * u_{D,c} \quad (13)$$

Similarly, the likelihood of finding an employed person in the domestic sector during the closed period with a wage $w_{D,c}$ is:

$$L(w_{D,c}, e_{D,c}) = \frac{f(w_{D,c})}{\bar{F}(w_{D,c}^*)} * e_{D,c} \quad (14)$$

The first term is the probability of earning a wage $w_{D,c}$ given that the wage exceeds the reservation wage and the second term is the probability of finding a representative agent in the employment state. Given equation (4), the first term can be rewritten as:

$$\frac{f(w_{D,c})}{F(w_{D,c}^*)} = \frac{g(\tilde{\theta}_{D,c})}{\alpha_{D,c} * \tilde{G}(\theta_{D,c}^*)} \text{ where } \tilde{\theta}_{D,c} = [w_{D,c} - (1 - \alpha_{D,c})\theta_{D,c}^*] / \alpha_{D,c}$$

The likelihood function for all individuals in a random sample during the closed period is reported in the Appendix A, along with all other likelihood functions. A consistent estimator of the reservation wage $w_{D,c}^*$ is taken from the data as the minimum value of all wages observed such that:

$$\widehat{w_{D,c}^*} = \min \{w_{D,c,1}, w_{D,c,2} \dots \dots \dots w_{D,c,N_{E,D,c}}\}$$

where $N_{E,D,c}$ is the number of employed workers in the domestic sector during the closed period.

After obtaining estimates for the reservation wage using the data and taking logs of equation (14), maximum likelihood estimators are the solutions to the first order conditions:

$$\frac{\partial \ln L(w_{D,c}, t_c)}{\partial \Gamma} = 0 \quad (15)$$

where $\Gamma = (\eta_{D,c}, \lambda_{D,c}, \mu_{D,c}, \sigma_{D,c})$ is the parameter vector and $\mu_{D,c}$ and $\sigma_{D,c}$ are the means and standard deviations of the productivity parameter $\theta_{D,c}$.

C. The Two Sector Model

Before the onset of the second intifada on September 2000, workers in Gaza searched for jobs in both the domestic sector and Israel or the settlements, which will be characterized as the foreign sector. In this section, the one sector model developed by Flinn (2005) is extended to two sectors. As before, workers can only search for jobs if they are in the state of unemployment and if they exit the state of employment they must enter the state of unemployment before searching for jobs. Given that the model is set in continuous time, the value of employment for Gaza residents in the domestic and foreign sectors during the short interval of time ε are the following:

$$E_{D,o}(w_{D,o}) = (1 + \rho\varepsilon)^{-1} \{w_{D,o}\varepsilon + \eta_{D,o}\varepsilon V_{u,o} + (1 - \eta_{D,o}\varepsilon) * E_{D,o}(w_{D,o}) + o(\varepsilon)\} \quad (16)$$

$$E_{F,o}(w_{F,o}) = (1 + \rho\varepsilon)^{-1} \{(w_{F,o} - k)\varepsilon + \eta_{F,o}\varepsilon V_{u,o} + (1 - \eta_{F,o}\varepsilon) * E_{F,o}(w_{F,o}) + o(\varepsilon)\} \quad (17)$$

where the first index represents the sector, D for domestic and F for foreign and the second index represents the accessibility of Israeli jobs, o for open economy. Note that

while the observed daily wage in the foreign sector is $w_{F,o}$, the real value of the wage for Palestinian commuters is $w_{F,o} - k$ where k represents the fixed additional cost (e.g. transportation, search, social or political cost) of working in Israel or the settlements. Combining like terms and taking the limit as $\varepsilon \rightarrow 0$ yields the following expressions:

$$E_{D,o}(w_{D,o}) = \frac{w_{D,o} + \eta_{D,o} V_{u,o}}{\rho + \eta_{D,o}} \quad (18)$$

$$E_{F,o}(w_{F,o}) = \frac{w_{F,o} - k + \eta_{F,o} V_{u,o}}{\rho + \eta_{F,o}} \quad (19)$$

The Nash-bargained wage for each sector during the open period follows from expression (3). Solving both maximization problems provides the two wage equations during the open period:

$$w_{D,o} = \alpha_{D,o} \theta_{D,o} + (1 - \alpha_{D,o}) \rho V_{u,o} = \alpha_{D,o} \theta_{D,o} + (1 - \alpha_{D,o}) \theta_{D,o}^* \quad (20)$$

$$w_{F,o} = \alpha_{F,o} \theta_{F,o} + (1 - \alpha_{F,o}) \rho V_{u,o} + k = \alpha_{F,o} \theta_{F,o} + (1 - \alpha_{F,o}) \theta_{F,o}^* + k \quad (21)$$

The value of unemployment for each sector will have three terms, one more than in equation (7) where there was one sector. This is because when a worker is at the state of unemployment, there are three possible states he/she can enter in the future: remain in the unemployed state, enter the domestic employment state or the foreign employment state. Therefore the flow equation for the value of unemployment is:

$$V_{u,o} = (1 + \rho\varepsilon)^{-1} \{ b_{D,o} \varepsilon + \lambda_{D,o} \varepsilon \int \max[V_{u,o}, E_{D,o}(w_{D,o})] + \lambda_{F,o} \varepsilon \int \max[V_{u,o}, E_{F,o}(w_{F,o} - k)] + (1 - \lambda_{D,o} \varepsilon - \lambda_{F,o} \varepsilon) * V_{u,o} + o(\varepsilon) \} \quad (22)$$

As in the one sector case, the reservation wages are solved for by simplifying the maximization problem. The reservation wage in the domestic sector is simply equivalent to the value of unemployment multiplied by the discount rate ρ . Similarly, the foreign sector reservation wage is equal to the domestic sector reservation wage plus the fixed cost of commuting which implies the real value of the foreign reservation wage is equal to the domestic wage. Using equations (20) and (21), it is straightforward to infer that the

reservation productivity value is equal for both sectors; all of these relationships are captured by the two equations: $\theta_{D,o}^* = w_{D,o}^* = \rho V_{u,o}$ and $\theta_{F,o}^* = w_{F,o}^* - k = \rho V_{u,o}$.

Taking the limit as $\varepsilon \rightarrow 0$, the value of unemployment can be simplified as:

$$\rho V_{u,o} = b_{D,o} + \frac{\alpha_{D,o} \lambda_{D,o}}{\rho + \eta_{D,o}} \int_{\rho V_{u,o}} [\theta_{D,o} - \rho V_{u,o}] dG_{D,o}(\theta_{D,o}) + \frac{\alpha_{F,o} \lambda_{F,o}}{\rho + \eta_{F,o}} \int_{\rho V_{u,o}} [\theta_{F,o} - \rho V_{u,o}] dG_{F,o}(\theta_{F,o}) \quad (23)$$

D. Empirical Strategy during the Open Period (2000Q1-2000Q3)

In the one sector model, workers were divided into two groups, workers who were unemployed but had an observed duration of unemployment and employed workers whose wages were observed. In the two sector model, workers are divided into five groups, those who are working in the domestic sector with an observed wage $w_{D,o}$, those who are working in the foreign sector with an observed wage $w_{F,o}$, those who are seeking employment and have not found employment by the last time they are observed, those who are seeking employment and have entered the domestic employment state, and those who are seeking employment and have entered the foreign employment state.

As before, the labor market is memory less and the hazard is constant so that the likelihood of receiving an offer at time t_o given that an offer has not been received before time t_o is the probability that a domestic firm and worker will make contact and the productivity of the worker is at least equal to the reservation productivity value for the domestic firms ($\theta_{D,o} \geq \theta_{D,o}^* = \rho V_{u,o}$) or the probability that a foreign firm and a worker will make contact and the productivity of the worker is at least equal to the reservation productivity value for foreign firms ($\theta_{F,o} \geq \theta_{F,o}^* = \rho V_{u,o}$):

$$\frac{q_{U,o}(t_o)}{1 - Q_{U,o}(t_o)} = \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \quad (24)$$

As before, the CDF of worker-firm productivity levels for both sectors takes the form of a negative exponential since the hazard is a positive constant:

$$Q_{U,o}(t_o) = 1 - (\exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] * t_o)$$

$$q_{U,o}(t_o) = \left(\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \right) * \left(\exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] * t_o \right)$$

Unlike the one sector case, in the two sector case those whose unemployment spells have ended are in one of two states; either they are employed in the domestic sector or in the foreign sector. This additional information is critical since it is necessary in order to identify the model. Thus, given that a spell of unemployment ends by the end of the survey date, the probability that a worker will be found in the domestic sector or the foreign sector are given by:

$$P(\text{domestic} | \text{spell ends}) = \frac{\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)}{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)}$$

$$P(\text{foreign} | \text{spell ends}) = \frac{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)}{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)}$$

In the two sector model, the employment flow equations for each sector are used to solve for the unemployment rate during the open period.

$$u_o \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) = e_{D,o} \eta_{D,o} \quad (25)$$

$$u_o \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) = e_{F,o} \eta_{F,o} \quad (26)$$

$$u_o = 1 - e_{D,o} - e_{F,o} \quad (27)$$

where $e_{D,o}$ and $e_{F,o}$ are the percentage of workers employed in the domestic and foreign sectors respectively. The three systems of equations yield the following unemployment rate and employment rates:

$$u_o = \frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (28)$$

$$e_{D,o} = \frac{\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (29)$$

$$e_{F,o} = \frac{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (30)$$

The joint likelihood of finding an unemployed person during the open period with an unemployment spell of duration t_o and given the unemployment spell ends the worker joins the domestic sector is:

$$L(t_o, u_o, \text{domestic} | \text{spell ends}) = q_{U,o}(t_o) P(\text{domestic} | \text{spell ends}) u_o \quad (31)$$

The joint likelihood of finding an unemployed person during the open period with an unemployment spell of duration t_o and given the unemployment spell ends the worker joins the foreign sector is:

$$L(t_o, u_o, \text{foreign} | \text{spell ends}) = q_{U,o}(t_o) P(\text{foreign} | \text{spell ends}) u_o \quad (32)$$

The joint likelihood of finding an unemployed person during the open period with an unemployment spell of duration t_o and the unemployment spell does not end is:

$$L(t_o, u_o) = q_{U,o}(t_o) u_o \quad (33)$$

The likelihood of finding an employed person in the domestic sector during the open period with a wage $w_{D,o}$ is:

$$L(w_{D,o}, e_{D,o}) = \frac{f(w_{D,o})}{\tilde{F}(w_{D,o}^*)} * e_{D,o} \quad (34)$$

The likelihood of finding an employed person in the foreign sector during the open period with a wage $w_{F,o}$ is:

$$L(w_{F,o}, e_{F,o}) = \frac{f(w_{F,o})}{\tilde{F}(w_{F,o}^*)} * e_{F,o} \quad (35)$$

As noted above, the likelihood function for the representative sample of N_o individuals is in the Appendix A, along with the other likelihood functions.

Estimates of the reservation wages $w_{D,o}^*$ and $w_{F,o}^*$ are taken from the data as the minimum values of all domestic and foreign wages such that:

$$\widehat{w_{D,o}^*} = \min\{w_{D,o,1}, w_{D,o,2} \dots \dots \dots w_{D,C,NE,D,o}\} \quad (37)$$

$$\widehat{w}_{F,o}^* = \min \{w_{F,o,1}, w_{F,o,2} \dots \dots \dots w_{F,o,N_{E,F,o}}\} \quad (38)$$

$$k = \widehat{w}_{F,o}^* - \widehat{w}_{D,o}^* \quad (39)$$

where $N_{E,D,o}$ and $N_{E,F,o}$ are the number of employed workers in the domestic and foreign sector during the open period. After plugging in estimates of the reservation wages and taking logs of equation (36), the parameters of the model can be estimated. Maximum likelihood estimators are the solutions to the first order conditions:

$$\frac{\partial \ln L(w_{D,o}, w_{F,o}, t_o)}{\partial \Gamma'} = 0 \quad (40)$$

where $\Gamma' = (\lambda_{D,o}, \eta_{D,o}, \mu_{D,o}, \sigma_{D,o}, \lambda_{F,o}, \eta_{F,o}, \mu_{F,o}, \sigma_{F,o})$ is the parameter vector.

V. Results

In this section, I first estimate the model parameters during the open and closed period. Then, I conduct a comparative static exercise by using the domestic parameter estimates from the open period to predict labor market outcomes during the closed period. In order to predict labor market outcomes, I impose the restriction $\lambda_{F,c} = 0$, which represents the blockade on the Gaza Strip and endogenize the labor force participation rate (more on this later). To further our understanding of the labor market, I then estimate demand-side parameters by endogenizing the domestic contact rate through the use of two distinct matching technologies (see Appendix B). Finally, I use the estimates of these results to quantify the economic cost of immobile labor and conduct a sensitivity analysis to assess how robust the results are given changes in the bargaining power parameter.

Main Results for the Open Period (2000Q1-2000Q3)

Table 4 displays estimates of the parameter vector Γ' along with the corresponding standard errors. In the first column, the parameters are estimated for the entire sample and in the remaining columns the model is estimated for other demographic subgroups. In the dataset, female Gaza residents do not report working in Israel and therefore, for this population, only the domestic parameters will be estimated. Initially,

the bargaining power parameter for all sectors during all periods is set equal to 0.5 since it is the most standard procedure in the literature when demand-side information is not available as is the case here (Flinn and Heckman (1982), Eckstein and Wolpin (1995)). Setting the bargaining power parameter to 0.5 suggests there is no power dynamic between firms and workers, which may undermine the limited work opportunities available to wage earners in Gaza. Therefore, in the results section, I conduct a sensitivity analysis to investigate how robust the results are to changes in the estimates of workers' bargaining power.

The estimated values of $\lambda_{D,o}$ and $\lambda_{F,o}$ suggest that offers arrive approximately every 3.15 years (1/.317) in the domestic market on average and every 14.71 (1/.068) years in the foreign labor market on average.¹⁰ On the one hand, men, unskilled workers and inexperienced workers are offered domestic jobs more frequently than their counterparts. On the other hand, their dismissal rate is also much higher than their counterparts suggesting these groups have higher levels of labor mobility. For example the point estimates for the dismissal rates in the domestic market suggest that the average job tenure is approximately 11 years for younger workers and 38 years for older workers.

In the foreign labor market, job offers arrive more often for older workers and dismissals for this group are more infrequent as well. Similarly, unskilled workers have a greater advantage over skilled workers in the foreign labor market with higher arrival rates and relatively comparable dismissal rates. Since the bargaining power parameter is equal, $\alpha_{D,o} = \alpha_{F,o} = .5$ for all groups, the point estimates of the means and standard deviations of the productivity parameter for each sector, $\mu_{D,o}, \mu_{F,o}, \sigma_{D,o}, \sigma_{F,o}$, are monotonically increasing in the mean wage and standard deviation of the wage in Table 2 for all groups. As before, women, skilled workers and older workers are more productive (they earn higher wages and have similar reservation wages as their

¹⁰ This is consistent with the solution to the first order conditions of the log likelihood function (with respect to $\lambda_{D,o}$ and $\lambda_{F,o}$), which simplifies to the equation that the ratio of job offers received in the domestic market to those received in the foreign market equals the ratio of workers observed entering the domestic market to those entering the foreign market after exiting the state of unemployment ($\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) / \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) = N_{U,o,ends,D} / N_{U,o,ends,F}$). Parameter estimates in Table 4 simplify the left hand ratio to approximately 4.65 while according to the all category in Table 2, the right hand ratio is equal to $186/40 = 4.65$.

counterparts) in the domestic labor market. In the foreign labor market, despite the earnings advantage that unskilled workers and older workers have over their counterparts (see Table 2) skilled workers are still more productive than unskilled workers due to the relatively high commute costs of unskilled workers¹¹. The standard errors suggest that all parameters are precisely estimated in this model.

Main Results for the Closed Period (2008Q1-2010Q4)

Table 5 reports parameter estimates from the model for the domestic labor market during the closed period. A comparison of Tables 4 and 5 immediately reveal that differences in labor market outcomes described in the data section are primarily driven by the fact that the job termination rate more than tripled for all groups. This fact is worth discussing since the sharp rise in the job extermination rate is exogenous in the model and has a profound impact on the remaining analysis uncovered in this paper. Part of the increase in the dismissal rate can be explained by the rise in the employment to unemployment flows between the open period and closed period. However, it is clear that the dismissal rate (as measured in the model in Tables 4 and 5) increased much more drastically than the percentage of employed individuals who subsequently became unemployed. One surprising outcome is that as the unemployment rate in the entire sample increased from approximately 14% to 39% between the open and closed periods, the domestic dismissal rate tripled but the domestic contact rate barely changed (from 0.317 to 0.307). One would have expected the increase in the unemployment rate during the closed period to be explained by both a higher dismissal rate and a significantly lower contact rate, which is consistent with the increase in the duration of unemployment spells observed in the data¹². However, the overall domestic contact rate is almost unaffected by the blockade since the increase in the duration of unemployment spells during the closed period, which should have lowered the domestic contact rate, was (almost) offset by the removal of the foreign sector.

¹¹ This is because the difference between the reservation wage in the foreign sector and the reservation wage in the domestic sector for unskilled workers is large (see equation(39)).

¹² The first order conditions of the maximum log likelihood estimator show that $\lambda_{D,c}\tilde{G}_{D,c}(\theta_{D,c}^*) = \frac{1}{\bar{\tau}_c}$ where $\bar{\tau}_c$ is the average duration of unemployment spells in the closed period and $\lambda_{D,o}\tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o}\tilde{G}_{F,o}(\theta_{F,o}^*) = \frac{1}{\bar{\tau}_o}$ where $\bar{\tau}_o$ is the average duration of unemployment spells in the open period.

Although the contact rate slightly decreased for the entire sample, there is a lot of heterogeneity. While the contact rate increased for females, skilled workers and experienced workers, it decreased for the remaining groups especially unskilled workers. Furthermore, the mean productivity parameter grew by approximately 5-10% for all groups suggesting there was a shift in the composition of workers as well as more competition given that workers now search in only one labor market. As will be shown in the subsection on Welfare Empirics, an increase in productivity among Gaza residents should not be confused with an increase in social welfare.

Comparative Static Exercise

After obtaining estimates of the model's parameters during the open period, one can use these parameter estimates to predict labor market outcomes when Israel implements the blockade on the Gaza Strip by setting $\lambda_{F,c} = 0$. The assumption is that domestic parameters remain unchanged after the change in border policy. Table 6 reports the predictions for labor market outcomes for this comparative static exercise. Note that women have the same labor market outcomes as they did before the policy change since they were not represented in the foreign labor market; thus, they will be excluded in the analysis for this subsection. The reservation wage is solved for using equation (23), which simplifies to equation (7) when setting $\lambda_{F,c} = 0$. The reservation wage is then used with domestic parameter estimates to solve for the unemployment rate and (log) wage distribution. The reservation wage has decreased for all groups and although its value is distinct for each group, it is similar across groups. The unemployment rate increased by approximately two percentage points and women, unskilled workers and younger workers continue to have higher unemployment rates than their counterparts. The wage distribution for all groups shifted to the left due to lower reservation wages.

In order to predict the labor force participation rate when the blockade is in effect, I impose structure on the labor force participation decision. The labor force participation decision during the open period is defined as:

$$d_o = \begin{cases} 1 & \text{if } \rho V_o \leq \rho V_{u,o} \\ 0 & \text{if } \rho V_o > \rho V_{u,o} \end{cases} \quad (41)$$

where ρV_O is the flow value of being out of the labor market. On average, workers in an open economy will participate in the labor force if their flow value of not participating is less than the reservation wage. Therefore, the labor force participation rate in the open period can be written as:

$$Prob(d_o = 1) = Prob(\rho V_O \leq \rho V_{u,o}) = H(\rho V_{u,o}) \quad (42)$$

where $H()$ is the CDF of the flow value of the outside option, ρV_O . Analogously, the labor force participation rate can be written in the closed period as:

$$Prob(d_c = 1) = Prob(\rho V_O \leq \rho V_{u,c}) = H(\rho V_{u,c}) \quad (43)$$

Assuming ρV_O has a lognormal distribution the two parameters $\mu_{\rho V_O}, \sigma_{\rho V_O}$ can be recovered from the system of equations (equations (42) and (43)) given the labor force participation rates and the reservation wages during both periods.

The parameter estimate representing the mean of the flow value of being out of the labor market are larger than the reservation wage for all groups except men suggesting that men do not place a high value on being out of the labor market. For women, the flow value is extremely large, suggesting that women place greater value in participating in activities outside the labor force than other groups. The extreme values for men and women reflect the large difference in the labor force participation rates between the two groups. The predicted labor force participation rate decreased for all groups using participation rates in the open period as a standard. As expected, the largest decreases in the participation rate were experienced by men, unskilled workers and older workers; this is not surprising since these groups were more dependent on Israel's labor market for employment.

In order to measure the model's degree of accuracy in predicting labor market outcomes, the statistics predicted by the model in Table 6 are compared to the actual labor market outcomes in Gaza when border closures were enforced (Table 3). With the exception of women, the model correctly predicted that the reservation wage would decrease for all groups. However, the model predicted that skilled workers have a higher reservation wage, but their reservation wage is about half of the value of the reservation

wage for unskilled workers. Furthermore, the magnitude of the predicted unemployment rate is less than one half of the actual unemployment rate during the closed period and understates unemployment for all groups. The model's predictions were inaccurate but the qualitative message that younger workers, women and unskilled workers suffered the most from high unemployment rates is correct. This suggests that the built-in assumption in the comparative exercise that domestic parameters in the likelihood function are constant after the change in border policies took place is not valid, as indicated by the differences in parameter estimates during the open and closed periods reported in Tables 4 and 5 respectively.

Mean wages are larger than the model predicted in the static exercise. In the static exercise, the wage distribution shifted to the left for all groups due to the decline in reservation wages for all groups. However, during the closed period, the reservation wages decreased but mean wages increased, suggesting that other changes occurred that may not be fully captured by the static exercise (e.g. change in the composition of workers in the domestic sector leading to increases in productivity etc). Unlike the case for the unemployment rate, the predicted labor force participation rates in the static exercise were relatively accurate in determining the labor force participation in the closed period. The predicted values for the participation rates were between the actual labor force participation rates during the open period and closed period.

Welfare Empirics

The goal of this paper is to quantify the economic cost of immobile labor. Several welfare measures are used to measure the impact of the Blockade on Gaza residents. The most intuitive welfare measure is Gross National Income (GNI) since GNI is a common economic indicator. GNI consists of domestic output plus wages and profits earned abroad. In the case of the Gaza Strip and in the context of this model (where labor is the only input in a firm's production function), an analogous measure of GNI is calculated in the following way:

$$GNI (Open) = l_o * e_{D,o} (\overline{\mu_{D,o}} + \overline{w_{D,o}}) + l_o * e_{F,o} * \overline{w_{F,o}}$$

$$GNI (CS) = l_{CS} * e_{D,CS} (\overline{\mu_{D,o}} + \overline{w_{D,CS}})$$

$$GNI (Closed) = l_c * e_{D,c} (\overline{\mu_{D,c}} + \overline{w_{D,c}})$$

where l_o and l_c represent the labor force participation rates during the open and closed periods respectively. CS denotes the values that were predicted using the comparative static exercise and the bars indicate average values. Although GNI is a common welfare measure, one criticism of GNI is that it does not account for the welfare levels of unemployed workers and non-participants. Other economic indicators such as the unemployment rate and the labor force participation rate demonstrate the relative sizes of the groups who have these characteristics but do not inform us on the distribution of welfare among these populations.

One way to remedy this and account for all individuals is by introducing a Benthamite social welfare function, which will allow us to incorporate the unemployment rate and the labor force participation rate as well as the average welfare level for these groups. Three welfare measures derived from a Benthamite social welfare function are the Rawlsian Criterion (RC), the Total Welfare Measure (TW) and the Participants Welfare (PW) Measure. These measures are computed during the open period in the following way:

$$RC_o = V_{u,o}$$

$$TW_o = (1 - l_o) * \overline{V_o} + l_o * u_o * V_{u,o} + l_o * e_{D,o} * (\overline{E_{D,o}} + \overline{J_{D,o}}) + l_o * e_{F,o} * \overline{E_{F,o}}$$

$$PW_o = l_o * u_o * V_{u,o} + l_o * e_{D,o} * (\overline{E_{D,o}} + \overline{J_{D,o}}) + l_o * e_{F,o} * \overline{E_{F,o}}$$

where J is the expected value of a filled vacancy:

$$J_{D,o} = \int \frac{\theta_{D,o} - w_{D,o}}{\rho + \eta_{D,o}} * \frac{g(\theta_{D,o})}{G(\theta_{D,o}^*)} \quad (\text{for more on this, see Appendix B})$$

The calculations for the comparative static exercise and the closed period immediately follow. The first welfare measure equates welfare with the value of unemployed search (the reservation wage/ ρ). The motivation for using this welfare measure is to capture an estimate of welfare for individuals who are seeking jobs but are

not able to attain employment and therefore, presumably have the lowest welfare value. The total welfare measure aims to capture a complete welfare measure by accounting for all people in a society; the first term is the portion of people outside the labor force times the expected value of not participating in the labor market. The second term refers to the population unemployment rate multiplied by the value of unemployed search. The third term refers to the population domestic employment rate multiplied by the sum of the expected value of domestic employment and expected value of filling a vacancy.¹³ Finally, the fourth term refers to the population foreign employment rate multiplied by the expected value of foreign employment. The Participants Welfare (PW) measure simply excludes the first term so that only labor force participants are included. This will be the focus of the analysis in this paper since the welfare level of non-participants (V_o) is arbitrarily determined. In the appendix, Table I summarizes estimates of the value of outside labor force option, unemployment, employment in both sectors and filled vacancies for the open period, the comparative static exercise and the closed period. Table II reports all four welfare measures during the open period, closed period and the comparative static exercise.

Table 7 reports the welfare loss (%) between the comparative static exercise and the open period as well as the welfare loss (%) between the closed period and the open period. The results suggest the blockade had a profound impact on Gaza, where welfare losses during the closed period ranged between 22.6% and 53.9% depending on the measure used. When actual welfare losses (the percentage difference between social welfare during the closed and open period) are compared to predicted welfare losses (the percentage difference between welfare levels predicted using flow values from the comparative static exercise and during the closed period), the differences are stark for all measures except the Rawlsian criterion. This is because while the comparative static exercise was relatively accurate in predicting labor force participation rates and reservation wages, it understated the unemployment rate by an order of 2.5 for all groups and the job extermination rate by approximately an order of 3 for all groups, thereby underestimated the losses incurred after the blockade.

¹³ In equilibrium, the number of employed individuals and the number of filled vacancies are equal.

Sensitivity Analysis

In all the previous analyses, the bargaining power parameter is assumed to be 0.5 for workers in the domestic sector during both periods as well as workers in the foreign sector. An inaccurate estimate of the bargaining power parameter directly affects the mean of the productivity parameter θ , which in turn affects estimates of social welfare estimated in the previous subsection. For example if the bargaining power parameter is underestimated then the average productivity of workers (and the expected value of a filled vacancy J) is underestimated as well which means that welfare losses are overstated¹⁴. Further, this paper assumes that employees in domestic firms during the open period have at least as much bargaining power than they did during the closed period and that at no point in time does the bargaining power parameter exceed 0.5. This is because during the open period, (potential) employees had more labor force options which were largely unavailable after the blockade was implemented such as seeking work in Israel or working in a domestic firm which has frequent business transactions with Israel. Therefore in the sensitivity analysis, I only consider the cases in which $\alpha_{D,o} \geq \alpha_{D,c}$.

Table 8 reports the Net Participants' Welfare Losses (%) between the Open and Closed Period for different values of the bargaining power parameters ($\alpha_{D,o}, \alpha_{D,c}$). For values where the bargaining power parameters are equal in the two periods, $\alpha_{D,o} = \alpha_{D,c}$, welfare losses are relatively large. However, the magnitude of the loss declines the lower the estimate of the bargaining power parameter. Table 8 suggests that even if the bargaining power of workers is sufficiently low (0.1) in both periods, welfare losses range between 25% and 63% depending on the demographic group.

The magnitude of the welfare loss decreases at a more rapid pace with an increase in the difference between the estimates of the bargaining power parameters. When $\alpha_{D,o} - \alpha_{D,c} = 0.1$, although the losses are still large in magnitude, they are much smaller than when the bargaining power parameter were assumed to be equal. In fact, when ($\alpha_{D,o}, \alpha_{D,c}$) is (0.2, 0.1) the results show that skilled and older workers experience a

¹⁴ Since this paper does not address the productivity of Israeli firms or welfare levels in Israel, the bargaining power parameter for workers in the foreign sector is not discussed.

welfare gain after the blockade. When the difference between the two bargaining power parameters is estimated to be 0.2 and $\alpha_{D,o} \geq 0.4$, welfare losses are relatively substantial, although when $\alpha_{D,o}=0.4$, skilled and older employees experience slight welfare gains after the blockade. When the difference between the two bargaining power parameters is estimated to be 0.3 and $\alpha_{D,o}=0.5$, then the magnitude of the welfare loss is economically significant only for women, unskilled and inexperienced workers but is almost completely offset by the welfare gains experienced by men, skilled and experienced workers. When $\alpha_{D,o}=0.4$, all groups are shown to experience welfare gains after the blockade; it is unlikely that workers lost such a large share of their bargaining power in the domestic labor market after the blockade. In conclusion, welfare losses between the open and closed period are relatively substantial as long as the bargaining power parameter in the closed period is at least 0.2 ($\alpha_{D,o} \geq 0.2$) and the difference between the two bargaining power parameters is at most 0.2 ($\alpha_{D,o} - \alpha_{D,c} \leq 0.2$).¹⁵

VI. Discussion and Conclusion

Loss in social welfare is difficult to define. A more concrete way to identify what the welfare losses in Tables 7 and 8 capture is by estimating the reduction in wages necessary to incur an equivalent amount of social welfare loss as the blockade. In this paper, I do this exercise by assuming that the blockade did not occur and then estimate the decrease in average wage(s) necessary in the open period to reach the level of welfare in the closed period. In the first two rows of Table 9, the average values of the real domestic and foreign wages are reported. The next two rows of Table 9 display the estimates of the average domestic and foreign wage required during the open period to produce the same level of welfare as in the closed period conditional on the constancy of all other variables and labor market outcomes (average match value, unemployment rate, % working in the foreign sector, labor force participation rates). Note that in this

¹⁵ It is unlikely that on average, workers in Gaza have a bargaining power parameter that is less than 0.2 although there may be a lot of heterogeneity across individuals (e.g. union status, socio-economic status, etc). Further, public sector expansion and the rise in the public wage premium in Gaza following the intifada (Miaari, 2006) and the blockade (Adnan, 2012a) indicates that workers in Gaza have some bargaining power with the largest employer in Gaza-the government. This also suggests that although workers' bargaining power decreased between the open period and the blockade, it probably was not very large to begin with. The specifications associated with $(\alpha_{D,o}, \alpha_{D,c})=(0.3,0.2)$ and $(\alpha_{D,o}, \alpha_{D,c})=(0.5,0.3)$ in Table 8 are probably the most accurate.

specification, there is a lower bound of \$1 for the daily domestic wage ($\ln \text{ wage}=0$) and a lower bound of \$2.7 for the daily foreign wage ($\ln \text{ wage}=1$; which covers the commute costs). The domestic wage (0.98) for the “all” category is slightly higher than the reservation wage (0.88). Older workers and skilled workers have a clear advantage over other groups; however for domestic sector employees, who include approximately 74% of older wage-earners in Gaza and 89% of skilled wage-earners, the reduction in domestic wages is about one-third for older workers while the reduction for skilled workers is over 40%. The decline in foreign wages is not substantial but given that commute costs are fixed (assuming $k=1$), the real value of the foreign wage is reduced by a higher percentage.¹⁶ In the “all” category, Table 9 implies that the level of welfare (analogous to GNI) during a period of absolute labor market segmentation in Gaza is equivalent to a level of welfare during the open period where there is a joint decrease in real domestic wages by 64% and in foreign wages (net of commute costs assuming $k=1$) by 18%¹⁷.

The remainder of Table 9 displays the average wages in the domestic and foreign sectors conditional on the assumption that the level of Participants Welfare during the open period is equivalent to the corresponding measure during the closed period. The bargaining power parameter during the open period is assumed to be 0.5 while the level of bargaining power is allowed to vary during the closed period. The table shows that in order to preserve the same level of welfare during both periods, average wages in both sectors must decrease substantially for all groups when the difference between the bargaining power parameters is less than or equal to 0.2. When the difference between the bargaining power parameters is 0.3, the model suggests that men, skilled and older workers must earn higher wages because the level of welfare increased after the blockade¹⁸.

¹⁶ For example, the average foreign wage for older workers is estimated to be 3.36 in Table 9 which is not much lower than their actual average foreign wage (3.61). However, given that commute costs are constant, the decrease in wages experienced by older workers is not $(3.61-3.36)/3.605=6.9\%$ but $(2.61-2.36)/2.61=9.57\%$.

¹⁷ In Table 9, when wages do not have lower bounds, the solutions are not unique. Nevertheless, the range of solutions is relatively small.

¹⁸ This is expected since estimates of welfare losses using the PW measure in Table 8 predict that men, skilled and older workers experience welfare gains when $(\alpha_{D,o}, \alpha_{D,c})=(0.5, 0.2)$.

It is highly unlikely that the difference in the bargaining power parameter is so large for Gaza workers in the domestic sector between the two periods. Future research should incorporate demand side information in order to estimate the bargaining power parameter. The decrease in average domestic and foreign wages that amount to the loss of social (PW) welfare are substantial for the majority of estimates of the bargaining power parameter under the condition: $\alpha_{D,o} \geq \alpha_{D,c}$. Although wage subsidies may increase social welfare for Gaza residents temporarily, this is not a long term solution since Gaza's economy suffers from economic isolation after long-term dependence on Israel's economy. Further, it seems that Gaza's economy cannot sustain itself without labor and product market integration with neighboring countries like Israel and Egypt. Since these countries implemented the blockade on Gaza, a major concern is that it is impossible to disentangle Gaza's economic woes from its political ones.

Table 2--Descriptive Statistics during the Open Period (2000Q1-2000Q3)

	All	Men	Women	Skilled	Unskilled	Age<35	Age≥ 35
Number Employed (D)	2668	2371	297	1304	1364	1500	1168
Number Employed (F)	474	474	0	134	340	210	264
% Employed in Foreign sector	0.151	0.167	0	0.093	0.200	0.123	0.184
Number in Wage Sector (D)	1876	1702	174	1064	812	1135	741
Number in Wage Sector (F)	465	465	0	132	333	209	256
% of Wage sector in Foreign	0.199	0.215	0	0.11	0.291	0.156	0.257
LF Participation Rate	0.414	0.687	0.132	0.506	0.363	0.366	0.502
Total Unemployed	510	437	73	226	284	382	128
Unemployment Rate	0.140	0.133	0.197	0.136	0.143	0.183	0.082
Unemployment Spell (years)	2.60	2.22	4.86	3.28	2.06	2.51	2.85
Employment-Unemp Flows	0.079	0.085	0.027	0.055	0.099	0.099	0.056
Unemp Spell Ended by Survey	226	207	19	78	148	162	64
Employed in Domestic	186	168	18	68	118	143	43
Employed in Foreign	40	39	1	10	30	19	21
Monetary Unit: US \$ (2010)							
Mean Log Wage (D)	2.713	2.712	2.722	2.865	2.413	2.573	2.927
Standard Dev.(D)	0.449	0.437	0.535	0.429	0.395	0.393	0.446
Mean Log Wage (F)	3.526	3.526	-----	3.511	3.531	3.428	3.605
Standard Deviation Log Wage(F)	0.399	0.399	-----	0.472	0.367	0.464	0.316
Reservation Log Wage (D)	0.878	0.878	0.878	0.878	0.878	0.878	1.284
Reservation Log Wage (F)	2.057	2.057	-----	2.057	2.239	2.057	2.239
k (fixed commute cost)	1.179	1.179	-----	1.179	1.361	1.179	0.955

Source: Palestinian Labor Force Survey Data (2000-2000Q3)

Table 3--Descriptive Statistics during the Closed Period (2008-2010)

	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
Employed	6409	5625	784	3695	2714	2873	3536
Wage Sector	4985	4270	715	3198	1787	2304	2681
L F Participation Rate	0.370	0.611	0.118	0.464	0.306	0.319	0.457
Unemployed	4099	3476	623	1669	2430	2762	1337
Unemployment Rate	0.390	0.382	0.443	0.311	0.472	0.490	0.274
Unemployment Spell (years)	3.26	3.20	3.56	3.09	3.37	3.13	3.52
Employment-Unemp Flows	0.122	0.125	0.099	0.084	0.174	0.164	0.088
Monetary Unit: US \$ (2010)							
Reservation Log Wage	0.405	0.692	0.405	0.405	0.692	0.405	0.692
Mean Log Wage	2.79	2.78	2.82	2.97	2.46	2.58	2.96
Standard Deviation Log Wage	0.628	0.627	0.631	0.563	0.604	0.595	0.604

Source: Palestinian Labor Force Survey Data (2008Q1-2010Q4).

Table 4--Model Estimates during Open Period ($\alpha_{D,o} = \alpha_{F,o}=.5, \rho=.1$)

Parameters	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
$\lambda_{D,o}$	0.317 (0.017)	0.365 (0.021)	0.206 (0.024)	0.266 (0.021)	0.388 (0.028)	0.351 (0.021)	0.236 (0.029)
$\eta_{D,o}$	0.061 (0.004)	0.067 (0.005)	0.051 (0.009)	0.046 (0.005)	0.081 (0.008)	0.090 (0.007)	0.026 (0.004)
$\mu_{D,o}$	4.55 (0.021)	4.55 (0.021)	4.57 (0.081)	4.85 (0.026)	4.15 (0.028)	4.27 (0.023)	4.57 (0.033)
$\sigma_{D,o}$	0.899 (0.015)	0.881 (0.015)	1.07 (0.057)	0.857 (0.019)	0.790 (0.020)	0.787 (0.017)	0.893 (0.023)
$\lambda_{F,o}$	0.068 (0.010)	0.085 (0.013)	-----	0.039 (0.013)	0.099 (0.020)	0.0467 (0.012)	0.115 (0.023)
$\eta_{F,o}$	0.073 (0.012)	0.078 (0.013)	-----	0.066 (0.021)	0.082 (0.016)	0.085 (0.020)	0.056 (0.013)
$\mu_{F,o}$	3.82 (0.037)	3.82 (0.043)	-----	3.78 (0.125)	3.46 (0.081)	3.62 (0.125)	4.02 (0.040)
$\sigma_{F,o}$	0.798 (0.026)	0.798 (0.033)	-----	0.945 (0.096)	0.733 (0.058)	0.933 (0.090)	0.630 (0.030)

Source: Palestinian Labor Force Survey Data (2000-2000Q3). Standard errors are in parentheses.

Table 5--Model Estimates during Closed Period ($\alpha_{D,c}=.5$, $\rho=.1$)

Parameters	All	Men	Women	Skilled	Unskilled	Age<35	Age \geq 35
$\lambda_{D,c}$	0.307 (0.005)	0.313 (0.005)	0.281 (0.011)	0.323 (0.008)	0.298 (0.006)	0.319 (0.006)	0.284 (0.008)
$\eta_{D,c}$	0.196 (0.005)	0.193 (0.005)	0.223 (0.015)	0.146 (0.006)	0.266 (0.009)	0.307 (0.010)	0.108 (0.005)
$\mu_{D,c}$	5.17 (0.018)	4.87 (0.019)	5.24 (0.047)	5.54 (0.020)	4.22 (0.029)	4.76 (0.025)	5.23 (0.023)
$\sigma_{D,c}$	1.26 (0.013)	1.26 (0.014)	1.26 (0.033)	1.13 (0.014)	1.21 (0.020)	1.19 (0.018)	1.21 (0.016)

Source: Palestinian Labor Force Survey Data (2008Q1-2010Q4). Standard errors are in parentheses.

Table 6--Model Predictions of Labor Outcomes Post-Blockade ($\lambda_F = 0$)

Comparative Static Exercise	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
Reservation Wage	0.615	0.581	0.878	0.730	0.614	0.813	0.803
Unemployment rate	0.160	0.156	0.197	0.148	0.172	0.204	0.099
Mean Wage	2.58	2.56	2.72	2.79	2.38	2.54	2.69
Standard Deviation wage	0.450	0.440	0.535	0.429	0.395	0.394	0.446
$\mu_{\rho V_O}$	1.78	0.437	8.64	0.811	1.29	2.14	1.26
$\sigma_{\rho V_O}$	4.13	0.905	6.95	4.49	1.19	3.69	5.24
LF Participation Rate	0.389	0.563	0.132	0.493	0.283	0.359	0.465

Note: Table 6 reports the model's predictions of labor market outcomes using a comparative static exercise. To conduct this comparative static exercise, I use the parameter estimates during the open period in order to predict labor market outcomes when Israel implements the blockade on the Gaza Strip, setting $\lambda_{F,c} = 0$. Additionally, I assume that domestic parameters remain unchanged after the change in border policy.

Table 7 –Net Welfare Losses Relative to the Open Period

Panel A: Net Welfare Loss Between Open Period and Comparative Static Exercise (%)							
Welfare Measures	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
Rawlsian Criterion	30.0	33.8	0	16.9	30.1	7.40	37.5
Total Welfare (TW)	-0.383	12.1	0	-0.565	2.22	-0.860	-1.35
Participants Welfare (PW)	3.39	16.2	0	-0.032	18.2	-0.429	0.970
GNI Welfare Estimate	-0.388	12.1	0	-1.23	13.4	-3.18	-1.54
Net Welfare Loss Between Open and Closed Period (%)							
Rawlsian Criterion	53.9	21.2	53.9	53.9	21.2	53.9	46.1
Total Welfare (TW)	22.8	39.6	1.29	33.7	20.3	18.1	24.0
Participants Welfare (PW)	52.2	44.6	60.7	44.7	51.9	61.8	36.6
GNI Welfare Estimate	22.6	24.9	31.4	14.3	38.9	36.6	9.25

Note: Table 7 reports the welfare loss (%) between the comparative static exercise and the open period as well as the welfare loss (%) between the closed period and the open period. These losses are computed using Table II in the Appendix Tables, which reports all four welfare measures during the open period, closed period and the comparative static exercise.

Table 8--Sensitivity Analysis: Net PW Loss (%) for different values of $(\alpha_{D,o}, \alpha_{D,c})$

Constraint: $\alpha_{D,o} = \alpha_{D,c}$							
$(\alpha_{D,o}, \alpha_{D,c})$	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
(0.5,0.5)	52.2	44.6	60.7	44.7	51.9	61.8	36.6
(0.4,0.4)	51.1	45.0	60.7	43.4	52.8	61.4	34.5
(0.3,0.3)	49.9	45.4	60.8	42.3	53.8	61.0	32.3
(0.2,0.2)	48.3	46.0	60.9	40.8	55.3	60.5	28.6
(0.1,0.1)	46.4	46.7	63.0	39.1	58.1	61.7	24.6
Constraint: $\alpha_{D,o} - \alpha_{D,c} = .1$							
(0.5,0.4)	43.7	36.9	54.2	33.9	46.8	56.3	25.6
(0.4,0.3)	38.9	33.7	51.6	28.2	45.2	53.4	18.8
(0.3,0.2)	29.8	26.9	45.9	17.6	41.1	47.6	4.90
(0.2,0.1)	3.88	4.92	28.6	-12.4	26.3	30.1	-32.1
Constraint: $\alpha_{D,o} - \alpha_{D,c} = .2$							
(0.5,0.3)	29.7	23.9	43.5	15.9	38.3	47.2	7.77
(0.4,0.2)	14.4	11.2	33.1	-2.47	30.1	37.3	-14.0
(0.3,0.1)	-30.6	-28.7	1.30	-56.5	3.00	7.14	-76.0
Constraint: $\alpha_{D,o} - \alpha_{D,c} = .3$							
(0.5,0.2)	1.46	-1.89	22.0	-20.0	21.3	28.9	-29.5
(0.4,0.1)	-59.2	-56.3	-22.1	-94.6	-15.1	-11.1	-111

Note: Table 8 reports the Net Participants' Welfare Losses (%) between the Open and Closed Period for different values of the bargaining power parameters $(\alpha_{D,o}, \alpha_{D,c})$. First, the bargaining power parameters are considered equal in the two periods, $\alpha_{D,o} = \alpha_{D,c}$. Next, the bargaining power parameters between the open and closed period have a difference of 0.1, then 0.2 and 0.3. It is assumed that Palestinian workers in Gaza had more bargaining power during the open period than the closed period ($\alpha_{D,o} \geq \alpha_{D,c}$).

Table 9--What is the Equivalence of the Blockade in terms of Real Wages?

		All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
Wages in	$\overline{w_{D,o}}$	2.71	2.71	2.72	2.87	2.41	2.57	2.93
Open Period	$\overline{w_{F,o}}$	3.53	3.53	0.00	3.51	3.53	3.43	3.61
Constraints: GNI is Equal in Both Periods, $w_{D,o} \geq 0, w_{F,o} \geq 1, \alpha_{D,o} = \alpha_{D,c} = .5$								
	$\overline{w_{D,o}}$	0.98	0.81	0.43	1.72	0.00	0.00	2.21
	$\overline{w_{F,o}}$	3.10	3.01	1.00	3.37	1.81	2.53	3.36
Constraints: PW is Equal in Both Periods, $w_{D,o} \geq 0, w_{F,o} \geq 1$								
$(\alpha_{D,o}, \alpha_{D,c})$								
(0.5,0.5)	$\overline{w_{D,o}}$	0.14	0.59	0.00	0.54	0.20	-0.46	1.43
	$\overline{w_{F,o}}$	1.00	1.04	1.00	1.06	1.00	0.00	1.06
(0.5,0.4)	$\overline{w_{D,o}}$	0.64	1.06	0.00	1.16	0.51	-0.31	2.09
	$\overline{w_{F,o}}$	1.05	1.06	1.08	1.07	1.02	0.94	1.07
(0.5,0.3)	$\overline{w_{D,o}}$	1.45	1.81	0.45	2.20	0.97	0.22	2.46
	$\overline{w_{F,o}}$	1.24	1.25	1.08	1.18	1.20	1.00	3.61
(0.5,0.2)	$\overline{w_{D,o}}$	2.63	2.83	1.57	4.03	1.08	0.85	4.71
	$\overline{w_{F,o}}$	3.53	3.53	0.00	3.51	3.53	3.43	3.61

In the first two rows of Table 9, the average values of the real domestic and foreign wages are reported. The next two rows of Table 9 display the estimates of the average domestic and foreign wage required during the open period to produce the same level of welfare as in the closed period conditional on the constancy of all other variables and labor market outcomes. Note that in this specification, there is a lower bound of \$1 for the daily domestic wage (ln wage=0) and a lower bound of \$2.7 for the daily foreign wage (ln wage=1; which barely covers commute costs).

The remainder of Table 9 displays the average wages in the domestic and foreign sectors conditional on the assumption that the level of Participants Welfare during the open period is equivalent to the corresponding measure during the closed period. The bargaining power parameter during the open period is assumed to be 0.5 while the level of bargaining power is allowed to vary during the closed period.

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Appendix A

Closed Period

The likelihood of finding an unemployed person in the domestic sector during the closed period with an unemployment spell of duration t_c is:

$$L(t_c, u_{D,c}) = q_U(t_c) * u_{D,c} = \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) \exp(-\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) t_c) * \frac{\eta_{D,c}}{\eta_{D,c} + \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)}$$

Similarly, the likelihood of finding an employed person in the domestic sector during the closed period with a wage $w_{D,c}$ is:

$$L(w_{D,c}, e_{D,c}) = \frac{f(w_{D,c})}{\tilde{F}(w_{D,c}^*)} * e_{D,c} = \frac{f(w_{D,c})}{\tilde{F}(w_{D,c}^*)} * \frac{\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)}{\eta_{D,c} + \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)} \quad (13)$$

Therefore, the likelihood function for random sample of $N_{D,c}$ individuals is:

$$L(w_{D,c}, t_{D,c}) = \prod_{i \in S_{E,D,c}} \frac{g(\tilde{\theta}_{D,c})}{\alpha_{D,c} * \tilde{G}(\theta_{D,c}^*)} * \frac{\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)}{\eta_{D,c} + \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)} \prod_{i \in S_{U,D,c}} \frac{\eta_{D,c} \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) \exp(-\lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*) t_c)}{\eta_{D,c} + \lambda_{D,c} \tilde{G}_{D,c}(\theta_{D,c}^*)} \quad (14)$$

where S_i are the number of sample members who are in state i at the time of the survey.

Open Period

The joint likelihood of finding an unemployed person during the open period with an unemployment spell of duration t_o and given the unemployment spell ends the worker joins the domestic sector is:

$$\begin{aligned} L(t_o, u_o, \text{domestic} | \text{spell ends}) &= q_{U,o}(t_o) P(\text{domestic} | \text{spell ends}) u_o \\ &= [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] * (\exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] * t_o) \\ &\quad * \frac{\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)}{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)} * \frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \\ &= \\ &\quad \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) * \exp(-[\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{D,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] t_o) * \frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \end{aligned} \quad (31)$$

The joint likelihood of finding an unemployed person during the open period with an unemployment spell of duration t_o and given the unemployment spell ends the worker joins the foreign sector is:

$$\begin{aligned}
L(t_o, u_o, \text{foreign} | \text{spell ends}) &= q_{U,o}(t_o) P(\text{foreign} | \text{spell ends}) u_o \\
&= \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] t_o * \\
&\frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (32)
\end{aligned}$$

The joint likelihood of finding an unemployed person during the open period with an unemployment spell of duration t_o and the unemployment spell does not end is:

$$\begin{aligned}
L(t_o, u_o, \text{domestic} | \text{spell does not end}) &= q_{U,o}(t_o) u_o \\
&[\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] * \\
&* (\exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*)] * t_o) * \\
&\frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (33)
\end{aligned}$$

The likelihood of finding an employed person in the domestic sector during the open period with a wage $w_{D,o}$ is:

$$L(w_{D,o}, e_{D,o}) = \frac{f(w_{D,o})}{\tilde{F}(w_{D,o}^*)} * e_{D,o} = \frac{g(\tilde{\theta}_{D,o})}{\alpha_{D,o} * \tilde{G}(\theta_{D,o}^*)} * \frac{\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (34)$$

The likelihood of finding an employed person in the foreign sector during the open period with a wage $w_{F,o}$ is:

$$L(w_{F,o}, e_{F,o}) = \frac{f(w_{F,o})}{\tilde{F}(w_{F,o}^*)} * e_{F,o} = \frac{g(\tilde{\theta}_{F,o})}{\alpha_{F,o} * \tilde{G}(\theta_{F,o}^*)} * \frac{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \quad (35)$$

Thus, the likelihood function for the representative sample of N_o individuals is:

$$\begin{aligned}
& L(w_{D,o}, w_{F,o}, t_o) \\
&= \prod_{i \in S_{E,D,o}} \frac{g(\tilde{\theta}_{D,o})}{\alpha_{D,o} * \tilde{G}(\theta_{D,o}^*)} * \frac{\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \\
&* \prod_{i \in S_{E,F,o}} \frac{g(\tilde{\theta}_{F,o})}{\alpha_{F,o} * \tilde{G}(\theta_{F,o}^*)} * \frac{\lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \\
&* \prod_{i \in S_{U,o, no\ end}} [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)] \\
&\quad * (\exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)] * t_o) \\
&\quad * \frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \\
&* \prod_{i \in S_{U,o, ends,D}} \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)] t_o \\
&\quad * \frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}} \\
&* \prod_{i \in S_{U,o, ends,F}} \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \exp - [\lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*)] t_o \\
&\quad * \frac{\eta_{D,o} \eta_{F,o}}{\eta_{D,o} \eta_{F,o} + \lambda_{D,o} \tilde{G}_{D,o}(\theta_{D,o}^*) \eta_{F,o} + \lambda_{F,o} \tilde{G}_{F,o}(\theta_{F,o}^*) \eta_{D,o}}
\end{aligned} \tag{36}$$

where S_i are the number of sample members who are in state i at the time of the survey.

Appendix B

Endogenous (Domestic) Contact Rates

Thus far, the analysis has focused on the supply side of the labor market. In this section, I model domestic firms' decisions to create vacancies for workers in Gaza during the open period. The same analysis follows for the closed period.

Assume there exists a constant returns to scale (CRS) matching technology during the open period such that:

$$M(u_o l_o, v_o) = v_o \left(1 - \exp\left(-\frac{u_o l_o}{v_o}\right) \right) \quad (44)$$

where $u_o l_o$ is the population unemployment rate and v_o is the job vacancies rate. From the perspective of searchers, the contact rate is the average number of matches divided by the population unemployment rate:

$$\lambda_{s,o} = \frac{v_o \left(1 - \exp\left(-\frac{u_o l_o}{v_o}\right) \right)}{u_o l_o} \quad (45)$$

Similarly, from the firms' perspective, the contact rate is the average number of matches divided by the vacancy rate or:

$$\lambda_{f,o} = 1 - \exp\left(-\frac{u_o l_o}{v_o}\right) \quad (46)$$

Therefore, the expected value of creating a vacancy is:

$$\rho V_v = -\psi_o + \lambda_{f,o} \tilde{G}_{D,o}(\theta_{D,o})(J_{D,o} - V_v) \quad (47)$$

where ρV_v is the firms' flow value of not filling up the vacancy, ψ_o is the flow cost of creating a vacancy ($\psi_o > 0$), $\lambda_{f,o} \tilde{G}_{D,o}(\theta_{D,o})$ is the rate at which firms fill up a vacancy, and J is the expected value of a filled vacancy:

$$J_{D,o} = \int \frac{\theta_{D,o} - w_{D,o}}{\rho + \eta_{D,o}} * \frac{g(\theta_{D,o})}{G(\theta_{D,o}^*)} \quad (48)$$

The free entry condition for firms is to create vacancies until the expected value of creating a vacancy is zero which simplifies equation (47) to:

$$\psi_o = \lambda_{f,o} \tilde{G}_{D,o}(\theta_{D,o}) J_{D,o} \quad (49)$$

Since an estimate of $u_o l_o$ can be derived from the data, and a consistent estimator of $\lambda_{s,o}$ is provided by the model, equation (45) can be used to estimate the vacancy rate. Given the vacancy rate and other parameters of the model, the flow cost of creating a vacancy can be estimated by equation (49). The same procedure is followed for uncovering the demand side parameters during the closed period.

In the above analysis, demand side parameters are easily estimated because the matching function did not have any unknown parameters other than the vacancy rate. However, if the matching function has additional unknown parameters, more assumptions are required to uncover the demand side parameters. Both matching functions are considered in this paper since there is no consensus in the literature as to which matching function is more accurate. Consider a Cobb-Douglas CRS matching technology such that

$$M(u_o l_o, v_o) = (u_o l_o)^\omega v_o^{1-\omega} \quad (50)$$

for some $\omega \in (0,1)$.

The contact rates from the perspective of searchers and firms are:

$$\lambda_{s,o} = (u_o l_o)^{\omega-1} v_o^{1-\omega} \quad (51)$$

$$\lambda_{f,o} = (u_o l_o)^\omega v_o^{-\omega} \quad (52)$$

Unlike the previous case, estimates of $u_o l_o$ and $\lambda_{s,o}$ are not sufficient to estimate v_o and ψ_o . One way to proceed is by pooling the data from both periods and restricting the cost of creating a vacancy to be the same during the open and closed periods ($\psi_o = \psi_c$).

According to equation (49),

$$\lambda_{f,o} \tilde{G}_{D,o}(\theta_{D,o}) J_{D,o} = \lambda_{f,c} \tilde{G}_{D,c}(\theta_{D,c}) J_{D,c} \quad (53)$$

Therefore given $u_o l_o$, $u_c l_c$, $\lambda_{s,o}$, $\lambda_{s,c}$, the Cobb-Douglas parameter can be estimated by the following equation:

$$\lambda_{s,o}^{\frac{-\omega}{1-\omega}} \tilde{G}_{D,o}(\theta_{D,o}) J_{D,o} = \lambda_{s,c}^{\frac{-\omega}{1-\omega}} \tilde{G}_{D,c}(\theta_{D,c}) J_{D,c} \quad (54)$$

Given an estimate of ω , equations (51) and (49) can be used to estimate the vacancy rate for each period as well as the flow cost of creating a vacancy respectively.

In the table below, estimates of the demand side parameters for the “All” category are displayed in columns (1) and (2) during the open and closed period respectively using the CRS matching technology, $M(u_o l_o, v_o) = v_o \left(1 - \exp\left(-\frac{u_o l_o}{v_o}\right)\right)$. The estimated vacancy rate during the open period is 0.019 which is approximately one-third of the population unemployment rate 0.058. These estimates are consistent with Flinn (2010) who focuses on the population of 16-24 year olds using US CPS data. During the closed period, the vacancy rate increased to approximately 0.044; the rise in the steady state vacancy rate after the blockade is expected given the surge in the population unemployment rate.¹⁹ The flow cost of creating a vacancy (ψ) is larger in the open period than the closed period, which is primarily attributed to the fact that the expected value of a filled vacancy is greater during the open period²⁰. The elasticity of the matching function with respect to the population unemployment rate is approximately 0.049 during the open period and 0.038 during the closed period. These estimates suggest that at the appropriate equilibrium levels during each period, the productivity gain from an additional vacancy is 19-25 times as high as the productivity gain from an additional unemployed searcher. The elasticity measures noted above are extremely low relative to the range (0.2, 0.4) presented in the literature (see Petrongolo and Pissarides (2001) for a comprehensive review).

Column (3) presents estimates of demand-side parameters using pooled data from both periods and a CRS Cobb-Douglas matching function. The steady state vacancy rates are almost negligible in the pooled sample. However, like before, the vacancy rate during the closed period is larger than the vacancy rate during the open period. The flow cost of creating a vacancy is large and incomparable to estimates in columns (1) and (2). The

¹⁹ The steady state vacancy rate and the population unemployment rate grew almost uniformly between the open and closed period. In fact, during the closed period, the vacancy rate is about three-tenths of the population unemployment rate, 0.144.

²⁰ The difference between the expected value of a filled vacancy in the open period ($J_{D,o}$) versus the closed period ($J_{D,c}$) is mainly attributed to the steep rise in the job extermination rate during the closed period ($\eta_{D,c}$).

match elasticity with respect to the population unemployment rate, which in the case of a Cobb Douglas matching function is simply the Cobb Douglas parameter (ω), is 0.91. This estimate contradicts the match elasticity estimates in columns (1) and (2) where the majority of match creation productivity are ascribed to additional vacancies. Almost all estimates in column (3) are perverse in that they are too high or too low. One reason might be due to how the Cobb-Douglas parameter is estimated. In equation (54), the Cobb Douglas parameter is estimated without restricting any of the model's parameters other than the flow cost of creating a vacancy. Usually, the job extermination rate is restricted to be equal in the two periods of the pooled sample but in this analysis, since the results were primarily driven by the increase in the job extermination rate during the closed period, imposing such structure makes the model less credible. Since it is highly likely that the estimate of the Cobb-Douglas parameter is inaccurate, it follows that the steady state vacancy rates and the flow cost of creating a vacancy are inaccurate.²¹

Note that with the exception of the flow cost of creating a vacancy (ψ), estimates in columns (1) and (2) are robust to changes in the bargaining parameter (α). Additionally, since it is assumed throughout the entire paper that workers in Gaza's domestic sector had more bargaining power during the open period than the closed period ($\alpha_{D,o} \geq \alpha_{D,c}$), then it must be the case that the expected value of a filled vacancy is larger during the open period ($J_{D,o} > J_{D,c}$). Similarly, in column (3), the Cobb Douglas parameter barely changes for all values where the bargaining parameter is equal in both periods, and when the bargaining power parameter during the open period is strictly larger than in the closed period ($\alpha_{D,o} > \alpha_{D,c}$), the Cobb-Douglas parameter exceeds 1.

Point Estimates of Demand-side Parameters

	Open Period (1)	Closed Period (2)	Pooled (3)
$v_{D,o}$	0.019	--	7.38E-08
$v_{D,c}$	--	0.044	1.26E-07
Ψ	10.80	7.73	2831104
Match Elasticity	0.049	0.038	--
ω	--	--	0.915

²¹ When evaluating the Cobb Douglas parameter at 0.2, the vacancy rates and the flow cost of creating a vacancy are similar to the values reported in columns (1) and (2).

Source: Palestinian Labor Force Survey Data (2000Q1-2000Q3) and (2008Q1-2010Q4). The Match elasticity in columns (1) and (2) is computed by deriving the elasticity of the matching function $M(u, v) = v \left(1 - \exp \left(-\frac{u}{v} \right) \right)$ with respect to the population unemployment rate and evaluating it at the equilibrium values. In column (3) the data from both periods are pooled and the matching function is Cobb-Douglas so that the match elasticity with respect to the population unemployment rate is equivalent to the Cobb-Douglas parameter.

Appendix Tables

Table I-Estimates of the Value of Outside Labor Force Option, Unemployment, Employment in Both Sectors and Average Productivity by Period and Demographic Group

Open	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
V_o	17.750	4.370	86.410	8.110	12.940	21.430	12.580
$V_{u,o}$	8.780	8.780	8.780	8.780	8.780	8.780	12.840
$E_{D,o}$	20.178	19.762	20.992	22.390	17.261	17.701	25.880
$E_{F,o}$	17.271	17.033	-----	17.539	15.879	16.191	21.596
$\mu_{D,o}$	4.547	4.545	4.567	4.853	4.148	4.268	4.569
$J_{D,o}$	11.37	10.96	11.47	13.59	8.77	8.396	12.997
Comparative Static	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
V_o	17.750	4.370	86.410	8.110	12.940	21.430	12.580
$V_{u,c}$	6.150	5.810	8.780	7.300	6.140	8.130	8.030
$E_{D,c}$	18.361	17.678	20.992	21.416	15.897	17.225	22.974
$\mu_{D,c}$	4.547	4.545	4.567	4.853	4.148	4.268	4.569
$J_{D,c}$	12.192	11.85	11.47	14.104	9.486	8.561	14.903
Closed	All	Men	Women	Skilled	Unskilled	Age<35	Age≥35
V_o	17.750	4.370	86.410	8.110	12.94	21.43	12.58
$V_{u,c}$	4.050	6.920	4.050	4.050	6.920	4.050	6.920
$E_{D,c}$	12.094	14.046	11.539	14.477	11.742	9.404	17.824
$\mu_{D,c}$	5.167	4.868	5.243	5.535	4.22	4.763	5.228
$J_{D,c}$	8.039	7.122	7.187	10.422	4.817	5.344	10.893

Table II--Estimates of Welfare Measures during Open Period, Calibrated Exercise and Closed Period ($\alpha_{D,o} = \alpha_{F,o}=.5, \rho=.1$)

Panel A: Welfare Measures	All	Men	Women	Skilled	Unskilled	Age<35	Age \geq 35
Open Period							
Rawlsian Criterion	8.78	8.78	8.78	8.78	8.78	8.78	12.8
Total Welfare (TW)	21.1	18.7	78.7	19.5	15.9	21.5	22.7
Participants Welfare (PW)	10.7	17.3	3.67	15.45	7.64	7.93	16.4
GNI Welfare	2.32	3.85	0.773	3.17	1.77	1.89	2.99
Comparative Static Exercise							
Rawlsian Criterion	6.15	5.81	8.78	7.30	6.14	8.13	8.03
Total Welfare (TW)	21.2	16.5	78.7	19.6	15.5	21.7	23.0
Participants Welfare (PW)	10.4	14.5	3.67	15.5	6.25	7.96	16.2
GNI Welfare	2.33	3.38	0.773	3.21	1.53	1.95	3.04
Closed Period							
Rawlsian Criterion	4.05	6.92	4.05	4.05	6.92	4.05	6.92
Total Welfare (TW)	16.3	11.3	77.7	12.9	12.7	17.6	17.2
Participants Welfare (PW)	5.13	9.61	1.44	8.55	3.68	3.03	10.4
GNI Welfare	1.80	2.89	0.530	2.72	1.08	1.20	2.72