The Effect of Israeli Closure Policy on Wage Earnings in the West Bank and Gaza Strip

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Abstract

This paper analyses the effects of the Israeli closure policy on Palestinian wage earnings. The study decomposes the effect on the average daily wages, days worked, and employment. It also illuminates the distributional impacts on different groups in the economy with respect to potential heterogeneous effects on daily wages and days worked. Closure has a significant impact on the wages, workdays, and employment outcome in the West Bank and Gaza Strip. The effect differs between the two regions. The Israeli closure policy appears to have been more detrimental for residents in the Gaza Strip relative to West Bankers. Furthermore, the Israeli demand for Gazan workers appears to have diminished, indicating an Israeli policy of political and economic separation of the Gaza Strip.

***JEL classification*: J21; J61; O24; O53**

Keywords: Labour market; Palestinian labour force; Israel; closure policy; wage differentials; days worked; employment

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1. Introduction

Since the occupation of the West Bank and Gaza Strip in 1967 the Palestinian economy has become almost entirely dependent on the richer economy of Israel. With the signing of the Oslo accords in 1993 many believed that the constraints on growth would be removed since peace would give the Palestinians the means to define and implement their own economic priorities. But with the retraction of the peace process since the second Intifada the economic situation in the West Bank and Gaza Strip is worse than it used to be before the initiation of the peace process, and the Palestinian economy is still directly tied to that of Israel.

As the Oslo accords divided the Palestinian territories into cantons separated between the Israeli and Palestinian authorities, Israel instituted a system of permits and passes for Palestinians to travel within the territories. Consequently the Palestinian economy has not only suffered from the isolation from world markets, but also from the restrictions on movements of goods and people between the West Bank, the Gaza Strip and Israel and even cutting off transit between Palestinian population centres within the Palestinian territories. The Israeli policy of closure is instituted as a security instrument to prevent, or minimize the threat of Palestinian attacks on Israeli security forces or citizens. However, the imposed external closure (restrictions on Palestinians entering Israel and other countries) and internal closure (restrictions on Palestinian movement within the territories) is likely to be a major explanation of the Palestinian economy performing far below its potential, as the Palestinian economy has stabilized at a lower level of output and employment (World Bank, 2003).

Several organisations have reported about the economic impact of closure.[1] However, the empirical literature on the subject remains poor.[2] The purpose of this paper is to analyse the effects of the Israeli closure policy on the Palestinian wage earnings. The paper decomposes the effect of the policy in terms of the effect on the average daily wages, days worked, and employment. It also illuminates the distributional impacts on different groups in the economy with respect to potential heterogeneous effects on daily wages and days worked. Changes in

1 The UNSCO, the World Bank, the IMF, the Palestinian Central Bureau of Statistics (PCBS) and others have produced impact reports of some kind.

2 Ruppert Bulmer (2003) has developed a model to quantify the impact of change in Israeli border policy and the magnitude of daily Palestinian labour flows to Israel on Palestinian employment, unemployment and wages. The model is calibrated for alternative policies using data from the PCBS. Ruppert Bulmer finds that for a sharp reduction in Palestinian labour flows to Israel following a policy decision of political and economic separation, the return of Palestinian workers to the domestic labour market would put downward pressure on domestic wages and domestic employment would rise. These gains would be offset by higher unemployment in the long run, limiting the use of available productive assets of the Palestinian economy.

the wage structure and in employment opportunities of Palestinian employees are of special interest to policy makers, since stabilization of the Palestinian labour market is a vital factor in order to achieve lasting peace in the area. It is also important to clarify the causal effect of the Israeli closure policy on wage earnings since higher growth, employment generation and a reduction in poverty in the Palestinian territories is likely to be targets of any coherent policy to stimulate and facilitate the negotiations in the Israeli-Palestinian conflict. Furthermore, policy changes that affect labour supply and demand will result in different labour allocation within the Palestinian economy, implying different earning distributions and unemployment levels. The Israeli border policy is therefore a potentially significant determinant of Palestinian welfare.

The West Bank and Gaza Strip will probably remain two separate entities in the future, with or without a peace agreement. Differences between the two regions may motivate the design of different development strategies. A significant difference between the West Bank and Gaza Strip is that the closure of the Gaza Strip has always been more strictly enforced than those of the West Bank. For these reasons, the study account for the potential differences between the two entities. The existence of a relatively sophisticated and ongoing Palestinian Labour Force Survey (PLFS) in the West Bank and Gaza Strip makes this research possible. The data used in this study covers the time period from 1999 to 2003 on a quarterly basis.

The next section of the paper describes the PLFS data and provides a brief descriptive analysis. Section 3 presents the method and statistical models estimated in this paper. In section 4 the estimation results are shown, and the last section contains the conclusions.

2. Data and Descriptive Analysis

The analysis in this paper is based on the PLFS in the West Bank and Gaza Strip. The micro level dataset used is obtained from pooling twenty consecutive quarterly PLFS cross-sections from the first quarter 1999 to the fourth quarter 2003. The studied time period covers an important and highly volatile time in the Palestinian economy, especially for the Palestinian labour force, as the period before and through the second Intifada is investigated.

The PLFS have a rotating sample design as individuals are replaced. The same household remains in the sample over two consecutive rounds, rests for the next two rounds and is

represented again in the sample for two additional consecutive rounds before it is dropped from the sample. Each survey round consists of approximately 7,600 households, which amounts to a sample of around 22,000 individuals aged 15 years and above living in the Palestinian territories. The usual types of sampling and non-sampling errors in labour force surveys are also present in the PLFS.[3] In addition, data collection after the uprising of the second Intifada in late September 2000 became more difficult.

2.1 Labour Force Characteristics

Basic descriptive statistics by region of residence for the sample of men aged 15 years and above are reported in table 1.[4] Around 23,500-31,000 interviews were conducted each year in the West Bank, and between 15,300 and 16,400 interviews were conducted each year in the Gaza Strip. The sample sizes show that the number of completed interviews fell with the onset of the second Palestinian uprising in late September 2000, especially in the West Bank.

The average level of schooling is relatively, to countries in the Middle East and North Africa (MENA) region, high in the West Bank and Gaza Strip and rose over the sample period from 9.2 years to 9.5 in the West Bank and from 9.6 years to 9.9 in the Gaza Strip. The average schooling level is higher in the Gaza Strip than in the West Bank. This may be due to the smaller market and lower labour demand in the Gaza Strip, which encourage students to remain in school, rather than entering the labour force. The age variable is available as an interval group variable with five years intervals between the groups. The median age of the sample ranges between 25-29 and 30-34 years in the West Bank, and is in the interval between 25-29 years in the Gaza Strip. The proportion married in the sample is similar during the observed period in the Palestinian territories, where it fell from 59% to 55%.

Table 1 also shows a substantial drop in employment between the years 2000 and 2001, in both the West Bank and the Gaza Strip.[5] The fraction employed declined with more than 10

[3] The overall non-response rate amounted to almost 10.4%, which is relatively low; a much higher rate is rather common in an international perspective.
[4] Men constitute the bulk of the Palestinian labour force, as labour force participation of women is very low.
[5] In Appendix A, we present a table that illustrates the employment characteristics in the West Bank and Gaza Strip. The calculations are based only on those individuals who are observed in the dataset pre and post 2000:Q3. The share of West Bankers and Gazans employed in Israel fell sharply with the uprising of the second Intifada. Noticeable is that of those West Bankers employed in Israel before the third quarter year 2000 only 33 percent were still employed in Israel after the outbreak of the second Intifada, compared to Gazans where only 3 percent was still employed in the Israeli market. This consequently led to an increase in the local unemployment rate.

percentage points in the West Bank and over 13 percentage points in the Gaza Strip. This decline may partly be explained by the uprising of the second Intifada.

The fraction of those employed that are employed as wage earners varied between 44%-63% for West Bankers, and between 59%-73% for Gazans. The share of wage earners are generally higher in the Gaza Strip than in the West Bank, and the decline in this share, due to the shock in late September 2000, appears to be similar in both the West Bank and Gaza Strip where it declined by about 10 percentage points between year 2000 and 2001. Employed individuals who are not wage earners are either self-employed or unpaid family members. The data analyses below are primarily conducted on wage earners only.

Table 1

Descriptive Statistics

	Sample size	Years of Schooling	Age*	Married	Employed	Wage Earner	Work in Israel
A. Residents in the West Bank							
1999	31115	9.1590	25-29	0.5862	0.6458	0.6214	0.4087
2000	31125	9.2266	25-29	0.5802	0.6277	0.6302	0.3912
2001	28720	9.2794	30-34	0.5697	0.5209	0.5329	0.2883
2002	23461	9.4460	30-34	0.5599	0.4505	0.5352	0.2285
2003	29080	9.4607	30-34	0.5524	0.4908	0.4427	0.2018
B. Residents in the Gaza Strip							
1999	16255	9.5680	25-29	0.5894	0.5420	0.6672	0.2528
2000	16439	9.7128	25-29	0.5744	0.5037	0.7291	0.2108
2001	16316	9.7979	25-29	0.5679	0.3668	0.6211	0.0253
2002	15269	9.7851	25-29	0.5488	0.3567	0.6262	0.0413
2003	16215	9.8608	25-29	.05491	0.4335	0.5883	0.0498

Distribution of Labour Force by PCBS Occupation Code

	Employed Locally							Employed in Israel						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
1999	3.49	27.36	15.08	5.37	16.14	8.34	24.21	0.03	1.47	2.97	2.47	33.08	4.81	55.16
2000	2.67	27.79	19.51	5.71	16.43	8.27	19.63	0.02	1.67	4.49	3.90	36.71	5.23	47.99
2001	3.01	28.74	21.12	5.22	15.22	8.53	18.17	0.08	2.01	5.69	1.05	31.40	5.89	53.89
2002	3.27	30.36	21.47	5.26	14.35	7.79	17.50	0.14	2.79	6.69	0.49	36.05	7.39	46.44
2003	3.22	27.49	20.57	7.61	15.59	8.02	17.49	0.20	1.96	6.68	0.27	41.86	8.64	40.38

Note: Statistics are from micro-level data from PCBS labour force surveys, round 12-31.
(*) The age variable is available as an interval group variable with five years intervals between the groups. The median of the intervals is presented in the table.
The PCBS occupation codes are; (1) legislators, senior officials and managers; (2) professionals, technical, associate and clerks; (3) service, shop and market workers; (4) skilled agricultural and fishery workers; (5) craft and related trade workers; (6) plant and machine operators and assemblers; (7) elementary occupations.

The last column of table 1 shows that there was a huge decline in the share of workers from the Palestinian territories employed in Israel.[6] The proportion of wage earning West Bankers and Gazans working in Israel were stable until the third quarter of year 2000; between quarter three and four in year 2000 this proportion declined from 42% to 25% for West Bankers compared to a fall from 23% to 4% for Gazans. Again, this is likely to be a consequence of the Palestinian uprising. An important component of this change comes from difficulties in getting to work due to border controls, closures and curfews. The lower part of table 1 shows that workers from the Palestinian territories who are employed in Israel are concentrated in semiskilled and unskilled jobs (see also Kleiman, 1992; Angrist, 1995).

The average days worked per month are generally higher for residents in the Gaza Strip than in the West Bank. Figure 1, plots average days worked by workplace location, shows that the reduction in average days worked was more severe for those employed in Israel.[7] However, in year 2002 average days worked in Israel seem to have returned to the 19-20 days level prevalent before the uprising.

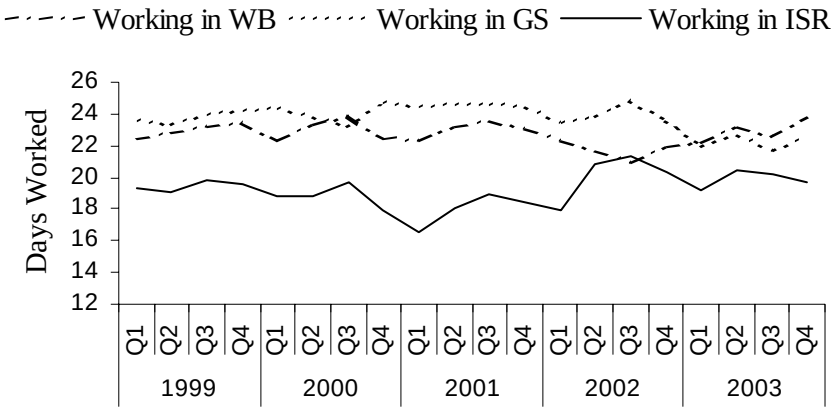

Figure 1: Average days worked by work location.

Figure 2 plots survey data on the median real daily wage by workplace location.[8] The wages that are published in the PLFS reflect the nominal daily wages for all persons who are wage employees. The real daily wages were computed by deflating the nominal daily wage for each

[6] The referred variable capturing if the individual is working in Israel also includes if the wage earner was working in Israeli settlements in the Palestinian territories.
[7] Average days worked are plotted in figure for all workers employed at that location, regardless of region of residence.
[8] Daily wages are expressed in New Israeli Shekels (NIS).

quarter by its consumer price index, with base year 1996. The figure shows that the real daily wages for Palestinian employees remained basically constant during the period.[9] It is also shown that Israeli jobs pay considerably higher wages than jobs in the domestic Palestinian market, and jobs in the West Bank are paying better than the Gaza Strip. The higher wages in Israel reflect Israel's large and well-developed economy, with more modern productive capacities and high per capita income levels.

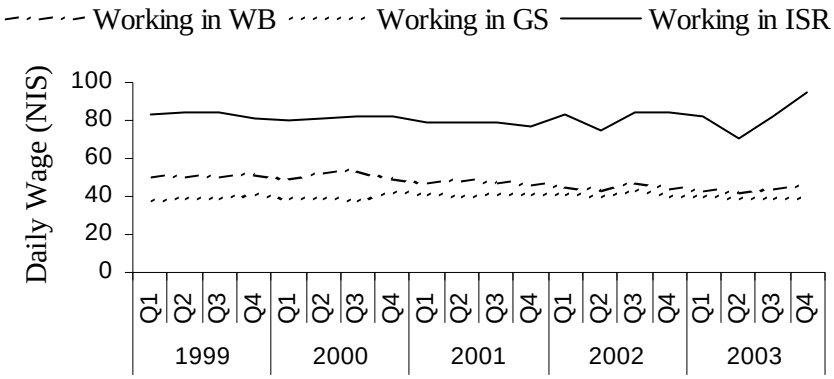

Figure 2: Real daily wage (median) by place of work.

Palestinians from the West Bank and Gaza Strip who work in Israel are generally paid more in Israel than in the local "home" market. Prior to the outbreak of the first Intifada in 1988, the relatively free movement of Palestinian labour led to a near closing of this wage gap (Arnon and Weinblatt, 2001). However, since the late 1980s a significant wage gap has re-emerged. There are many factors that contribute to the re-emerging wage gap: Higher average productivity in Israel, minimum wages, and Israeli relatively high demand for unskilled labour (as seen in table 1, over 80% of Palestinians employed in Israel during 1999-2003 worked in elementary occupations or as craft and related trade workers).

Figure 3 plots the aggregate wage earnings by workplace location.[10] The figure shows a substantial fall in aggregate earnings for Palestinians working in Israel. Prior to the outbreak of the second Intifada, employment in Israel amounted to some 20 percent of the total Palestinian employment. Yet, aggregate wage earnings of Palestinians employed in Israel

[9] The plot in figure 2 does not consider the structural change in the Palestinian labour force during the period 1999-2003, as seen in table 1.

[10] Aggregate wage earnings (WE) is calculated using the following equation, fixing for the population size; $\sum_i WE_i = \sum_i \left(Employment * Monthly\,Workdays * Real\,Daily\,Wage\right)_i$

were still higher than aggregate wage earnings of West Bankers and Gazans employed in the local market. However, with the uprising of the second Intifada, aggregate wage earnings related to work in Israel dropped sharply. The main reason behind this is the large drop of Palestinians employed in Israel that occurred at the same time as the increase in the number of external closure days. The figure also shows that aggregate earnings in the West Bank fell more in the third quarter year 2000 than they did in the Gaza Strip. One explanation to this may be that in the beginning of the second Intifada internal closures within the Gaza Strip were not as widespread as in the West Bank.

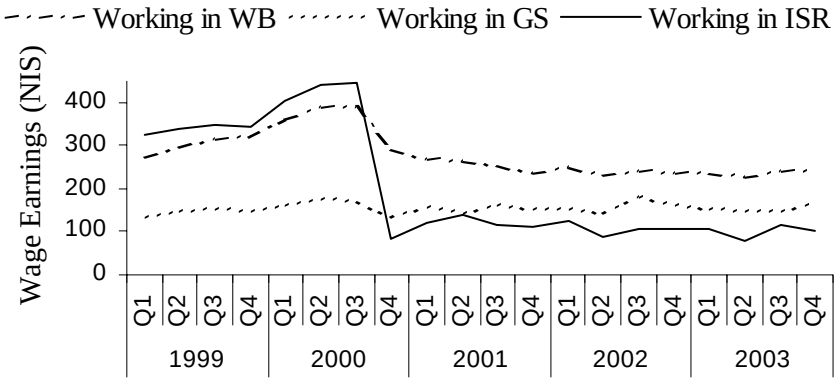

Figure 3: Aggregate wage earnings (in millions) by place of work.

2.2. Restrictions on the mobility of the Palestinian labour force

There are two main instruments that the Israeli authorities use to restrict the mobility of the Palestinian labour force: “permits” and “closure”. Since 1967, the Israeli military issued orders proclaiming the West Bank and Gaza Strip to be closed military zones, and the Palestinian population was issued general permits, allowing relatively free movement. These allowed residents in the occupied territories to leave the territories freely. Following the total curfew placed by Israel on the occupied territories during the Gulf war in 1991, Israel erected checkpoints along its borders and, by 1993, solidified the system known as “closure”. The general permit system was replaced with an individual permit system for Palestinians. The duration of issued permits varies between 1 to 3 months. The qualifying criteria for a permit are selective (i.e., based on gender, age, and marital status), and workers are prohibited from spending the night in Israel. Days of closure and permits issued to work in Israel are related to the political disturbances in the Israeli-Palestinian conflict.

With the beginning of the second Intifada, the permit system has been dramatically tightened, with travel permits frequently cancelled, and crossings sporadically sealed off completely, greatly reducing employment in Israel as well as commercial transactions with or through Israel. The Israeli system of "entry permits" is instituted to control the flow of Palestinians crossing the “green line”.[11] Since it is quite complicated for a Palestinian from the Palestinian territories to get a legal permission to work in Israel, there might be Palestinians working in Israel without a legal permit.

Figure 4 shows the total external closure days in the Palestinian territories for workers going to Israel. The imposed closure days increased remarkably with the uprising of the second Intifada. However, during the imposed Israeli policy of closure, even those with entry permits are not allowed to move in or out of the West Bank or Gaza Strip.[12]

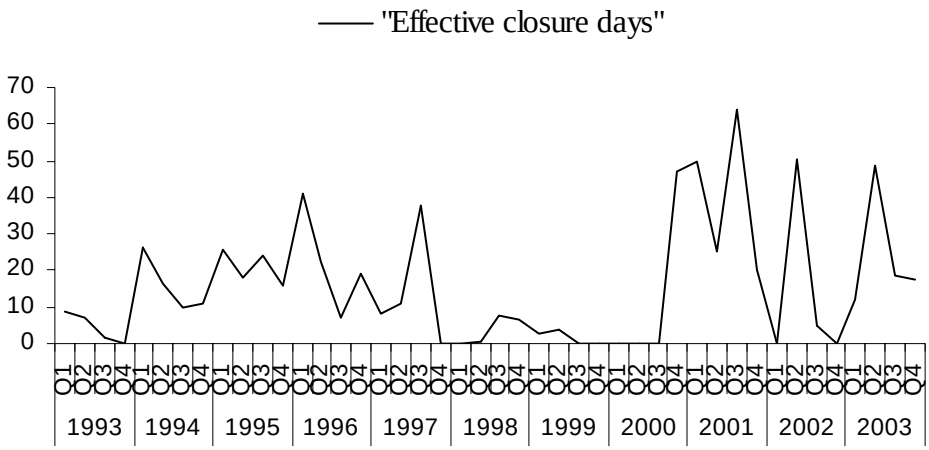

Figure 4: Imposed closure days in the Palestinian territories.
(Data source: UNSCO)

3. Method and statistical models

This section outlines the method used to estimate the effect of the Israeli closure policy on the Palestinian wage earnings. The empirical models decompose the effect on earnings in terms of the “closure-effect” on average daily wages, monthly days worked for wage, and

[11] That is, the borders between Israel and the occupied Palestinian territories, from 1967.
[12] Calculating the correlation coefficients of the number of issued permits (collected by the Palestinian Ministry of Labour) and imposed external closure gives a correlation of –0.6383 in the West Bank and-0.7598 in the Gaza Strip, analyzed over the period 1999-2002.

employment.[13] "Closure" is measured as the percentage of days that the borders between the West Bank and Gaza Strip and Israel were closed during a quarter. The general turmoil during the second Intifada obviously makes it difficult to separate the effect of closure from that of other shocks related to the conflict. To deal with this potential problem in the analysis and to separate the effect of closure from that of other aspects of the conflict, we estimate each model with a full set of quarterly dummies.[14] The closure policy is, furthermore, likely to affect groups of Palestinian wage earners differently. We will control if the effect of closure differs between those wage earners who are employed in Israel and those employed locally.

The closure policy variable can be seen as a labour supply shock and as a labour demand shifter. For example, closure may lead workers to substitute to local employment rather than Israeli employment (supply effect) and it may lead employers to substitute to other workers (demand effect). In the short-run we would expect a supply effect of closure, as closure consequently restrain workers who need to cross the borders from their place of work. This would lead to a labour supply increase in the Palestinian territories, where former Israeli migrant workers would compete for employment in the local market. If wages are sticky this supply increase may result in unemployment rather than increase in local employment.

Closure might also affect labour demand negatively, since closure may increase the uncertainty on behalf of the employers regarding Palestinian workers showing up at work or not. If employers are risk-averse, closure might in effect induce employers to change their hiring practices. However, since the Israeli policy of closure is instituted as a security instrument during political instability. And since the political instability may have a negative impact on the Israeli economy, labour demand in Israel may also exhibit a negative correlation with closure. In fact, the Israeli economy experienced a deep recession in 2001, a year in which days of closure peaked.

3.1 Wage equation model

The estimated wage equation is based on the human capital theoretical framework pioneered by Becker (1964). Regression estimates are used to describe changes in average Palestinian

[13] The models are based on the theoretical framework presented in Appendix B that can be used to interpret the effect of exogenous shocks on Palestinian wages and employment.
[14] A description of the variables included in the estimation models is presented in Appendix C.

wages conditional on demographic characteristics and the percentage of days closed. The following equation is estimated:

$$\log W_{it} = \rho_t + \alpha_1 Closure_t + \sum_c \alpha_{2c} a_{itc} + \alpha_3 S_{it} + \alpha_4 m_{it} + \alpha_5 r_{it} + \sum_g \alpha_{6g} occ_{itg} + \sum_h \alpha_{7h} e_{ith} + \sum_k \alpha_{8k} wp_{itk} + \lambda(Interactions) + \varepsilon_{it} \quad (1)$$

The dependent variable is the log of real daily wage. ρ_t is a time effect; $Closure_t$ is the percentage of days closed at time *t*, and α_1 is a closure effect; a_{itc} is a dummy variable that indicates age group c, and α_{2c} is an age effect; S_{it} is years of schooling, and α_3 is the economic return to schooling; m_{it} is a dummy variable indicating the civil status, and α_4 is the effect of being married; r_{it} is a dummy variable indicating if the individuals residence is in a refugee camp, and α_5 is a residence in a refugee camp effect; occ_{itg} is a dummy variable indicating the individual occupation by occupation group *g*, and α_{6g} is a occupation group effect; e_{ith} is a dummy variable indicating the individual employment status by employment sector *h*, and α_{7h} is an employment sector effect; wp_{itk} is a dummy variable indicating the individual place of employment by workplace location *k*, and α_{8k} is a work-location effect.

Age groups indexed by c are age 15-19, age 20-24, age 25-29, age 30-34, age 35-39, age 40-44, age 45-49, age 50-54, age 55-59, age 60-64, and age 65 and over. Occupation groups indexed by *g* are: skilled workers including legislators and professionals, service and fishery workers, trade workers, machine operators, and elementary occupations. Employment sectors indexed by *h* are national government employees (NGE) and foreign government, international organisations or UNRWA employees (UNE). Employees in the rest of the economy constitute the reference group. Workplace locations indexed by *k* are the West Bank, the Gaza Strip, and Israel. (*Interactions*) is the interaction terms of the percentage of days closed and the dummy variables indicating the individual place of employment by workplace location. ε_{it} is an error term. Thus, the parameters of primary interest in this paper are the parameter measuring the closure effect (α_1) and the vector of the interaction parameters (λ), which captures the effects of the imposed closure on different groups in the economy.

3.2 Days of work equation model

Unemployment in the West Bank and Gaza Strip has become one of the most pressing problems facing the Palestinian economy, with vital economic, social, and political consequences. Since imposed closure most likely affects the employment opportunities for West Bankers and Gazans in Israel, changes in employment outcomes are of special interest to policy makers as the labour market is a major nexus of economic relations between Palestinians and Israelis. The estimated model used to study whether imposed closure in the Palestinian territories had any identifiable effect on the monthly workdays as wage earners is:

$$Workdays_{it} = \phi_t + \beta_1 Closure_t + \sum_c \beta_{2c} a_{itc} + \beta_3 m_{it} + \beta_4 r_{it} + \sum_g \beta_{5g} occ_{itg} + \sum_h \beta_{6h} e_{ith} + \sum_k \beta_{7k} wp_{itk} + \varphi_1 W_{it} + \varphi_2 N_{it} + \lambda(Interactions) + u_{it} \quad (2)$$

The dependent variable is the reported monthly workdays for wage and the covariates are the same as in equation (1) except for the schooling variable who is excluded from this model. Additionally, W_{it} is a variable capturing the individual real daily wage (in log), and φ_1 is a real daily wage effect; N_{it} is a variable capturing the size of the individual's household, and φ_2 is a household-size effect; u_{it} is an error term.

This specification comes from a standard labour supply model. Similar to equation (1), the focus is on the impact of the days of closure on the labour supply behaviour. The closure effect could be interpreted as a cost of time for the Palestinian wage earner from the West Bank and Gaza Strip to get to his work.

3.3 Employment state model

Most likely the severe blockade imposed on the Palestinian territories has added to the burden and difficulties of employment conditions. To capture the effect of closure on the labour force status in the Palestinian territories, the probability of being selected into different employment states is investigated. A five-way multinominal logit model including the following states: out of labour force (j=0), unemployed (j=1), employed in the local domestic market (j=2), employed in Israel (j=3), and other employment (j=4) is estimated (see Maddala, 1983). We assume a multinominal logit model for the probability of being in state j as follows:

$$P_j = \frac{\exp(Z\alpha_j)}{1+\sum_{j=1}^{4}\exp(Z\alpha_j)} \quad (3)$$

where *Z* is a vector of explanatory variables affecting the state of employment. The covariates included in the estimated regression are: the percentage of days closed; a schooling variable; a household size variable; age dummies; dummy for residence in a refugee camp; civil status dummy; occupation group, and employment status dummies; and quarterly effects. And α_j is the vector of unknown parameters of state j.

The number of issued permits is furthermore likely to have an impact on the Palestinian employment outcomes. However, as increased closure will affect the number of issued permits negatively as no permits are issued during time of closure, our main focus is on the effects of the imposed days of closure on the individuals employment state.

We will compare the effect of closure on the probability of being outside the labour force, unemployed, employed in the local domestic market, employed in Israel, and other employment. The states employed in the local domestic market, and Israeli market only include those who are employed as wage earners. The category of other employment includes employers, self-employed, and unpaid family members.

3.4 Econometric consideration

Moulton (1990) show that in regression models with mixtures of individual and grouped data (e.g., regressing outcomes at the individual level on a policy that applies to all individuals in the group) failing to account to common group errors can generate estimated standard errors that are dramatically biased downwards. Additionally, Donald and Lang (2001) show that when the number of groups is small, inference is further complicated. Asymptotic results based on the assumption of an infinite number of groups are inappropriate.

An alternative to the micro level analyses is to group the data into cells and then work with cell averages. With an adequate group size the average of the outcome variable are normal distributed, and t-tests are therefore likely to be valid for a grouped analysis, even with a moderate number of groups (Donald and Lang, 2001). However, grouped analyses have two

drawbacks. First, micro data on individual characteristics may reduce the variability in outcomes. The potential benefit from control for covariates is highlighted by the temporal variation in group averages. Second, grouped analyses are conservative in the sense that they treat additional observations within groups as if they were uninformative beyond their impact on the dispersion of the averages. Statistical tests based on grouped data may therefore be less powerful than those based on micro data (see, e.g., Angrist and Lavy, 2004).

Donald and Lang (2001) have illustrated an alternative approach (two-step approach) to inference, particularly for testing hypothesis about the aggregate explanatory variable on the individual-specific response variable. We will use the two-step approach discussed by Donald and Lang (2001). However, as each worker is a daily worker, the probability to go to work each day is determined by individual characteristics. The closure policy does not necessarily strike all individuals in the labour supply equally, as there exists a variation in the daily labour supply among individuals. Assuming there is an underlying variation in the closure variable, depending on individual characteristics, we will also investigate the distributional impacts of closure on different groups in the economy using a standard micro approach. These two approaches are examined and presented in the paper to check robustness and increase the precision of the estimated closure effects on the Palestinian wage earnings.

3.5 Two-Step approach

To account for group effects in the estimations we utilized the two-step approach discussed in Donald and Lang (2001). In our case, this amounts to first adjusting the group means for effects of micro covariates by estimating quarterly fixed effects, and then regressing the estimated fixed effects on the closure policy variable. In particular we first estimate:

$$y_{ijt} = \mu_{jt} + \beta X_{jt} + \varepsilon_{ijt} \qquad (4)$$

and regress $\hat{\mu}_{jt}$, the estimated μ_{jt}, on the closure policy variable. Thus the second step is:

$$\hat{\mu}_{jt} = \alpha_j + \lambda Closure_{jt} + \omega_{jt} \qquad (5)$$

where t = 1,…..,20 quarters; j = West Bank, and Gaza Strip. We can use inference based on the t_{G-2} distribution to test hypothesis about λ, provided G>2, where G is the number of

groups (see Wooldridge, 2003). This procedure is done for the dependent variable (y_{ijt}) log of real daily wage, and in a second approach for the dependent variable (y_{ijt}) monthly workdays for wage. X_{jt} is a vector of micro covariates included in the corresponding wage equation (1) respective days of work equation (2).

Additionally, we will use this framework on an employment state model. We will estimate the effect of closure in the West Bank and Gaza Strip on the probability of being outside the labour force, unemployed, employed in the local domestic market, employed in Israel, and other employment. The covariates included in the first step of the estimated employment state model are: a schooling variable; a household size variable; age dummies; dummy for residence in a refugee camp; civil status dummy; occupation group, and employment status dummies; and quarterly effects. And in the second step we regress the corresponding quarterly effects on the closure policy variable.

The two-step procedure provides a compromise between grouped and individual analyses in that it uses micro-data to reduce the dispersion in group means. Donald and Lang (2001) present Monte Carlo evidence suggesting the two-step estimator has good finite sample properties for many designs and always improves on cluster adjustments.

4. Results

In this section we first present selected estimates from the two-step procedure. Furthermore, we present estimates from a conventional micro approach. To capture some of the differences between the West Bank and Gaza Strip, separate estimations were made for the two entities.

4.1 Results two-step estimates

To control for group effects in the estimation of the impact of closure, we used the two-step approach as in Donald and Lang (2001). Adjusting for micro covariates using the two-step procedure described by equation (4) and (5) generates more precise effects than the analysis of group means.[15] The results using this approach show that the Israeli policy of closure only has a significant negative effect on wages and workdays for Gazans employed in Israel. A

[15] Group mean regressions have been estimated. The results from these estimations are not significantly different from the results of the two-step procedure presented in the table 2.

significant difference between the West Bank and Gaza Strip is that closures of the Gaza Strip have always been more strictly enforced than those of the West Bank. And the estimated results suggest that Israeli employers are no longer as dependent on Gazan workers as they used to be. The Israeli demand for Gazan workers seems to have diminished, as Gazans are offered lower wages during time of closure.

In general, decreased Israeli demand for labour from the Palestinian territories may come from the fact that during the 1990s there was a dramatic influx of immigrants to Israel. Additionally, the Israeli government dramatically increased the number of permits issued to foreign workers, as the new immigrants were not sufficiently attracted to the jobs that Palestinians were traditionally performing (Weiss et al, 2003). Another possible explanation may come from the decrease in economic activity in Israel after the uprising of the second Intifada, which consequently also lowers the Israeli demand of workers from the Palestinian territories.

The fact that evasion of checkpoints is possible in order to pass from the West Bank into Israel is a probable explanation for the result that West Bankers employed in Israel are not significantly affected by imposed closures. Additionally, the result that imposed closure does not have any significant effect on Palestinians employed in the local market implies that residents in the Palestinian territories who are employed in Israel do not compete with local employment, given that closure is a temporary shock. In contrast to the West Bank, closure of the Gaza Strip seem to have been more effective as closure has a significant negative effect on both the Israeli wage premium to Gazans and the monthly workdays.

Table 2 – Estimates using micro data for the wages and workdays (Two-step estimates)

	West Bank				**Gaza Strip**			
	Local wage	**Israeli wage**	**Local workdays**	**Israeli workdays**	**Local wage**	**Israeli wage**	**Local workdays**	**Israeli workdays**
Closure	-.0529	-.0317	-.4204	-.6758	-.0359	-.5553***	-.4061	-4.0572**
[Std. Err.]	[.0434]	[.0336]	[.4990]	[.8366]	[.0385]	[.1554]	[.6034]	[1.5968]

(*) Indicates significance at 10% level. (**) 5% level. (***) 1% level.

Notes: The table reports estimates from the second step of the two-step procedure. Separate estimations is made for those who work in the local market, and those who work in the Israeli market (for each region) in order to control for heterogeneous effects of the closure policy on different groups in the economy. In the first step separate regressions was estimated in order to adjust the group mean of the dependent variable (reported in each column of the table above) for effects of micro covariates by estimating quarterly fixed effects. And the second step amounts to regress the estimated fixed effects on the closure policy variable.

In table 3 we control for variations in the Israeli demand for Palestinian workers from the West Bank and Gaza Strip by including a variable measuring the number of foreign workers in Israel (foreign workers in Israel does not include workers from the Palestinian territories) and the Israeli gross domestic product.[16] The result shows that increases of foreign workers to Israel will only have a significant negative impact on the wages paid to Gazans employed in Israel. The coefficient measuring the effect of foreign workers on Israeli wages paid to West Bankers are not statistically significant. These results suggest that Israeli employers seem to have found substitutes to Gazans, indicating an economic and political separation of the Gaza Strip, unlike the West Bank.

Additionally, the coefficient measuring the effect of economic growth in Israel on wages paid to West Bankers and Gazans employed in Israel is significant and positive only for West Bankers. That is, increased growth in Israel will have a positive impact on the wages paid to West Bankers employed in Israel. However, Gazans employed in Israel are not significantly affected by increased Israeli growth.

Table 3 – Estimates using micro data for the wages paid in Israel (Two-step estimates)

	West Bank		**Gaza Strip**	
	Israeli wage		**Israeli wage**	
	Coef.	**[Std. Err.]**	**Coef.**	**[Std. Err.]**
Closure	-.0587	[.0342]	-.5043***	[.1552]
Foreign workers	-.0003	[.0003]	-.0032**	[.0013]
Israeli GDP	.0051**	[.0023]	.00005	[.0106]

(*) Indicates significance at 10% level. (**) 5% level. (***) 1% level.

Notes: The table reports estimates from the second step of the two-step procedure. Separate estimations are made for those who work in the Israeli market (from each region). In the first step separate regressions was estimated in order to adjust the group mean of the dependent variable (reported in each column of the table above) for effects of micro covariates by estimating quarterly fixed effects. And the second step amounts to regress the estimated fixed effects on the aggregate group variables. In the second step the number of foreign workers and Israeli GDP is included as additional covariates.

Table 4 shows the results from the second step of the estimated employment state model. In the first step, a five-way multinominal logit model is estimated with a full set of quarterly

[16] Statistics of foreign workers in Israel (measured in thousands of persons) and Israeli GDP (season adjusted at 2000 prices, in millions) are obtained from Israeli Central Bureau of Statistics.

effects for all states. The five labour force states are outside labour force, unemployed, employed in the local domestic market, employed in Israel, and other employment.[17]

The results suggest that the Israeli policy of closure has had an impact on the employment outcome in the Palestinian territories. All the coefficients are significant except for the coefficient measuring the closure effect on the probability of getting unemployed for Gazans. A likely explanation is that a huge share of Gazans employed in Israel got out of the labour force as a consequence of the second Intifada (see Appendix A). However, the probability of being employed in all the evaluated states is significantly affected negatively by the imposed closure. These results indicate that during times of closure the probability of getting employed decreases for all Palestinians from the Palestinian territories. Return Palestinians to the local market will meet a lower probability of getting employed in the local market either as wage earners or as other employment.

Table 4 – Estimates using micro data for the employment states (Two-step estimates)

	West Bank		**Gaza Strip**	
	Closure		**Closure**	
	Coef.	**[Std.Err.]**	**Coef.**	**[Std.Err.]**
Unemployed	.7063***	[.2867]	-.0008	[.2220]
Employed locally	-.7286***	[.2683]	-1.7527***	[.4625]
Employed in Israel	-1.4093***	[.4312]	-3.5840***	[.8859]
Other Employment	-.6149**	[.2720]	-1.5357***	[.4996]

(*) Indicates significance at 10% level. (**) 5% level. (***) 1% level.

Notes: The table reports estimates from the second step of the two-step procedure (for each region). In the first step, separate regressions was estimated in order to adjust the group mean of the dependent variable (reported in each row of the table above) for effects of micro covariates by estimating quarterly effects. And the second step, amounts to regress the estimated time effects on the closure policy variable.

4.2 Results from the conventional micro approach

Given the additional assumption that the closure policy has a random impact on different individuals, depending on their individual characteristics, we can examine the distributional impacts of closure on different groups in the economy using a standard micro approach.[18]

[17] As there is a lack of movement of wage earners between the West Bank and Gaza Strip (probably due to a shortage of a "safe passage" between the territories) we have only examined the probability of being employed in the local domestic market for Palestinian workers from the respective region.

[18] The standard errors reported in the tables are robust to the problem of random group or cluster effects in the data (see e.g. Moulton, 1986).

This is done in order to compare the results with the two-step procedure and increase the precision of the estimated closure effects.

4.2.1 The effect of closure on wages

In this section we present the results of the wage equation. Table 5 presents the regression coefficients of interest for Palestinian wage earners who reside in the West Bank and Gaza Strip respectively.[19]

As noted above, the effect of closure has a particular significance in the West Bank and Gaza Strip. The estimated results from the regression model show that the coefficient that picks up the effect of closure on real daily wages is significant and negative in the West Bank. Gazans employed in the corresponding local market are significantly affected positively by the imposed closure days. This is probably a selection effect. A direct result of the second Intifada was a dramatic increase of unemployment in the private sector, while national government employees were not affected to the same extent. Unlike in the West Bank, the average wage of public employees in the Gaza Strip is higher than of those employed in the local private sector.

West Bankers and Gazans employed in Israel are paid considerably higher wages compared to those employed in the local market. This is seen by the coefficient that picks up the effect of being employed in Israel. The imposed closure has significantly affected the wage premium of being employed in Israel negatively only for residents in the Gaza Strip. The coefficient that picks up the effect of closure of West Bankers employed in Israel is not significant. This result does not contradict the previous findings, as it may be explained by the fact that evasion of checkpoints is possible in order to pass from the West Bank into Israel. For residents in the Gaza Strip the corresponding coefficient is significantly negative. A percentage increase of the days closed will decrease the local-Israeli wage differential for Gazans with on average 50%.

The results presented in table 5 confirm the findings in previous section that external closures of the Gaza Strip have been more strictly enforced than those of the West Bank. And the

[19] A F-test was carried out to control for across region equality. The test confirms that the estimated parameters from the West Bank regression are statistically different from the estimated parameters from the Gaza Strip regression.

Israeli demand for Gazan workers appears to have diminished, as the Gazans are offered lower wages during time of closure.

Table 5 – The impact of closure on wages by place of residence 1999-2003

	West Bank		Gaza Strip	
	Coef.	**[Std. Err.]**	**Coef.**	**[Std. Err.]**
Closure	-.0394***	[.0125]	.0540***	[.0047]
Empl. in Israel * Closure	.0466	[.0406]	-.6637***	[.0848]
Empl. in GS* Closure	-.2202	[.3529]		
Empl. in WB * Closure			-.0815**	[.0382]
Employed in Israel	.4439***	[.0200]	.8893***	[.0189]
Employed in the Gaza Strip	.0924	[.0752]		
Employed in the West Bank			.1143***	[.0194]
No. of obs.	44956		23174	
R-squared	0.4254		0.5231	

(*) Indicates significance at 10% level. (**) 5% level. (***) 1% level.
Notes: This table presents selected estimates of equation (1) (one for each place of residence). The regressions use sample weights provided by the PCBS to adjust for non-random sampling. Standard errors are corrected for heteroskedasticity using White´s robust standard errors.

4.2.2 The effect of closure on days worked

Table 6 presents the main results of the days of work equation for Palestinian wage earners who reside in the West Bank and Gaza Strip.[20] The results suggest that an increase in the percentage days of closure will increase the monthly days supplied in the Gaza Strip. Return Palestinian workers to the domestic labour market in the Gaza Strip will put upward pressure on the domestic labour days supplied for wage earners employed in that local market. However, this effect is, on average, very small as indicated by the calculated labour supply elasticity. The labour supply elasticity, defined as the proportional change in working days in response to a proportional change in the imposed days of closure evaluated at the sample mean, is 0.0036 for Gazans employed in the local domestic market.

In general, West Bankers and Gazans employed in Israel supply fewer workdays than those employed in the domestic market as indicated by the significant negative sign on the coefficients that picks up the effect of being employed in Israel. And, as expected, increased days of closure further decrease the monthly workdays in Israel for Gazans. For West Bankers the corresponding coefficient is not statistically significant. Unlike Gazans employed in Israel,

[20] A F-test on the equality of the regression coefficients between the West Bank and Gaza Strip rejects the hypothesis of homogeneous effects on the working days.

there is no significant effect of closure on the days supplied for West Bankers working in Israel. This is probably explained by the fact that the external closure of the Gaza Strip is much more complete than that of the West Bank.

Table 6 – The impact of closure on workdays by place of residence 1999-2003

	West Bank		Gaza Strip	
	Coef.	**[Std. Err.]**	**Coef.**	**[Std. Err.]**
Closure	.4143	[.3077]	.3591***	[.0932]
Empl. in Israel * Closure	.2113	[.9830]	-3.0938**	[1.3334]
Empl. in GS* Closure	4.7711**	[2.1977]		
Empl. in WB * Closure			.2129	[.4679]
Employed in Israel	-1.1191**	[.4031]	-1.4947***	[.1840]
Employed in the Gaza Strip	-1.8315	[1.1207]		
Employed in the West Bank			.3940*	[.1897]
No. of obs.	44938		23141	
R-squared	0.1779		0.3238	

(*) Indicates significance at 10% level. (**) 5% level. (***) 1% level.

Notes: This table presents selected estimates of equation (2) (one for each place of residence). The regressions use sample weights provided by the PCBS to adjust for non-random sampling. Standard errors are corrected for heteroskedasticity using White´s robust standard errors.

4.2.3 The effect of closure on employment state

Multinominal logit estimates of the employment state are shown in table 7 for residents in the West Bank and Gaza Strip. Table 7 gives the estimated coefficient and calculated marginal effects of the coefficient measuring the impact of imposed closure days on the probability of a particular state and the corresponding standard errors. The marginal effects are calculated at the mean values of the variables.

The results in table 7 indicate that the marginal effect of the probability of being unemployed increases due to increased days of closure in both the West Bank and Gaza Strip. The estimation results suggest that all states of employment are affected by the imposed closure days, and not only wage earners who need to cross the border in order to reach their place of work. The number of imposed closure days has a negative impact on employment in both the local and Israeli market for the Palestinian labour force. The employment state model shows that external closure decreases the probability of West Bankers and Gazans to be employed in the local domestic market with on average 1.7% and 17% respectively.

A test was carried out to control for the differences between the two entities. The test rejects the hypothesis of homogenous effects of closure on the employment states across the West Bank and Gaza Strip. The test also confirms that the impact of closure is greater for residents in the Gaza Strip than for residents in the West Bank on all the employment state probabilities.

Table 7 – Multiniominal logit estimates of employment state 1999-2003

	West Bank		**Gaza Strip**	
	Closure		**Closure**	
	Coef. [Std.Err.]	**Marg. Eff. [Std. Err.]**	**Coef. [Std.Err.]**	**Marg. Eff. [Std. Err.]**
Unemployed	.7063***	.1230***	-.2520***	.1020***
	[.0091]	[.0023]	[.0344]	[.0056]
Employed locally	-.1344***	-.0175***	-1.2560***	-.1689***
	[.0163]	[.0017]	[.0554]	[.0088]
Employed in Israel	-1.0215***	-.0949***	-3.6418***	-.0298***
	[.0098]	[.0036]	[.0543]	[.0027]
Other Employment	-.1561***	-.0244***	-1.4449***	-.1159***
	[.0214]	[.0027]	[.0614]	[.0069]
No. of obs.	143389		79889	
Log likelihood	-145854.48		-60963.674	
Pseudo R-squared	0.3416		0.4703	

(*) Indicates significance at 10% level. (**) 5% level. (***) 1% level.

Notes: This table presents selected estimates of equation (3) (one for each place of residence). Additional covariates included in this regression are a schooling variable; a household size variable; age dummies; dummy for residence in a refugee camp; civil status dummy; occupation group, and employment status dummies; and quarterly effects. The regressions use sample weights provided by the PCBS to adjust for non-random sampling. Standard errors are corrected for heteroskedasticity using White´s robust standard errors. Out of labour force is the omitted category.

5. Conclusions

The purpose of this paper was to analyse the effects of the Israeli closure policy on the Palestinian wage earnings. The results suggest that the effect of closure has a particular significance in the West Bank and Gaza Strip. However, the effect differs between the two regions, as the implementation of the closure policy differs and it also exists a difference in the structure of the labour market between the West Bank and Gaza Strip.

The results suggest that the Israeli policy of closure has a significant impact on the Palestinian labour force in the West Bank and Gaza Strip. Wages and workdays are significantly affected negatively by the imposed closure only for Gazans who are employed in Israel. This indicates that the closure of the Gaza Strip has been more effective, compared to the West Bank, as evasion of checkpoints seems to be possible in order to pass from the West Bank into Israel.

Also, as the wages paid to Gazan workers employed in Israel decreases during time of closure, this result implies that the Israeli demand for Gazan workers seems to have diminished. The differences between the results for the West Bank and Gaza Strip suggest that the Israeli policy of political and economic separation of the Gaza Strip has been effective, as Israeli employers seem to have found substitutes to Gazan workers.

An important question for the policy makers to solve is how to open up new channels and diversify away from the disproportionate reliance on Israel in the delivery of labour, especially for the Gaza Strip. In the light of these findings, disturbances and increased days of closure generate more permanent effects on the Israeli demand for Palestinian labour from the Gaza Strip relative to employees from the West Bank. In a time of stability in the Palestinian-Israeli conflict the deep integration of the West Bank and Gaza Strip with the richer economy of Israel will probably affect the smaller Palestinian economy and shape its development differently. An alternative to the Gazan labour migration to Israel would be to promote Palestinian industry and agriculture in the Gaza Strip. For example, foreign aid could be designed to reduce the Palestinian dependency of the Israeli market in order to reduce the negative economic consequences of the Israeli closure policy on the Palestinian economy.

REFERENCES

Altonji, J.G., and Card, D., (1991). The effects of immigration on the labor market outcomes of less skilled natives. In: J.M. Abowd and R.B. Freeman (ed) Immigration, trade, and the labor market. Chicago and London: The University of Chicago Press

Angrist, J., 1995. The Economic Returns to Schooling in the West Bank and Gaza Strip, American Economic Review, 85(5), 1065-87.

Angrist, J., 1996. The Short-Run Demand for Palestinian Labor, Journal of Labor Economics, 14(3), 425-53.

Angrist, J., and Lavy, V., 2004. The Effect of High Stakes High School Achievement Awards: Evidence from a School-Centered Randomized Trial, IZA Discussion Paper No. 1146.

Arnon, A., and Weinblatt, J., 2001. Sovereignty and Economic Development: The Case of Israel and Palestine, The Economic Journal, 111 (June), F291-F308.

Becker, G., 1964, Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education. (Columbia University Press, New York).

Donald, S., and Lang, K., 2001. Inference with Differences-in-Differences and Other Panel Data, Boston University Department of Economics, mimeo, March 2001.

Kleiman, E., 1992. The Flow of Labour Services from the West Bank and Gaza to Israel, Hebrew University (Jerusalem) Department of Economics Working Paper No.260.

Maddala, G., 1983, Limited-Dependent and Qualitative Variables in Econometrics. (Cambridge: Cambridge University Press).

Moulton, B., 1986. Random group effects and the precision of regression estimates. Journal of Econometrics 32, 385-397.

Moulton, B., 1990. An Illustration of a Pitfall in Estimating the Effects of Aggregate Variables on Micro Units, Review of Economics and Statistics, 72(2), 334-338.

Ruppert Bulmer, E., 2003. The Impact of Israeli Border Policy on the Palestinian Labor Market. Economic Development and Cultural Change, 51(3), 657-676.

Weiss, Y., R.M. Sauer and M. Gotlibovski., 2003. Immigration, Search and Loss of Skill, Journal of Labor Economics, 21, 557-591.

Wooldridge, Jeffrey M., 2003. Cluster-Sample Methods in Applied Econometrics, American Economic Review 93 (May 2003), 133-138.

World Bank., 2003. Twenty-Seven Months - Intifada, Closures and Palestinian Economic Crisis, Jerusalem.

Appendix A

Employment characteristics in the **West Bank** and **Gaza Strip,** conditional on those individuals who are observed in the dataset before and after the outbreak of the second Intifada.

Residents in the West Bank

	> 2000:Q3				
<= 2000:Q3	**Outside LF**	**Unemployed**	**PWB**	**PGS**	**PISR**
Outside LF	77.96	9.48	10.91	0.00	1.65
Unemployed	19.77	41.06	25.86	0.00	13.31
PWB	8.20	13.60	75.22	0.00	2.97
PGS	50.00	0.00	50.00	0.00	0.00
PISR	7.56	41.79	17.31	0.00	33.33

Residents in the Gaza Strip

	> 2000:Q3				
<= 2000:Q3	**Outside LF**	**Unemployed**	**PWB**	**PGS**	**PISR**
Outside LF	83.51	9.79	0.64	5.96	0.11
Unemployed	29.32	51.88	1.88	16.54	0.38
PWB	12.90	12.90	45.16	29.03	0.00
PGS	16.25	18.21	0.27	64.92	0.36
PISR	42.25	43.02	0.39	11.63	2.71

Notes: The percentage distributions are shown in table. Outside LF = Out of Labour Force, PWB = Employed in the West Bank, PGS = Employed in the Gaza Strip, PISR = Employed in Israel.

Appendix B

Equilibrium model of the Palestinian labour market

This section illustrates a theoretical framework that can be used to interpret the effect of exogenous shocks on Palestinian wages and employment. To illustrate an equilibrium model of the Palestinian labour market, we utilize the model developed by Angrist (1996), which is an extension of Altonji and Card`s (1991) model of a labour market with two skill groups. The empirical results in this paper is motivated by a simple equilibrium model of Palestinian workers who can work in one of two locations.

Workers from the Palestinian territories are assumed to supply working days per month according to the following labour supply equations:

$$L_j\left(w_L, w_I, z_j\right), \begin{cases} \text{j = L, for local supply in West Bank/Gaza Strip,} \\ \text{j = I, for working in Israel,} \end{cases} \qquad \text{(A1)}$$

Thus the supply of labour depends on the wage paid in the local Palestinian market (w_L), the wage paid in Israel (w_I), and a location and type specific shock to the labour supply function (z_L) and (z_I).

Workers employed locally produce y_L, and workers employed in Israel produce y_I, with the following unit cost functions:

$$c_j\left(w_j, x_j\right), \quad \text{j = L, I,} \qquad \text{(A2)}$$

where x_j is the price of a second input in each production function i.e., a product demand shift parameter.

Local demand for the local output, y_L, is assumed to be a function of its own price, p_L, and the wages paid in the local Palestinian and the Israeli market (*E*). Local demand for the Israeli good is assumed to be a function of price, p_I, only. Equilibrium in the product market requires:

$$\left.\begin{aligned} y_L &= d_L(E, p_L) \\ y_I &= d_I(p_I) \end{aligned}\right\} \qquad \text{(A3)}$$

Given that producers are assumed to be cost minimizers, conditional factor demands can be obtained by Shephard`s Lemma. In factor market equilibrium we have:

$$y_j * c_{j1}(w_j, x_j) = L_j(w_L, w_I, z_j), \qquad \text{j = L, I,} \qquad \text{(A4)}$$

where $c_{j1}(w_j, x_j)$ is the partial derivative of the unit cost function with respect to wage rates.

Firms are assumed to choose a level of output given the condition of price equaling marginal costs. Therefore, product prices are set by:

$$p_j = c_j(w_j, x_j), \qquad \text{j = L, I,} \qquad \text{(A5)}$$

Using the conditional factor demands (A4), the condition of price equaling marginal costs (A5), and the product demand functions (A3), the equilibrium level of wages paid to Palestinians employed locally and in Israel and the prices of goods produced using Palestinian labour locally and in Israel can be determined. Substituting (A5) into (A3) and (A3) into (A4) gives:

$$\begin{aligned} &d_L[E, c_L(w_L, x_L)] * c_{L1}(w_L, x_L) = L_L(w_L, w_I, z_L) \\ &d_I[c_I(w_I, x_I)] * c_{I1}(w_I, x_I) = L_I(w_I, w_L, z_I) \end{aligned} \qquad \text{(A6)}$$

Using this information, the effect of shifts in exogenous variables (x_j and z_j) on equilibrium wage rates and employment can be obtained.

Closure conveniently fits into the model through the labour supply shock variables (z_j) and the labour demand shifters (x_j). For example, closure may lead workers to substitute to local employment rather than Israeli employment (supply effect) and it may lead employers to substitute to other workers (demand effect).

In the short-run we would expect a supply effect of closure, as closure consequently restrain workers who need to cross the borders from their place of work. This would lead to a labour supply increase in the Palestinian territories, where former Israeli migrant workers would compete for employment in the local domestic market. If wages are sticky this supply increase may result in unemployment rather than increase in local employment.

Closure might also affect labour demand negatively, since closure may increase the uncertainty on behalf of the employers regarding Palestinian workers showing up at work or not. If employers are risk-averse, closure might in effect induce employers to change their hiring practices. However, since the Israeli policy of closure is instituted as a security instrument during political instability. And since the political instability may have a negative impact on the Israeli economy, labour demand in Israel may also exhibit a negative correlation with closure. In fact, the Israeli economy experienced a deep recession in 2001, a year in which days of closure peaked.

Imposed closure may have a different impact on residents from the West Bank contra the Gaza Strip. For example, the imposed internal closure has also had a significant effect in the Palestinian territories, and especially in the West Bank where it got most severe.[21] Additionally, a significant difference between the West Bank and Gaza Strip is that external closures of the Gaza Strip have always been more strictly enforced than those of the West Bank. This structural difference between the two entities implies that imposed closure may have a greater impact on the local market in the West Bank compared to the Gaza Strip. On the other side, the effect of closure is probably larger for Gazans who need to cross the borders in order to reach their work, as evasion of checkpoints is possible in order to pass from the West Bank into Israel.

[21] The losses of the internal closure are difficult to measure. But they include reduced income to workers, farmers and business people who cannot reach their places of employment in the Palestinian territories and reduced output and revenues for commercial and business enterprises that are unable to obtain inputs and/or access output markets. Moreover, the uncertain security situation has reduced tourist-generated income.

Appendix C

Summary statistics of wage earners from the Palestinian territories

	Sample size	Years of School	Age*	Married	Camp	NGE	UNE	PISR	PWB	PGS
A. Residents in the West Bank										
1999	12488	9.846	25-29	0.6582	0.1377	0.1859	0.0268	0.4087	0.5898	0.0009
2000	12534	10.005	25-29	0.6541	0.1399	0.1985	0.0207	0.3912	0.6078	0.0006
2001	7972	10.300	30-34	0.6730	0.1522	0.2725	0.0276	0.2883	0.7109	0.0003
2002	5658	10.855	30-34	0.6923	0.1504	0.3074	0.0481	0.2285	0.7702	0.0000
2003	6319	10.845	30-34	0.6818	0.1424	0.3182	0.0546	0.2018	0.7979	0.0000
B. Residents in the Gaza Strip										
1999	5878	10.641	30-34	0.8195	0.3399	0.4039	0.0430	0.2528	0.0109	0.7355
2000	6040	10.808	30-34	0.7575	0.3598	0.4520	0.0454	0.2108	0.0522	0.7368
2001	3717	11.852	30-34	0.7743	0.3949	0.6664	0.0729	0.0253	0.0406	0.9333
2002	3412	11.693	30-34	0.7969	0.3790	0.5923	0.0765	0.0413	0.0144	0.9440
2003	4138	11.250	30-34	0.8023	0.3642	0.5295	0.0686	0.0498	0.0024	0.9478

Note: Statistics are from micro-level data from PCBS labour force surveys, round 12-31.
(*) The age variable is available as an interval group variable with five years intervals between the groups. The median of the intervals is presented in the table.

Variable description

	Dependent variable
Wage	The logarithm of real daily wage.
Work days	The reported monthly workdays.
P_j	Probability of being selected into the j:th state: out of labour force (j=0), unemployed (j=1), employed in the local domestic market (j=2), employed in Israel (j=3), other employment (j=4).
	Explanatory variables
Closure	Percentage days of total external closure imposed in the Palestinian territories.
Schooling	The individuals years of schooling.
D.AGEic	Dummy variable indicating if observation i is in age group c. Age groups indexed by c are age 15-19, age 20-24, age 25-29, age 30-34, age 35-39, age 40-44, age 45-49, age 50-54, age 55-59, age 60-64, and age 65 and over.
$D.Occ_{ig}$	Dummy variable indicating if observation i is in occupation group g. Occupation groups indexed by g are skilled workers including legislators and professionals, service and fishery workers, trade workers, machine operators, and elementary occupations.
MARRIED	1 if an individual is married, 0 otherwise.
CAMP	1 if an individual resides in a refugee camp, 0 otherwise.
NGE	1 if an individual is a National Government Employee, 0 otherwise.
UNE	1 if an individual is a foreign gov., international org. or UNRWA employee, 0 otherwise
PISR	1 if an individual is employed in Israel, 0 otherwise.
PGS	1 if an individual is employed in the Gaza Strip, 0 otherwise.
PWB	1 if an individual is employed in the West Bank, 0 otherwise.
Household size	The individuals household size that is included in the labour force.
Interaction variables	
PISR * Closure	The effect of closure on those who are employed in Israel.
PGS * Closure	The effect of closure on those who are employed in the Gaza Strip.
PWB * Closure	The effect of closure on those who are employed in the West Bank.