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## The Effect of Public Sector on Private Jobs: Evidence from the West Bank.

### Abstract

This paper estimates the short run effect of creating more public jobs on private employment in the occupied West Bank. Unlike most cited research, the results provide evidence that favors crowd-in effect both at the aggregate employment level and across sectors. A main contribution of the paper is to empirically explore the underlying mechanisms that drive the results. They include positive public employment effect on local demand, lack of public wage premium, as well as no effect on private wages. It turns out that an increase in the local labor force participation is a driving factor for the latter channel. Interestingly, the increase in labor force participation exceeds that of public and private employment, leading to an increase in the number of job seekers.

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## 1. Introduction

The impact of expanding public employment in local labor market has recently attracted growing attention among economists (see for example Faggio and Overman 2014 and Jofri-Monseny *et al* 2018). This is simply because public sector generates employment for a large segment of workers. For example, the share of public employment, in OECD countries, is about 21% of the total work force.<sup>1</sup>The share also rises in many developing countries, like Iran, Egypt, South Africa and several other MENA countries.<sup>2</sup>In addition, governments often utilize public employment to combat negative economic shocks or to reduce regional inequality (see Alisena *et al* 2000).

So far, the empirical literature, mostly covering developed economies,<sup>3</sup> show mixed conclusions, differing by country, type of industries, and duration of the analysis, reflecting short run versus long run effect. Faggio and Overman (2014) use long-run differences from British data and provide evidence that is consistent with their theoretical prediction.<sup>4</sup> In particular, they show that expanding public employment crowds in (out) jobs in the non-tradable (tradable) sector in the short run. They show that a crowd-out effect prevails in the long run (see also Senfleben-König 2014; Ranzani and Tuccio 2016). On the other hand, Jofri-Monseny *et al* (2018) use data from Spanish cities and find that increases in public employment crowd in private employment in the long run.<sup>5</sup>

This paper investigates the short run effect of creating more public jobs on private employment in the occupied West Bank of Palestine during the Second Intifada period (between September 2000 and December 2004). The paper adds several contributions to the literature. First, it re-visits the linkages between public and private employment in a context of developing economy that faces ill economic conditions.

As violence intensified during this period, Israel imposed severe mobility restrictions on goods and labor, distorting market linkages across West Bank's districts (See Cali and Miaari 2018). Israel also invoked work permits for a large section of Palestinian

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<sup>1</sup>OECD (2015).

<sup>2</sup><https://www.ilo.org/ilostat/>

<sup>3</sup> One exception is Ranzani and Tuccio (2016) who investigates labor market effect of public employment in three African countries (Ghana, Mali and Mozambique). They provide empirical evidence that expanding public employment crowds out (in) private jobs for skilled (unskilled) workers. However, they remained silent about the driving mechanisms.

<sup>4</sup>See more discussion on the theoretical work of Faggio and Overman (2014) in section 2.

<sup>5</sup>See Quadrini and Trigari (2008) for a macro study that explores effect of public employment on the volatility of unemployment and output.

commuters, reducing their share, relative to total Palestinian work force, from 0.26 in 2000 to about 0.11 by the end of 2004.<sup>6</sup> During this period, unemployment rate rose from 0.12 to 0.23.<sup>7</sup> Luckily for the Palestinian economy, these negative shocks did not impact public employment, partly due to the flow of international donation that kept feeding government budget (Sarsour and Atallah 2011). In fact, public employment expanded by 18%, rising from 55,000 employee at the eve of the Second Intifada. This increase is largely accounted for by employing security personnel. The soaring unemployment as well as the expansion in public employment raised the share of public employment in the West Bank, relative to all waged workers, from 0.19 to 0.31 by the end of 2004. The same conclusion also holds when considering the trend for most districts (see Figure 1).

Undoubtedly, the environment governing the Palestinian economy, mainly during the Second Intifada, is unique due to the constraints imposed by the Israeli occupation.<sup>8</sup> Still, such an environment can be utilized as a simulation to examine how excess labor supply shapes the linkages between public and private employment.

The other contribution of the paper is that it empirically explores the channels of the effects of public employment. So far, the literature has paid little attention to this issue. One exception is Algan *et al* (2002) who show that increases in public jobs crowd out private employment in countries with greater public substitutability between public and private sectors.<sup>9</sup> Their findings mostly fit cross country analyses but may not be useful in explaining how increases in public employment influence local labor markets.<sup>10</sup> Senftleben-König (2014) empirically shows that the increase in wages possibly explains the crowd-out effect in the German tradable sector. Nonetheless, he provides no explanation of why public employment has no employment effect on the non-tradable sector, even though creating additional public employment increases wages in this sector.

Jofri-Monseny *et al* (2018) set up a simulation model to explain how expanding public employment crowds in private employment in the long run. Consistent with Fagio and Overman (2014), the model predicts that creating additional public employment

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<sup>6</sup>See Farsakh (2002).

<sup>7</sup>During the Second Intifada period, real GDP, measured in 2004 prices, dropped from \$3,272 to \$2,836 million and wages decreased by about 10% and The source of data for the share of commuters, wages, and unemployment rate is labor force surveys published during the Second Intifada by Palestine Central Bureau of Statistics (PCBS). The source of GDP data is PCBS's national account publications.

<sup>8</sup>See World Bank (2012).

<sup>9</sup>Algan *et al* (2002) suggest that expanding public services, like transportation, education, and health, are expected to exert greater crowd-out effects relative to pure collective goods, such as justice or defense.

<sup>10</sup> Algan *et al* (2002) also consider the impact of public rent, but their documented analysis is correlational.

increases local demand for the non-tradable sector. It also predicts that household mobility limits the positive impact of local public employment on local wages. These two factors cause private employment in the non-tradable sector to increase. Nonetheless, the effect on tradable employment remains small as local demand for this sector is unaffected. This paper differs from Jofri-Monseny *et al* (2018) on two fronts. Firstly, it empirically tests the mechanisms driving the crowd-in effect. It also explores other labor market mechanisms, including public wage premium as well as linkages between wages in private sector and expansion of labor force participation.

This paper is also the first to explain how a local labor market responds to changes in public employment in an aid-based economy. Unlike countries where expanding the public sector is financed via tax increases, the Palestinian public wage bill is largely financed by international cash grants. As explained below, this may generate different mechanisms through which expanding public employment affects jobs in the private sector. In this context, the outcome of this research helps understand the local economic effects of international aid in the short run.

Drawing on district-quarter pooled data, the study shows that expanding public employment crowds in private employment. Specifically, the OLS estimates indicate that increasing public employment by an additional 100 jobs increases private employment by 71 jobs. The study also considers the endogeneity concern due to the fact that the PA utilizes public employment to curb rising local unemployment and/or as a response to population growth. To address these issues, I use an instrument that utilizes district's initial share of public employment to redistribute the overall increases in public employment across districts. The IV estimates confirm the OLS findings, though the magnitude of the effect is smaller, crowding in private employment by 52 jobs. Consistent with the related studies, the paper examines the impact of increasing public employment on non-tradable versus tradable sectors. The findings, using OLS and IV models, show that expanding public employment increases jobs in both sectors. Still, the magnitude of the effect is disproportionately concentrated in the non-tradable sector.

The positive impact of expanding public employment on overall private jobs and across sectors is at odds with most of existing literature. The question then becomes what are the mechanisms that support this finding? To seek answers, I firstly explore whether

income generated from expanding public employment increases demand for goods and services (Faggio and Overman 2014). To test this theoretical prediction, I estimate a model that links the expansion of local public employment with a change in the number of local entrepreneurs (employers and self-employed). The latter is utilized as a proxy for changes in local demand, which can be manifested either by expanding existing firms and/or inducing more entrepreneurs to join the market. The results, using OLS and IV models, show that the number of entrepreneurs increases both at the overall level and across tradable and non-tradable sector.

Second, I explore the impact of expanding public employment on private wages. The OLS and IV results report a negative estimate but statistically insignificant. This indicates that the offsetting wage effect seems to play little role and that the positive shift of labor supply is possibly a driving factor. In other words, it is likely that in a period with ill economic conditions and excess labor supply, the increase in overall employment (public and private) enhances the probability of employment and therefore induces more individuals to join the labor market. Noticeably, the increase in labor supply exceeds that of private employment, leading to an increase in the number of job seekers (a higher level of unemployment).

Following Algan *et al* (2002), the paper also examines other channels of the public employment effect, focusing on the impact of public wage premium. They suggest that higher public wages would increase returns to seeking public employment, attracting workers out of the private sector (see also Edin and Holmlund 1997). The paper suggests that the limited capacity of the PA to absorb excess labor supply neutralizes this effect. Evidently, the empirical results show that districts' changes in private employment are independent of changes in public wages.

The remainder of the paper is organized as follows: The second section explores a number of theoretical arguments regarding the relationship between public and private employment. Section three and four discuss the empirical models and the results, respectively. Section five provides evidence on the channels that explain the public employment effect. Finally, the paper briefly concludes with policy implications in section seven.

## **2. Impact of Public Sector on Private Employment: Overview**

In the spirit of Moretti (2010), Faggio and Overman (2014) are the first to sketch a theoretical foundation that links expansion in public employment to local labor market outcomes. In this section, I depict the main assumptions and prediction of their model. I also show how the assumptions can be modified to fit the Palestinian context during the Second Intifada. Faggio and Overman (2014) assume that each local area, in a given region, is a competitive economy and uses labor to produce nationally traded goods with prices that are exogenously determined, non-traded goods with locally determined prices, as well as public goods. The production in the public sector is funded by national taxes and provides non-tradable services. Wages in tradable and non-tradable sectors are determined locally, while public wages are determined nationally.

In the Palestinian context, the reliance on national taxes did not play a major role during the Second Intifada. Crippled with a weak economy, rampant tax evasion (World Bank 2007), and Israel's economic restriction, the PA has heavily depended on international aid to finance its expenditures (Sarsour et al 2011). During the Second Intifada period, the average annual share of grants, relative to PA's expenditures, amounted to 53%. Noticeably, the public wage bill often consumed more than two third of the national budget,<sup>11</sup> indicating that change of public employment is largely funded by international grants.

Faggio and Overman (2014) also assume that the cost of labor mobility across areas is assumed to be zero and public wages are assumed to be higher in the private sector (tradable and non-tradable sectors).<sup>12</sup> This is unlike our case in which the restrictions that Israel placed in the West Bank during the Second Intifada largely restricted mobility across districts (Mansour 2010). Nonetheless, excess local labor supply, due to rising unemployment rate, is expected to equalize marginal product of labor and wages across the tradable and non-tradable sectors within local labor markets. Notably, the mobility restrictions are expected to localize the public employment effect.

Faggio and Overman (2014) assume that labor supply is upward sloping in which elasticity positively depends on a number of factors, including degree of labor mobility across local areas and local housing supply. Also, expanding public employment is expected to raise income, creating more jobs in the non-tradable sector. Labor demand

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<sup>11</sup>Source of data on taxes, share of wage bill, and budget is the Palestinian ministry of finance

<sup>12</sup>This assumption is consistent with the Palestinian labor market during the Second Intifada. The estimated average wage for public workers is 3% higher, holding constant workers' socioeconomic characteristics; type of economic activities; district of residence, and overtime national changes.

in this sector is expected to increase further due to providing intermediate outputs to the public sector. Nonetheless, the positive employment effect may be counterbalanced by other factors. Specifically, the public sector may provide substitute services to the private non-tradable sector (such as health care and education), decreasing the demand for the latter.<sup>13</sup>In addition, increases in the labor demand of the non-tradable sector might be offset by increases in the labor cost (labor demand effect) and non-tradable prices. To the extent that the effect of the off-setting factors is partial and that that labor supply is elastic, employment in the non-tradable sector is anticipated to increase.

In addition, expanding public employment is expected to have no significant effect on labor demand in the tradable sector. This prediction is driven by the assumption that local demand of the tradable sector is a negligible component of national demand. Therefore, an increase in income, at the local level, will have no effect on demand for tradable sector. On the other hand, increases in labor cost, housing prices, and other input prices in the non-tradable services would decrease employment in this sector. The extent of the crowd-out effect is negatively correlated with the elasticity of labor supply. In our case, public employment expanded in almost all districts, so the income effect may increase local demand for tradable sector as well. The extent to which employment increases in this sector depends on the labor cost effect, which is determined by the extent of labor supply.

### **3. Data and Empirical Models**

The empirical analysis draws upon quarterly labor force data in the West Bank districts covering the Second Intifada period, spanning from the third quarter of 2000 until the end of 2004. The labor force data is collected by the Palestine Central Bureau of statistics(PCBS) and contains rich data on employment and socioeconomic characteristics of household members. These include type of employment; whether a worker is employed in the private or public sector and whether an individual is a waged worker, an employer, or self employed. To fit the empirical analysis, the variables included in the econometric models are aggregated at the district level using PCBS's sampling weights. The sample excludes East Jerusalem, as except for some towns, the PA lacks sovereignty and is barred from providing public services in the city and main populous areas. This restricts the cross sectional dimension to ten districts.

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<sup>13</sup>See Algan *et al* (2002) for more discussion on the theoretical effect of substitutability between the private and public sector .



The estimation methodology builds on the work of Moretti (2010) and Faggio and Overman (2014). I first estimate a model that links the change in public employment with the change in overall private employment for all waged workers. I then use the same model to explore the differential effect on tradable sector employment (manufacturing) and non-tradable sector (services and construction) employment. In the following section, I explore the channels of the public employment effect by estimating another set of models. They specifically link changes in public employment to private wages as well as changes in labor force, unemployment, and number of entrepreneurs, among other models. The model of the overall private employment is specified as follows:

$$prvt_{dq} = \alpha + \beta Pub_{dq} + \Theta X_{dq} + \mu_d + \gamma_q + \varepsilon_{dq} \dots \dots \dots (1)$$

Like in Faggio and Overman (2014), the dependent variable ( $prvt_{dq}$ ) is the change in private employment measured as  $(private_{dq} - private_{dq-1}) / tot\_emp_{dq-1}$ . The numerator measures the quarterly change (expansion) in the number of private employees for district  $d$ . To account for cross district differences in size of private employment and accordingly avoid spurious correlation, the measure is deflated by the lagged value of district's total employment ( $tot\_emp_{dq-1}$ ). Private employees are defined as those working in non-agricultural firms and non-public (governmental) institutes. This measure excludes those employed in the Israeli labor market (commuters). The dependent variable reflects the contribution of private sector employment to total employment growth.<sup>14</sup>

The main independent variable ( $Pub_{dq}$ ), constructed in the same fashion ( $public_{dq} - public_{dq-1} / tot\_emp_{dq-1}$ ), measures public employment contribution. A negative (positive) estimate of  $Pub_{dq}$  indicates that expanding public employment crowds out (in) private employment. Nonetheless, differences in districts' size can be alternatively addressed via using quarterly growth rates of public and private employment I explored this venue and the results remain qualitatively the same (see more discussion below)

The vector  $\mathbf{X}$  includes control variables that potentially affect private employment growth. These include human capital, measured using the share of labor force participants with secondary, and post-secondary education. The reference group is the share of workers with less than secondary education. The control variables also account

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<sup>14</sup>Faggio and Overman (2014) decomposed total employment growth, for a given period of time, into contribution from private sector and public sector, such that  $(E_t - E_s) / E_s = (R_t - R_s) / E_s + (B_t - B_s) / E_s$ . In this respect, the dependent variable in equation (1) measures the contribution of private employment to total employment growth.

for other district characteristics, including share of population living in urban and rural areas in which the share of population living in refugee camps is the reference group. The control variables also account for the effect of age structure using share of labor force participants that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21).

Model (1) also isolates demand effects that might be correlated with the expansion in public employment. The first is related to the impact of violence intensity during the Second Intifada. In this respect, I include district's lagged number of Palestinian fatalities in each quarter. It is expected that negative demand shocks are greater in cities with a greater level of violence (Mansour 2010). Data on the number of fatalities is collected by B'Tselem, the Israeli Information Center for Human Rights in the Occupied Territories.

In addition, model (1) accounts for the effect of labor market linkages with Israel (commuting effect). Similarly to the public and private employment variables, the effect is measured as the quarterly change in number of commuters deflated by the lagged value of total employment ( $commut_{dq} - commut_{dq-1} / tot\_emp_{dq-1}$ ). The Israeli labor market has historically absorbed a large proportion of Palestinian workers, amounting at the eve of the Second Intifada to about 0.23 of total Palestinian work force. As the Second Intifada broke out and violence intensified, Israel placed a system of internal and external closure, decreasing the share of commuters to 0.07 by the end of 2004 (See Farsakh2002).

Nonetheless, the sign of the commuting variable cannot be determined *a priori*. Prior to the Second Intifada, wages earned by commuters represented about 52%<sup>15</sup> of the work force' total wage bill. Accordingly, increases in the number of commuters, is likely to raise local demand and thus increase employment. On the other hand, commuting to the Israeli labor market represents a negative supply shock to local labor markets, leading to an increase in local wages,<sup>16</sup> and may therefore decrease employment. Importantly, to the extent that expansion in public employment correlates with commuting, not controlling for the latter would confound the effect of the former. Arguably, changes in private employment are expected to affect commuting flow, biasing the estimate of the latter. This is unlikely the case in our setting as the extent of commuting flow is driven by level

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<sup>15</sup>The wage bill share is calculated as the sum of daily wages for commuters divided by total wage bill. The source of data is PCBS' labor force survey-third quarter of 2000.

<sup>16</sup>See Mansour (2010) and Fallah (2018).

of restriction imposed by the Israeli government during the Second Intifada (Mansour 2010).

Model (1) also controls for district fixed effects ( $\mu_d$ ) to account for time invariant factors that might affect growth in private sector employment, such as geography and proximity to major cities. Accordingly, this model estimates the within district effect of expanding public employment. Quarter (time) fixed effects ( $\gamma$ ) is also included to accounts for the time varying national shocks in private employment, including population growth. The descriptive statistics and the results of the regression models are reported in the appendix.

A major concern of estimating the public employment effect is related to the possible simultaneity with private employment. As noted by Faggio and Overman (2014) and Senfleben-König (2014), the magnitude of the effect might be underestimated if the government encounters negative demand shocks by increasing public employment. On the other hand ,the effect might be overestimated if public employment increases more in districts with expanding private employment. To correct for the simultaneity bias, I will re-estimate model (1) using the IV estimation approach. Consistent with Bartik (1991), Moretti (2010), and Faggio and Overman (2014), I utilize the following instrumental variable:

$$IV1 = (\log pub_q - \log pub_{q-1}) \times pub\_sh_{jq0} \dots\dots(2)$$

where the first term measures the quarterly change in the logarithmic value of total public employment in West Bank. To ensure exogeneity, this term excludes the number of public employees in their own district. The second term ( $pub\_sh_{jq0}$ ) refers to district's share of public employment measured in the initial period (first quarter of 1999). To this end, the identification assumption of this IV is that each district, in a given quarter, would receive a share of the growth in public employment in proportion to its initial share. The rational of choosing this reference date is that it predates the break out of the Second Intifada and the associated deterioration of the economic condition across the West Bank. Figure (2) depicts changes in the unemployment rate across districts, which shows that the substantial increase in unemployment rate pertains only to the shocks of the Second Intifada. Therefore, using the initial share of public employment as a distribution weight allows the IV isolate correlated economic shocks at the district-

quarter level. See Aizer (2010) for more discussion on the advantage of fixating the weight at the initial period.<sup>17</sup>

#### 4. Results

This section discusses the effect of expanding public employment on the growth of the overall private-waged employment. To focus on the prediction of the theoretical model, the analysis of model (1) includes only waged workers. However, the following section utilizes other types of workers (employers and self-employed) to explore the various channels of the public employment effects. The results are shown in Table (1). I first present the OLS estimates of model (1), only including the public employment variable as well as the district and quarter fixed effects (Column 1). This is to examine the extent to which the control variables confound the public employment estimate. Then, the table reports the results when controlling for education and age shares (Column 2) as well as the commuting change variable (Column 3) and Palestinian fatalities (Column 4), constituting the full model.<sup>18</sup>

The results show that the impact of public employment on waged-private sector employment is positive and statistically significant at 5%. Controlling for education level, age shares, and share of urban and rural populations seem to play a minor role; the magnitude of the public employment effect changes little. Interestingly, the effect of commuting to the Israeli labor market turns out to be a confounding factor, overestimating the public employment effect. In particular, controlling for commuting lowers the public employment estimate from 0.91 to about 0.70. Controlling for the number of Palestinian fatalities, though it has a negative and significant effect at 1%, seems to have little effect; the magnitude of the public employment estimate decreases to 0.68.<sup>19</sup> Overall, the public employment estimate in the full model, as reported in Column 4, indicates that creating 100 additional public jobs would increase waged-private employment by 68 jobs, *ceteris paribus*.

The estimates in Columns (5) to (8) report the findings of the IV models. The first stage estimates show that the effect of the instrument is negative and statistically significant at 1%. Similar to Faggio and Overman (2014) and Cali *et al* (2014), the negative sign of the

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<sup>17</sup>See also Bertrand *et al* (2016)

<sup>18</sup>The estimates of the other control variables are not reported but available upon request from the author.

<sup>19</sup>The estimate of the commuting factor indicates that adding 100 extra commuters would increase local waged-private employment by 60 jobs.

instrument implies that actual public employment growth, at the district level, is negatively correlated with the predicted growth based on the initial public employment share. The IV results, confirm the positive impact of increases in public employment, though the magnitude of the estimates is smaller. The IV estimate of the full model (Columns 8), a preferred model over the OLS's, indicates that creating 100 additional jobs increases private employment by 52 jobs, *ceteris paribus*.

To explore whether the public employment estimates are robust to different construct of the public employment and private employment variables, I re-estimated model (1) using alternative measures. In particular,  $prvt_{dq}$  and  $pub_{dq}$  are now measured as growth rate variables ( $(private_{dq} - private_{dq-1}) / private_{dq-1}$ ) and ( $(public_{dq} - public_{dq-1}) / public_{dq-1}$ ), respectively. The findings of the OLS and IV estimates, reported in Column (1) and (2) of Table (5), are qualitatively similar to those in Table (1). **The estimates of the latter are preferred as they quantitatively decompose the total crowd-in effect of the public employment by type of sector; tradable versus non-tradable.**

#### 4.1 Distributional Effect of Public Employment

The theoretical model of Faggio and Overman (2014) suggests that expanding public employment has a short run asymmetric effect across sectors, crowding in (out) private employment in the non-tradable (tradable) sector. This section empirically tests these predictions in the Palestinian context. In particular, separate versions of model (1) are re-estimated for both sectors in which the dependent variable is measured in the same fashion as in model (1). To save space, I will only report the estimates of the full model.

Columns (1) and (2) in Table (2) exhibits the OLS results, which show that increasing public employment creates jobs in both sectors. Still, the results report differential effects; about 60% of the increase in the waged-private employment is accounted for by the non-tradable sector. Similar to the analysis of model (1), these estimates might be biased due to the simultaneity concern. To address this issue, I use the same instrumental variable as above. The IV findings, confirm the distribution aspect of public employment, but with lower estimates (Columns 3 and 4). This indicates that increasing public employment by 100 jobs would increase waged employment by 34 jobs in the non-tradable sector and 19 jobs in the tradable sector. Consistent with aforementioned robustness checks, the distributional effect of public employment is re-estimated using growth rate variables. The results qualitatively remain the same (see Columns 3 to 6).

In sum, the analysis in the current and previous section provides evidence that the short run effect of expanding public employment crowds in waged- private employment at the overall level and across sectors. To my knowledge, these findings are unique. As explained above, most of existing research documents crowd-out effects, either at the level of aggregate employment or at the level of tradable sector. The following section explores the basis of the results.

## **5. How does Expanding Public Employment Increase Private Employment?**

In this section, I empirically test a number of channels that explain how expanding public employment crowds in private jobs during the Second Intifada. The analysis relies heavily on the theoretical predictions discussed in section 2. To the extent that data availability allows, I will explore the following channels: demand increase in the private sector, effect on private wages, and effect of public wage premium.

### **5.1 Crowd in Effect: Increasing Demand in Private Sector.**

One option to estimate the impact of expanding public employment on local demand is to link the former with quarterly changes in prices, consumer demand, investment or level of production. Unfortunately, data for these indicators are not available at the district level. I overcome this problem by utilizing data on the number of local entrepreneurs. As explained above, the PCBS's labor force survey classifies workers according to employment status, including entrepreneurs (employers and self-employed). It is expected that an increase in the demand for local goods and service would either expand existing firms and/or induce more entrepreneurs to join the market, *ceteris paribus*. Consistently, Figure (3) depicts that the evolution of the number of entrepreneurs is associated with that of public employees during the study period; with a correlation of 0.55.

To formally test this hypothesis, I estimate a model similar to model (1) above, except that the dependent variable is now measured as the quarterly change in number of entrepreneurs deflated by the lagged value of district's total employment. Consistent with the analysis above, the sample excludes entrepreneurs from the agricultural sector.

The results, reported in Columns (1) to (3) of Table (3), show that the impact is positive and statistically significant at 5%. The OLS estimates show that expanding public employment by 100 jobs increases the number of entrepreneurs by 81 (Column 1). The

results are also consistent with those reported in Table (2), exhibiting a differential effect across sectors, led by the non-tradable sector with a crowd-in effect of 59 jobs. The IV estimates, reported in Columns (4) to (6), go hand in hand with this finding, though consistently they produce smaller estimates. Specifically, the total number of entrepreneurs increases by 64 (47 the non-tradable sector and 17 for the tradable sector, respectively). These findings are robust to measuring public employment and entrepreneurs' variables using growth rates (See Columns to 7 to 10 in Table 5). The expansion in public employment in most districts, as shown in the data section, seems to raise local demand for tradable sector as well. In a separate regression, I estimate the public employment effect on the self-employed and employers. The results, reported in Table (6) show that most of the increase in entrepreneurs is disproportionately accounted for by the self-employed.

## 5.2 The Wage Effect

As indicated in Section 2, expanding public employment may increase private wages and non-tradable prices and thus off-set the positive linkage between labor demand and expanding public employment. The following analysis empirically explores this channel, though it will be limited to the wage effect. Local data on non-tradable prices, including housing, is not readily available. The wage effect will be tested utilizing a modified version of Mincer's wage equation (Mincer 1974):

$$\log W_{ijq} = \gamma \text{Pub}_{dq} + \delta \text{Commute}_{dq} + \mathbf{B}_1 \mathbf{G}_{idq} + \mu_d + \gamma_q + e_{idq} \dots \dots (3)$$

where  $\log W_{ijq}$  is the logarithmic daily wage, measured in new Israeli Shekel, for a private worker "i", who resides in West Bank's district "j", excluding Jerusalem, and observed in quarter "q" during the Second Intifada period. The sample excludes commuters to the Israeli labor market. The main independent variable of interest is contribution of public employment ( $\text{Pub}_{dq}$ ), which is measured as in model (1). The variable  $\text{Commute}_{dq}$  controls for effect of commuting to Israeli labor market,<sup>20</sup> which is measured as specified in model (1). Vector  $\mathbf{G}_{ijq}$  accounts for workers' demographic and socioeconomic characteristics, including sex, education, marital status, age, and age squared. The vector also includes a list of dummy variables to account for wage differences across industries and

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<sup>20</sup>See Mansour (2010) and Fallah (2018) for more discussion on the effect of commuting to the Israeli labor market on wages in West Bank.

occupations, classified at a four-digit level. The vectors " $\mu_j$ " and " $\gamma_q$ " controls for district and quarter fixed effects, respectively.

Focusing on the public employment effect, the results of the wage model, whether estimated by OLS or IV techniques, show that the effect of public employment is negative but statistically insignificant at the conventional levels.<sup>21</sup> The magnitude of the OLS estimate is 0.11 with a p-value of 0.11 and the IV estimate is 0.05 with a p-value of 0.45. One concern with this finding is that the effect of public employment might be confounded by negative demand shocks during the Second Intifada. To account for this effect, I re-estimated the wage model including district's unemployment rate and lagged number of Palestinian fatalities.<sup>22</sup> The OLS and IV results, unreported, remain qualitatively the same. This finding suggests that local private wages are insensitive to the expansion of public jobs, paving the way for local demand of tradable and non-tradable sectors to increase.

### 5.2.1 Linkages between Wage Effect and Labor Force

To explain the insignificant effect of public employment on private wages, I argue that the increase in the labor market participation is a driving factor. Markedly, as the economic conditions worsened during the Second Intifada, the expansion in public employment induced individuals to seek employment in this sector. Also, the associated crowd-in effect of this expansion (employment increases in the private sector) is also expected to induce more individuals to join the labor force. With the increase in labor market entrants the effect of public employment on private wages is expected to diminish.

To empirically test this hypothesis, I estimate a labor force model in which the RHS variables are the same as in model (1). The dependent variable, change in labor force, is measured as  $(l_{dq} - l_{dq-1}) / tot\_emp_{dq-1}$ .<sup>23</sup> To avoid direct endogeneity, workers in the public employment are purged from the labor force measure. Also, to better understand the

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<sup>21</sup>One concern with the wage model is that public employment only varies across districts and time. Moulton (1990) shows that not accounting for common group errors would underestimate the standard errors. However, this issue is not a concern, since the public employment effect is insignificant.

<sup>22</sup>Consistent with Mansour (2014), wages are negatively correlated with rising intensity of violence.

<sup>23</sup>As a robustness check, I specified the dependent variable of the labor force model as difference in the logarithm of labor force. The results, unreported, remain qualitatively, the same.



linkages between expanding public employment and wages, the labor force measure excludes unpaid family workers, self-employed, and employer.

The OLS results are reported in Column (1) of Table (4), showing that the effect on labor supply is positive and statistically significant at 1%. Increasing public employment by 100 jobs would increase labor force participants by about 213.<sup>24</sup>The IV findings are similar, though the estimates are smaller (168 participants). These findings clearly indicate that the expansion in public employment substantially shifts labor supply and neutralize the positive effect on wages. So far, the analysis shows that expanding public employment increases employment in the private sector and enhances labor supply at the same wage level. This suggests that the labor supply in the private sector is perfectly elastic during the study period.

### **5.2.2 Does Expanding Public Employment Decrease Unemployment?**

So far, the analysis provides empirical evidences that expanding public employment crowds in overall employment with differential effects across sectors. But does this result suggest that unemployment has decreased? The effect depends on the extent of the increase in labor force participation (Algan *et al* 2012). Specifically, at a given level of labor force, the crowd-in effect implies that expanding public employment must necessarily reduce unemployment. Nevertheless, the findings in the last section show that expanding public employment encourages more workers to join the labor market. With a rising number of job seekers, unemployment is expected to increase.

To test this hypothesis, I estimate a similar model to the labor force model. The dependent variable is measured as quarterly change in unemployment, relative to lagged total employment ( $un_{dq} - un_{dq-1} / tot\_emp_{dq-1}$ ). The results are reported in Column (4) – (6) of Table (4). The OLS estimate of public employment is positive and significant at 1%. This indicates that expanding public employment by 100 jobs would increase the number of unemployed by about 150 individuals. Though, this estimate is likely biased due to simultaneity concern that rising unemployment rate drove the expansion of public employment. To address this issue, I employ the IV model, which consistently produces smaller effect; about 119 unemployed individuals.

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<sup>24</sup>One concern of the labor supply results is that the increase in labor force participation may be driven by population growth. To the extent that population growth rate is common across districts, its effect will be accounted for by the quarter (time) fixed effects.

To sum up, the expansion of public employment has made it more appealing for individuals to join the labor market; either to apply for new vacancies in the public sector, or to seek employment in the private sector as job opportunity expanded due to the crowd-in effect. However, as shown above, the increase in the number of labor force participants tops the number of jobs created in the private sector. Moreover, the number of jobs created in the public sector is fewer than the number of those seeking them. For example, the share of vacancies, relative to the number of applications, in the Ministry of Education<sup>25</sup> did not exceed 8% between 2010 and 2013.<sup>26</sup> To this end, it can be concluded that while many individuals join the labor force as public employment expands, not all succeed to find jobs, and become unemployed.

### 5.3 The Effect of Public Wage Premium

According to Algan *et al.* (2002), returns to seeking public jobs increase with public wages. They suggest that, for a given level of labor supply, expanding public sector with higher wages attract workers out of private sector and thus decrease private employment. They also show that the crowd-out effect applies to countries with higher public wages. To explore this venue, I firstly estimate a Mincer (1974) wage model to unfold wage differentials between public and private workers. The Mincer wage model is specified in the following fashion:

$$\log W_{idq} = \gamma D_{dq} + \mathbf{B}_1 \mathbf{Z}_{idq} + \mu_d + \gamma_q + e_{ijq} \dots\dots(4)$$

where  $\log W_{ijq}$  is the logarithmic daily wage, measured in new Israeli Shekel, for worker "i", who resides in district "d" observed in quarter "q" during the Second Intifada period. The sample excludes workers from Jerusalem, the Gaza strip, and those reportedly commuting to the Israeli labor market. The dummy variable "D" captures the wage differential between private and public workers (public wage premium). The dummy variable takes a value of 1 for public workers and 0 for private workers (the reference group).

The vector "Z" includes a host of control variables to sort out differences in socioeconomic characteristics, including gender; years of education; age and age squared; and marital status. The model also controls for job characteristics, including number of

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<sup>25</sup><http://www.moche.gov.ps/services/Employees-Services/Educational-Jobs-Statistics>.

<sup>26</sup>Data on vacancies and number of job applicants in the ministry of education is readily available prior to 2010. Nonetheless, information obtained from interviews with officials from the ministry assert that the imbalances between vacancies and job applications have been the norm.

months a worker has been employed by the current employer as well as type of industry and type of occupation in which both are classified at the four digit level. The vectors " $\mu_d$ " and " $\gamma_q$ " controls for district and quarter fixed effects, respectively. The source of data is PCBS' labor force survey. The results show no evidence of wage premium; the estimate of private-public dummy variable is -0.004 but statistically insignificant (p-value = 0.75).<sup>27</sup> I further examined how increases in public wage affect private employment growth. In this respect, I re-estimate model (1), adding district's changes in public wages. The OLS results<sup>28</sup> show that the effect of public wage premium is positive but statistically insignificant at the conventional level (p-value = 0.57). The results remain the same when using the IV technique.

Furthermore, according to Algan *et al* (2002), public fringe benefits may also attract workers out of the private sector. Unlike the majority of private workers<sup>29</sup> in the occupied West Bank, Palestinian public workers enjoy a host of fringe benefits, such as paid vacations, pension, and health insurance. Still, the rising unemployment rate and limited capacity of the PA to absorb excess labor supply may render the channel of fringe benefit ineffective. The evidences exhibited in this section further explain why expansion in public employment has no crowd-out effects.

## 6. Conclusion and Policy Implications

This paper investigates the short run effect of creating more public jobs on private employment in the occupied West Bank of Palestine during the Second Intifada period. It provides evidences that creating more public jobs increases overall private employment. The findings also show that private employment also increases in both the tradable and non-tradable sectors, but disproportionately favoring the latter. This conclusion is at odds with most empirical literature, which either favors the crowd-out effect or limits the crowd-in effect to the non-tradable sector.

A main contribution of this paper is to empirically test the channels that explain its findings. Building on the theoretical work of Faggio and Overman (2014) and Algan *et al* (2002), the paper shows that the crowd-in effect is driven by the increase in local demand

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<sup>27</sup>As for the socioeconomic effects on wages, the estimates are in accordance with the documented literature. For example, wages tend to increase with years of education. Wages also increase with age, though at a decreasing rate as captured by age squared variable.

<sup>28</sup> The identification assumption of the re-estimation of model (1) is that public wages are exogenous to changes in local labor market conditions as they are determined nationally.

<sup>29</sup>While the Palestinian labor law grants private workers many of the fringe benefits, compliance rate in the private sector is limited to about 20% of total workers (Fallah 2018).

for tradable and non-tradable sector. It also shows that the effect on private wages, as a main off-setting factor of the crowd-in effect, is neutralized possibly due to expansion in labor force participation. Interestingly, the increase in labor force participation exceeds the increase in public and private employment (crowd-in effect), leading to increases in the number of unemployed.

The paper also sheds light on other mechanisms, including the public wage premium. The results show that, holding workers' socioeconomic characteristics and type of industry and occupation constant, average public and private wages are similar. In addition, unlike in many countries, the growth in public employment is primarily financed by international cash grants and thus taxes play, at best, a minor role in lowering the demand in private sector. These two factors provide further explanation as why we observe the documented crowd in effect.

The finding of this paper generates interesting policy implications. Commonly, limiting public hiring is often prescribed for developing countries to reduce fiscal stress during ill economic conditions. The findings of this research suggest that such a policy might back fire and negatively affect labor market outcomes. Put differently, expanding public employment is possibly one avenue to revive the private sector and create more jobs in a labor market with excess labor supply. At the Palestinian level, this research suggests that expanding public employment, mostly financed by international grants, was vital to limit the negative demand shocks during Second Intifada period.

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**Appendix: Table (1): Effect of Expanding Public Employment on Waged-Private Employment**

Variable	OLS				IV			
	1	2	3	4	5	6	7	8
Public Employment Contribution	0.90 (2.32)**	0.91 (2.37)**	0.70 (2.44)**	0.68 (2.55)**	0.71 (2.41)**	0.74 (2.36)**	0.54 (2.26)**	0.52 (2.3)**
Commuting Contribution	No	No	0.52 (3.13)***	0.60 (2.98)**	No	No	0.58 (2.76)**	0.67 (2.74)**
lagged Palestinian fatalities	No	No	No	-0.002 (-2.79)**	No	No	No	-0.002 (-2.87)**
Education Shares	No	Y	Y	Y	No	Y	Y	Y
Age Composition	No	Y	Y	Y	No	Y	Y	Y
Share of population living in Urban and Rural areas	No	Y	Y	Y	No	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y
Quarter (time) FE	Y	Y	Y	Y	Y	Y	Y	Y
Constant	0.01 (0.42)	0.62 (0.45)	0.32 (0.33)	0.76 (0.73)	0.02 (0.75)	0.53 (0.37)	0.22 (0.24)	0.72 (0.74)
No. of obs	162	162	162	152	162	162	162	152
Adjusted R square	0.37	0.39	0.49	0.50	0.36	0.38	0.48	0.49
	First Stage Estimation							
IV estimate					-1.56 (-27.63)***	-1.61 (-27.29)***	-1.53 (-26.28)***	-1.53 (-24.74)***
F-statistics					32.93	24.77	27.49	25.96

Robust standard errors (Huber-White method) clustered at district level in parentheses. t-statistics are reported in the parenthesis. The symbols\*, \*\*, and \*\*\* represent statistical significance at the 10, 5, and 1 percent levels. The dependent variable is measured as the quarterly change in the district's number of waged private employees divided by the lagged value of district's overall employment. The public employment contribution is measured as the quarterly change in the district's number of public employees divided by the lagged value of district's overall employment. The commuting Contribution is measured as the quarterly change in the district's number of Palestinian workers employed in the Israeli labor market divided by the lagged value of district's overall employment. The education share variables include share of labor force participants with secondary, and post-secondary education. The reference group is the share of workers with less than secondary education. The age structure variables using share of labor force that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21). The IV is measured as the quarterly change in the logarithmic value of total public employment in the West Bank multiplied by district's share of public employment measured in the initial period (first quarter of 1999).

**Table (2): The Cross Sector Effect of Public Employment**

Variable	Non-tradable Sector	Tradable Sector	Non-tradable Sector	Tradable Sector
	OLS		IV	
	1	2	3	4
Public Employment Contribution	0.41 (2.63)**	0.26 (2.47)**	0.34 (2.45)**	0.19 (2.45)**
Commuting Contribution	0.44 (3.95)***	0.14 (1.59)	0.47 (3.70)***	0.18 (1.52)
lagged Palestinian fatalities	-0.001 (-3.1)†	-0.0005 (-1.54)	-0.001 (-3.1)†	-0.0005 (-1.60)
Education Shares	Y	Y	Y	Y
Age Composition	Y	Y	Y	Y
Share of population living in Urban and Rural areas	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Quarter (time) FE	Y	Y	Y	Y
Constant	0.17 (0.22)	0.37 (0.70)	0.13 (0.18)	0.31 (0.62)
No. of Obs	160	152	160	152
Adjusted R square	0.4505	0.37	0.45	0.36
IV estimate		First Stage Estimation		
			-1.54	-1.53 (-)
F-statistics			(-26.34)***	24.74)†=***
			27.55	25.69

Robust standard errors (Huber-White method) clustered at district level in parentheses. t-statistics are reported in the parenthesis. The symbols\*, \*\*, and \*\*\* represent statistical significance at the 10, 5, and 1 percent levels. The dependent variable is measured as the quarterly change in the district's number of waged private employees, in the tradable (non-tradable) sectors, divided by the lagged value of district's overall employment. The public employment Contribution is measured as the quarterly change in the district's number of public employees divided by the lagged value of district's overall employment. The commuting contribution is measured as the quarterly change in the district's number of Palestinian workers employed in the Israeli labor market divided by the lagged value of district's overall employment. The education share variables include share of labor force participants with secondary, and post-secondary education. The reference group is the share of workers with less than secondary education. The age structure variables using share of labor force that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21). The IV is measured as the quarterly change in the logarithmic value of total public employment in the West Bank multiplied by district's share of public employment measured in the initial period (first quarter of 1999).



Table (3): Effect of Expanding Public Employment on Number of Entrepreneurs

Variable	All	Non-tradable	Tradable	All	Non-tradable	Tradable
	1	OLS 2	3	4	IV 5	6
Public Employment Contribution	0.81 (2.93)**	0.59 (3.39)***	0.23 (2.12)*	0.64 (3.24)***	0.48 (3.56)***	0.17 (2.26)***
Commuting Contribution	0.78 (3.53)***	0.58 (4.32)***	0.19 (1.98)*	0.86 (3.14)**	0.63 (3.79)***	0.22 (1.86)*
Lagged Palestinian Fatalities	-0.0006 (-0.67)	-0.0005 (-0.63)	0.00001 (-0.00)	-0.0005 (-0.70)	-0.0004 (-0.58)	0.00001 (-0.06)
Education Shares	Y	Y	Y	Y	Y	Y
Age Composition	Y	Y	Y	Y	Y	Y
Share of population living in Urban and Rural areas	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y
Quarter (time) FE	Y	Y	Y	Y	Y	Y
Constant	1.78 (2.24)**	1.12 (1.73)	0.71 (1.60)	1.69 (2.15)**	1.06 (1.59)	0.67 (1.59)
N	160	160	155	160	160	155
Adjusted R square	0.59	0.58	0.41	0.58	0.57	0.40
IV estimate				-1.54 (-26.34)***	-1.54 (-26.34)***	-1.51 (-26.24)***
F-statistics				27.55	27.55	29.04

Robust standard errors (Huber-White method) clustered at district level in parentheses. t-statistics are reported in the parenthesis. The symbols\*, \*\*, and \*\*\* represent statistical significance at the 10, 5, and 1 percent levels. The dependent variable is measured as the quarterly change in the districts' total number of entrepreneurs (Column 1 and 4), in the non-tradable sector (Column 2 and 5), and tradable sector (Column 3 and 6) in which each is divided by the lagged value of district's overall employment. The public employment contribution is measured as the quarterly change in the district's number of public employees divided by the lagged value of district's overall employment. The commuting contribution is measured as the quarterly change in the district's number of Palestinian workers employed in the Israeli labor market divided by the lagged value of district's overall employment. The education share variables include share of labor force participants with secondary, and post-secondary education. The reference group is the share of workers with less than secondary education. The age structure variables using share of labor force that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21). The IV is measured as the quarterly change in the logarithmic value of total public employment in the West Bank multiplied by district's share of public employment measured in the initial period (first quarter of 1999).

Table (4): The Effect of Expanding Public Employment on Labor Force and Unemployment.

Variable	Unemployment		Labor Force Participation	
	OLS	IV	OLS	IV
	1	2	3	4
Public Employment Contribution	1.50 (4.25)***	1.1942 (3.28)***	2.1331 (3.58)***	1.6817 (3.19)***
Commuting contribution	0.30 (0.90)	0.4315 (1.33)	1.8911 (3.90)***	2.09 (3.80)***
lagged Palestinian fatalities	-0.001 (-0.58)	-0.001 (-0.43)	-0.003 (-1.08)	-0.003 (-0.87)
Education Shares	Y	Y	Y	Y
Age Composition	Y	Y	Y	Y
Share of population living in Urban and Rural areas	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Quarter (time) FE	Y	Y	Y	Y
Constant	-0.47 (-0.62)	-0.55 (-0.72)	-0.18 (-0.23)	-0.30 (-0.35)
N	159	159	159	159
Adjusted R square	0.52	0.51	0.66	0.65
IV estimate		-1.5 (-25.34)** *		-1.5 (-25.34)** *
F-statistics		27.32		27.32

Robust standard errors (Huber-White method) clustered at district level in parentheses. t-statistics are reported in the parenthesis. The symbols\*, \*\*, and \*\*\* represent statistical significance at the 10, 5, and 1 percent levels. The dependent variable in Column (1) and (2) is measured as the quarterly change in the district's number of labor force participants divided by the lagged value of district's overall employment. The public employment Contribution is measured as the quarterly change in the district's number of public employees divided by the lagged value of district's overall employment. The commuting contribution is measured as the quarterly change in the district's number of Palestinian workers employed in the Israeli labor market divided by the lagged value of district's overall employment. The education share variables include share of labor force participants with secondary, and post-secondary education. The reference group is the share of workers with less than secondary education. The age structure variables using share of labor force that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21). The IV is measured as the quarterly change in the logarithmic value of total public employment in the West Bank multiplied by district's share of public employment measured in the initial period (first quarter of 1999).

Table (5): Effect of Expanding Public Employment Using Employment Growth Rate.

VARIABLES	Waged private Employment		Waged private Employment tradable sector		Waged private Employment non-tradable sector		Entrepreneur non-tradable sector		Entrepreneur tradable sector	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV	(9) OLS	(10) IV
Public Employment Contribution	0.562** (2.342)	0.539** (2.627)	0.820** (2.874)	0.817*** (3.533)	0.523* (2.056)	0.528* (2.179)	0.527*** (3.422)	0.454*** (3.457)	1.846* (2.204)	1.407** (2.320)
Commuting Contribution	2.833*** (4.532)	2.872*** (4.620)	2.350* (2.069)	2.356* (1.986)	2.968*** (4.941)	2.960*** (5.388)	3.484*** (4.838)	3.608*** (4.531)	9.344 (1.702)	10.16 (1.635)
lagged Palestinian fatalities	-0.00434 (-0.579)	-0.00430 (-0.570)	-0.0118 (-1.607)	-0.0118 (-1.600)	-0.00363 (-0.281)	-0.00364 (-0.281)	-0.00658 (-1.471)	-0.00650 (-1.460)	0.0217 (0.831)	0.0213 (0.837)
Education Shares	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Age Composition	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Share of population living in Urban and Rural areas	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
District FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Quarter (time) FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Constant	3.098** (2.754)	3.371** (3.104)	1.304 (0.793)	1.298 (0.818)	6.056*** (3.507)	6.060*** (3.473)	1.521 (0.903)	1.442 (0.880)	14.70* (1.968)	15.19* (2.058)
First Stage Estimates										
IV estimate		- 6.844*** (-34.05)		- 6.844*** (-34.05)		-6.76*** (-36.29)		-6.76*** (-36.29)		- 6.69*** (-34.88)
F-statistics		47.17		47.17		51.06		51.06		49.17
Observations	152	152	152	152	160	160	160	160	155	155
R-squared	0.576	0.576	0.393	0.393	0.545	0.545	0.631	0.629	0.498	0.493

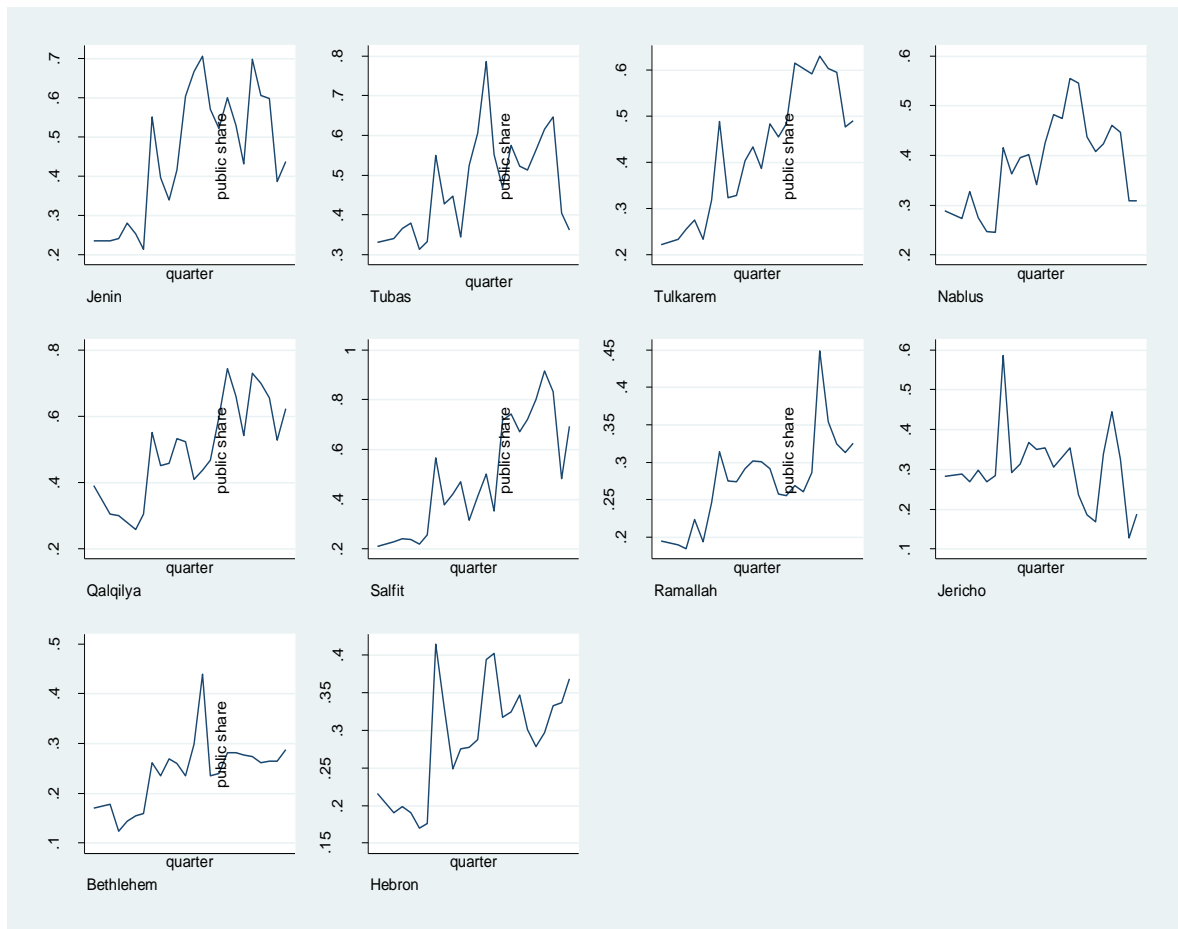
Robust standard errors (Huber-White method) clustered at district level in parentheses. t-statistics are reported in the parenthesis. The symbols\*, \*\*, and \*\*\* represent statistical significance at the 10, 5, and 1 percent levels. The dependent variable is measured as the quarterly growth rate in the district's: total number of waged private employment (Column 1 and 2), waged private employment in the non-tradable sector (Column 3 and 4), wage employment in tradable sector (Column 5 and 6), entrepreneurs in the non-tradable sector (Column 7 and 8, and entrepreneurs in the tradable sector (Column 9 and 10). The public employment contribution is measured as the quarterly change in the number of public employees divided by the lagged value of district's overall employment. The commuting contribution is measured as the quarterly change in the district's number of Palestinian workers employed in the Israeli labor market divided by the lagged value of district's overall employment. The education share variables include share of labor force participants with secondary, and post-secondary education. The reference group is the share of workers with less than secondary education. The age structure variables using share of labor force that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21). The IV is measured as the quarterly change in the logarithmic value of total public employment in the West Bank multiplied by district's share of public employment measured in the initial period (first quarter of 1999).

Table (6): Effect of Expanding Public Employment on Entrepreneurs: Self Employed versus Employers.

VARIABLES	Self Employed		Employers	
	(1) OLS	(2) IV	(3) OLS	(4) IV
Public Employment Contribution	0.656*** (3.267)	0.524*** (3.633)	0.154* (1.857)	0.119 (1.778)
Commuting Contribution	0.683*** (3.957)	0.741*** (3.474)	0.103 (1.766)	0.118 (1.666)
lagged Palestinian fatalities	-0.000973 (-1.249)	-0.000937 (-1.282)	0.000336 (0.718)	0.000346 (0.785)
Education Shares	Y	Y	Y	Y
Age Composition	Y	Y	Y	Y
District FE	Y	Y	Y	Y
Quarter (time) FE	Y	Y	Y	Y
Constant	0.553 (1.761)	0.605* (1.915)	0.138 (1.702)	0.137* (1.845)
First Stage Estimates				
IV estimate		-1.53*** (-26.59)		-1.53*** (-26.59)
F-statistics		29.06		29.06
Observations	160	160	160	160
R-squared	0.677	0.671	0.469	0.463

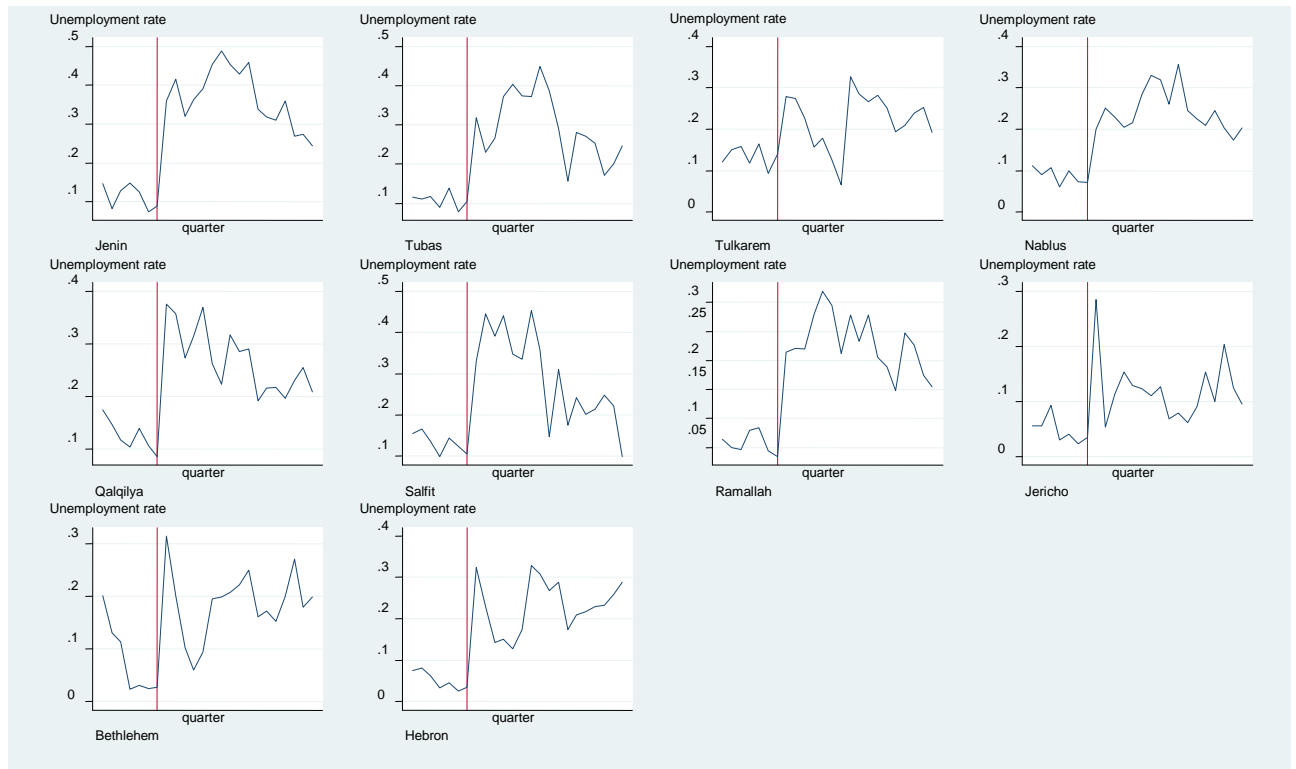
Robust standard errors (Huber-White method) clustered at district level in parentheses. t-statistics are reported in the parenthesis. The symbols\*, \*\*, and \*\*\* represent statistical significance at the 10, 5, and 1 percent levels. The dependent variable is measured as the quarterly change in the number of the self employed (Column 1 and 2) and employers (Column 3 and 4) in which each is divided by the lagged value of district's overall employment. The public employment contribution is measured as the quarterly change in the number of public employees divided by the lagged value of district's overall employment. The commuting contribution is measured as the quarterly change in the number of Palestinian workers employed in the Israeli labor market divided by the lagged value of district's overall employment. The education share variables include share of labor force participants with secondary, and post-secondary education. The reference group is the section of workers with less than secondary education. The age structure variables using share of labor force that belong to the following age categories: 21-25, 26-35, 36-45, 46-50, 50-65, and older than 65. The reference group is young individuals (younger than 21). The IV is measured as the quarterly change in the logarithmic value of total public employment in West Bank multiplied by district's share of public employment measured in the initial period (first quarter of 1999).

Figure (1) Change in Public Employment Share, Relative to Total Waged Employment, Across Districts (1999 – 2004)



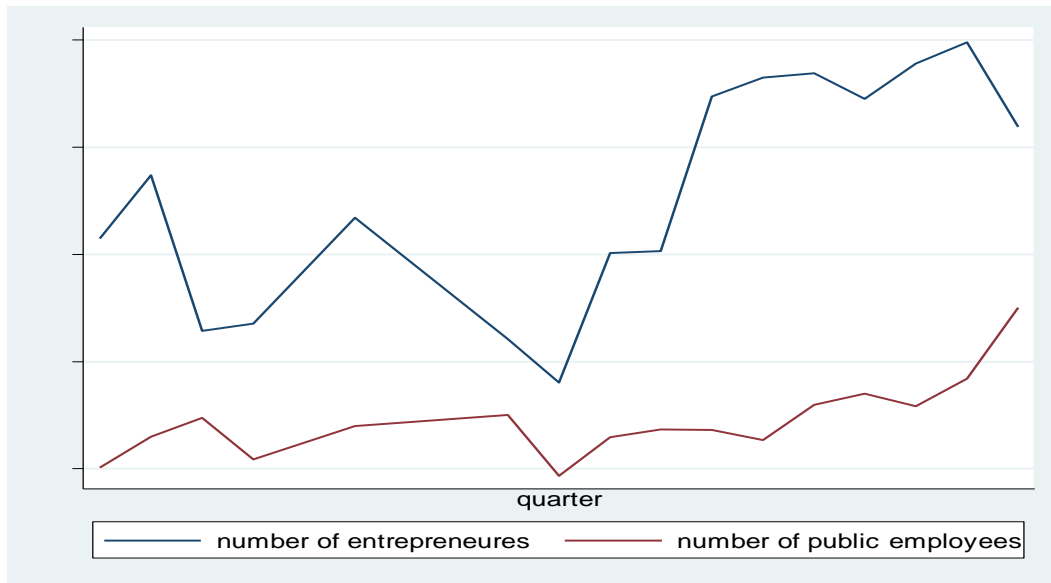
Source of Data is PCBS's Labor Force survey. For each district in the West Bank, excluding east Jerusalem, the figure quarterly tracks the share of public employment, relative to waged employment between 1999 and 2004.

Figure (2): Unemployment Rate Across District (1999-2004)



The source of data is PCBS's Labor Force survey. For each district in the West Bank, excluding east Jerusalem, the figure quarterly tracks unemployment rate between 1999 and 2004. Unemployment rate is calculated as the district's number of unemployed divided by the districts labor force participation. The reference line marks the break out of the Second Intifada.

Figure (3): Association between number of Non-Agricultural Entrepreneurs and Number of Public Jobs: 2000-2004.



The source of data is PCBS's Labor Force survey. The number of non-agricultural entrepreneurs and public employees are calculated for the West Bank, excluding East Jerusalem.

**Table (I): Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
private employment growth	620	0.028	0.215	-0.691	3.035
Public employment contribution	620	0.005	0.046	-0.195	0.461
Commuting contribution	600	0.001	0.062	-0.506	0.417
Education shares:					
Primary education	630	0.209	0.041	0.105	0.329
Elementary education	630	0.318	0.041	0.202	0.474
Secondary education	630	0.140	0.030	0.059	0.247
Post-secondary education	630	0.230	0.056	0.065	0.390
Age Shares					
21-25 years old	630	0.117	0.035	0.037	0.221
26-35 years old	630	0.166	0.022	0.095	0.229
36-45 years old	630	0.304	0.032	0.202	0.404
46-50 years old	630	0.231	0.027	0.138	0.321
50-65 years old	630	0.074	0.017	0.025	0.118
older than 65	630	0.094	0.019	0.046	0.145
Non-tradable private employment growth	569	0.006	0.055	-0.206	0.604
Service employment growth	602	0.004	0.043	-0.158	0.453
Manufacturing employment growth	592	0.002	0.028	-0.076	0.386
Construction employment growth	569	0.001	0.023	-0.116	0.151
Entrepreneur growth	603	0.009	0.093	-0.347	1.517
Service-entrepreneur change	620	0.005	0.046	-0.169	0.709
Manufacturing-entrepreneur growth	610	0.002	0.023	-0.070	0.404
Construction-entrepreneur growth	611	0.001	0.018	-0.055	0.187
Unemployment rate	630	0.187	0.077	0.024	0.488
Unemployment growth	620	0.006	0.119	-0.436	1.346
Labor force growth	602	0.015	0.181	-0.687	2.753



Dear Dr. Richard Frensch,

I would like to thank you for giving me the opportunity to respond to the referee's comments. Below I address them in order. The modifications in the manuscript are highlighted in yellow.

1. *I still do not understand why people in the West Bank register as unemployed in response to more public jobs being available. Is there any advantage of being officially registered as unemployed for being offered or assigned such a job? Answering this question necessitates a deeper understanding and presentation of the underlying institutional setup and mechanisms, which I think is, in light of the focus of the paper ('Effects of a rise in public jobs on the labor market in the West Bank'), a key contribution of the paper.*

The findings of the paper show that expanding public employment encourages more individuals to seek employment in the labor market (increase in labor force participation); either to apply for new vacancies in the public sector or seek employment in the private sector as job opportunity expanded due to the crowd in effect. Nonetheless, the increase in the number of labor force participants tops the number of jobs created in the private sector and in the public sector. Thus, it can be concluded that while many individuals join the labor force as public employment expands, not all succeed to find jobs and become unemployed. Please see last paragraph in page 16-extended to page 17.

2. *Likewise, I am still surprised by the ostensibly large effect of public employment on entrepreneurship (84 more entrepreneurs on every 100 additional public sector jobs). This is less of an institutional question but would, for my take, require more efforts on providing descriptives on the evolution of entrepreneurship during the time of investigation (time series of the absolute number of entrepreneurs (e.g., by means of a figure); raw correlation between changes in public jobs and changes in entrepreneurs (e.g., by means of a correlogram)) so as to see that entrepreneurship has indeed picked up and that this is plausibly related to public employment.*

I would like to assert that the preferred estimates in the manuscript are the IV estimates. With this, the preferred crowd-in estimate in the entrepreneur model is lower (64). That is expanding public employment by 100 jobs would increase the number of entrepreneurs by 64.

I agree with the referee remarks to provide more descriptive analysis on the evolution of entrepreneurs during the study period. Please see third paragraph in page 13, where I document the correlation between the number of entrepreneurs and number of public employees (0.55). I also utilize a graph (Figure 3) to show how these two variables evolve over the study period.

3. *The authors now provide results from using simple growth rates as dependent variables, which I appreciate. However, the reason for resorting to their preferred indicators in the subsequent analysis (i.e., their argument that this allows for a differentiation between tradable and non-tradable sectors) is unclear. I consent with the idea to keep the later equations based on the more complex indicator - I am just not convinced that the reference to the tradable and non-tradable sectors is the best argument one can advance for this choice.*

The argument of using  $(private_{da} - private_{da-1}) / tot\_emp_{da-1}$  and  $(public_{da} - public_{da-1}) / tot\_emp_{da-1}$  as preferred variables is that they quantitatively decompose the total crowd-in effect of the public employment by type of sector; tradable versus non-tradable. Thus, it allows explore the distributional effect of expanding public employment. Please see paragraph 2 in page 12, where it is now better explained to reflect the exact meaning of the distributional effect.

4. *The authors confirm in their replies that the Gaza Strip is excluded from the analysis. Why don't they make this point clear right from the start in the paper so as to avoid confusion?*

Please see the third paragraph in the introduction section (page 2), where the objective of the study shows that the exploration of the study is limited to the West Bank. I also modified the title of the paper to reflect the scope of the study. It now becomes “The Effect of Public Sector on Private Jobs: Evidence from the West Bank.”

5. *The name 'Moretti' is still spelled wrong on page 6.*  
It is now corrected.

6. *The paper is in need for a thorough language and grammar check (see, e.g., 'How Expanding Public Sector Increases Private Employment?' on page 13 as only one example).*

I gave the manuscript another round of language edit. I believe it is now improved.

## **The Effect of Public Sector on Private Jobs: Evidence from Palestine**

### **Highlights**

This paper investigates the short run effect of creating more public jobs on private employment in the occupied West Bank of Palestine during the Second Intifada period. It provides evidences that creating more public jobs increases overall private employment. The findings also show that private employment also increases in both the tradable and non-tradable sectors, but disproportionately favoring the latter. This conclusion is at odds with most empirical literature, which either favors the crowd out effect or limits the crowd in effect to the non-tradable sector.

A main contribution of this paper is to empirically test the channels that explain its findings. They include positive public employment effect on local demand, lack of public wage premium, as well as no effect on private wages. It also shows that the latter is neutralized due to expansion in labor force participation. Interestingly, the increase in labor force participation exceeds that of public and private employment (crowd in effect), leading to increases number of job seekers.

To: **The Editor of the *Journal of Economic Systems***

Subject: Manuscript “**The Effect of Public Sector on Private Jobs: Evidence from Palestine**”

Dear Editor,

Please find enclosed the revised manuscript “**The Effect of Public Sector on Private Jobs: Evidence from Palestine**”, which I would like to submit for publication in the *Journal of Economic Systems*.

I would like to thank you for the opportunity to revise the manuscript and accommodate the feedback from the referees. I have addressed all their comments, which truly enriched the paper, and revised the paper accordingly. I also improved the documentation of the tables and made another round of language edits.

This manuscript has not been previously published and is not under consideration by another publisher at this time.

I appreciate your consideration of our manuscript and look forward to your comments.

Yours sincerely,  
Belal Fallah

## The Effect of Public Sector on Private Jobs: Evidence from the West Bank

Belal Fallah<sup>1</sup>

### Abstract

This paper estimates the short run effect of creating more public jobs on private employment in the occupied West Bank. Unlike most cited research, the results provide evidence that favors crowd-in effect both at the aggregate employment level and across sectors. A main contribution of the paper is to empirically explore the underlying mechanisms that drive the results. They include positive public employment effect on local demand, lack of public wage premium, as well as no effect on private wages. It turns out that an increase in the local labor force participation is a driving factor for the latter channel. Interestingly, the increase in labor force participation exceeds that of public and private employment, leading to an increase in the number of job seekers.

**Keywords:** public employment, labor demand, crowd in effect, excess labor supply

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