# WAGE DIFFERENTIALS AND ECONOMIC RESTRICTIONS: EVIDENCE FROM THE OCCUPIED PALESTINIAN TERRITORIES

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**Abstract**

The article examines the wage impact of Israel's constraints on economic activities and infrastructure development in the West Bank's Area C. We provide evidence to show that Area C workers suffer a wage penalty of about 8 percent relative to workers in Areas A and B. The results also show that when controlling for worker characteristics, the magnitude of the Area C wage differential drops by about half. We then extend our analysis to compare average wages between Area C workers and other rural workers and show that the wage difference is statistically insignificant. This indicates that the Area C wage differential we observe can be attributed primarily to a rural environment effect rather than to Israeli economic restrictions placed on Area C *per se*. This result indicates that the effect of Israeli restrictions on Area C wages is neutralized. We show that negative labor supply shocks (commuting) serve as a potential transmission mechanism. Specifically, we show that Area C residents are more likely to commute than their peers in other rural areas.

According to the Oslo peace accords, signed between Israel and the Palestine Liberation Organization (PLO) in 1993, Israel assumes full control over 60 percent of West Bank areas, referred to as Area C (see Figure 1). Area C, mostly rural, is economically important to the Palestinians. The fertility of its agricultural land, the availability of aquifers, and its rich mining reserves are vital to Palestine's economic development. Yet the government of Israel has constrained Palestinian economic activities in this area in general and, in particular, infrastructure development such as construction. Currently, Israel bans expanding construction, which deters development projects in about 70 percent of the area.[1]

This article considers one aspect of the impact of Israel's development restrictions on Palestine's economy, namely, the impact on Area C wages. We view Area C restrictions as a disincentive to attract firms or to expand existing businesses, thus adversely affecting labor demand and leading to lowered wages. Wage effects of course also depend on labor supply. Drawing on extensive panel labor force data from the Palestine Census Bureau of Statistics (PCBS), we provide evidence to show that Area C workers suffer a wage penalty relative to workers in areas A and B. While Area C wage differentials in part reflect the rural character of the area, the results also indicate that the adverse effect of the Israeli restrictions on Area C wages is neutralized, with labor supply shocks (commuting) serving as the potential transmission mechanism.

The next section provides an overview of development restrictions in Area C. This is followed by a simple theoretical model that relates development restrictions to wage changes. The empirical strategy, including data descriptions and model specifications, and the empirical findings are then discussed. The final section summarizes.


**Figure 1**: Areas A, B, and C. *Source*: Political Geography Now. *Source*: www.polgeonow.com. Used by permission.

## Overview of development restrictions in Area C

Since 1993 the West Bank has been divided into three distinct areas: A, B, and C. Area A covers about 18 percent of the West Bank and includes major populated areas such as the cities of Bethlehem, Hebron, Jericho, Nablus, and Ramallah. Area B consists of 22 percent of the West Bank, including large rural areas. The remaining West Bank land, Area C, is mostly rural and sparsely populated at around 180,000 people (about 7 percent of the West Bank's population).[2]

What distinguishes Area C is that its security and many aspects of civil services, including planning, construction, and infrastructure, are fully under Israeli control. The Palestinian Authority (PA) is responsible for providing education and health services for Area C residents. The partition of the West Bank was meant to be transitory. According to the Oslo peace accords, Israel was to transfer all control to the Palestinian Authority within a few years of signing the 1993 peace accord. Yet in the name of security, Israel still maintains full control over Area C, causing severe economic underdevelopment. In particular, Israeli authorities prohibit any type of infrastructure development. A number of restrictive measures have been devised for Area C, such as designating around 40 percent of Area C as state land where Palestinians are not allowed to carry on any construction or development activities at all. Israel has exclusively allocated this land to build and expand Israeli settlements. An additional 30 percent of Area C, mainly in the Jordan valley, are designated as military zones and nature reserves. Other restrictive measures include the banning of any construction within 70 meters along each side of regional roads that are intended to serve Israeli settlements in the West Bank. As for the remaining 30 percent of Area C, Israel imposes severe restrictions on construction activities, except for already built-up communities.[3]

A World Bank report from 2008 shows that during the 2000-2007 period, less than 6 percent of the 1,624 construction requests made for Area C were approved.[4] This has exposed Area C residents to high risks of housing and infrastructure demolition for facilities that did not receive prior approval from Israeli authorities. (In fact, during the same period, about 1,660 facilities were demolished.) Israel's Area C restrictions extend to public infrastructure projects which are often delayed or refused. The report notes restrictions' adverse effects on Palestine's agricultural and other economic sectors. Notably, the significant number of roadblocks, checkpoints, and the long stretch of the separation wall has reduced farmers' access to agricultural land and to markets, leading to increased transportation costs. The report further discusses the limitations of industrial development in Area C. Permits to develop industrial facilities rarely are granted. This has hampered industries such as stone and marble, construction, and tourism.

**The West Bank is divided into three areas, the so-called Areas A, B, and C. The government of Israel has placed certain restrictions on economic activity within Area C. This article studies the effect, if any, that these restrictions may have on wage differentials between Palestinian workers in Area C relative to workers in Areas A and B. The main finding is that wage differentials are due, in part, to the predominantly rural character of Area C but that, in addition, Israeli restriction have also induced labor demand and supply shocks leading to interarea migration and commuting that, in turn, affect wage rates across all three areas.**

An even more recent World Bank report shows that restricted access to education for Palestinians who live in Area C increases their poverty rate. Also, restricting access to agricultural land in Area C reduces both the amount of land that is cultivated and its productivity. The report suggests that lifting these restrictions and exploiting Dead Sea minerals would revive the Palestinian economy by an annual USD2.2 billion, equivalent to about 23 percent of 2011 GDP.[5]

## Theoretical model, data, and empirical strategy

### *The model*

The effect of development restrictions on Area C can be modeled within a straightforward labor supply and demand framework. We assume that, prior to any development restrictions, workers across areas A, B, and C operate in similar labor markets. Accordingly, we assume that an equilibrium wage would prevail at a common wage level of $w^*$.

We then conceive of Area C development restrictions as disincentives for businesses who otherwise would wish to operate in this area. The restrictions result in an adverse labor demand shock that is expected to decrease the average wage in Area C to $w'$, where $w' < w^*$. In the short run, the level of $w'$ depends on the magnitude of the negative demand shock, as well as on labor demand and supply elasticities. In the long run, the decrease in Area C's average wage would induce Area C workers to migrate or commute to other areas, thus leading to a negative shift in Area C's labor supply as well. This would then result in an increase in the average Area C equilibrium wage from $w'$ to w". Whether this wage increase restores the initial equilibrium ($w'' = w^*$) depends on the relative magnitude of the demand and supply shifts, holding demand and supply elasticities constant. (A formal exposition of this simple theoretical argument is displayed in the Appendix.)[6]

### *Data*

We use individual-level, quarterly PCBS labor force data over the 2001 to 2008 time period. We exclude Gaza's workers as

Area C is in the West Bank. We also exclude observations for workers who report their place of work as Israel or Israeli settlements in the West Bank. The quarterly average share of this worker category is 11 percent of the total workforce. Using pooled-OLS regressions, we find that working in the Israeli labor market earns a Palestinian worker, on average, a 72 percent wage premium.[7] Thus, the reason behind excluding these workers is to avoid an estimation bias that would mask any urban-rural wage differential. Excluding those who work in Israel, reduces the sample size to 60,766 observations in Areas A, B, and C, and 2,371 of which represent Area C workers and commuters.

Before discussing the empirical model, it is informative to indicate spatial differences in worker characteristics between Area C and the other areas. Descriptive statistics (available on request) show that the share of Area C residents who hold 13 years of education or more is 13 percent, about half the share of the other areas. Agriculture is the main employing sector, hiring about 35 percent of Area C workers as compared to 13 percent in other areas. Services, the largest sector in Palestine, is disproportionately concentrated in urban areas, hiring about 41 percent relative to only 24.5 percent in Area C. Area C also tends to differ, slightly, in terms of employment status. Specifically, labor force participation in Area C is 44 percent, 3 percentage points higher than in the other areas, and might reflect a tendency to mitigate Area C's lower average wages. Area C's rate of unemployment is lower by about 1 percent, affecting 8.2 percent of the labor force for the average of the 2001 to 2008 time period.

### *Empirical strategy*

Following the literature, we use regression analysis to capture wage differences, if any, between Area C and the other areas by estimating Mincer's earnings model. In this model workers' wages are a function of their demographic, human capital, and socioeconomic characteristics.[8] It is specified as follows:

$$(1)\quad \log w_{itj} = \gamma C_i + BX_{ijt} + d_j + q_t + e_{it},$$

where the dependent variable, $\log w_{itj}$, is the logarithm of the daily wage for worker $i$ in quarter $t$ in district $j$. A dummy variable, $C_i$, takes a value of 1 for Area C workers and 0 otherwise, and captures the wage differential, if any, for Area C workers. In some specifications we add an Area C residence dummy variable, which takes a value of 1 for Area C residents and zero otherwise. The rationale behind this is to examine whether commuting to Areas A and/or B may offset any Area C wage differential.[9] As our place of work data is available only at the locality level, we are able to identify only those Area C workers who report their place of work also as their place of residence. However, a recent PCBS survey (from 2011) shows that most of Area C commuters report their place of work in areas A and B.

To investigate the importance of worker characteristics as distinct from location (restriction) effects, we add a vector, $X_{itj}$, that includes demographic, socioeconomic, and job characteristics. This includes gender, a dummy variable that takes the value of 1 for females and zero for males. Another dummy variable classifies workers based on marital status. It takes the value 1 for married workers and zero otherwise. We also interact gender with marital status (married × female).

We include workers' age in the model to reflect experience, and age squared to account for life cycle wage earnings. Educational attainment is controlled for by adding workers' years of education. To account for any cross-industry wage differences, a set of dummy variables codes for the type of industry in which people work. The industry vector includes (1) agriculture, hunting, and fishing; (2) mining, quarrying, and manufacturing; (3) construction; (4) commerce, hotels, and restaurants; (5) transportation, storage, and communication; and (6) services and other branches. The reference (omitted) industry is agriculture. We also add seven occupation dummies to control for observable career-skill differences. The groups are legislators, senior officials, and managers; professionals; technicians, associates, and clerks; skilled agricultural and fishery workers; craft and related trade workers; plant and machine operators and assemblers; and elementary occupations. The reference group is elementary occupation.

An employment status vector distinguishes workers based on their type of employer. This includes eight categories: public sector; formal private sector; informal private sector; foreign government; UNURWA; international organization; not-for profit organization; and others. The last one is the reference group. Another employment status dummy variable distinguishes between part-time and full-time workers, the former being the reference group.

The empirical work further includes district fixed effect dummies to control for cross-district differences that vary little over time. In addition, we include a set of regional dummies to (partially) account for wage differentials among cities, rural towns, and refugee camps. Finally, time (quarter) dummies are added to capture any national shocks such as the breakout of the second *intifada* in September 2000 or national demand shocks due to the frequent financial difficulties that have faced the Palestinian Authority (PA) on account of Israel's frequent withholding of the PA's tax returns.

The estimation strategy consists of multiple steps. The first is to estimate the wage differential for Area C workers relative to those working in Areas A and B. In this regression, we add an Area C residence dummy to explore, as explained, the potential effect of commuting to Areas A and B. Moreover, we estimate a separate regression in which the sample is limited to Area C residents (Area C workers and commuters). This is to sort out any area-related unobserved differences in characteristics between Area C as compared to Area A and B workers.

Due to data limitations, we are unable to control for workers' unobserved characteristics, such as their innate ability, that might affect wage differences across workers. To estimate the extent to which any Area C wage differential is attributed to unobserved worker characteristics, we thus use the Oaxaca-Blinder decomposition technique that separates the wage gap into an explained part (workers' endowment effect) and an unexplained part (unobserved workers' characteristics).[10]

To address our main research question—whether Area C restrictions impose a wage penalty (lower wages) beyond the urban-rural effect—we restrict the sample to rural workers. In this analysis, an Area C wage differential is estimated relative to non-Area C rural workers (that is, Area B rural workers). A negative, and statistically significant, coefficient for the Area C work dummy variable would then suggest that an Area C negative wage effect pertains only to Area C workers. We also conduct a robustness analysis to learn how sensitive the results are to model specification. Specifically, we address selection issues which might bias the estimates if the distribution of employed individuals is not random or if there are other factors that might affect the probability of joining the workforce.

**Table 1: Area C wage differential models: Pooled-OLS estimations**

| *Variable/model* | *(1)* | *(2)* | *(3)* | *(4)* | *(5)* |
|---|---|---|---|---|---|
| Area C residence | –0.05 | 0.00 | | | |
| | (–0.99) | (0.04) | | | |
| Area C work | **–0.08** | **–0.05** | **–0.07** | | 0.06 |
| | (–2.09) | (–1.75) | (–2.58) | | (1.12) |
| Rural area | | | | **– 0.13** | |
| | | | | (–11.23) | |
| Years of education | | **0.04** | **0.04** | **0.03** | **0.03** |
| | | (22.34) | (6.68) | (22.28) | (11.49) |
| Age | | **0.03** | **0.03** | **0.03** | **0.04** |
| | | (10.75) | (3.07) | (10.73) | (7.42) |
| Age squared | | **–0.00** | **–0.00** | **–0.00** | **–0.00** |
| | | (–7.69) | (–2.08) | (–7.62) | (–6.08) |
| Married | | **0.06** | 0.06 | **0.06** | –0.04 |
| | | (6.15) | (1.63) | (6.40) | (–1.53) |
| Female | | **–0.36** | **–0.32** | **–0.35** | **–0.60** |
| | | (–25.7) | (–5.51) | (–25.5) | (–15.5) |
| Married × female | | **0.09** | 0.06 | **0.10** | **0.26** |
| | | (5.81) | (1.09) | (6.17) | (5.75) |
| *Dummy variables* | | | | | |
| Industry | No | Yes | Yes | Yes | Yes |
| Occupation | No | Yes | Yes | Yes | Yes |
| Employment status | No | Yes | Yes | Yes | Yes |
| Urban/rural/refugee | No | Yes | Yes | Yes | No |
| District | Yes | Yes | Yes | Yes | Yes |
| Quarter (time) | Yes | Yes | Yes | Yes | Yes |
| Constant | **4.74** | **3.43** | **3.27** | **3.44** | **3.50** |
| | (104.3) | (45.5) | (22.5) | (45.7) | (22.7) |
| N | 60,756 | 60,722 | 2,371 | 60,722 | 7,412 |
| R-squared | 0.10 | 0.42 | 0.41 | 0.42 | 0.32 |

*Notes*: (1) Entire sample I; (2) entire sample II; (3) Area C sample; (4) rural vs. urban; (5) Areas B and C rural observations only. All coefficients are rounded to the second decimal place; *t*-statistics are in parentheses. Coefficients reported in **bold typeface** are statistically significant at the conventional level of 10 percent or better.

## Estimation results

### *Results of the base model*

In this section, we focus on Area C wage differential results, although we briefly discuss notable results associated with the control variables as well. One potential problem with the model in equation (1) is that its residuals might be spatially correlated, biasing the standard errors of the estimates downward. To correct for this potential problem, we use Stata's cluster command, which assumes that the error terms are correlated *within* geographic clusters but uncorrelated *across* them. The geographic clusters are defined as workers' locality of residence.

The results are reported in Table 1. Model 1 presents the estimates of a parsimonious version in which $log\ w_{itj}$ is regressed on the Area C work dummy, Area C residence dummy, quarter dummies, and set of geographic dummies (districts and urban, rural, and refugee camp locations). The estimates will be compared to that of the base model (Model 2). The rationale behind this exercise is to explore the extent to which workers' characteristics explain any Area C wage differential. Thus, in Model 1, the coefficient of the Area C work dummy is negative and statistically significant at the 5 percent level, with an estimate of –0.08. This indicates that, on average, Area C workers earn about 8 percent less than Area C commuters and Areas A and B workers. In contrast, the estimated coefficient for the Area C residence dummy, while also negative, is statistically insignificant. This indicates that commuting from residence in Area C to work in Areas A and B offsets any area wage differentials.[11]

When controlling for workers' observable characteristics, the estimate of the Area C residence dummy remains statistically insignificant, while the negative coefficient of the Area C work dummy drops to 0.05 and is statistically significant at the 10 percent (Model 2). This shows that nearly half of the negative wage differential of Area C workers is captured by differences in workers' observed characteristics.[12] As a robustness check, we re-estimate Model 2 with the sample restricted to Area C observations only (Model 3). The aim is to isolate any unmeasured differences in characteristics between Area C and Areas A and B workers. Using this specification, the coefficient of the Area C work dummy measures the wage differential between Area C workers and Area C commuters. The results of Model 3 show that the Area C work coefficient is negative and highly significant, suggesting that Area C workers earn about 7 percent less than Area C commuters, holding workers' characteristics constant.[13] (Models 4 and 5 are discussed later on in the article.)

As regards the control variables, Model 2 shows that the coefficients of the education and age variables are positive and highly significant. Age also shows a nonlinear effect, with a negative and highly significant coefficient. Further, the results show that the estimated coefficient for female workers, relative to males, is negative and highly significant.

### *Observed versus unobserved worker characteristics effect*

Lack of data has restricted our empirical analysis to compare workers' wages holding observed characteristics constant. Still, unobserved workers' effect might be influential. For example, it could be the case that more able workers are more likely to commute to urban areas, where average wages are higher than in Area C. Consequently, the Area C wage differential might at least in part reflect a sorting effect such that a portion of the observed Area C wage differential reflects unobserved worker characteristics. To shed light on the size, if any, of workers' observed versus unobserved characteristics effect, we use the Blinder-Oaxaca decomposition technique.

The technique is an algorithm for the decomposition of wage differentials, which is based in our case on estimating a separate wage equation for those working in Area C and for Area C commuters. The wage decomposition equation is specified as follows:

$$LnW_{AB} - LnW_C = (\overline{X}_C - \overline{X}_{AB})' B_{AB} + \overline{X}_{AB}(B_{AB} - B_C) + (\overline{X}_{AB} - \overline{X}_C)(B_{AB} - B_B) \tag{2}$$

The left-hand side term is the difference in mean log wages between Areas A and B workers and Area C workers. The right-hand side consists of three parts. The first, which is the difference in the endowment effect between the two worker groups weighted by the parameter estimates ($B_i$) from the Area C commuter model (the reference group), captures the explained part of the model and is attributed to differences in workers' characteristics (the endowment effect). The second term refers to the wage differential that is attributed to differences in the estimated coefficients of both models. And the third part is an interaction term that accounts for the differences in endowment and coefficient effects. The second and third terms together constitute the unexplained part (residual) of the wage differential.

**Table 2: Commuters vs workers, Area C**

| *Variable* | *Commuters* | *Workers* |
|---|---|---|
| Years of education | **0.02** | **0.03** |
| | (6.99) | (5.44) |
| Age | **0.03** | **0.04** |
| | (3.94) | (3.80) |
| Age squared | **–0.00** | **–0.00** |
| | (–2.52) | (–3.03) |
| Part-time | **–0.07** | **–0.18** |
| | (–1.93) | (–4.08) |
| Married | **0.08** | –0.02 |
| | (2.43) | (–0.42) |
| Female | **–0.27** | **–0.41** |
| | (–7.57) | (–7.29) |
| Married × female | 0.01 | **0.18** |
| | (0.12) | (2.42) |
| *Dummy variables* | | |
| Industry | Yes | Yes |
| Occupation | Yes | Yes |
| Employment status | Yes | Yes |
| Urban/rural/refugee | Yes | Yes |
| District | Yes | Yes |
| Quarter (time) | Yes | Yes |
| Constant | **3.17** | 2.73 |
| | (19.70) | (10.27) |
| N | 1,689 | 682 |
| R-squared | 0.50 | 0.40 |

*Notes*: All coefficients are rounded to the second decimal place; *t*-statistics are in parentheses. Coefficients reported in **bold typeface** are statistically significant at the conventional level of 10 percent or better.

The results, reported in Table 2, show that the wage coefficient estimates for Area C workers and Area C commuters are similar to the base model (Table 1, Model 3).[14] Nonetheless, the decomposition analysis shows that around 30 percent of the wage differential can be attributed to differences in workers' observed characteristics (Table 3).[15]

### *Area C wage differentials: Rural or restriction effect?*

So far, we have shown that Area C workers do earn lower wages than workers in Areas B and C. Still, we cannot be sure whether Area C's negative wage differential is driven by the restriction effect as opposed to a rural environment effect. This is because almost all Area C localities are in rural areas.

Economists often suggest that urban wage premiums are attributed to the positive effect of urban agglomeration on worker productivity. The agglomeration effect is likely enacted via cities' role in enhancing learning and knowledge spillovers between firms and workers.[16] Another explanation for the urban-rural wage differential is the coordination hypothesis. It states that agglomeration economies facilitate worker-firm matching due to cities' higher job opening rates and reduced time and cost of job search. Yet other researchers highlight the significance of the sorting effect. Here the suggestion is that urban wage premiums are related to the role of cities as centers of consumption and urban amenities and thus are better able to attract skilled workers. Put differently, spatial differences in the stock of human capital and economic activities might contribute to the urban wage premium.[17]

To sort out the urban/rural wage effect, if any, we first estimate an urban-rural wage differential. This shows whether working in rural areas, including in Area C, imposes a wage penalty relative to working in urban areas. Then, to isolate the rural effect from any Area C restriction effect, we limit the sample to rural workers, i.e., those working in Area C and the rural part of Area B. Accordingly, if the Area C work estimate then turns out to be negative, and statistically significant, we conclude that Area C restrictions exert a negative effect on Area C workers indeed.

The results are in Table 1, Model 4. The coefficient for the rural dummy is negative and highly significant, indicating that rural workers earn, on average, about 13 percent less than do their urban counterparts, holding workers' observed characteristics constant. As for the rural-observations only sample, Model 5 shows that the coefficient for the Area C work dummy is positive but statistically insignificant.[18] This suggests that the Area C wage differential reflects a rural environment effect.[19] (We also estimated a separate regression in which we discard worker characteristics to sort out workers' observed effects. The results, unreported, show that the Area C wage differential estimate remains the same.)

The findings confirm our theoretical expectation, namely that negative labor supply shocks in Area C, that is, migrating or commuting to Areas A and B, are likely neutralizing the economic restrictions' negative wage effects (and restoring the initial equilibrium wage relative to non-Area C rural areas).

To further explore the mechanism of negative labor supply shocks in Area C, we estimate a probit model to examine the likelihood that Area C workers commute, relative to non-Area C rural residents. The rationale for restricting the sample to rural areas is, first, to be consistent with the wage model of the rural sample and, second, to purge all unobserved differences between rural and urban residents that otherwise might bias our commuting estimate.

**Table 3: Blinder-Oaxaca wage decomposition analysis**

| *Variable* | *Log wage* |
|---|---|
| Area C commuters | **4.20** |
| | (368.58) |
| Area C workers | **4.12** |
| | (223.63) |
| Log wage differences | **0.08** |
| | (3.51) |

**Decomposition of log wage difference**

| | |
|---|---|
| *Explained by differences in worker characteristics* | |
| Endowments | 0.02 |
| | (1.46) |
| *Log wage differences due to unobserved effects* | |
| Coefficients | **0.12** |
| | (4.61) |
| Interaction | **–0.06** |
| | (–2.75) |

*Notes*: All coefficients are rounded to the second decimal place; *t*-statistics are in parentheses. Coefficients reported in **bold typeface** are statistically significant at the conventional level of 10 percent or better.

The probit model is specified as follows:

$$(3)\ Commute_{it} = \beta C_i + BX^*_{it} + d_i + q_t + e_{it},$$

where the dependent variable ($Commute_{it}$) takes a value of 1 for non-commuters (those working in the same locality as their place of residence) and zero for commuting workers. The key independent variable is the Area C dummy, $C_i$, which takes a value of 1 for Area C residents and zero otherwise. The vector $X^*_{it}$ includes a number of socioeconomic and demographic control variables, including years of education, age, age squared, gender, marital status, as well as quarter and district dummy variables (and $B$ is the coefficient for the vector). Similar to the wage equation, the sample is restricted to the 2001 to 2008 time period for rural workers above 14 years of age and who do not work in Israel or Israeli settlements in the West Bank.

The results, reported in Table 4, show that the coefficient of Area C dummy is negative and statistically significant, with an estimated magnitude of 0.24. This indicates that Area C residents are more likely to commute relative to other rural residents, *ceteris paribus*. The estimate of the Area C dummy shows that the probability for Area C workers to commute increases by 6 percent. This result provides some evidence to show that Israeli restrictions on Area C induce workers to

**Table 4: Commuting differential between Area C and other rural workers**

| *Variable* | *Commuters* | |
|---|---|---|
| | Coeff. | *z*-statistic |
| Area C, years of residence | **–0.24** | – 2.69 |
| Years of education | **–0.03** | –13.04 |
| Age | **0.10** | 36.93 |
| Age squared | **–0.00** | –38.97 |
| Married | **2.00** | 8.45 |
| Female | **–0.65** | –18.50 |
| Married × female | –0.02 | – 0.64 |
| *Dummy variables* | | |
| District | Yes | |
| Quarter (time) | Yes | |
| Constant | **–1.40** | 6.75 |
| N | 191,179 | |
| Pseudo R-squared | 0.14 | |

*Notes*: All coefficients rounded to the second decimal place.

**Table 5: Heckman's first stage selection model**

| *Variable/model* | *(2)* | *(3)* | *(4)* | *(5)* |
|---|---|---|---|---|
| Years of education | **0.13** | **0.10** | **0.13** | |
| | (37.15) | (7.1) | (37.14) | |
| Education categories | | | | Yes |
| Age | 0.00 | –0.00 | 0.00 | **–0.00** |
| | (0.26) | (–1.57) | (0.26) | (–7.88) |
| Married | **0.93** | **0.97** | **0.93** | **0.46** |
| | (46.21) | (14.70) | (46.22) | (9.03) |
| Female | **–0.50** | **–0.53** | **–0.50** | **–0.16** |
| | (–18.19) | (–6.67) | (–18.19) | (–2.57) |
| Married × female | **–1.06** | **–1.19** | **–1.07** | **-1.02** |
| | (–41.13) | (–15.96) | (–41.13) | (–13.53) |
| Constant | **–2.21** | **–1.86** | **–2.21** | **1.59** |
| | (–28.77) | (–8.15) | (–28.77) | (4.95) |
| N | 350,467 | 16,271 | 350,467 | 18,010 |

*Note*: The models correspond to those in Table 1, i.e.: (2) entire sample II; (3) Area C sample; (4) rural vs. urban; (5) Areas B and C rural observations only. All coefficients are rounded to the second decimal place; *t*-statistics are in parentheses. Coefficients reported in **bold typeface** are statistically significant at the conventional level of 10 percent or better.

commute, thereby probably reducing the negative effect on Area C wages.

### *Robustness check: Selection bias*

The reported estimates are based, of course, on observed wages for employed individuals. This might imply that the sample of working individuals is not random if there were circumstances that affect the probability of joining the labor force in the first place, leading to inconsistent and biased estimates (selection

**Table 6: Heckman's second stage Area C wage differential model**

| *Variable/model* | *(2)* | *(3)* | *(4)* | *(5)* |
|---|---|---|---|---|
| Area C residence | 0.00 | | | |
| | (0.04) | | | |
| Area C work | **–0.05** | **–0.07** | | 0.04 |
| | (–1.75) | (–2.62) | | (0.99) |
| Rural area | | | **– 0.13** | |
| | | | (–11.24) | |
| Years of education | **0.04** | **0.03** | **0.04** | **0.01** |
| | (17.00) | (6.36) | (16.88) | (4.31) |
| Age | **0.03** | **0.03** | **0.03** | **0.04** |
| | (10.79) | (3.10) | (10.77) | (8.23) |
| Age squared | **–0.00** | **–0.00** | **–0.00** | **–0.00** |
| | (–7.72) | (–2.10) | (–7.65) | (–6.09) |
| Married | **0.07** | **0.07** | **0.07** | **–0.13** |
| | (5.97) | (2.09) | (6.21) | (–4.99) |
| Female | **–0.36** | **–0.33** | **–0.36** | **–0.47** |
| | (–26.64) | (–5.76) | (–26.43) | (–13.55) |
| Married × female | **0.08** | 0.04 | **0.09** | **0.44** |
| | (4.59) | (0.74) | (4.85) | (9.96) |
| *Dummy variables* | | | | |
| Industry | Yes | Yes | Yes | Yes |
| Occupation | Yes | Yes | Yes | Yes |
| Employment status | Yes | Yes | Yes | Yes |
| Urban/rural/refugee | Yes | Yes | No | Yes |
| District | Yes | Yes | Yes | Yes |
| Quarter (time) | Yes | Yes | Yes | Yes |
| Constant | **2.74** | **2.91** | **2.74** | **3.08** |
| | (42.89) | (20.64) | (42.32) | (29.67) |
| λ | 0.01 | 0.02 | 0.02 | –0.35 |
| | (0.01) | (0.02) | (0.01) | (–0.03) |
| N | 60,722 | 2,371 | 60,722 | 7,412 |

*Notes*: The models correspond to those in Table 1, i.e.:(2) entire sample II; (3) Area C sample; (4) rural vs. urban; (5) Areas B and C rural observations only. All coefficients are rounded to the second decimal place; *t*-statistics are in parentheses. Coefficients reported in **bold typeface** are statistically significant at the conventional level of 10 percent or better.

bias). To this for this, we employ Heckman's two stage approach.[20]

The first stage model is based on estimating an employment participation model using a probit estimation technique, such that

(4) $L_i = \mu H_i + e_i$,

where $L_i$ is a latent variable that equals 1 if worker $i$ is employed and zero otherwise.[21] $H_i$ is a vector of explanatory variables that affect the work decision, including years of education, age, gender, marital status, and married × female. The estimates from the probit model will be used to construct the inverse Mills ratio that is conventionally used to correct for the sample selection bias, if any, in the wage equation.

The estimates are reported Table 5. The models correspond to those in Table 1. All employment participation factors in all of the models are statistically significant. We find that workers with a greater educational attainment are more likely to join the work force, and married individuals are more likely to get employed.[22] The coefficients for age, female, and married × female are negative, indicating a higher values for these variables are associated with a lower probability of joining the labor force, *ceteris paribus*.

The selectivity parameter, λ, is presented at the bottom of Table 6. The sign of λ is positive for all models except for the rural sample model (Model 5). In all models, λ is statistically insignificant, suggesting that sample selection concerns are not driving our original findings. And, indeed, the coefficients in Table 6 are very similar to the OLS model coefficients reported in Table 1.

## Conclusion

The objective of this study is to examine the wage impact of Israel's constraints on economic activities and infrastructure development in the West Bank's Area C. We provide evidence to show that Area C workers suffer a wage penalty of about 8 percent relative to workers in Areas A and B. The results also show that when controlling for worker characteristics, the magnitude of the Area C wage differential drops by about half but is still negative. Government policies such as subsidizing educational attainment and funding skills-upgrade programs might be helpful to decrease the wage inequality between urban and rural areas.

We then extend our analysis to compare average wages between Area C workers and other rural workers and show that the wage difference is statistically insignificant. This indicates that the Area C wage differential we observe can be attributed primarily to a rural environment effect rather than to Israeli economic restrictions placed on Area C *per se*. This result indicates that the effect of Israeli restrictions on Area C wages is neutralized. We show that negative labor supply shocks (commuting) serve as a potential transmission mechanism. Specifically, we show that Area C residents are more likely to commute than their peers in other rural areas.

## Notes

For research support and funding, we thank the Economic Research Forum and the Global Development Network.

1. Fertility: World Bank (2008). Settlements: B'Tselem's (2013).

2. United Nations (2011).

3. For a description of Area C and the development restrictions there, see B'Tselem (2013). Data in the paragraph are taken from the United Nations Office for the Coordination of Humanitarian Affairs in the Occupied Palestinian territories (OCHA).

4. World Bank (2008).

5. More recent: World Bank (2013).

6. The model assumes zero effects on wages in Areas A and B. We can relax this assumption such that workers who migrate or commute from Area C would increase labor supply in Areas A and B, leading to lower average wages there. The magnitude of the wage decrease in Areas A and B then depends on the share of migrants or commuters relative to the work force in rural areas that are not located within Area C as well as on the labor demand and supply elasticities. If the share of the migrants or commuters were large enough, we would expect that migration and/or commuting would lead to a new wage equilibrium that is the same across all three areas. Here, again, the net effect of Area C restriction can only be determined empirically.

7. In the pooled-OLS regression workers' wage are regressed on a dummy variable that distinguishes workers based on place of work (Israel or Israeli settlements versus local Palestinian labor markets), among other variables (district dummies, industry, and occupation dummies).

8. Existing literature: Daoud (2005); Daoud and Shanti (2011). Mincer: Mincer (year?).

9. Including an Area C dummy also includes all time invariant effects, such as distance to other localities in Area A and B. This captures spatial differences in commuting cost that might affect Area C wage differentials.

10. Blinder (1973); Oaxaca (1973).

11. As noted, one concern over excluding the observations of Palestinian workers in Israel or Israeli settlements is that it may affect the remaining wage equilibrium in Areas A and B. In a separate model, we controlled for their share at the district level. The results, not reported here but available on request, show that the wage coefficients for the Area C dummies did not change appreciably. The estimated coefficient of the share of workers in Israel or Israeli settlements is positive and significant at the 1 percent level. This indicates that increases in the share of these workers raises wages in the local labor market, reflecting the presence of an adverse labor supply shock effect.

12. Arguably, the control variables might capture some of the restrictions' negative effects on wages, that is, lower wages might be driven by restricting economic activities in Area C. If this were the case, the effect would be captured by the industry control variable. We thank an anonymous referee for bringing this point to our attention.

13. Moretti (2013) shows that spatial wage differences might be related to differences in the cost of living. Accordingly, it could be the case that the wage differential between Area C

and Areas A and B in Model 1 reflects differences in the cost of living between these areas. Unfortunately, we are unable to control for the cost of living as data is not readily available at the locality level. Nonetheless, the fact that the estimated coefficient for Area C work, in Model 3 is negative and statistically significant ensures that not controlling for the cost of living does not bias our estimates in a major way.

14. The estimates for the other variables also are similar except for married × female, which becomes statistically insignificant in the Area C work model.

15. The 30 percent difference is calculated by dividing 0.02 (reflecting differences in worker characteristics endowments) by [0.12 – 0.06], which reflect differences due to unobserved effects. See Table 3.

16. Agglomeration: Combes, *et al*, (2008); Rosenthal and Strange (2003). Spillovers: Glaeser (1999); Moretti (2004); Glaeser and Resseger (2010).

17. Coordination hypothesis: Kim (1990); Helsely and Strange (1990); Yankow (2006). Sorting effect: Fallah and Partridge (2006); Combes, *et al*. (2008); Mion and Naticchioni (2009); Matano and Natichchioni (2011).

18. The difference in industry distribution between Area C workers and non-Area C rural workers is minimal. In particular, about 62 percent of Area C workers are employed in the agricultural sector versus 52 percent for non-Area C rural workers. Also, 8.4 percent and 7 percent of Area C workers are employed in the commerce and hotels and other services sector (except for transportation, storage, and communications) as opposed to 4.2 percent and 11 percent, respectively, for the other group. Nonetheless, worker distribution for the other sectors (construction and manufacturing) is similar in both cases. Moreover, in terms of differences in educational attainment, the average years of education for Area C workers is 7.17, around 1.3 year less than for non-Area C rural workers.

19. That the estimate for the Area C work dummy is statistically insignificant does not rule out negative effects of Israeli economic restrictions. Any such effect might be transmitted via other channels that are not captured in our model. We thank an anonymous referee for raising this point.

20. Heckman (1974).

21. In another model, unreported, we estimated a Heckman first stage model in which selection is via workers' decision to join the labor force. This is particularly relevant in Palestine as the labor force participation for females is so low, reaching only about 13 percent in 2008. However, the results show that Area C wage differential results are unaffected.

22. We were unable to run the Heckman model with years of education *per se*. With the specification of the OLS rural model, the log-likelihood of the selection bias model is not concave. To get around this problem, we used nine education categories. The results show that the selectivity parameter (λ) is negative and significant. Still, and confirming the OLS finding, the coefficient for the Area C dummy is statistically insignificant.

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## Appendix

Assume that the labor supply and demand of Area C are linear and specified by $S = c + gW$ and $D = a - bW$, respectively, with slopes $b > 0$ and $g > 0$. The slopes reflect the degree of elasticity since the elasticity of the linear demand can be written as $(-1/b) \cdot W/D$. Therefore, for a given wage level, the greater the slope, the smaller is elasticity. Likewise, the elasticity of labor supply can be written as $(1/g) \cdot W/D$.

Utilizing the labor market clearing condition $D = S$, the equilibrium wage can be written as:

$$\text{(A1)} \quad W^* = (a - c) / (b + g).$$

The effect of an adverse labor demand shock on the equilibrium wage can be modeled as a decrease in the intercept, $a$. A comparative static analysis of the equilibrium wage shows that the new equilibrium wage, $W'$, depends on the size of the shock and the magnitudes of $b$ and $g$. Specifically,

$$\text{(A2)} \quad dW^* = 1/(b + g) \cdot (da).$$

The positive effect of an adverse labor supply shock on the new equilibrium wage ($W'$) can be modeled as a decrease in $c$, such that

$$\text{(A3)} \quad dW^* = -1/(b + g) \cdot (dc).$$

Holding $b$ and $g$ constant, whether the initial equilibrium wage is restored then depends on the size of the supply shock.