Mobility and Inequality: Evidence from the Second Intifada

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Abstract

This paper finds that mobility disruption of a commuter economy tends to exacerbate preexisting spatial economic inequalities, while producing ambiguous aggregate welfare consequences. I study the Palestinian West Bank, 1997-2007, a small and densely populated land mass possessing a highly active commuter economy where laborers travel regularly between their hometowns and places of work. Starting in 2002 the Israeli army deployed numerous security obstacles (checkpoints, roadblocks) along the West Bank's internal road network, disrupting commuter traffic. Economic consequences for Palestinians varied depending on whether they happened to be dwelling in labor-demanding or labor-supplying towns. Labor-supplying towns offered few local job opportunities, so their residents were highly dependent on jobs in other towns. Obstacle deployment negatively affected employment rates, per-capita nighttime lights, and net-immigration rates of supplier towns. Resident laborers of labor-demanding towns, however, were significantly insulated against these effects, and may even have benefited from obstacles as they reduced the inflow of competing labor from other towns.

1 Introduction[1]

Transportation infrastructure is generally thought to be a key contributor to

[1]PRELIMINARY AND INCOMPLETE. PLEASE DO NOT CIRCULATE WITHOUT PERMISSION. I thank Nathaniel Baum-Snow and Andrew Foster for guidance throughout the research process. Special thanks go to Lynn Carlson for her generosity in teaching

economic success and growth. Improvements to connectivity lowers shipping costs of goods and commuting costs of labor. Colonial India enjoyed large gains from trade when a network of inter-regional railroads was built, allowing disparate agricultural zones within India to specialize by crop type (Donaldson, 2013). Cities are likewise expected to specialize industrially when connected (Henderson, 1974). Within cities, meanwhile, improvements to commuting infrastructure allow residents to live outside city centers (Baum-Snow, 2007), freeing downtown land use for industries with high returns to agglomeration. Baum-Snow et al (2012) document significant intracity population displacements in Chinese cities after highways and ring roads facilitated commuter transits. Duranton and Turner (2012) find interstate highway expansions raised employment among U.S. cities.

Conversely, it is thought that increased transit costs have negative economic consequences. Storeygard (2013) finds that among sub-Saharan African countries with major ports, inland cities far from their country's port suffered a slowdown in economic growth relative to inland cities closer to ports when world oil prices exogenously increased in the 2000s. Redding and Sturm (2008) find the division of East and West Germany in the 1940s led to depopulation of West German cities near the border as trade relations were severed. Relatedly, Ahlfeldt et al (2013) study historic Berlin, where the building of the Berlin Wall disrupted agglomeration economies.

In this paper I find that mobility disruption exacerbates preexisting spatial economic inequalities, while having ambiguous economic consequences in aggregate. I study the Palestinian West Bank, a small developing economy with a highly active commuter economy. During the Second Palestinian Uprising (2000-2005) the daily flow of Palestinian laborers between Palestinian towns was disrupted by the deployment of hundreds of Israeli army security obstacles along the internal road network. Contradicting a significant body of

and assisting with ArcGIS software; to Rita Giacaman for her crucial support in helping gain access to PCBS census data; and to the PCBS staff (especially Majdoleen Gibril) for making the data available. Thanks to Jacob Goldston for many excellent comments; to Martina Kirchberger for her comments on an earlier draft; to Rachel Franklin for GIS advice; to Philipp Ketz and Nickolai Riabov for technical support with MATLAB; and to Alex Eble, Gareth Olds, and Sanjay Singh for insightful comments. Finally, thanks to the Brown University Population Studies & Training Center and NIH T-32 training grant program for key funding support.

World Bank reports and academic articles which claim that mobility disruption unambiguously harmed the Palestinian economy, I find instead that the marginal effects of obstruction on town-level employment rates, per-capita nighttime light emissions, and net-immigration rates were statistically indistinguishable from zero. Upon closer inspection, however, I discover that obstruction had a devastating effect on all three outcomes for towns that *began* with *low* employment rates, but that the effect was significantly mitigated or even reversed for towns that began with *high* employment rates.

To explain these results I turn to the Berlin commuting model of Ahlfeldt et al (2013) to argue that towns with high employment rates in the pre-obstacle era were most likely to offer high average wages, and thus to attract more commuters from out of town. Thus in the pre-obstacle era, not all towns were equal: some were desirable destinations, with higher wages, higher employment among residents and more demand for labor; while other towns offered low wages, achieved low employment among residents, and served largely as commuter origins, supplying labor to the (relatively) more prosperous towns. When obstacles were subsequently deployed, towns were affected differently depending on whether they tended to be suppliers or demanders of commuting labor. Supplier towns were highly vulnerable to obstacle deployment, since their residents depended on employment in other towns. By dramatically raising transit costs, obstacles forced many commuters to give up their jobs, accept lower-paying jobs at more easily reachable destinations, or altogether relocate to be nearer to their workplaces. Thus supplier towns suffered losses to employment rates, total and per-capita income, and net-immigration rates. Destination towns fared very differently. Residents of destination towns tended to work locally, and so were unphased by obstacle deployment. Instead, obstacles choked off the inflow of competing labor from other towns, creating job vacancies and likely raising wages even more.

Why did obstructed commuters not simply relocate to their destination towns? In fact census data indicate 5% of the 2007 population *did* migrate internally during 1997-2007, and like the other outcome variables, I find that town-level net-immigration responded negatively to obstruction, with the effect significantly mitigated for towns with high initial employment. But the low migration rates recorded in the West Bank reiterate a common pattern in the developing world generally[2], where weak state institutions leave people particularly dependent on their families and local communities, so that individuals take on large risks by relocating away from their hometown. Infrequent relocation contributes to thin housing markets[3], making relocation even more difficult. This issue is likely compounded for many West Bank towns by severe building restrictions enforced by the Israeli army.[4] Finally, if workers felt the West Bank's future was volatile, they might reasonably have doubted their job security (say, anticipating a retraction in demand), undermining the impetus for relocating. Together, these issues help explain the low migration rate and high rate of commuting observed in the census data, as individuals were effectively unable or very reluctant to change their place of residence and thus commuted daily to their workplaces. The subsequent deployment of obstacles likewise could seldom be responded to by relocation, but instead by accepting lower-paying jobs at more easily reachable destinations, or by giving up employment altogether. For these reasons, town-level employment rates and per-capita income (as proxied for by per-capita-light emissions) are useful outcomes to observe.

The central identification problem of this paper is that obstacles may have been deployed with special reference to each Palestinian town's tendency for (or opportunity cost of) violent confrontation, with more confrontational towns probably scheduled for more obstruction. As such, the degree of obstruction faced by each town would likely correlate with (unobserved) security crackdowns and curfews, making it hard to isolate the specific effect of obstruction on economic outcomes. To address this issue I construct a continuous IV, derived from the army's blanket claim that obstacles were deployed only to protect Israeli civilians.[5] Such a claim could not have been credible if Israeli civilians lived only in Israel, since in that case it would have been sufficient to wall off the West Bank from Israel, without disrupting internal traffic. But since there was over a quarter million Israeli settlers living *inside* the West Bank during the 2nd Intifada, it is indeed arguable that at

[2]For example, they are very consistent with Egyptian labor force data (ELMPS 1998-2012)

[3]See, for example, Takeuchi et al (2008).

[4]See, for example, the World Bank report on Area C (2013).

[5]For example, the World Bank's recent report on Area C (2013) states that 'The perceived need to protect Israeli settlers is seen by some observers as the key driver behind many of the restrictions imposed on Palestinians in Area C'.

least some of the obstacles may have been deployed along the internal road network to prevent Palestinian militant traffic from passing within range of Israeli civilian settlements[6] In that case, Palestinian towns whose optimal road sequences to other towns passed unluckily near settlements would tend to face extra obstruction. I construct an IV using precisely this reasoning, finding it to be a strong predictor of obstruction.

Closely related to this paper, Cali and Miaari (2014 working paper) use Palestinian labor-force survey data to present reduced-form evidence that Israeli obstacles lowered employment and wages. In earlier work, Miaari et al (2012) find that increased Israeli border security during the 2nd Palestinian Uprising raised unemployment among Palestinian towns, lowering the opportunity cost to violence. My results are robust to the loss of cross-border employment, and I provide evidence against opportunity cost of violence as a competing explanation for my results. While Cali and Miaari (2014) define obstruction by counting obstacles within 30km (by road) of Palestinian towns, I count obstacles along optimal paths to other towns and expressly avoid proximity measures, concerned that they may be correlated with Israeli troop deployment and thus with violent confrontations. I show that my instrumented obstruction measure is orthogonal to most proximity measures.

In the next section I provide a brief historical background on the Israel-Palestine conflict. In section 3 I describe my data sources, while in section 4 I present reduced-form results. Section 5 explains the results of Section 4 by presenting the Ahlfeldt et al (2013) commuting model. Section 6 concludes.

2 Historical background

The West Bank has been under Israeli military occupation since 1967, when Israeli forces routed the Jordanian army during the Six Day War. As depicted in Figure 1, the West Bank is surrounded by Israel on its north, west, and south sides, while sharing an eastern border with Jordan. It is very small: just over 60km at its widest and 130km at its lengthiest, with roughly 1/4 the area of New Jersey. More than 2 million Palestinians live there, as

[6] For example, see Arbel et al (2010), which documents decline in housing prices in the Israeli civilian locality of Gilo after multiple gunshot attacks from the neighboring Palestinian town of Beit Jala, lying over 650 meters away.

Figure 1: Regional map of West Bank and surrounding countries

do more than 300,000 Israeli civilian settlers.

Palestinian aspirations to achieve national self-determination have been disappointed by decades of failed negotations and the expansion of Israeli settlements. Frustration has boiled over twice into extended popular uprisings, once in 1987-1991 (The First Intifada), and later in 2000-2005 (The Second Intifada). The second uprising was accompanied by an escalation in violence as militant Palestinian elements used conventional and suicide attacks against Israeli military and civilian targets.

The Israeli Army responded to militant activity with both offensive retaliations (Paserman 2008) and defensive efforts aimed at intercepting militants before they could reach Israeli civilian destinations. This latter policy was known as "Operation Defensive Shield", and involved the deployment of a separation barrier exceeding 500km in length and thousands of road obstacles such as manned checkpoints, boulders and earthmounds. For more details I refer the reader to a comprehensive report of B'Tselem, a reputable Israeli

NGO; and to the World Bank Report (2013) on Area C. [7]

3 Data

My empirical analysis combines three datasets: (1) restricted-access versions of the Palestinian population censuses of 1997 and 2007 with spatial identifiers, (2) UN-OCHA maps of the West Bank from 2003-2007 that I convert to ArcGIS format, and (3) Annual lights-at-night satellite data that I calculate for Palestinian towns, 1992-2012.

Palestinian census data

The Palestinian Central Bureau of Statistics (PCBS)[8] conducted censuses of the West Bank and Gaza Strip in 1997 and 2007, conveniently pre- and post-dating the 2nd Intifada. A town of current residence was recorded for each person in both censuses. The PCBS defined 659 distinct West Bank Palestinian localities in the 1997 census, but only 524 in the 2007 census. I merge the two datasets by spatial proximity of 1997 towns to 2007 towns. Some Jerusalem localities accessible to the PCBS in 1997 were forbidden by Israeli authorities in 2007, so I am forced to exclude those data due to censoring. For a handful of localities I am unable to obtain spatial coordinates. I refer the reader to the technical appendix for further details.

I am left with a dataset of 479 Palestinian West Bank towns. Using the classical definition,[9] I calculate labor force for each town i and each time period t as

$$HL_{i,t} = HR_{i,t} + HU_{i,t}$$

Where $HR_{i,t}$ is the number of employed residents of town i at time t, and where $HU_{i,t}$ is the number of residents of town i who are not employed *but* searched for a job in the week preceding the census.

Table 1 contains pertinent summary statistics from the censuses. Unemployment ran high at 10% in 1997, 13% in 2007. Among the employed, Israel was a massive source of demand for Palestinian laborers; in 1997, one in four

[7] www.ochaopt.org/documents/opt_prot_btselem_ground_halt_aug_2007.pdf;

[8] Established under the Palestinian Authority (PA) after the Oslo Accords of 1993.

[9] Regression results are similar though statistically weaker under a broader definition of labor force as persons aged 16-64 (including students, housewives, etc).

Table 1: Summary of data – censuses (West Bank)

	1997	2007
Population	1,535,428	1,955,154
Labor Force	366,143	458,173
Employed	89.9%	87.1%
Work in Israel	22.3%	12.7%
Commute inside West Bank	NA	41.6%
Public sector	14.4%	17.4%
Farming	NA	6.3%
Minerals	NA	2.9%
Construction	NA	21.1%
Teaching	NA	9.9%
Retail	NA	10.0%

employed West Bank Palestinians made the daily border crossing. During the 2nd Intifada years, admission to Israel was severely restricted (Miaari et al, 2012), evident in the lower rate for 2007. Internal commuting rates (i.e. between Palestinian destinations) in 2007 (after obstacle deployment) were still very high at 41.6%, suggesting an even higher rate in 1997.[10]

Since I am analyzing obstacles internal to the West Bank, I wish to focus on Palestinian workers traveling between Palestinian towns, and to exclude from consideration all Palestinian workers employed at Israeli destinations. I therefore calculate the 'internal' labor force as

$$HL\_int_{i,t} = HR\_int_{i,t} + HU_{i,t}$$

Where $HR\_int_{i,t}$ is the number of workers residing at town i employed at Palestinian destinations at time t:

$$HR\_int_{i,t} = HR_{i,t} - work\_israel_{i,t} - work\_settlement_{i,t}$$

While I easily subtract from the labor force those Palestinians working at Is-

[10] Commuting rates cannot be accurately measured for 1997 since the question was partially botched. See the technical appendix for details.

raeli destinations, I have no way of removing unemployed Palestinians whose best (untaken) job offer was at an Israeli destination. I therefore implicitly adopt the assumption that, for every unemployed Palestinian, his best untaken job offer was *not* at an Israeli destination. In fact this assumption is very reasonable. Miaari et al (2012), among other sources, document that these labor markets were (and continue to be) importantly segmented, with most Palestinian cross-border workers obtaining their jobs not through free labor market competition but through their network affiliations with other cross-border workers. The wages from such jobs are also well known to be significantly higher. Combining these facts, it seems reasonable to assume that, given the opportunity, a Palestinian laborer would certainly have taken an Israeli job if offered in 1997 or in 2007; and thus in neither year could an unemployed Palestinian laborer have been made any such offer (else he would not be unemployed).[11]

My analysis depends heavily on the accuracy with which town-level internal employment rates are measured. For any town with a small labor force, a misleading response from even one person could have significant leverage.[12] I therefore restrict the dataset to towns that have at least 100 laborers *not* employed at Israeli destinations. This eliminates 150 towns, leaving me with a dataset of 329 towns.

Table 2 summarizes descriptive statistics of these 329 towns. Comparing Tables 1 & 2, note that these 329 towns possess 97.07% of the West Bank's labor force in 1997 and 82.83% in 2007. Figure 2 presents a spatial histogram of labor force sizes. Evidently the distribution is heavily left-skewed. Indeed, only 17 of 329 towns have more than 2500 laborers.

Figure 3 graphs the 1997-2007 change in employment[13] rates against their 1997 levels. The pronounced negative relationship suggests considerable

[11]Furthermore, the regression analysis includes a control for each town's vulnerability to border closings by taking the log of the percentage of each town's 1997 labor force employed in Israel.

[12]For example, consider a town with 7 employed residents, and 2 unemployed. If a 10th person reports erroneously that she is searching for work, then I record 3 unemployed and claim the town's employment rate is 70% instead of 77.7%.

[13]From here on the word 'internal' is implied when referring to employment or labor force.

Figure 2: Labor force size distribution, 1997

Table 2: Summary statistics – 329 towns

	1997	2007
Total Population	1,483,463	1,887,842
Labor Force	355,442	444,318
Internal		
Labor Force	269,595	379,485
Percent employed	86.69%	85.12%
Avg. labor force	1080	1350
Median labor force	513	623

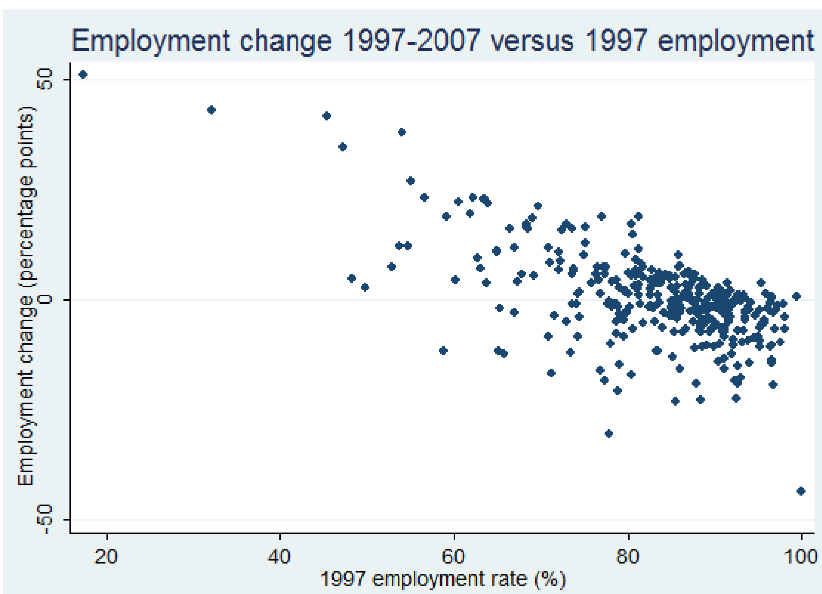

Figure 3: Evidence of mean reversion in employment data, 1997-2007

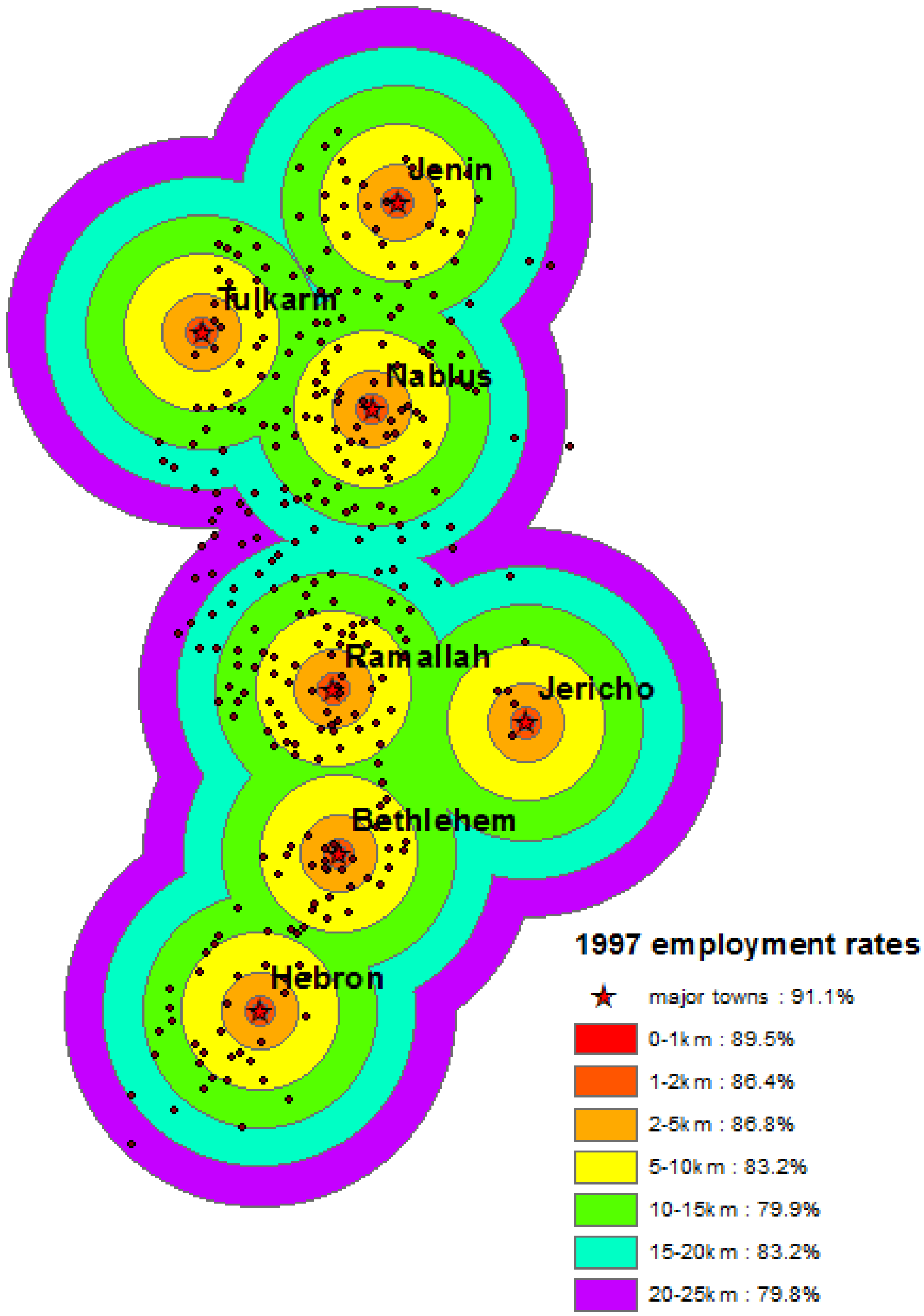

Figure 4: 1997 employment rates in distance bands from major towns

mean reversion. Also evident is that most towns (230) enjoyed an employment rate of over 80% in 1997. The median town had 85.6% employment.

A key missing variable in my analysis is the count of jobs (employees) per town. For each town i I know how many of i's residents were employed, but I do not know how many laborers (hailing from any town in the West Bank) actually worked in town i.[14] As a result I cannot easily predict net-inflow rates of commuters and so I lack a direct way to measure whether a town is mostly a supplier or demander of labor. Informally, it is recognized that the major population centers of the West Bank are also the main employers and job providers, while smaller towns mostly just supply labor. Figure 4 presents 1997 employment rates for various distance bands around the 7 most important Palestinian governorate capitals, which even without their adjoining refugee camps account for over 22% of the 1997 West Bank population. Note the almost monotonic decline in employment rates as one moves from major towns to the outer distance bands. In section 4 I present a commuting model that argues that 1997 town employment rates should have correlated positively with 1997 net-inflow rates, so that in the absence of jobs data, employment rates are a suitable proxy for distinguishing demander and supplier towns in the pre-obstacle era.

UN-OCHA maps
Since September 2003, the Map Center of the United Nations Office of the Coordination of Humanitarian Affairs (UN-OCHA) in East Jerusalem has been publishing detailed, poster-sized maps of the West Bank depicting roads, the precise locations of Palestinian towns, and Israeli security obstacles, among other features. Through to the end of 2007 a total of eleven posters were published[15].

While the Map Center generously shared their ArcGIS point and polygon feature classes of Palestinian towns, and their roads line feature class, they were unable to provide the Israeli obstacle feature classes corresponding to the 11 poster-maps of interest. I georeferenced all 11 maps and manually digitized almost 10,000 obstacles, superimposing the new data over the poster

[14] I will have access to these data for the next draft of the paper.

[15] The entire time series of posters is available in pdf format from UN-OCHAs website: http://www.ochaopt.org/

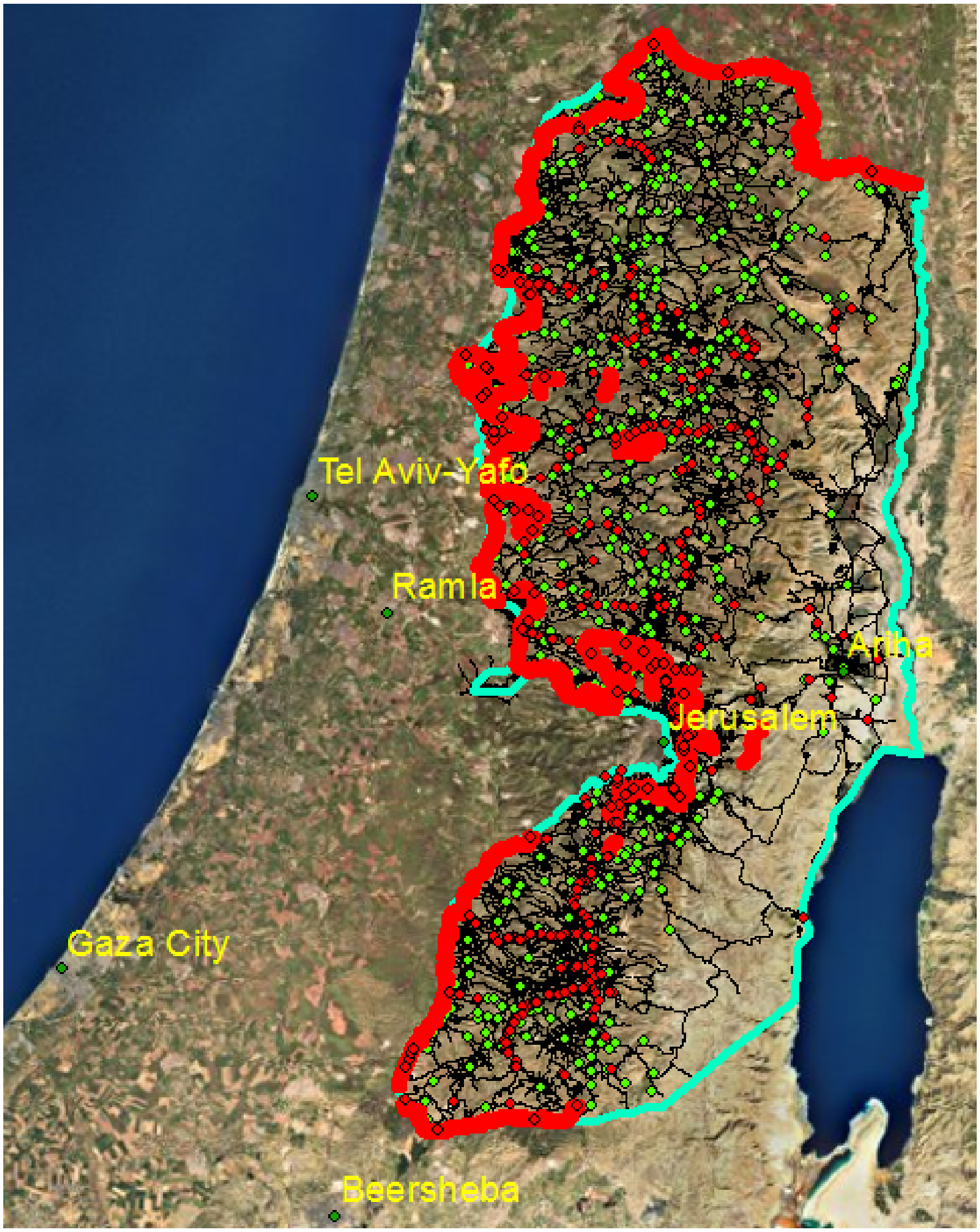

Figure 5: Palestinian towns (green), roads (black), Israeli closures (red), 2007

imagery. Figure 5 displays the result of these efforts for one of the 11 maps, dated December 2007 (precisely when the second census was taken). Deployed obstacles numbered more than 500, while completed sections of the separation barrier extended more than 500km.

After 'snapping' the obstacles to the roads data, I used ArcMap's *Network Analyst* software package to count the number of obstacles lying along distance-minimizing sequence of roads from each Palestinian town i to each other Palestinian town j. The average across all destinations j of the duration-weighted count of these obstacles along the optimal path from i to j is my basic measure of i's obstruction due to obstacles. This measure implicitly assumes that town i's residents in the *pre*-obstacle era traveled to each and every other town j with equal frequency. Such an assumption is implausible: some West Bank towns lay less than 1km apart by road, while for others the shortest path was 180km long. Towns varied considerably in population size, employment rates, per-capita lights, and some towns were clearly more devoted to farming than others. For all of these reasons one should expect there were asymmetric daily flows of labor and goods between towns in the pre-obstacle era. So when obstacles were subsequently deployed, obstruction was likely more harmful to town i along some paths than along others, depending on the volume of the *pre-obstacle* flow being obstructed. In other words, a town's measure of obstruction should not only be a function of the number of obstacles lying between it and other towns, but by the importance of each of those other towns as an economic partner. Obstacles obstructing town i's flows with town j should have been inconsequential if town j was economically unimportant to town i *in the pre-obstacle era.* The naive measure of obstruction presented here therefore weights too heavily obstruction experienced along paths to unimportant destinations. In Section 5, after developing an interpretation of my baseline results, I include additional regression results where the set of destination towns is more realistically limited.[16]

Figure 6 presents a spatial histogram of log-obstruction using the naive measure. All obstacle types were included in the calculation *except* earthmounds

[16] In a later draft I attempt to characterize the set of (pre-obstacle-)relevant destination towns for each origin, estimating a commuting model to impute the set of destination towns and their corresponding flows.

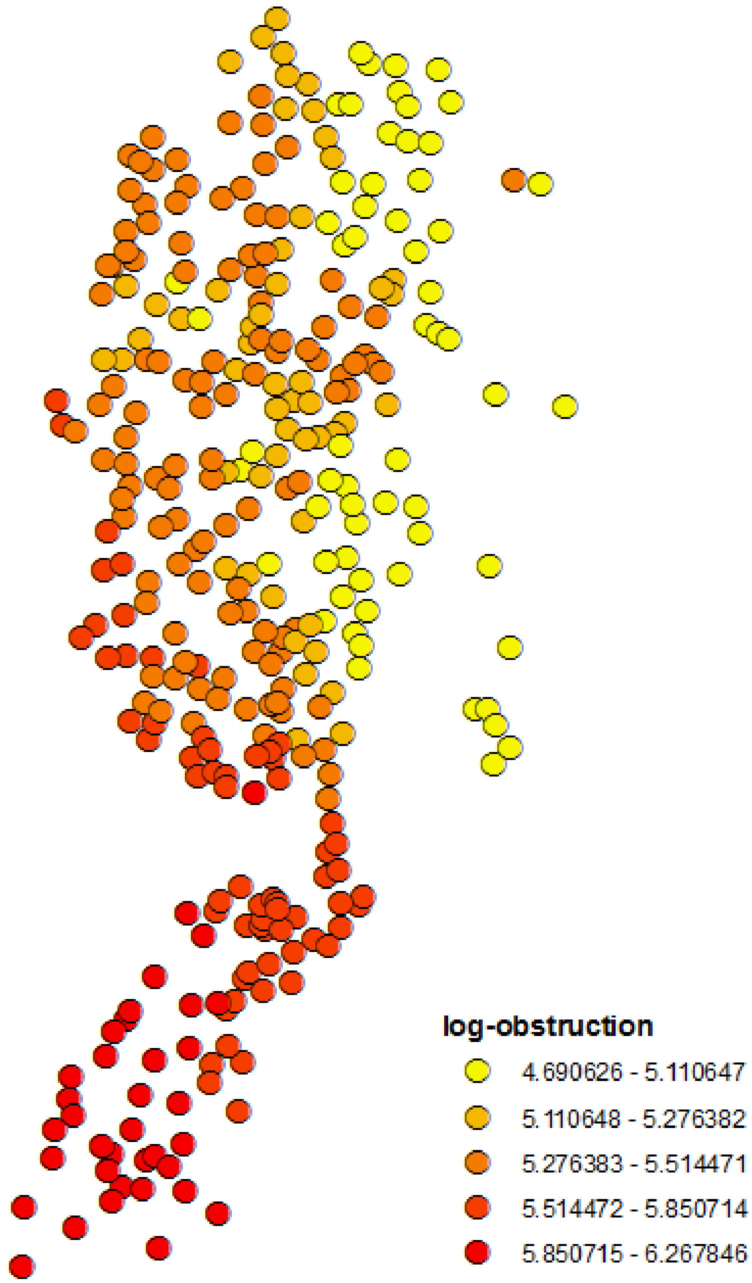

Figure 6: Spatial histogram of obstruction

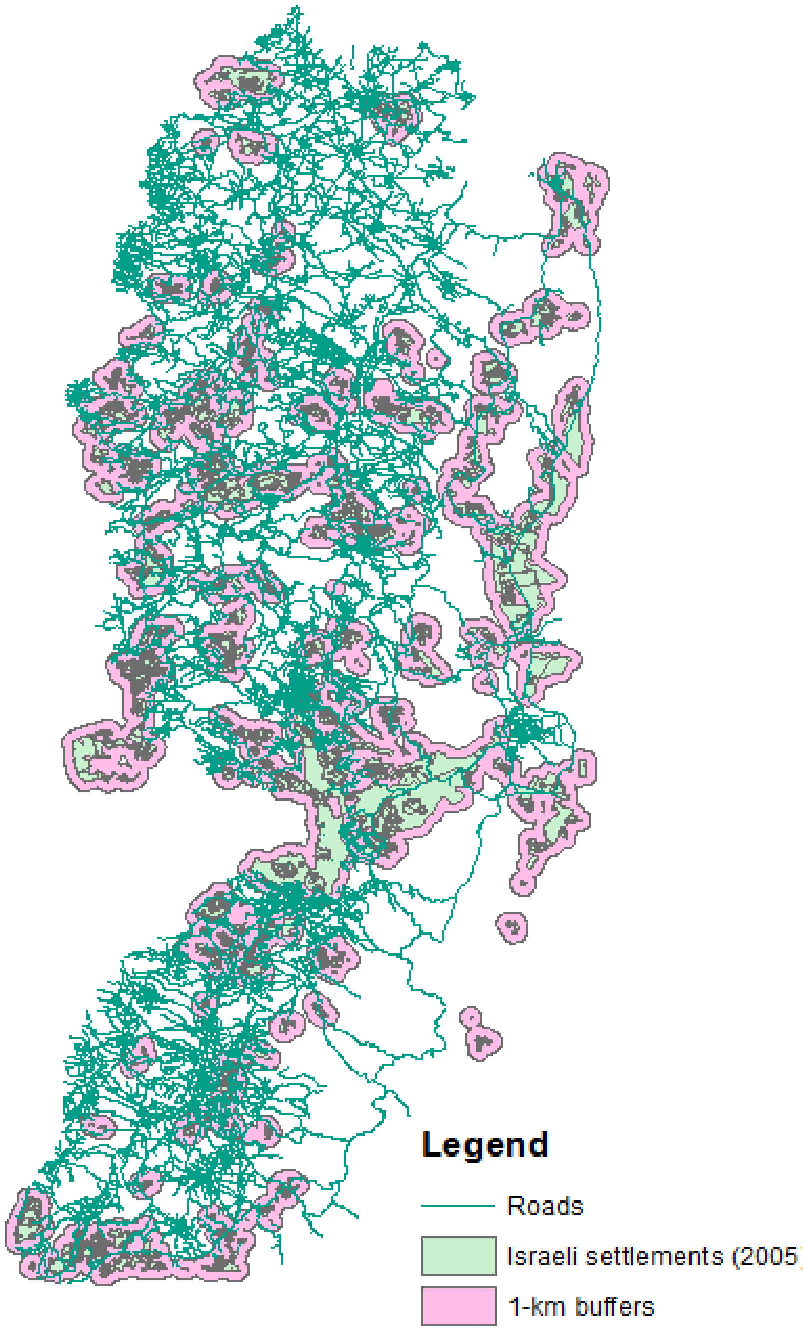

Figure 7: IV for obstruction: defensive buffer zones around settlements

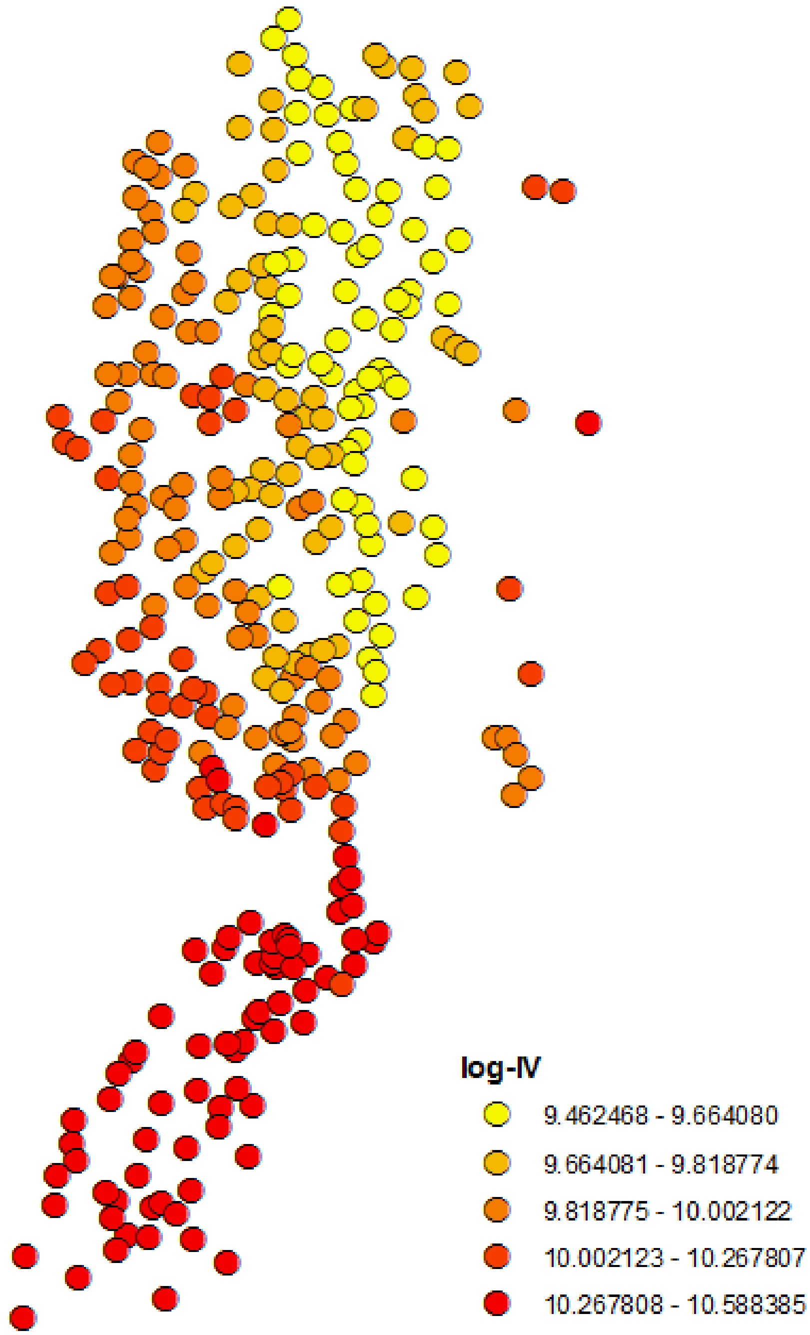

Figure 8: Spatial histogram of IV of obstruction

and projected parts of the separation barrier, i.e. sections of the barrier that were intended to have been built but had not yet been as of the time of the map's publication. UN-OCHA reports indicate that earthmounds, the most ubiquitous type of road obstacle, were observed to have been largely ineffective in deterring traffic. Indeed, in later regressions I show that the inclusion of earthmounds in obstruction measures tends to attenuate results.

Note in Figure 6 that the average level of obstruction varies for different governorates, with the highest levels suffered mostly by towns in the southern governorates of Hebron and Bethlehem, while the lowest levels are found in the northern governorates of Tulkarem and Jenin. Despite this visual impression, regression analysis finds results are robust to the inclusion of governorate-level dummies, suggesting town-level variation is important.

As discussed earlier, Israeli obstacle deployment may plausibly have correlated with Palestinian towns' proclivity for violent confrontation, so that my measure of obstruction may be confounded by unobserved security crackdowns and curfews. To address this central identification issue I construct a continuous IV. I use UN polygon data of Israeli settlements, dated 2005, to identify all strips of road not expressly prohibited to Palestinian traffic but lying within 1 kilometer of a settlement. Arguably these are precisely the parts of the road network for which the Army would have been most concerned about monitoring or moderating Palestinian traffic, and so obstacles would most likely have been deployed along or around these strips of road. Palestinian towns whose optimal paths to other towns passed within these 1-kilometer buffers would then tend to face more obstruction. I calculate for each town across all of its optimal paths the average number of kilometers of road lying within 1 kilometer of any settlement, and use this as my continuous IV.

Figure 7 depicts the settlements, their 1-km defensive buffer zones, and roads. Note how significant portions of the road network lie within these buffers, so that if indeed the Army was monitoring and moderating traffic in those areas, mobility throughout the West Bank would have been significantly hampered. Figure 8 depicts the spatial histogram of reduced-form obstruction using the derived log-IV, where like before, all destinations are equally frequented by residents of each origin[17]. The similarity between Figures 6 and 8 is striking. Indeed, the two variables enjoy an 83.7% correlation, strongly supporting the army's claim that obstacles were deployed in an effort to defend Israeli civilians, and likewise supporting my identification strategy. I show later in my regression analysis that, after including some essential covariates, the IV is apparently orthogonal to relevant Palestinian-town-level covariates.

USAF lights-at-night data
Satellite luminosity data need little introduction, having become a popular measure of economic activity since the publication of Henderson et al (2012). These imagery capture light emissions from towns in the late evening (830pm-10pm local time) and are particularly useful in contexts such as the West Bank where town-level income data are not often collected. Lights data are available annually for the entire globe, 1992-2012. Figure 9 depicts a light raster of the West Bank for 2005 as captured by the F15 satellite.

Each lights raster consists of pixels with sides just under 900 meters long, and each pixel has a 'digital number' measuring the quantity of light recorded by the satellite's sensor over that locale. I follow Henderson et al's methodology to generate lights data for each Palestinian town, applying a polygon feature class provided by UN-OCHA demarcating town boundaries. Python scripts available with the technical appendix apply each town polygon to each raster, recovering the total quantity of light emitted by pixels within each polygon for each satellite-year. I do not calculate lights for towns whose polygons are too small to contain any pixels (98 out of 329 towns experience this problem).

Figure 10 presents total light output per year summed across all 231 Palestinian towns for which lights data could be calculated. The pattern is striking to those familiar with recent Palestinian history. Lights trend upward during the mid-1990s following the Oslo Accords, grow less quickly in the late 1990s as statehood began to look doubtful, and outright decline during the 2nd Intifada years 2000-2005, recovering once more after hostilities ceased. The marked decline of light emission during the Intifada is particularly important: census data indicate that 1997-2007 was a time of profound population increase in the Palestinian West Bank (1.5 million to 2 million), so evidently lights cannot merely be tracking population growth in the West Bank, but

[17] And likewise, removing this distance limit does not weaken regression results.

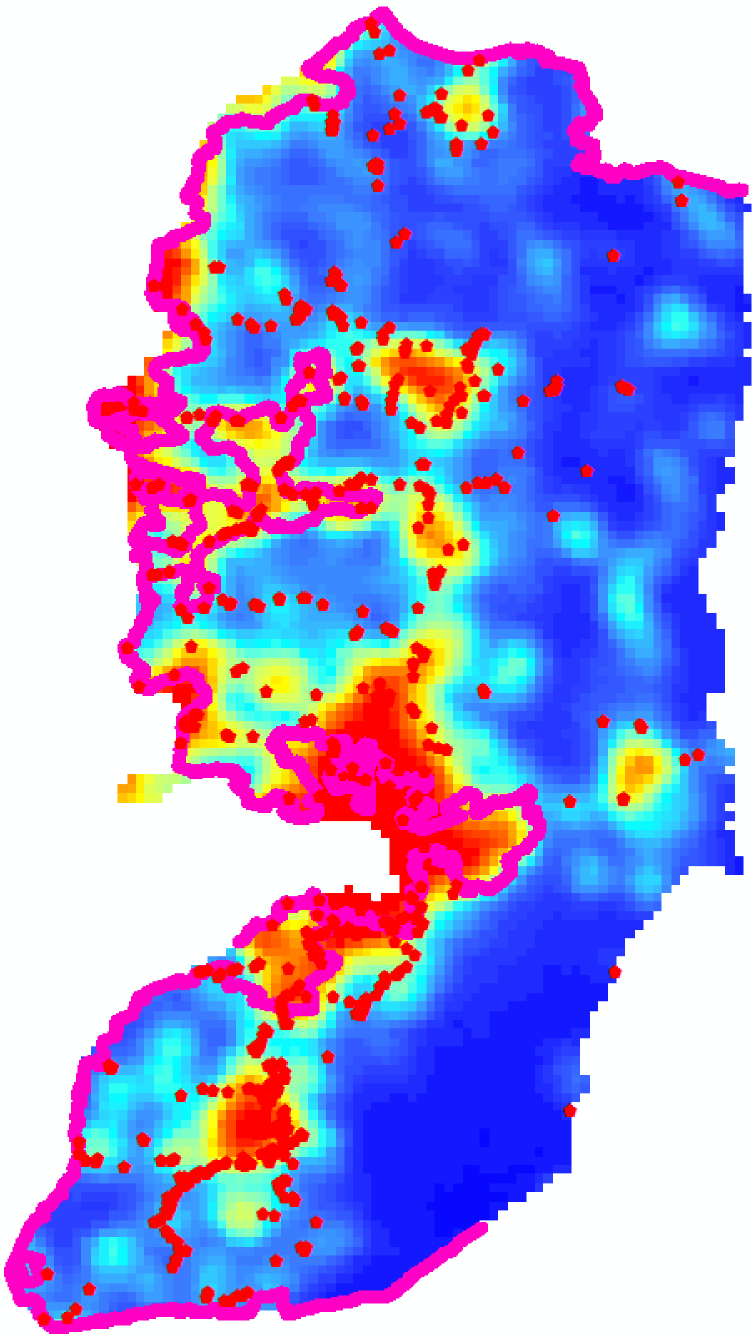

Figure 9: West Bank closures and lights (F15-2005)

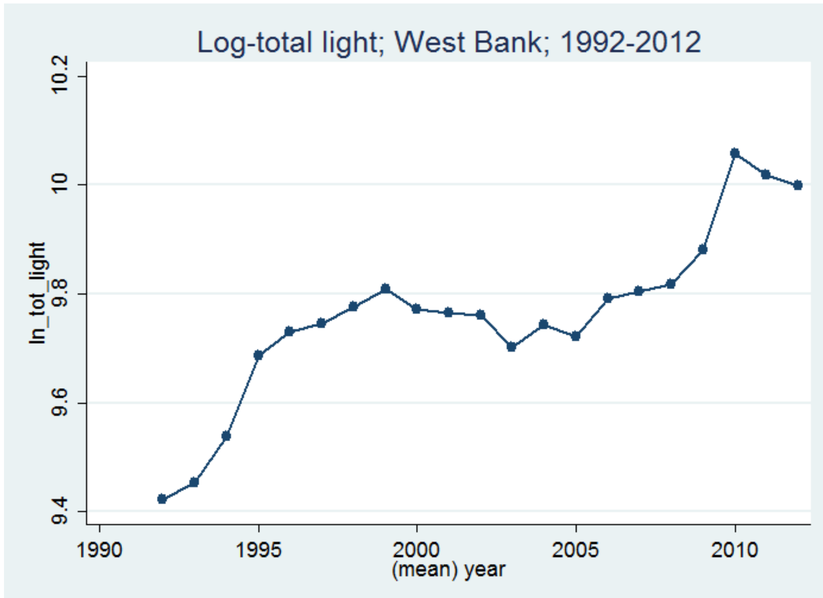

Figure 10: Total light output across 231 Palestinian towns, 1992-2012

rather are communicating important information about economic activity. Furthermore, a regression of town-level log-per-capita light output for 1997 on log-1997 employment rates ('internal' and 'external') yields a strong statistical relationship, where a relative increase of 1 percent in employment is associated with a 2.8% increase in light output for the same town.

In the next section I present the Ahlfeldt et al (2013) commuting model.

4 - Commuting Model

The census data do not include counts of jobs offered per town, making it impossible to directly classify towns as demanders or suppliers of labor. In the absence of these data I turn to a commuting model to argue that a town's employment rate is a credible indirect measure of a town's tendency to demand labor. The model clarifies the assumptions underwriting this proxy, and is helpful in setting the stage for the regression analyses of Section 5.

I adapt the commuting model of Ahlfeldt et al (2013), itself an offshoot of Eaton and Kortum (2002). While Ahlfeldt et al study intracity commuting in historic Berlin with the intention of estimating agglomeration benefits, I apply their model with minor modifications to explain commuting between West Bank towns.

I assume each Palestinian laborer faces a *separable* utility maximization problem[18], where the optimal strategy is to maximize wages and then afterward to allocate optimally those earnings across consumption goods. Under this assumption, it is sufficient to model laborers as wage-maximizers.

Each individual is born into some home location $i = 1, ..., I$, in the West Bank[19] and decides either not to work at all, or to work at *one* of locations $j = 1, ..., S$. Unemployed individuals stay home and obtain a reservation wage $\bar{v}$ through unemployment benefits available to the individual from the state, religious or non-governmental charities, or familial networks.[20]

In deciding whether and where to work, individual ω correctly anticipates a daily commute of length τ_{ij} between his hometown i and workplace j. He furthermore knows the baseline wage w_j earned at location j, and observes a personal productivity shock $z_{ij\omega}$ drawn from a Fréchet distribution:

$$Pr(z_{ij\omega} \leq z) = e^{-Tz^{-\epsilon}} \tag{2}$$

Where $T > 0$ scales average worker productivity and $\epsilon > 1$ determines the dispersion of worker productivity across locations.[21]

Equipped with this information, individual ω calculates for each workplace j his after-commuting wage

$$v_{ij\omega} = (w_j/d_{ij})z_{ij\omega} \tag{3}$$

Where $d_{ij} = e^{\kappa\tau_{ij}}$. Since w_j and d_{ij} are deterministic parameters, the

[18]See, for example, Bardhan and Udry, 1998, chapter 1.

[19]Excludes Jerusalem-J1 locations; see Data section for full discussion.

[20]I assume throughout that $\bar{v}$ is only obtainable at the individual's home location i, since refugee status benefits or familial benefits are likely obtainable only at home.

[21]T is soon cancelled out and is inconsequential to results, but ϵ's value matters: if workers enjoy wide dispersion of productivity, they may obtain high after-commuting wage offers even at distant locations, leading to a highly integrated spatial economy where obstacles can affect commuting patterns even in towns relatively far away.

after-commuting wage for residence i and workplace j is likewise Fréchet-distributed:

$$Pr(v_{ij} \leq v) = e^{-T(vd_{ij}/w_j)^{-\epsilon}} \tag{4}$$

Desiring $max\{\bar{v}, v_{i1\omega}, ..., v_{iS\omega}\}$, ω chooses whether and where to work. Note that $max\{\bar{v}, v_{i1\omega}, ..., v_{iS\omega}\} = max\{\bar{v}, max\{v_{i1\omega}, ..., v_{iS\omega}\}\}$, so ω's decision can be broken down into two stages: ω chooses where he would work *if* working were in his best interest, identifying $v_{i\omega} \equiv max\{v_{i1\omega}, ..., v_{iS\omega}\}$. He then compares $v_{i\omega}$ to $\bar{v}$ and decides whether or not to work.

The distribution of maximum after-commuting wages for residents of i can be calculated as

$$Pr(v_i \leq v) = Pr(max\{v_{i1}, ..., v_{iS}\} \leq v) = e^{-v^{-\epsilon} \sum_{s=1}^{S} T(w_s/d_{is})^{\epsilon}} \tag{5}$$

In the presence of a positive reservation wage $\bar{v}$, distribution (5) is left-censored at $\bar{v}$. Residents of i who receive unfavorable productivity shocks may find themselves far down the left tail of (5) with low after-commuting wage options and may prefer not to work at all. The fraction of employed residents of i is therefore

$$1 - Pr(v_i \leq \bar{v}) = 1 - e^{-\bar{v}^{-\epsilon} \sum_{s=1}^{S} T(w_s/d_{is})^{\epsilon}} \tag{6}$$

Note that the probability of employment for a resident of town i increases when wages rise (ceteris paribus) in town s for any s, but this increase is mollified by the effective distance d_{is} between i and s. The probability rises more dramatically when wages increase in towns s *near* to town i, where $d_{i,s}$ is small. The largest marginal increase is enjoyed when town i *itself* experiences a wage increase, since obviously $d_{i,i} < d_{i,s}$. Thus the model predicts that when the reservation wage $\bar{v}$ is the same across all towns, then high-employment towns are most likely also to be high-wage towns, or at least to be located near to high-wage towns.

Among those laborers for whom employment is optimal, the conditional choice probability (CCP) of commuting from origin i to destination j is calculated as

$$(7) \qquad Pr(v_{ij} \geq v_{is} \forall s) = \frac{(w_j/d_{ij})^{\epsilon}}{\sum_{s=1}^{S}(w_s/d_{is})^{\epsilon}}$$

Evidently an increase in j's nominal wage raises the probability (CCP) that residents of town i commute to town j. Likewise, an increase to town i's nominal wage lowers the probability that town i's residents commute to other destinations. Thus from (6) the model predicts that high-employment-rate towns offer high wages, while from (7) the model predicts that high-wage towns achieve a high net-inflow rate of commuting labor both by attracting in-commuters and by discouraging residents from out-commuting. As such, in the absence of any data directly measuring the net-inflow rates of commuters to each town, the model suggests that a town's employment rate may be relied upon as a credible proxy for its net-inflow rate. *In the pre-obstacle era*, high-employment-rate towns tended to be labor-demanding, while low-employment-rate towns tended to be labor-supplying.

The model also formalizes the assumptions underpinning this relationship in the pre-obstacle era, and helps determine regression specifications in section 5. It is assumed, for example, that the reservation wage is equalized across all locations. If true, then differences in employment rates across towns can only be explained by the (lack of) availability of high-wage jobs in the vicinity of those towns, in which case the proxy is credible. If unemployment benefits varied from town to town, however, then a town with poor unemployment benefits could still have achieved a high employment rate while neither offering high wages nor attracting high net-inflow. For part of Section 5's regression analysis, pre-obstacle per-capita nighttime light emissions are included as a control. To the extent to which this variable controls for initial wealth and variation in unemployment benefits across towns, it may be seen as a way of bolstering the credibility of the proxy.

The credibility of the proxy is also evidently contingent on towns' relative remoteness from other towns. Maintaining the assumption of equalized unemployment benefits, let us suppose that town i is far removed from other towns. Then a high employment rate in town i must imply a high average wage in town i. If, however, town i has sizeable neighboring towns in its vicinity, then i's high employment rate may not so much indicate that wages are high in i, but that they are high in nearby towns. To support the credibility of the proxy, regression specifications in section 5 control for geographic remoteness.

5 - Empirical results

I now present reduced-form regression analysis. The fundamental results are that (1) road obstruction by obstacles negatively affected employment rates, per-capita light emissions and per-capita net-immigration rates in Palestinian towns, and (2) the negative effects on all outcomes were significantly mitigated among towns that, to begin with, had *higher* employment rates.

For each outcome variable I present results in a separate table. For all tables, the main econometric specification is

$$\begin{aligned} (5.1) \qquad \triangle ln(outcome_{i,97-07}) &= \beta_1 ln(oe_{i,97-07}) + \beta_2 ln(e_{i,97}) \cdot ln(oe_{i,97-07}) \\ &+ \beta_3 ln(e_{i,97}) + \gamma X_{i,97} + c_{gov(i)} + error_{i,97-07} \end{aligned}$$

Where $int\_empl_{i,t}$ calculates the percentage of the internal labor force of town i that is employed at time t for t in $\{1997, 2007\}$; where $oe_{i,97-07}$ is the average duration-weighted number of obstacles that lay along town i's optimal paths to other towns during the 1997-2007 decade; where $X_{i,97}$ is a vector of town-level covariates from 1997 data; and where $c_{gov(i)}$ is a dummy for town i's governorate. An important covariate included in $X_{i,97}$ in all specifications is $ln(border_{i,97})$, which attempts to control for town i's vulnerability to the closing of the Israel-West-Bank border by calculating the natural-log of the percentage of i's 1997 labor force that was employed in Israeli destinations.

A second specification includes per-capita lights for each town $pc\_light_{i,t}$, for t in $\{1997, 2007\}$:

$$\begin{aligned} (5.2) \qquad \triangle ln(outcome_{i,97-07}) &= \beta_1 ln(oe_{i,97-07}) + \beta_2 ln(e_{i,97}) \cdot ln(oe_{i,97-07}) \\ &+ \beta_4 ln(pc\_li_{i,97}) \cdot ln(oe_{i,97-07}) + \beta_3 ln(int\_e_{i,97}) + \beta_4 ln(pc\_li_{i,97}) \\ &+ \gamma X_{i,97} + c_{gov(i)} + error_{i,97-07} \end{aligned}$$

Owing to their urban extents being very small, light emissions could not be reliably measured for 98 of 329 towns. As a result, regressions containing $pc\_light_{i,t}$ include at most 231 observations, and systematically underrepresent small towns. Nevertheless, regression results are stable across both datasets and present a very consistent story.

Employment rates and obstruction

Table 3 presents the main results where the outcome is change in log-employment-rates. All types of obstacles are counted towards obstruction *except* (for reasons discussed earlier) earthmounds and those parts of the separation barrier that were planned but never built. Per origin, the set of destination towns is left unlimited and unweighted; later in this section I explore realistic limitations to each origin's destination set.

Column 1 runs (5.1) *without* the interaction term, finding obstruction has a negligible and statistically insigificant marginal effect on town-level employment rates. The absence of the employment interaction term, however, masks enormous countervailing effects, revealed in Column 2. With the interaction term included, the coefficient on obstruction now indicates a 10% increase results on average in a staggering 24.6% decline in relative internal employment. For the median town, which had a labor force of 513 and saw 85.6% internal employment in 1997, this corresponds to an absolute decline on the order of 21 percentage-points, or 92 jobs lost. To interpret the interaction term's coefficient, consider two towns facing the same quantity of obstruction. If the first town's 1997 employment rate was 10% greater (in relative terms) than the second's, then just over 22.3% of the employment loss from obstruction would have been erased. In other words, the negative effect of obstruction was importantly mitigated for towns with higher 1997 employment rates.

Column 3 runs (5.2) over the small-town-censored dataset, finding similar results. Column 4 presents results of running the reduced-form IV regression. The coefficient on *ln_iv_200* indicates the average % change to employment rate experienced by a Palestinian town when the average portion of its optimal paths lying within 1 kilometer of Israeli settlements increased by 1%. The results are qualitatively very consistent with Columns 1-3. Column 5 meanwhile presents the results of 2SLS estimation, where the IV and covariates together generate fitted values of obstruction and use these as an alternative and arguably exogenous measure of obstruction. Results continue to be magnitudinally substantial, statistically significant, and correctly

Table 3: Effect of obstruction on employment rates

	(1)	(2)	(3)	(4)	(5 - 2SLS)
ln_oe_200	0.004	-2.462	-3.079		-2.149
	(t=0.11)	(t=-4.53)	(t=-3.53)		(t=-2.85)
ln_e97_ln_oe_200		0.555	0.677		0.561
		(t=4.56)	(t=3.5)		(t=3.39)
ln_pc_li1997_ln_oe_200			-0.026		
			(t=-0.83)		
ln_iv_200				-2.094	
				(t=-3.58)	
ln_e97_ln_iv_200				0.505	
				(t=3.85)	
ln_e97	-0.757	-3.705	-4.344	-5.737	-3.753
	(t=-13.31)	(t=-5.89)	(t=-4.37)	(t=-4.48)	(t=-4.33)
ln_pc_li1997			0.15		
			(t=0.87)		
ln_dist_to_nearest_settle	0.017	0.018	0.04	0.032	0.03
	(t=1.29)	(t=1.35)	(t=2.06)	(t=2.24)	(t=1.95)
ln_remote	-0.321	-0.261	-0.329	-0.375	-0.526
	(t=-2.94)	(t=-2.41)	(t=-2.65)	(t=-3.29)	(t=-3.19)
ln_border	-0.036	-0.032	-0.034	-0.038	-0.046
	(t=-5.0)	(t=-4.8)	(t=-4.1)	(t=-5.83)	(t=-4.91)
farm_pc07	0.554	0.57	0.206	0.42	0.99
	(t=3.03)	(t=3.11)	(t=0.69)	(t=2.54)	(t=3.29)
Observations	324	324	228	324	324
R^2	0.6517	0.6792	0.7282	0.6842	0.6070

signed.

Per-capita lights and obstacles

Table 4 repeats Table 3's format, except the outcome variable is now the change in log-per-capita light emission. As in Table 3, the regression in Column 1 of Table 4 yields a small negative effect for obstacle exposure (statistically insignificant), masking massive countervailing effects. When the interaction term is included (Column 2), obstacles are revealed to have a devastating effect on per-capita light emissions. The results in Tables 3 and 4 are very similar – a remarkable fact given that employment rates were measured by census data of the Palestinian CBS, while lights data were collected by USAF satellites. These data sources and methods of collection could not be more different from each other, and yet both per-capita lights and employment rates react much the same way to obstruction. The similarity of these results lends credibility to both data sources.

Net-immigration rates

Table 5 mirrors Tables 3 and 4, but the outcome is log-net-immigration for 1997 to 2007, calculated by subtracting the number of emigrants from each town from the number of immigrants to each town, dividing by the 1997 town population, and taking the natural log. Again, the results are remarkably consistent with the other outcomes: towns that face more obstruction suffer substantial losses to net-immigration[22], but losses are significantly mitigated for towns enjoying a higher employment rate.

Credibility of the IV

A variable must satisfy two basic criteria to be an IV: (1) conditional on covariates X_i, it must strongly predict the endogenous regressor, and (2) unlike the endogenous regressor it must be uncorrelated with unobserved covariates. The IV used above easily satisfies (1) with a powerful first-stage regression (see appendix). As for the exclusion restriction, the correlation of the IV with unobserved variables can never been known, but lack of correlation with some observed covariates would bolster confidence. In particular, the IV was introduced out of concern that town-level exposure to security crackdowns correlated with obstruction measures. I show in Table 6 that con-

[22]This turns out to be driven by decreased immigration to obstructed towns, not increased emigration.

Table 4: Effect of obstruction on per-capita light emissions

	(1)	(2)	(3)	(4 - 2SLS)
ln_oe_200	-0.04	-3.147		-3.687
	(t=-0.24)	(t=-2.05)		(t=-1.82)
ln_e97_ln_oe_200		0.489		0.545
		(t=1.53)		(t=1.33)
ln_pc_li1997_ln_oe_200		-0.207		-0.291
		(t=-1.28)		(t=-1.22)
ln_iv_200			-3.369	
			(t=-1.81)	
ln_e97_ln_iv_200			0.506	
			(t=1.36)	
ln_pc_li1997_ln_iv_200			-0.254	
			(t=-1.16)	
ln_e97	-0.236	-2.802	-5.181	-3.094
	(t=-2.44)	(t=-1.7)	(t=-1.43)	(t=-1.45)
ln_dist_to_nearest_settle	0.025	0.026	0.032	0.028
	(t=0.39)	(t=0.41)	(t=0.52)	(t=0.48)
ln_remote	-0.375	-0.352	-0.392	-0.41
	(t=-0.81)	(t=-0.78)	(t=-1.0)	(t=-1.01)
ln_border	-0.002	0.008	0.006	0.007
	(t=-0.03)	(t=0.18)	(t=0.11)	(t=0.12)
ln_pc_li1997	-0.141	0.984	2.383	1.433
	(t=-3.35)	(t=1.15)	(t=1.1)	(t=1.12)
farm_pc07	0.302	0.397	0.447	0.541
	(t=0.3)	(t=0.43)	(t=0.46)	(t=0.58)
Observations	228	228	228	228
R^2	0.2023	0.2168	0.2216	0.1617

Table 5: Effect of obstruction on net-immigration rates (2SLS)

	(1)	(2)	(3)	(4)
ln_oe_200	0.333	-14.556		-8.277
	(t=0.68)	(t=-3.33)		(t=-1.11)
ln_e97_ln_oe_200		3.353		3.631
		(t=3.46)		(t=2.2)
ln_pc_li1997_ln_oe_200				1.187
				(t=2.89)
ln_iv_200			-8.038	
			(t=-1.26)	
ln_e97_ln_iv_200			3.127	
			(t=2.16)	
ln_pc_li1997_ln_iv_200			1.066	
			(t=3.1)	
ln_e97	0.312	-17.456	-30.785	-19.304
	(t=0.65)	(t=-3.44)	(t=-2.19)	(t=-2.25)
ln_pc_li1997			-10.138	-6.072
			(t=-3.0)	(t=-2.75)
ln_dist_to_nearest_settle	0.053	0.048	0.274	0.263
	(t=0.32)	(t=0.28)	(t=1.47)	(t=1.38)
ln_remote	-1.875	-1.523	-2.315	-3.571
	(t=-1.8)	(t=-1.45)	(t=-2.17)	(t=-2.31)
ln_border	-0.351	-0.329	-0.337	-0.422
	(t=-3.59)	(t=-3.38)	(t=-2.99)	(t=-3.23)
farm_pc07	3.31	3.196	-0.565	2.99
	(t=1.38)	(t=1.34)	(t=-0.14)	(t=0.63)
Observations	260	260	188	188
R^2	0.9070	0.9095	0.9239	0.1855

Table 6: 2SLS and proximity measures

	(<1km)	(<2km)	(<5km)	(<10km)
ln_oe_200	-2.126	-2.24	-2.275	-2.383
	(t=-2.85)	(t=-2.96)	(t=-2.82)	(t=-2.85)
ln_e97_ln_oe_200	0.566	0.591	0.599	0.61
	(t=3.44)	(t=3.46)	(t=3.32)	(t=3.32)
ln_e97	-3.78	-3.913	-3.957	-4.011
	(t=-4.38)	(t=-4.38)	(t=-4.19)	(t=-4.17)
ln_dist_to_nearest_settle	0.028	0.029	0.028	0.026
	(t=1.79)	(t=1.96)	(t=1.82)	(t=1.67)
farm_pc07	1.048	1.026	1.026	1.014
	(t=3.25)	(t=3.38)	(t=3.2)	(t=3.18)
ln_remote	-0.546	-0.557	-0.534	-0.504
	(t=-3.29)	(t=-3.48)	(t=-3.13)	(t=-2.9)
ln_border	-0.048	-0.049	-0.045	-0.04
	(t=-4.72)	(t=-4.82)	(t=-4.8)	(t=-4.51)
manned	0.001	0.0	0.0	0.0
	(t=1.01)	(t=1.3)	(t=0.71)	(t=1.73)
wall	0.0	-0.0	-0.0	-0.0
	(t=0.19)	(t=-0.38)	(t=-0.55)	(t=-0.07)
under_constr	-0.0	0.0	-0.0	-0.0
	(t=-0.43)	(t=0.41)	(t=-0.65)	(t=-0.58)
roadgate	-0.001	-0.0	-0.0	0.0
	(t=-0.86)	(t=-0.92)	(t=-0.8)	(t=0.12)
roadblock	-0.001	-0.0	-0.0	-0.0
	(t=-1.4)	(t=-1.47)	(t=-0.42)	(t=-1.78)
Observations	324	324	324	324
R^2	0.5914	0.5937	0.5931	0.6199

trolling for proximity of obstacles to towns does not significantly alter the 2SLS-point-estimates for the marginal effects of interest. If obstacles and Israeli troops were deployed in close proximity, then towns near obstacles were exposed more to Israeli troops, and if their presence raised the probability of violent confrontation, then those confrontations and the ensuing cycle of violence (a la Paserman (2008)) would easily explain how all three outcomes above were negatively affected, and why for towns with lower employment (and therefore lower opportunity cost of violence (see Miaari et al (2012)) the effects were exacerbated.

As evident in Table 6, however, the inclusion of obstacle proximity measures as regressors does not meaningfully alter the 2SLS estimates. I include counts of manned obstacles, roadblocks, roadgates, and wall segments within 1, 2, 5, and 10 kilometers of each town. Not only are key point-estimates unchanged, but the proximity measures themselves apparently have no effect on employment changes in proximate towns.

Internal trade

As discussed in the World Bank's Area C report (2013) and confirmed here with the 2007 census data, the West Bank only possessed two sectors with the potential for regular internal trade: minerals & nonmetalic production, and agriculture. The minerals sector, however, employed only 2.9% of the labor force in 2007, and a spatial histogram (see appendix) suggests production occurred at several locations in the northern and southern West Bank, meaning goods would not have had to travel far to reach consumers. The World Bank report agrees that internal trade of minerals was likely limited throughout the time period.

The agricultural sector, however, is a different matter. Whereas building materials can be ordered in bulk, farm produce is perishable and must be ordered regularly. Likewise, people's demand for food is daily, whereas their demand for building materials is less frequent. It is virtually certain, therefore, that the agricultural sector made regular use of the road network and would therefore have been vulnerable to mobility disruption. Moreover, as depicted in Figure 11, LANDSAT daytime satellite imagery from throughout the decade agree with the 2007 census that farming occurred disproportionately in the northern parts of the West Bank, so that there was likely a

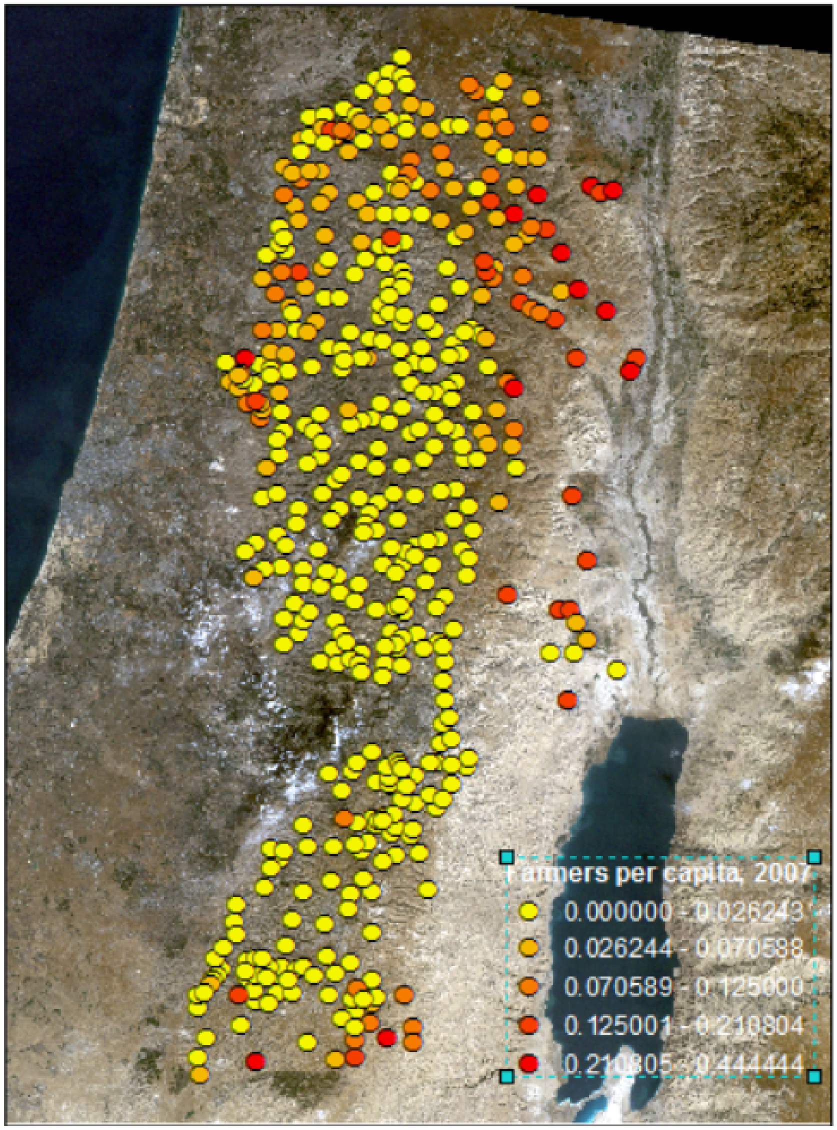

Figure 11: Farmers per capita, 2007; and LANDSAT imagery, 1999

north-to-south flow of produce.

If obstruction raised transit costs of farming goods, then the price index of food would have risen in (non-farming) destination towns, as predicted by typical NEG models (see Helpman (1998), for example). If demand for food was inelastic relative to other goods, then expenditure towards non-food items would have decreased in non-farming towns. If each farming town supplied a unique farming product (monopolistic competition), then those whose roads to non-farming towns were more obstructed would lose some share of total expenditures as consumers shifted to imperfect substitutes.

In all of the above regressions, however, the inclusion of an interaction term for farmers per capita (2007) and obstruction never approaches statistical significance, suggesting farming and non-farming towns did not experience obstruction differently. I now perform a more subtle test.

Further tests

Up until now the obstruction measure and IV have both been calculated assuming labor flows from town i were no greater to town j than to town k in the pre-obstacle era, for all $\{i, j, k\}$. The commuting model suggests some sensible limitations (or weights) to the set of destinations accessed by each origin. The model predicts, for example, that flows to more distant towns should have been less, and that flows to towns with lower wages (employment) should also have been less. In Table 7, I present regressions where the set of destinations per origin is limited according to this logic. For each town i, towns qualified as destinations in the pre-obstacle era only if they had higher employment rates than i. I simultaneously test the 'agricultural trade' hypothesis discussed above by creating a separate measure of obstruction where only paths to towns with higher rates of farming are considered.[23] For all columns, the 2SLS instrumented specification is used. For the first pair of columns, no distance limit is imposed; for the second pair, I apply a limit of 100km. For each pair, the left column uses the naive obstruction measure and IV, while the right column uses the 'higher employment rate' criterion to restrict the destination set. Results are qualitatively consistent

[23] As discussed earlier, since specific economic activities were not identified in the 1997 census, I am forced to use 2007 data. Visual inspection of Landsat imagery from the late 1990s suggests farmers per-capita in 2007 match well with land cultivation.

Table 7: Effect of obstruction on employment rates - 2SLS

	∞	∞	$\leq 100km$	$\leq 100km$
ln_oe	-2.17		-1.908	
	(t=-2.84)		(t=-2.56)	
$ln\_e97\_ln\_oe$	0.565		0.441	
	(t=3.37)		(t=2.51)	
$ln\_oe\_higher\_empl$		-3.855		-1.726
		(t=-2.4)		(t=-2.08)
$ln\_e97\_ln\_oe\_higher\_empl$		1.029		0.344
		(t=2.13)		(t=1.72)
ln_oe_farm	0.023	-0.29	0.044	0.183
	(t=0.71)	(t=-0.8)	(t=0.63)	(t=1.31)
ln_e97	-3.77	-6.153	-2.934	-2.444
	(t=-4.29)	(t=-2.46)	(t=-3.4)	(t=-2.49)
$farm\_pc07$	1.217	2.232	0.791	0.775
	(t=3.31)	(t=1.36)	(t=3.26)	(t=2.16)
Observations	323	322	323	322
R^2	0.6013	.	0.6633	0.5722

with earlier tables. No significant effects are found for the farming obstruction measure, casting doubt on the internal trade interpretation.

Conclusion

This paper studies mobility disruption in the West Bank during the 2nd Palestinian Uprising by assembling a town-level dataset of census and satellite data from before and after the deployment of security obstacles along the internal road network. As Palestinians negotiate a two-state solution to the Israel-Palestine conflict, they may naturally question the importance of geographic contiguity. Can the future Palestinian state be economically successful as an 'island economy' or 'archipelago', or should Palestinians negotiate for a contiguous land mass? The performance of the Palestinian West Bank economy in the face of Israeli obstacles provides the best simulation available for how the future state would function as a splintered geographic entity. This paper finds an increase to discontiguity exacerbates spatial economic inequalities by harming low-employment towns more than high-employment towns. The net-immigration results suggest a long-term consequence of such inequality may be depopulation of relatively impoverished areas, so that underdeveloped parts of the Palestinian island economy would tend to melt away, with the spatial economy ultimately occupying only a few major foci.

Bibliography

Ahlfeldt, Redding, Sturm, Wolf. The Economics of Density: Evidence from the Berlin Wall. Revise & resubmit, *Econometrica*, 2013.

Angrist, Joshua. The Economic Returns to Schooling in the West Bank and Gaza Strip. *American Economic Review*, 85(5), 1065-1087, Dec 1995.

Arbel, Ben-Shahar, Gabriel, Tobol. The local cost of terror: Effects of the Second Palestinian Intifada on Jerusalem housing prices. *Regional Science and Urban Economics*, 40, 415-426, 2010.

Atkin, David.

Trade, Tastes and Nutrition in India. Accepted, *American Economic Review*, 2013.

Endogenous Skill Acquisition and Export Manufacturing in Mexico. Revise & resubmit, *American Economic Review*, 2013.

Banerjee, Duflo, Qian. On the Road: Access to Transportation Infrastructure and Economic Growth in China. Working paper 2012.

Baum-Snow, Turner. Transportation and the Decentralization of Chinese Cities. Working paper, 2012.
Becker, Rubinstein. Fear and the Response to Terrorism: An Economic Analysis, 2011.

Benmelech, Berrebi.

Human Capital and the Productivity of Suicide Bombers. *Journal of Economic Perspectives*, 21(3), 222-238, 2007.

Benmelech, Berrebi, Klor.

On Terrorism and Electoral Outcomes: Theory and Evidence from the Israeli-Palestinian Conflict. *Journal of Conflict Resolution*, 50(6), 899-925, December 2006.

The Impact of Terrorism on the Defence Industry. *Economica*, 77, 518-543, 2010.

The Economic Cost of Harboring Terrorism. *Journal of Conflict Resolution*, XX(X) 1-23, 2010.

Counter-Suicide-Terrorism: Evidence from House Demolitions. Working paper, April 2011.

Economic Conditions and the Quality of Suicide Terrorism. *Journal of Politics*, 74, 113-128, 2012.

Berrebi, Klor. Are Voters Sensitive to Terrorism? Direct Evidence from the

Israeli Electorate. *Political Science Review*, 102(3), 279-301, August 2008.

Bertrand, Duflo, Mullainathan. How Much Should We Trust Differences-in-Differences Estimates?. *Quarterly Journal of Economics*, 119(1), pp. 249-275, 2004.

Brandt, Henderson, Turner, Zhang. Roads, Railroads and Decentralization of Chinese Cities. Working paper, 2012.

B'Tselem. 'Ground to a Halt'. www.btselem.org, July 2007.

Donaldson, David. Railroads of the Raj. Forthcoming, *American Economic Review*, 2013.

Duranton, Turner. Urban Growth and Transportation. *Review of Economic Studies*, 2012, 1-36.

Eaton, Kortum. 2002. Technology, Geography, and Trade. *Econometrica*, 70(5), 1741-1779.

Feenstra, Richard. Advanced International Trade: Theory and Evidence. Princeton: Princeton University Press, 2003.

Fujita, Krugman, Venables. The Spatial Economy: Cities, Regions and International Trade. Cambridge: MIT Press, 1999.

Hazam, Felsenstein. Terror, Fear and Behavior in the Jerusalem Housing Market. *Urban Studies*, 44, 2529-2546, 2007.

Harris, John R. Todaro, Michael P. Migration, Unemployment and Development: A Two-Sector Analysis. American Economic Review 60 (1): 126142, 1970.

Helpman, Elhanan. The Size of Regions. In *Topics in Public Economics: Theoretical and Applied*, ed. David Pines, Efraim Sadka, and Itzhak Zilcha, 33-54. Cambridge: Cambridge University Press, 1998.

Henderson, J. Vernon. The Sizes and Types of Cities. *American Economic*

Review, 64(4), 640-56, 1974.

Henderson, J. Vernon, Adam Storeygard, and David N. Weil. 2012. "Measuring Economic Growth from Outer Space." *American Economic Review*, 102(2): 994-1028.

Jaeger, Paserman.

Israel, the Palestinian Factions and the Cycle of Violence. *American Economic Review*, 96(2), 45-49, May 2006.

The Cycle of Violence? An Empirical Analysis of Fatalities in the Palestinian-Israeli Conflict. *American Economic Review*, 98(4), 1591-1604, September 2008.

The Shape of Things to Come? On the Dynamics of Suicide Attacks and Targeted Killings. *Quarterly Journal of Political Science*, 2009, 4: 315-342.

Jaeger, Klor, Miaari, Paserman.

The Struggle for Palestinian Hearts and Minds: Violence and Public Opinion in the 2nd Intifada. *Journal of Public Economics*, 96(3-4), April 2012.

Can Militants Use Violence to Gain Public Support? Evidence from the Second Intifada. Working paper, February 2012.

Krugman, Obstfeld. International Economics: Theory and Policy. Addison Wesley, 2005.

Miaari, Zussman, Zussman. Employment Restrictions and Political Violence in the Israeli-Palestinian Conflict. Working paper, July 2012.

Redding, Sturm. The Costs of Remoteness: Evidence from German Division and Reunification. *American Economic Review*, 98(5), 1766-1797, 2008.

Storeygard, Adam. Farther on down the road: transport costs, trade and urban growth in sub-Saharan Africa. Revise & resubmit, *Review of Economic*

Studies, 2013.

Takeuchi, Bento, Cooper. Measuring the welfare effects of slum improvement programs: The case of Mumbai. *Journal of Urban Economics*, 2008, 64: 65-84.

World Bank Report: West Bank and Gaza: Area C and the Future of the Palestinian Economy. 2013.

Shayo, Zussman. Judicial Ingroup Bias in the Shadow of Terrorism. *Quarterly Journal of Economics*, 126(3), 1447-1484, 2011.

Zussman, Zussman. Assassinations: Evaluating the Effectiveness of an Israeli Counterrorism Policy Using Stock Market Data. *Journal of Economic Perspectives*, 20(2), 193-206, Spring 2006.