The Economic Incidence of the Migration Surplus: Evidence from Border Regulations

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Abstract

Internal and international migration are known to reduce inequality, alleviate poverty in migrant-sending regions, and boost growth in migrant-receiving regions. However, many citizens of rich countries have raised concerns that open border policies reduce social cohesion and increase the criminal activity of undocumented workers. Thus, there has been pressure for stricter vetting of immigrants and more stringent border policies. Yet, as border restrictions tighten, this favors the rise of intermediaries and encourages criminal activity that redistributes the migration surplus: illicit trading of government-issued work permits between intermediaries and workers. This paper aims to quantify the causal impact of increased border regulations on the economic incidence of the migration surplus. The setting consists of Palestinian workers in Israel, some of whom are hired by Israeli firms as undocumented workers—without a valid work permit. Additionally, a portion of permit-holders illegally purchase work permits from influential Israeli employers (and intermediaries) who were granted permits according to a national quota. Our analysis takes advantage of security-motivated border policy reforms that increased enforcement of the law prohibiting undocumented workers from entering Israel proper. Using five rich data sources, we show that a stricter border policy increased demand for work permits (many of which were previously unused), doubled intermediary (black-market) revenue from $166 million to $317 million and decreased individual wages by 15%, thereby reducing worker surplus (i.e. take-home pay) by $361 million. Thus, strict border regulations reduced undocumented employment but transferred a significant portion of the migration surplus from workers to intermediaries and employers.

JEL: D4; D60; J08;J46; J61; K42; H82; L11; L40; O17

Keywords: labor mobility; worker surplus; migration surplus; intermediaries; undocumented workers; work permits; welfare; efficiency; informality; market power; price discrimination

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1 Introduction

Migrant workers and their families reap substantial gains from international labor mobility (McKenzie et al., 2010; Clemens, 2013) and internal migration (Adnan, 2015) . Remittances alone are estimated at about 9.4% of global GDP (McKinsey, 2016). Likewise, studies have found that guest worker programs decrease global wage inequality and drastically increase expenditures in migrant-sending countries (Clemens et al., 2018; Weyl, 2018; Gaikwad et al., 2022; Mobarak et al., 2021). However, many citizens of rich countries have raised concerns that open border policies reduce social cohesion and increase the criminal activity of undocumented workers. Thus, there has been pressure for stricter vetting of immigrants and more stringent border policies. Yet, as border regulations increase and labor markets become more formalized, they create the scope for the rise of intermediaries. In many settings, intermediaries provide migrant workers with formal documentation to access legal employment in the destination country and may even aid them in finding an employer. In return, intermediaries demand sizeable payments from workers. Although employers are required, by law, to bear the full costs of hiring employees, in practice, most migrant workers pay intermediaries a substantial share of their salary to compensate both employers and intermediaries for time and money spent on recruitment (see Figure 1).

In such a setting, the prices of visas and work permits are not driven to zero by competition since intermediaries usually operate as an organized crime syndicate. To further lower labor costs and increase permit payments, employers and intermediaries may even collude by sharing information on workers' characteristics and institutional details, especially when regulatory barriers to the labor market are high [1]. Perhaps, counterintuitively, increasing the legal coverage of migrant workers in the labor market– by seeking to ensure that a greater proportion are in possession of residence visas and work permits– facilitates the illicit practice of permit and visa trading in the black market between workers and intermediaries. This implies that not only will criminal activity increase, but workers may be worse off overall. To date, however, no one has considered how policy prescriptions such as strict border regulations can change or redistribute the migration surplus through increased interactions between workers and intermediaries, thereby mitigating labor mobility gains to workers and their relatives in migrant-sending countries.

This paper is the first to quantify the causal impact of increased border regulations on the economic incidence of the migration surplus. We exploit the unique circumstances of Palestinian cross-border commuters and are further aided by security-motivated border policy reforms implemented in 2018Q4-2019Q4 that increased enforcement of the law prohibiting undocumented workers from entering or working in Israel proper. We measure the impact of the reform on several individual outcomes including the propensity to migrate, wages, permit prices and well-being. We use these estimates to measure aggregate changes in employer labor costs, intermediary surplus and worker surplus, i.e. take home pay. Since we assume that permit brokers operate like a cartel to maximize joint profits and share worker information with employers, the permit price is positive and never driven to zero by perfect competition. Our main finding is that more stringent border regulations increased documented employment but reduced worker take-home pay by transferring worker surplus to permit brokers (intermediaries) and employers. We show that two factors drove this transfer, an increase in the permit price and a decline in wages for *all* migrant workers. The rise in the permit price was due to an increased demand for work permits–many of which were previously unused–following strict border policies. The decline in wages can be explained by the reduction of documented workers' outside offer (i.e. the expected undocumented wage) after heightened border restrictions lowered the likelihood of securing a job as an undocumented worker; we also show some evidence that the

[1] For example, intermediaries may inform employers about a worker's residence, which can then be used to estimate his outside offer in the local labor market, allowing employers to pay the worker less than the market wage. Likewise, employers may offer intermediaries useful information on institutional details that might help them expand the illicit market for permit trading.

decline in wages was partially due to changes in documented workers' characteristics. In effect, the reform increased the bargaining power of employers and intermediaries, who respectively paid lower wages and charged higher permit prices. Yet, workers report better treatment by employers.

The institutional setting is one in which workers are homogeneous while employers in different sectors are heterogeneous. "Formal employers" are allocated work permits in accordance with a government-set quota, which they use to hire Palestinians through the official process and for which they pay a fixed fee to the government. We refer to workers hired through this official process as "non-payers"[2]. Formal employers with excess permits illicitly sell them either directly to "payers" or, in many cases, via permit brokers who use their networks to secure buyers; the permits can only be sold once because they include detailed information on the worker and the formal employer [3]. Payers secure work permits by purchasing them from the black market, usually via brokers, in order to enter Israel proper through the main gates. Having a work permit can then be used to search for one or more jobs, typically with semi-formal employers, i.e., employers who are not granted (enough) work permits through the quota system[4]. Lastly, Israeli firms may hire workers who do not hold a work permit and thus, risk the possibility of a fine; we refer to these employees as undocumented workers. Despite the illegality of black market transactions, workers and employers typically face more serious consequences when workers are undocumented[5]. In summary, Palestinian migrant workers in Israel belong to one of three sectors: the formal sector (which hires "non-payers"), the semi-formal sector (which hires "payers") and the underground sector (which hires undocumented workers).

Our setting provides several advantages for answering these questions. First, given the recent reforms targeting undocumented workers, there is a unique opportunity to directly address the question of whether border regulations and more legal coverage of migrants reduce or redistribute the returns to migration. Second, while data on undocumented migrant workers and/or illicit behavior by migrants in the host country (e.g. purchasing government property like work permits) is rarely accessible due to constraints related to data collection methods and (understandably) low response rates, the unusual circumstances of Palestinian migrants as cross-border commuters allows for data collection where they are law-abiding legal residents, i.e. in the West Bank. This may explain our unusually high response rates from multiple data sources, even for questions relating to illicit behavior. Third, in addition to observing outcomes for undocumented workers and payers, we also examine outcomes for non-payers. Since non-payers are hired formally and not directly affected by reforms related to border regulations, their inclusion provides us with a sense of how far-reaching border policies are. Relatedly, sectors (formal, semi-formal, underground) are reasonably well integrated such that workers are known to experience inter-sectoral mobility within a given industry (e.g. construction). Thus, our setting allows us to observe how workers respond to the contraction of one of these sectors–the underground sector.

We use a simply stylized dual economy model to provide a formal framework for how the reform is expected to impact permit prices, wages and the share of permit-holders. We assume a perfectly elastic

[2]During our period of interest, formal employers had the power to revoke work permits and to terminate the contracts of any employee (nominal or actual) and were not legally required to give workers advance notice of revocation/ termination. On December 6 2020, an Israeli reform was implemented whereby the validity of work permits was extended for 60 days from the date of termination of a contract of employment.

[3]When selling excess permits, formal employers may contact brokers to help them secure buyers. Once the broker secures a match and a payment is made, the buyer will then send his personal/biographical details so that the formal employer can officially apply for the permit. The buyer (i.e. payer) may or may not ever work for the official employer named on his work permit.

[4]Technically the same firm may employ formal, semi-formal and undocumented workers based on labor demand.

[5]The reason for this is as follows: Consider a worker who purchased a work permit and is employed by a semi-formal employer. It is clear then that the formal employer named on his permit is not his actual employer. Nevertheless, this is not a cause for concern since during random inspections, the worker and semi-formal employer will argue that the discrepancy between the name of the employer on the work permit and the name of the semi-formal employer is due to the worker's status as a subcontractor. In contrast, undocumented workers can face consequences at the border between the West Bank and Israel as well as issues when actually working.

labor supply of commuters whose outside option is equivalent to an exogenous underground sector wage. In the model, the formal sector (along with brokers) operates as a monopolist in the permit market and a monopsonist in the labor market, where its workers (non-payers) earn the outside option. The semi-formal sector consists of a number of individual competitive firms–who are not granted permits–and thus, pay semi-formal workers (payers) according to their marginal revenue product of labor. Payers are willing to pay for the permit, purchased from the formal sector, as long as the price of the permit does not exceed the difference in wages between payers and non-payers. We also assume that prior to the policy change, there are idle permits such that the quota is not fully utilized. This is motivated by 1.) administrative data showing that the share of idle permits is higher prior to the reform; 2.) anecdotal evidence that brokers and employers collude to limit production and set prices and 3.) negligible wage differences across sectors (within an industry) and an active underground economy prior to the reform[6]. Thus, in equilibrium, non-payers and undocumented workers earn the same wage while payers earn the undocumented wage plus the permit price. The heightening of security measures along the border almost shutdown the underground sector, thereby reducing workers' outside option and the wages of non-payers and undocumented workers. At the same time, many undocumented workers sought to become documented, increasing the demand for work permits and thus, raising the price and quantity of work permits (i.e. payers); the absolute and relative number of idle permits declined. Since the wage distribution and the level of inter-sectoral mobility varied widely across industries, we present the main empirical results separately by industry.

We use five data sets to examine how strict border enforcement affects the economic incidence of the migration surplus. The main data set–the Entry Gates Survey (EGS)–is a unique survey instrument that we designed in order to collect novel data in June 2018 and June 2019 on documented Palestinian workers queuing at the four main gates that provide access to Israel proper. The EGS distinguishes between two types of permit-holders–payers and non-payers–and includes a wide range of worker and employer characteristics. We collected data on 2337 Palestinian permit-holders employed in Israel proper and observed 1268 illicit monthly payments, made by payers to their permit brokers. We found that, on average, payers spent 20% and 28% of their monthly income purchasing work permits in 2018 and 2019 respectively. Note that work permits are valid for six months but permit brokers allow buyers to make monthly payments [7]. The second data set used is the Palestinian Labor Force Survey (PLFS), which allows the researcher to distinguish between documented and undocumented workers. The rotational design of the PLFS can be used to construct short panels and since it is a nationally representative sample, its survey weights are used to calibrate weights for the EGS. Third, quarterly administrative data on issued and unused work permits are used as a benchmark for the number of documented migrants throughout the period. The fourth data set is constructed using Israeli legal databases to track the frequency and evolution of punitive measures against undocumented workers and Israeli (primarily Arab) citizens who assisted them in illegally crossing the border. Finally, our fifth data set is created using ArcGIS 11 software to geo-reference municipalities (self-reported in the EGS) where Palestinians live to create clusters, i.e. an approximation for local permit and labor markets [8]. This allows us to test whether the local characteristics of a worker's residence can

[6]When choosing between the sectors, workers face a trade-off between the greater protection afforded by legal migrant status and the monetary and search costs associated with acquiring a work permit or a formal job where a permit is automatically provided. If wages are similar across sectors and there is minimal enforcement at the border, a high share of workers will choose the underground sector over the semi-formal and formal sectors. Hence, there will be idle or unused permits.

[7]Since formal employers can easily revoke a worker's permit, workers must continue making payments to the broker. Otherwise, the broker will no longer split the payment with the employer and the employer will revoke the permit.

[8]Specifically, we use the network analysis algorithm in ArcGIS in order to group localities such that the distance among them is no more than 10 km apart. The computation is based on georeferenced data on the existing road network in the West Bank. The ruggedness of the terrain is also considered, allowing us to estimate more precise commute times—an alternative measure for defining local labor markets. Note that in the PLFS, the finest geographic unit available is district. We show that up to six local markets exist within a district.

predict the permit price.

The main finding in this paper is that although the reform led to increased legal coverage and modest improvements in employer-employee relations, this came at a substantial cost for workers. Using an event-study design, our identification strategy rests on the assumption that the reform was an exogenous shock and thus uncorrelated with the unobserved determinants of the main outcome variables (wages, permit prices, share of permit-holders). When the outcome variables is wages, we are also able to use a difference in-difference design where two different control groups from the (domestic) West Bank economy are used. Our findings are as follows: First, according to the PLFS, the share of undocumented workers declined by 18 percentage points (from 32% to 14%), despite the slight uptick in the number of Palestinian migrant workers; this implies there was no deadweight loss associated with this reform. Administrative data on work permits corroborates these findings since there was a simultaneous increase in the number of government-issued permits and a decline in idle permits between mid-2018 and mid-2019. Furthermore, by constructing short panels in the PLFS, we show that almost all of the newly documented workers had been undocumented prior to the reform; thus the increase in documented workers did not arise from those who were previously unemployed, economically inactive or employed in the West Bank. Second, using the EGS, we estimate that the number of payers increased by over 70% and the average permit price rose by approximately 14% between 2018 and 2019, almost doubling black-market revenue from 598 million NIS [US $166] to 1.14 billion NIS [US $317 million]. The latter estimate closely resembles that of the ILO in 2019 (ILO, 2021), thereby confirming the accuracy of our estimate. Third, real wages of all three worker types declined and hence, employers' labor costs in 2019 are estimated at 780 million NIS (9% of the 2018 wage bill). We estimate a 15% decline in wages and a considerable decline in overall worker surplus–estimated as take-home pay– by 1.3 billion NIS (15% of the 2018 wage bill). Accounting for compositional effects, i.e. changes in worker characteristics, reduces this figure to 850 million NIS (10% of the wage bill). Evidence for well-being measures is mixed; after the reform, both payers and non-payers reported better treatment by employers but payers experienced lower overall life satisfaction.

In our second set of findings, we investigate the pricing strategies of permit brokers. The existence of idle permits already suggests that brokers have market power. First, we show that in 2018, brokers imposed an extremely regressive pricing structure with respect to individual wages, which limited entry into legal jobs. Moreover, brokers practiced third-degree price discrimination, by using municipality-level characteristics of a payer's residence (in the West Bank) to estimate his alternative local labor market opportunities in Israel's underground and formal sectors. By merging the EGS with our ArcGIS measures, we show that in 2018, permit prices are positively associated with average local wages of payers and negatively associated with average local wages of non-payers; there was no association between permit prices and average local wages in 2019. Instead, permit prices became more strongly associated with the individual wage. Our interpretation is that permit brokers adjusted to new legal and institutional arrangements–that limited inter-sectoral worker mobility and strongly incentivized workers to seek legal employment–by adopting a more individually-targeted pricing strategy in 2019[9]. We conclude that brokers have considerable market power and devise pricing strategies that exploit information on market forces and the institutional setting, in a way that allows them to capture a substantial portion of worker surplus, either by limiting quantity (as in 2018) or increasing price (as in 2019).

This paper contributes to several strands of literature. In the migration literature, our study complements other work on the benefits of eliminating barriers to migration (McKenzie et al., 2010; Clemens, 2011), on how migrant workers' outcomes are shaped by labor reforms in the destination country (Naidu

[9]This was done to maximize profits in a new setting where workers had higher mobility constraints due to the fact that access to employment in the underground sector had been severely curtailed.

et al., 2016) and the effect of stricter (US) border enforcement on wages, welfare (Allen et al., 2018) and the share of undocumented immigrants (Feigenberg, 2020). Our findings are also consistent with an emerging literature that finds substantial labor productivity gains from reducing migration costs (Bryan and Morten, 2019; Tombe and Zhu, 2019). Our paper differs from those in the literature since in addition to estimating how stricter regulations shaped migrant outcomes (i.e. wages, hours), we can directly observe how border enforcement affected changes in the permit price, intermediary revenue, employer labor costs and the re-distribution of the migration surplus. We also provide estimates of well-being measures and contribute to the theory-based debate on the functionality of work permit markets (see Lokshin and Ravallion, 2019 for review) by providing empirical evidence on the broad consequences of an expanding permit market.

More generally, the paper relates to studies that measure the economic cost of organized crime (Pinotti, 2015) by documenting the rise in black market revenue, where payments are illicitly extracted by a close network of brokers who collude on prices and quantities. Our finding that strict border enforcement led to an expansion of illicit trading in permits relates to other papers that have highlighted negative unintended consequences of policies or agreements that were meant to curb illicit activity. For example, Brown et al. (2021) show that a non-aggression agreement between gangs reduced violence but increased extortion payments for consumers and retailers, likely through greater collusion and less competition by gangs (Brown et al., 2021). Likewise, Friebel and Guriev (2006) use a theoretical analysis to show that by raising the cost of legal immigration, stricter border policies increase undocumented employment by raising the demand for intermediaries, who in this context, smuggle illegal immigrants across the border.

We also expand the literature on the economic and social consequences of bribery, extortion and corruption (Olken and Pande, 2012) by examining how labor market outcomes respond to policies that increase the incentive to participate in illicit behavior. However, most studies in this literature focus on corruption, where government property is either sold by public officials (Shleifer and Vishny, 1993; Sukhtankar, 2015; Méon and Weill, 2010) or where there is collusion between public officials and private agents (Bertrand et al., 2007) . In our case, government property (work permits) is sold by private agents and to the best of our knowledge, collusion exists either among brokers or between brokers and formal employers; public officials are not usually involved. Thus, we document the adverse consequences of an expanding black market, even though corruption does not appear to take place. We also present a policy discussion on how stringent regulations can lead to greater opportunities for fraud or corrupt practices, especially in a context where systems are poorly designed .

The remainder of the paper is organized as follows: Section 2 contextualizes our paper in the literature. Section 3 describes the data sources and presents the institutional setting with the stylized facts to illustrate the validity of the basic assumptions made in the stylized model in Section 4. Section 5 lays out the permit broker's maximization problem, which is followed by the empirical strategy in Section 6. Section 7 presents the main results and section 8 discusses the broader consequences of a poorly designed system. Section 9 concludes.

2 Literature Review

Our paper contributes most directly to the broad literature on the returns to international migration in two ways (Clemens, 2011, 2013; McKenzie and Yang, 2012; McKenzie et al., 2010; Stillman et al., 2009, 2015; Gibson et al., 2013; Bryan and Morten, 2019; Tombe and Zhu, 2019) First, we differentiate between documented and undocumented workers due to the unique nature of our data sets. We also account for one of the most substantial costs of migration–payments made to intermediaries or brokers. Second, we examine the consequences of changes in labor market restrictions for migrant workers in their destination country.

Despite the serious implications for migrant workers (Ruhs, 2013), the literature on this issue has been scant and has almost exclusively relied on a few variables extracted from administrative data sets (Naidu et al., 2016) [10]. We offer a more comprehensive analysis by examining how workers' wages, permit prices, the degree of formality, and well-being have responded to a reform that limited inter-sectoral mobility of migrant workers. The findings reveal that an analysis of wages alone, underestimates the losses incurred by workers. This is consistent with Marinescu et al. (2020), who show that labor violations are found to deepen wage inequality.

Third, we shed light on the welfare consequences of the existence and expansion of black markets where "government property" is illicitly traded. The literature has mainly directed such questions to one subset of illicit activities, corruption–defined as the sale of government property by public officials (Shleifer and Vishny, 1993; Sukhtankar, 2015; Méon and Weill, 2010) [11]. One interesting exception in this literature is a study by Bertrand et al. (2007), who show that private agents are the main channel for corruption in a setting where driving test candidates make illicit payments to agents to secure drivers licenses in India; they conclude that private agents collude with public officials[12]. In our context, government property in the form of work permits are also sold by private agents to migrant workers, but agents likely collude with formal employers (i.e. official sponsors) rather than bureaucrats to perpetuate and expand the market[13]. Thus, an important contribution of this paper is to evaluate the costs associated with outsourcing government responsibilities to the private sector.

A related literature examines the economic and social consequences of illicit behavior in the form of bribery, extortion and corruption (for a review, Olken and Pande, 2012) [14]. In one study, Olken and Barron (2009) show that extortion payments are shaped by market forces and price discrimination tactics. Meanwhile, Balletta et al. (2019) show that extortion payments–extracted by the Sicilian Mafia–are regressive in that they disproportionately burden smaller firms (Balletta et al., 2019). These findings are consistent with studies that show politically-connected firms and candidates have the most to gain from policies that encourage state violence or corruption (Callen and Long, 2015; Okunogbe and Pouliquen, 2022; Colonnelli and Prem, 2022; Klor et al., 2021). While we are not able to conduct a firm-level analysis, our model predicts that formal firms–who were politically connected and favored when workers were allocated using a national quota–had market power in the permit and labor market, thereby reaping the maximum benefit from illicit activities. Empirically, we corroborate this by showing that wages of nonpayers fell and permit prices for semi-formal workers increased.

Our paper builds on previous studies by conducting an event study in the labor market to examine the market forces and institutional factors that led to more illicit activity as well as changes in price discrimination tactics (Bensassi and Jarreau, 2019; Brown et al., 2021). Additionally, while the literature usually finds adverse social consequences of corruption such as public distrust, in our setting, deregulation of the permit market led to more illicit activity and adverse labor market consequences for workers; we believe these findings are generalizable to other settings where workers pay for recruitment costs, including visas

[10] Naidu et al. (2016) show that wages for migrant workers increased when a reform relaxed labor mobility restrictions in the UAE.

[11] For example, Sukhtankar (2015) provides evidence that the illicit sale of spectrum licenses to Indian firms had almost no effect on a number of outcomes that proxy for quantity effects, price effects, revenue and quality of service.

[12] The agent helps the candidate secure a license even if he/she does not have the ability to drive. While the authors do not observe direct bribes to bureaucrats, they conclude that agents offer bureaucrats monetary kickback payments while bureaucrats create more red tape to perpetuate the use of agents.

[13] In practice, private agents may use a portion of the payment to finance recruitment fees and/or search costs related to finding workers a suitable match (employer); note that the law states that all recruitment costs should be borne by the employer not the worker.

[14] Most of the key studies have measured corruption, largely defined as payments made by individuals or firms to public officials, (e.g. police, judges, politicians), in return for a service, by explicitly designing surveys to include questions on bribery payments or by directly observing the bribe (e.g. Svensson, 2003; McMillan and Zoido, 2004; Olken and Barron, 2009; Sequeira and Djankov, 2010). The literature demonstrates that the estimates of corruption vary substantially and that the costs of corruption are sizeable, with adverse social consequences such as public distrust.

and work permits, but also contexts where workers pay bribes in order to secure government jobs (Weaver, 2021). The impact of illicit behavior on labor market outcomes has been almost completely absent from the literature (Gorodnichenko and Peter, 2007)[15]. Since work permits are required to secure jobs, identifying the causes underlying changes in permit prices is key to understanding how labor markets function.

Our paper also contributes to the literature that identifies complementarities between corruption and the underground economy. For example, as more workers and entrepreneurs join the shadow economy, there is less scope for officials to engage in corrupt practices to collect rent; thus corruption and the shadow economy are substitutes (Choi and Thum, 2005; Dreher et al., 2009). We show a similar trade-off where following the contraction of the underground sector, black market revenue rose. Moreover, net wages and take-home pay declined, which contributes to the economic cost of organized crime citeppinotti2015economic. Finally, we contribute to the industrial organization literature. Theoretically, studies have argued that an increase in the heterogeneity of buyers lead to an increase in price discrimination since buyers are more easily divided into categories and then charged different prices according to their willingness to pay (Varian, 1989). In our setting, we observe 1.) a rise in the heterogeneity of buyers–as proxied for by wage dispersion of payers–2.) a rise in the price dispersion of permits, and 3.) increased price discrimination with respect to wages.

3 Data Sources, Institutional Setting and Stylized Facts

We use five data sources to quantify how the reform affected the size and distribution of the migration surplus for Palestinian workers in Israel in 2018 and 2019. The first subsection provides a brief overview of each data source and how it contributes to the research question. The second and third subsections describe the descriptive statistics and stylized facts throughout the period of interest.

3.1 Data Sources

This section describes the five data sources used in this paper, where the first two sources provide context for Israel's border policy. The first data set is constructed using the most comprehensive legal database in Israel, the Nevot. The data set consists of all trial cases related to undocumented Palestinian workers in Israel between the years 2016 and 2021. Cases are categorized into two main types, those where undocumented Palestinian workers are prosecuted for entering Israel illegally and those where Israeli citizens (which are ethnically Arab or Jewish) are charged for enabling or assisting undocumented workers by housing, transporting or employing them in Israel. Thus, for each case, we observe the year, month, nationality/ethnicity of the defendant (Palestinian, Arab-Israeli, Jewish-Israeli), the crime for which the person was held (entry if defendant is undocumented Palestinian and transporting, employing or housing if defendant is Arab-Israeli or Jewish-Israeli) and the punishment given. Since the policy was motivated by security considerations, we also take note of which cases involved other serious crimes (i.e. robbery, murder, etc) unrelated to being an undocumented worker. Thus, the final data set allows us to track the frequency and evolution of punitive measures by nationality/ethnicity and the nature of the crime.

Our data reveals that in 2017Q4, the number of convictions and arrests declined steeply and remained low until 2019Q4 (Appendix A). Surprisingly, this decline was primarily driven by the number of undoc-

[15] One exception is a study by Gorodnichenko and Peter (2007), which finds that, although public sector workers earn wages that are 24-32% lower than those of private sector workers, the consumption levels enjoyed by the two groups are similar. They conclude that public sector workers are compensated for this wage penalty by accumulating bribes. The authors neither gather nor observe data on bribes collected by public sector workers at the individual level. However, they estimate the aggregate level of bribes collected and show that it is approximately 0.9-1.2% of GDP

umented Palestinians entering Israel illegally. This coincides with a change in internal police procedures that took place in August 2017 (see translation of police document in Appendix A). The first half of the document states that the majority of cases against undocumented Palestinians should not proceed to trial unless they involve repeat offenders or there are other serious crimes associated with unlawful entry.The second half of the document emphasizes the importance of raising the penalty for Israeli citizens who assist undocumented workers. Indeed, we show evidence of both of these trends starting late 2017 and throughout 2019 in Appendix A. As we show later, although Israeli policy involved stricter enforcement of the law with regard to Israeli citizens assisting undocumented workers from late 2017, undocumented workers did not own valid permits until late 2018.

The second data source used is the Palestinian Labor Force Survey (PLFS). The PLFS survey is a quarterly household survey conducted by the Palestinian Central Bureau of Statistics (PCBS) that includes standard questions on demographics, education, industry and place of employment. The PLFS contains several key features that allow for a thorough analysis of Palestinian workers in Israel. First, it provides a nationally representative sample of workers and allows the econometrician to observe whether workers are employed in in the West Bank or Israel, and if the latter is true, whether they are undocumented (i.e. work without a work permit) or not. For workers in both settings, we can also observe whether workers are employed via contract (written/verbal or none). Second, the survey design allows us to construct short panels and identify key descriptive statistics and stylized facts on the dynamics of the labor market. This because the PLFS has a rotational design such that Palestinian household members, including those who commute to Israel for work, are interviewed for two consecutive quarters and are revisited six months later to be re-interviewed for two more consecutive quarters. One drawback of the PLFS is that payers and non-payers cannot be distinguished in any year except for 2019–after the consequences of the reform are realized. Additionally, workers in Israel proper cannot be distinguished from those in the settlements. This is a major drawback since border enforcement occurred between the West Bank/Israeli border (i.e. green line) and thus, it is not clear how workers in the settlements were affected by the recent policy change.

To address the shortcomings of the PLFS, we commission a survey (see Appendix B) of Palestinian permit holders, which was conducted at the four main entry gates into Israel in June 2018 and June 2019 [16]. Approximately 1200 workers were interviewed in each round. The Entry Gates Survey (EGS) was primarily designed to distinguish payers from non-payers among Palestinian migrant workers crossing the border into Israel proper. Our entire sample is employed in Israel proper and is in possession of a valid work permit. Furthermore, we included detailed questions about how the permit was procured: whether the worker paid for the permit, the value of one-off or monthly payments made, whether the worker was actually employed by the official employer or "sponsor" named on the permit, and questions relating to overall well-being and treatment by the employer. The EGS also includes standard questions relating to marital status, level of education, recent employment history, work hours, and daily wages, which were copied from the Arabic questionnaire of the PLFS). Since the EGS is not a nationally representative sample of Palestinian migrant workers in Israel, we use the 2016-2019 waves of the micro-level data of the PLFS to calibrate the weights for the EGS (see Appendix C for details).

The fourth data set consists of quarterly administrative data on issued and unused work permits, which allows us to 1.) track the number of permit-holders throughout the period, and 2.) observe the evolution of the share of unused permits. These data, along with the share of undocumented workers in each period from the PLFS, permit us to draw conclusions about whether the reform led to a deadweight loss in addition to how brokers used their market power to influence the permit price. Finally, the fifth data set is constructed

[16]The gates are those at Eyal, Shaar Ephraim, Tarqumiya, and Meitar. The number of observations at a particular gate was determined by the share of Palestinians crossing at that gate in 2017.

using ArcGIS 11 software to geo-reference municipalities (self-reported in the EGS) where Palestinians live to create clusters, i.e. an approximation for local labor markets. This allows us to test whether local characteristics of a payer's residence–such as the average payer's wage and the average non-payer's wage in his local labor market– can predict the permit price.

3.2 Descriptive statistics

Table 1 provides basic summary statistics on key economic variables during the sample period 2016-2019 from the PLFS. Since almost all Palestinian migrant workers in Israel are men, the sample is restricted to males between the ages of 25 and 59. The first three rows in Panel A present macro-economic indicators. The broad takeaway is that while the labor force participation rate was high, at approximately 88-89%, throughout the period of interest, the unemployment rate was 18-20% and wage earners made up approximately 70-71% of all employed individuals. The share of employed individuals working in Israel and the settlements has remained stable at 31-32%, suggesting that there is no deadweight loss associated with the reform. Note, however, that workers in Israel and the settlements belong to one category in the PLFS. Thus, we will rely on other sources to verify this.

3.2.1 Documented and Undocumented Workers

The remaining rows in Panel A refer to Palestinian workers in Israel. The figures for some indicators remain constant throughout the years covered, but there are a few note-worthy changes. For example, the percentage of employees (and/or wage-earners) in Israel who possessed a work permit increased dramatically from 63% (67%) to 81% (86%) between 2016 and 2019. Figure 2 plots the share of permit-holders in each quarter during the period of interest. It is clear that the impact of the reform materialized in 2018Q4, although the share of permit-holders continued to increase. Table 1 shows that construction workers made up the majority (63-65%) of Palestinian workers in Israel, but were over-represented among permit-holders (71-72%). That said, the share of construction workers among earners in Israel as well as permit holders are constant over time, lending credence to the notion that the composition of permit-holders by industry type was not altered by the reform.

The next few rows display average real wages in Table 1 (Panel A) by industry affiliation and permit-holder status. The takeaway is that documented and undocumented construction workers earn similar wages while documented workers in other industries earn a premium. In Table A1, we show that this is also the case among switchers, such that non-construction workers who acquire a permit are positively selected while respective construction workers are neither positively nor negatively selected [17]. In Panel B, we replicate the exercise for payers and non-payers in Panel B using the June 2018 and June 2019 rounds of the EGS as well as the 2019Q2 wave of the PLFS. Summary statistics using the PLFS are reported only for 2019Q2 (col 3 of Panel B) to account for seasonal differences in wages and the composition of workers across industry type.

3.2.2 Payers and Non-Payers

There are several issues worth noting. First, the EGS rounds show that the share of payers among permit-holders increased after the reform and so did the permit price. Second, in 2018, the net wages of payers and

[17] See in cols(1) and (2) of Table A1 that non-construction switchers, i.e. from undocumented to permit holders (including payers and non-payers), are positively selected while similar construction workers are neither positively nor negatively selected. Likewise, cols (3) and (4) show that non-construction permit holders who switch to underground employment are negatively selected while their counterparts in the construction industry are neither negatively nor positively selected.

non-payers in both industries are similar but in 2019, a non-payer premium emerges in both industries (more on this later). Third, both payers and non-payers in construction experienced a substantial decline in gross wages between 2018 and 2019 while non-payers in non-construction experienced a slight increase, leading to greater labor market segmentation across sectors in non-construction industries than was observed between documented and undocumented workers in Table 1 Panel A and Table A1. Fourth, the decline in wages observed in the EGS for permit-holders between 2018 and 2019 is not reflected in the PLFS for either industry type, as is shown in Panel A. Relatedly, Panel B shows that estimates of wages, permit prices and the non-payer premium differ quite considerably between the EGS June 2019 and the PLFS 2019Q2. The 2019 round of the EGS reports higher wages and lower permit prices than the 2019Q2 wave of the PLFS. One explanation might be that workers in the settlements pay higher permit prices and earn lower wages than their employed counterparts in Israel proper, biasing permit prices upward and wages downwards in the PLFS. Workers might choose to work in the settlements due to lower transportation/commute costs or flexible work schedules. It is also possible that employers have different productivity requirements for workers in the settlements and in Israel proper.

Note that differences between the EGS 2019 and PLFS 2019Q2 are especially stark for non-construction workers. Thus, to the extent that differences between the EGS and PLFS are driven by outcomes of workers in the settlements, larger differences between workers in Israeli proper and the settlements among non-construction workers corroborate earlier suggestive evidence that there is more labor market segmentation among non-construction workers (e.g. a larger penalty for being undocumented, working in the settlements, or working as a payer after the reform).

3.2.3 Differences between Payers and Non-payers before and after the Reform

We will continue to use the PLFS to understand the mobility of workers and how various workers (self)select into each sector. However, our main analysis will primarily depend on the two major rounds of the EGS, which were specifically designed to collect detailed data about the unique circumstances of Palestinian permit-holders who entered Israel proper through the four main gates.

Table 2 provides descriptive statistics for the June 2018 and June 2019 samples of the EGS. Means for payers and non-payers along with differences in means by year are displayed to show absolute and relative changes between the two groups. Additionally, the last column reports the diff-in-diff for each variable to highlight whether the reform exaggerated the differences between payers and non-payers. Tables A2 and A3 display the corresponding statistics separately for construction and non-construction workers respectively.

Table 2 shows that in June 2018, non-payers were about 1.7 years older, less likely to speak English by 3 percentage points, had a tenure spell in Israel that was 13 months longer, and held a work permit for 1.2 years longer than payers. As expected, non-payers were also much more likely to work for one employer and almost all of them worked for an official employer, i.e. same employer named on work permit. They had shorter commutes of about 18 minutes less than that of payers and worked about half a day less per week. The daily wage of a payer exceeded that of a non-payer by about 94 NIS and since the average daily permit price was about 91 NIS for payers, the difference in the net daily between payers and non-payers is statistically and economically insignificant.

After the reform, several notable changes occurred. First, non-payers were four times more likely to be single in 2019. Second, approximately 20% spoke English fluently relative to 3% the previous year. Furthermore, payers were much more likely to work for multiple employers as is evidenced by the fact that their average number of employers rose from 1.8 to 2.5 while the corresponding figure for non-payers remained at 1.7. For both groups, work hours and commute times increased but the latter increased more

sharply for payers, doubling the difference in commute times. Likewise, real wages fell for both groups but differences in the daily wage fell from 94 NIS to 64 NIS, shrinking the premium paid to payers for purchasing the work permit. Meanwhile, daily permit prices rose by 13 NIS, increasing the net daily wage gap between payers and non-payers to a statistically and economically significant 44 NIS per day.

Tables A2 and A3 suggest that construction workers experienced fewer compositional changes after the reform than did non-construction workers. In fact, the non-payer net daily premium was 32 NIS for construction workers and 59 NIS for non-construction workers. One interpretation is that the reform increased labor market segmentation for both industry types but since sectors in the construction industry were closely integrated before the reform, the removal of the underground sector was more impactful, thereby leading to lower wages even for non-payers. For non-construction workers, the reform strengthened already existing labor market segmentation and thus, led to a greater wage differential between non-payers and payers.

3.3 Institutional Setting and Stylized Facts

In this subsection, we provide descriptive evidence **for six stylized facts**. The first two stylized facts refer to the institutional setting prior to the reform, which motivate the assumptions of the stylized model. The remaining stylized facts display descriptively how the reform led to changes in outcomes.

Fact 1—Wages of Undocumented Workers and Permit holders are similar in 2018 (PLFS)

In our model (next section), we assume that the outside option for permit-holders is simply the underground sector wage. In other words, formal and semi-formal employers in Israel proper must offer their employees at least the underground wage in order to retain their employees; otherwise, workers have no incentive to procure a valid work permit either through official or illicit channels. If workers across sectors are relatively homogeneous, then there is almost no penalty to being undocumented but to the extent that workers sort into sectors by ability and qualifications, a sector premium emerges. Using the PLFS, a comparison of the average wages of permitholders and undocumented workers on the eve of the reform (2018 Q1-Q3) reveals that if workers are separated by industry affiliation, there is almost no wage penalty to being undocumented (Figure 3a). Note that undocumented workers in non-construction industries earn about 8.5% less than permitholders although the difference is only marginally significant. This suggests that, for the period prior to the reform, the assumption that formal and semi-formal employers pay workers an amount based on the underground sector wage is reasonable. Additionally, since wages for construction workers are higher and more homogeneous across sectors than is the case for those working in other industries, we continue to report results separately by industry affiliation.

Fact 2—The Cost of Work Permits was fully passed on to Semi-formal Employers in 2018 (EGS)

Another major assumption in our stylized model is that payers and non-payers earn the same net wage because the permit price, which is modelled as the difference between the gross wage of payers and the wage of non-payers, is a cost fully borne by semi-formal employers. The logic is that workers are fairly homogeneous such that if the permit price is too high, this will induce many to exit the semi-formal sector, and semi-formal employers would rather pay the outside option, i.e. underground sector wage, plus the permit price rather than hire Israeli citizens. To test this assumption, we display the average net wages of payers, (the gross wage minus the permit price), and non-payers, separately by industry and year in Figure 3b. Using the EGS, the figure shows that in June 2018, there is virtually no difference between net wages

of payers and non-payers.

Fact 3—A Large Share of Undocumented Workers became Permit-holders in 2018Q4 (PLFS)

We argue that an exogenous shock occurred at the end of 2018, resulting in the contraction of the underground sector. By exploiting the short panel nature of the PLFS, we are able to show in Figure 4a, the percentages of cross-border commuters falling into one of four categories: workers who did not possess a work permit during two consecutive visits (No permit, No permit), workers who did not have a work permit during their previous visit but owned one currently (No Permit, Permit), workers who had a work permit in the previous visit but no longer owned a work permit (Permit, No Permit) and workers who were in possession of a permit for two consecutive visits. Note that the share of workers in the second group (No Permit, Permit) increased from 4.5% to 17% between 2018 Q3 and 2018 Q4.[18] Likewise, during the course of the same quarter, the share of workers in the first group (No Permit, No Permit) declined by over 10 percentage points from 32% to 22%, and then continued to fall such that workers without a permit for two consecutive visits made up only 16% of migrant workers. This means that the increase in the number of permit holders was primarily driven by the acquisition of permits by previously undocumented workers, rather than by workers who had been unemployed, by those not in the labor force or by workers employed in the Palestinian domestic economy.

Fact 4—The Share of Idle Permits (Issued Permits $<$ National Quota) Declined (Admin Data)

Figure 4b reports the total number of issued and unused permits as well as the share of unused permits per quarter. There are two aspects that warrant consideration. First, the total number of issued permits has been consistently lower than the number set by the national quota such that there were idle (unused) permits throughout our period of study. Secondly, despite the increase in the national quota during our sample period, the percentage of idle or unused permits decreased from 20% in September 2018 to 12% in June 2019. These facts support our model assumptions that permit brokers and the formal sector wielded market power in both years, potentially by creating barriers to entry. Nevertheless, the reform, by inducing workers to enter legal sectors, served to bring about a reduction in the share of idle permits. Later in the results sections, we investigate how pricing strategies took advantage of the institutional setting before and after the reform.

Fact 5—Gross Wages fell, especially for Payers and Construction Workers (EGS+PLFS)

Data from the EGS suggests that workers experienced a substantial decline in gross daily wages after the reform (Figure 5a). The effect was concentrated among construction workers and to a lesser extent payers outside the construction industry. Our interpretation is that the reform lowered the expected value of the outside option by reducing the likelihood of securing undocumented employment. If formal and semi-formal employers set workers wages according to the expected value of the undocumented wage, wages are expected to fall. It is also possible that labor market segmentation (across sectors) increased within industries but since sectors in the construction industry were closely integrated before the reform such that mobility across sectors was (almost) costless and wage differentials were negligible, this might explain why the removal of the underground sector had a stronger ripple effect, thereby leading to lower wages even for

[18] That said, throughout most of 2019, transition rates from the underground sector to more legal forms of employment continued at a strong rate (6-9%) relative to rates in 2016 and 2017 (3-5%).

non-payers.

We also display average gross wages before and after the reform using the PLFS. However, given the earlier discussion in the data section, the EGS and PLFS samples are not directly comparable for many reasons. The EGS sample consists of workers who are strictly employed in Israel proper, enter through the four main gates, work more days and hours on average, and earn higher wages. Overall, these workers are more formally employed than their PLFS counterparts. Thus, when examining wages using the PLFS, we restrict the sample to those who are employed by a contract (written or verbal). Figure 5b corroborates Fig 5a by showing that wages of construction workers declined during the period. In the main results, we present more evidence of a decrease in gross wages using a difference-in-difference design in the PLFS and an event study design using the EGS data. Our findings are similar across the two data sets.

Fact 6—Share of Payers Increased, Permit Prices Rose and a Non-Payer Premium Emerges

As the underground sector contracted, demand for work permits increased, leading to a rise in the share of payers and an increase in the permit price (Figure 6). Note that in addition to lower gross and net wages, a non-payer (net wage) premium emerges after the reform, confirming that payers were more adversely affected. Moreover, subjective well-being measures relating to overall life satisfaction and employer treatment of workers also point to a non-payer (non-pecuniary) welfare premium that did not exist prior to the reform (Figure 7). However, both payers and non-payers report overall better treatment by employers.

Fact 7—Permit Brokers and Employers Gained at the Expense of Workers

The reform was intended to improve the working conditions of workers, which may have occurred through better treatment by Israeli employers (Figure 6). However, given the decline in gross wages and the increase in permit prices, permit brokers and employers gained considerably at the expense of workers. This is depicted in Figure 8 (details provided in Table 3), where the left bar represents the distribution of the total wage bill paid by Israeli employers to Palestinian workers in June 2018. The wage bill is the sum of the product of each type of worker multiplied by the average wage for his group. There are two components of the wage bill, black market revenue, which equals the estimated number of payers multiplied by the average permit price; and take-home pay, which is the total wage bill minus black-market revenue. The right bar represents the total wage bill in June 2019 plus employer labor costs (the monetary gains accrued to employers after paying lower wages in 2019), the sum of which is assumed to equal the total wage bill in 2018 [19]. Overall, employer labor costs from paying lower wages in 2019 constituted a 9% increase of the total wage bill in 2018 and black-market revenue, as a share of the 2018 wage bill, almost doubled from 6% to 12%. Thus, take home pay was reduced substantially between 2018 and 2019, falling from 94% to 79% of the 2018 wage bill. A further breakdown by industry affiliation (Figure A1) shows that the increase in employer labor costs (black market revenue) was disproportionately at the expense of (non)construction workers. We discuss how these estimates are affected by changes in worker characteristics in the results section.

[19] If 2018 is the reference point and employer labor costs were then zero, employer labor costs in 2019 are calculated as the difference between the total wage bill in June 2018 and in June 2019.

4 Theory Section

We start with a basic model where wages, permit prices and employment of payers and non-payers are jointly determined using a simple frictionless supply-demand framework. Using this basic framework, we show who ultimately pays for the work permit and how the total migration surplus is allocated among formal employers, semi-formal employers, permit brokers and workers. Then we replicate this exercise after relaxing some of the strong assumptions of the basic model.

4.1 Basic Model

Suppose that the output produced by Palestinian workers in Israel's formal Sector A is $f(L_A)$ and the corresponding output produced by the semi-formal Sector B is $g(L_B)$. We assume a perfectly elastic labor supply of commuters whose outside option is equivalent to an exogenous underground sector wage W_{UG}. Sector B is a semi-formal sector such that payers earn wages according to their marginal revenue product of labor ($g'(L_B) = W_B$) while Sector A pays workers according to their outside option, W_{UG}.

The MRPL for the formal and semi-formal sectors is depicted in Figure 9a, where the semi-formal sector moves left to right and the formal sector moves right to left. The main actor in the model is Sector A, which maximizes profits from two sources, hiring non-payers and selling permits in Sector B at price P. Payers are willing to pay for the permit as long as the price of the permit does not exceed the difference in wages between payers and non-payers ($P = W_B - W_{UG}$). We make two important assumptions here. First, the market for work permits–where the formal sector (and, in practice, permit brokers) sell permits to payers–is competitive. Second, there is full mobility across sectors and the total number of workers in this economy is determined by the quota for permit holders and is set to $\bar{L}$. Each sector maximizes profits subject to the above-mentioned constraints such that:

$$\begin{aligned} &\max \pi_A = \max f(L_A) - W_A L_A + P L_B \\ &\max \pi_B = \max g(L_B) - W_B L_B \\ &L_A + L_B = \bar{L} \\ &P = W_B - W_A \\ &W_A = W_{UG} \end{aligned} \tag{1}$$

The following system of equations includes five equations for the five unknowns (L_A^1, L_B^1, W_A^1, W_B^1, P^1). The allocation of workers is given by $f'(L_A) = g'(L_B)$, which is depicted as point C in Figure 1a. Sector B pays L_B^1 workers according to their MRPL such that $g'(L_B^1) = W_B^1$ (point C) while $L_A^1 (= \bar{L} - L_B^1)$ non-payers earn the outside option such that $W_A^1 = W_{UG}$ (point D) and Sector A, along with permit brokers, collect the revenue $P^1 * L_B^1 = (W_B^1 - W_A^1) * L_B^1$ from payers. Additionally, they extract $P^1 * L_A^1$ indirectly from non-payers by setting wages in the formal sector to the outside option. There are two important implications of this model. First, the increase in profits collected by Sector A is highly sensitive to the outside option. Relatedly, if the outside option exceeds the competitive wage in Israel given by the intersection of $f'(L_A) = g'(L_B)$, then there are idle permits since $L_A^1 + L_B^1 < \bar{L}$. Second, Sector B bears the full burden of the cost of the permit, which we find support for in 2018 in the stylized facts above.

4.2 Main Model

In this section, we relax two main assumptions in the basic model and solve for the equilibrium before and after the change in border policy. This allows us to predict the welfare gains and losses to workers, employers and brokers. We relax the first assumption by allowing the permit market to be competitive such

that the permit price is a function of the number of payers, $P(L_B)$. Moreover, as shown in the stylized facts, there are idle permits, such that $L_A + L_B < \bar{L}$. Thus, sector A maximizes profits subject to the above-mentioned constraints:

$$\max \pi_A = \max f(L_A) - W_{UG}L_A + P(L_B)L_B \tag{2}$$

Hence, prior to the event, the equilibrium (M, Q) is given by the following equations and corresponding points in Figure 9b:

$$\begin{aligned}
&f'(L_A^1) = W_{UG} && (\textit{Point } M)\\
&MR(L_B^1) = g'(L_B^1) - W_{UG} + g''(L_B^1)L_B^1 = 0 &&\\
&g'(L_B^1) + g''(L_B^1)L_B^1 = W_{UG} && (\ L_B^1)\\
&g'(L_B^1) = W_B^1; && (\textit{Point } Q)\\
&P^1 = W_B^1 - W_{UG} && (\textit{Difference between } M \textit{ and } Q)
\end{aligned} \tag{3}$$

If an event raises the marginal cost of undocumented work, a decline in W_{UG} follows, which then leads to an increase in both types of permit-holders, lower gross wages and a higher permit price. These relationships are depicted in Figure 9b and will be further discussed in the comparative statistics below. Note that the rise in permit prices after the event stems from the increase in the payer-non-payer wage gap. Overall, this suggests that a reduction in the outside option leads to a considerable rise in black market revenue generated from both price and quantity increases.

In our case, the reform is a strict change in border policy, resulting in a dramatic increase in the relative cost of working illegally such that the outside option is reduced to the lowest wage an employee is willing to accept for working in Israel[20], denoted by W_I in the model such that $W_O^2 = W_I << W_O^1 = W_{UG}$[21]. If the wage is sufficiently low, specifically lower than the intersection of $f'(L_A)$ and $g'(L_B) + g''(L_B)L_B$, then there are no idle permits. Thus, sector A maximizes the profit function, $f(L_A) - W_{UG}L_A + (g'(L_B) - W_{UG})(\bar{L} - L_A)$, with respect to L_A and labor is allocated according to $f'(L_A) = g'(L_B) + g''(L_B)L_B$.

Thus, if the decline in W_{UG} is sufficiently large and all permits are used, the deadweight loss ($\bar{L} - (L_B^1 + L_A^1)$) is eliminated, although workers are paid lower wages. The equilibrium is given by the following equations and the corresponding point (T, V) in Figure 9b:

$$\begin{aligned}
&f'(L_A^2) = g'(L_B^1) + g''(L_B^1)L_B^1 && \textit{Labor Allocation}\\
&W_A^2 = W_I && (\textit{Point } V)\\
&g'(L_B^2) = W_B^2 && (\textit{Point } T)\\
&P^2 = W_B^2 - W_I && (\textit{Difference between } T \textit{ and } V)
\end{aligned} \tag{4}$$

Note that labor allocation is no longer dependent on the outside option. More importantly, it is worth mentioning that the labor allocation identity highlights the arbitrage condition for Sector A, $f'(L_A) - W_{UG} = g'(L_B) + g''(L_B)L_B - W_{UG} = MR(L_B)$, where sector A continues to hire non-payers as long as the profit earned from hiring a non-payer exceeds the revenue incurred from selling a work permit to a payer employed in Sector B. The chart below Figure 9b highlights how the border policy allowed employers and permit

[20] The minimum wage one is willing to accept to work in Israel can be modelled as the wage offered in the West Bank plus transportation costs. Realistically, one can still work as an undocumented worker but the probability of working in the underground sector is low.

[21] Another way of looking at this is that the event resulted in a higher demand for work permits, shifting the demand for work permits as well as the marginal revenue curve.

brokers to extract higher rents while workers incurred substantial losses.

Comparative Statics: By eliminating the underground sector and decreasing the outside option, the event leads to three main outcomes: 1.) an increase in black market activity through an increase in the number of permits sold, 2.) a decline in gross and net wages for all workers, and 3.) a rise in permit prices. We show these three trends in the comparative statics below given that $\frac{g''(L_B^1)}{MR'(L_B^1)} < 1$.

Differentiating equations in (2) with respect to W_{UG} yields the following as long as $L_A + L_B < \overline{L}$:

$$
\begin{aligned}
f''(L_A^1)\frac{dL_A^1}{dW_{UG}} = 1 \rightarrow \frac{dL_A^1}{dW_{UG}} &= \frac{1}{f''(L_A^1)} < 0 \\
\frac{dL_B^1}{dW_{UG}}(2g''(L_B^1) + g'''(L_B^1)L_B^1) = 1 \rightarrow \frac{dL_B^1}{dW_{UG}} &= \frac{1}{(2g''(L_B^1) + g'''(L_B^1)L_B^1)} = \frac{1}{MR'(L_B^1)} < 0 \\
g''(L_B^1)\frac{dL_B^1}{dW_{UG}} = \frac{dW_B^1}{dW_{UG}} \rightarrow \frac{dW_B^1}{dW_{UG}} &= g''(L_B^1)\frac{dL_B^1}{dW_{UG}} > 0 \\
\frac{dW_A^1}{dW_{UG}} &= 1 \\
\frac{dP^1}{dW_{UG}} = \frac{dW_B^1}{dW_{UG}} - 1 = \frac{g''(L_B^1)}{MR'(L_B^1)} - 1 &< 0^{22}
\end{aligned}
\tag{5}
$$

Thus, if there are unused permits, the decline in undocumented workers reduces wages, raises permit prices and increases the number of permit-holders. Once all permits are used, a decline in undocumented workers no longer alters the allocation of labor nor the gross wages of payers. In other words,if $L_A + L_B = \overline{L}$, then $\frac{dL_A^1}{dW_{UG}} = -\frac{dL_B^1}{dW_{UG}} = \frac{dW_B^1}{dW_{UG}} = 0$. However, gross wages for non-payers continue to decline ($\frac{dW_A^1}{dW_{UG}} = 1$), along with an increase in permit prices ($\frac{dP}{dW_{UG}} = -1$).

5 The Permit Broker's Profit Maximization Problem

Our estimates in Table 3 reveal that black-market revenue nearly doubled between June 2018 and June 2019, although permit prices increased by only 11-14% [23]. Our hypothesis is that permit brokers made drastic changes to their pricing strategy, not only by moderately raising prices but also by accommodating the increased heterogeneity among the pool of payers. The key assumption here is that although brokers always had specific knowledge on the individual characteristics of payers, even prior to the reform, they could not accurately predict whether a payer is willing to switch from the semi-formal sector since the wage penalty to becoming undocumented was negligible (see Table A1 and stylized fact 1). After the reform, sectoral mobility was considerably reduced, allowing brokers to estimate the reservation prices for work permits more precisely. To formally test this hypothesis, we model the determinants of permit prices and then identify which factors gained or diminished in relevance after the reform.

We sketch a model where permit brokers maximize revenue by having knowledge of the payer's actual wage, as well as his observable and unobservable characteristics, the latter of which are unobservable to the econometrician. Naturally, since the broker has full information on the payer, he can use the payer's observable characteristics (official employer status, educational attainment, experience, industry affiliation, occupation, skill level and proficiency in Hebrew and English) to decompose payer i's actual wage in

[22] A decline in the outside option leads to higher permit prices under the condition that $\frac{g''(L_B^1)}{MR'(L_B^1)} < 1$, which is fulfilled for instance when there is linear demand where $\frac{g''(L_B^1)}{MR'(L_B^1)} = 0.5$.

[23] The estimate varies depending on whether the monthly (self-reported) or daily permit price (calculated by the researcher as monthly permit price divided by number of days worked) is used. This explains the discrepancy between the change in daily permit prices (14%) in Figure 6 and the raw estimate in Table 4 Panels A and C (11%).

industry $d, W_{i,d}$, into the predicted wage ($\hat{W}_{i,d}$) and the residual wage ($\varepsilon_{i,d}$). He can also use observable characteristics to estimate the maximum predicted wage a payer is offered in the formal (F) or underground sector(U), denoted by $\hat{W}_{i,d,s}(s = F,U)$. Note that the broker does not know the exact wage a payer is offered in an alternative sector; otherwise, he would simply set the payer's permit price to $W_{i,d} - W_{i,d,s}$.

Instead, permit brokers set the maximum price by using payer information in two ways. First, knowing that some observable characteristics cannot be easily transferred to other sectors, they take a portion (α) of the expected gap in predicted wages between the semi-formal sector and an alternative sector s. Likewise, brokers charge workers a portion of their residual earnings (β) since some unobservable traits are not transferable or are more lucrative in the semi-formal sector. Brokers collude on α and β and choose them such that the average permit price is at least equal to differences in average wages of payers and other workers, $\bar{W}_d - \bar{W}_{d,s}$. Formally, the permit broker charges payer i in industry d the following:

$$P_{i,d} = \alpha(\hat{W}_{i,d} - \hat{W}_{i,d,s}) + \beta\varepsilon_{i,d} \;\; ;\alpha,\beta > 0 \tag{6}$$

In the empirical strategy we test how predicted and residual wages affect payers' permit prices before and after the reform. In other words, what direction can we expect $\frac{dP_{i,d}}{d\hat{W}_{d,i}}$ and $\frac{dP_{i,d}}{d\varepsilon_{i,d}}$ to go in? We posit that three further factors influence the relationship between permit prices and wages: 1.) the transferability of observable skills, 2.) the transferability of unobservable skills and 3.) sectoral mobility rate, i.e. the likelihood of switching sectors. As we show below, the first two factors are prominent in shaping this relationship prior to the reform, while the third factor dominates the first two factors after the reform.

5.1 Before Event—Transferability of Observable Skills and direction of $\frac{dP_{i,d}}{d\hat{W}_{i,d}}$

Note that $\frac{dP_{i,d}}{d\hat{W}_{i,d}} = \alpha(1 - \frac{d\hat{W}_{i,d,s}}{d\hat{W}_{i,d}}) + \beta\frac{d\varepsilon_{i,d}}{d\hat{W}_{i,d}}$. Since $\frac{d\varepsilon_{i,d}}{d\hat{W}_{i,d}} < 0$ by design, if observable characteristics are highly transferable to other sectors and lead to more productivity than what can be observed in the semi-formal sector, $\frac{d\hat{W}_{i,d,s}}{d\hat{W}_{i,d}} > 1$, then having more productive observable characteristics leads to lower permit prices $\frac{dP_{i,d}}{d\hat{W}_{i,d}} < 0$. If observable skills are transferable but do not necessarily lead to more productivity in other sectors such that $0 < \frac{d\hat{W}_{i,d,s}}{d\hat{W}_{i,d}} < 1$, then the effect of predicted wages on permit prices is ambiguous. Prior to the reform, we observe that $\frac{d\hat{W}_{i,d,s}}{d\hat{W}_{i,d}} = 0.8$ for construction workers and $\frac{d\hat{W}_{i,d,s}}{d\hat{W}_{i,d}} = 1.12$ for workers in other industries (see Table A4). Thus, we expect non-construction workers with higher predicted wages to be charged lower permit prices while the effect for construction workers is theoretically ambiguous.

5.2 Before Event—Transferability of Unobservable Skills and Direction of $\frac{dP_{i,d}}{d\varepsilon_{i,d}}$

As before, in order to predict how residual wages influence permit prices, we derive $\frac{dP_{i,d}}{d\varepsilon_{i,d}} = \alpha(\frac{d\hat{W}_{i,d}}{d\varepsilon_{i,d}} - \frac{d\hat{W}_{i,d,s}}{d\varepsilon_{i,d}}) + \beta$. Since $\frac{d\hat{W}_{i,d}}{d\varepsilon_{i,d}}$ and $\frac{d\hat{W}_{i,d,s}}{d\varepsilon_{i,d}}$ are both expected to be negative, the direction of $\frac{dP_{i,d}}{d\varepsilon_{i,d}}$ depends on the relative magnitude of the two effects. If predicted wages in the semi-formal sector is more strongly correlated with unobservable traits than is the case with predict wages in alternative sectors, then the use of residual wages to charge workers higher permit prices is ambiguous since there is a trade-off between being concerned workers will switch ($when \frac{d\hat{W}_{i,d}}{d\varepsilon_{i,d}} - \frac{d\hat{W}_{i,d,s}}{d\varepsilon_{i,d}} < 0$) and willingness to pay due to higher income (β). We find that non-construction workers before the reform have unobservable skills that are less negatively correlated with predicted wages in other sectors relative to the semi-formal sector, and thus, the effect of residual wages on permit prices is an empirical question[24] . Likewise, if residual wages have a similar effect on predicted wages across sectors or have a lower negative effect on the semi-formal sector (as is the

[24]Specifically, we show that for non-construction workers that $\frac{d\hat{W}_{i,d}}{d\varepsilon_{i,d}} - \frac{d\hat{W}_{i,d,s}}{d\varepsilon_{i,d}} = -0.33 - (-0.22) = -0.11$ (see Table A4).

case with construction workers—Table A4), then residual wages have an unambiguously positive effect on permit prices since $\frac{d\hat{W}_{i,d}}{d\varepsilon_{i,d}} - \frac{d\hat{W}_{i,d,s}}{d\varepsilon_{i,d}} \geq 0$

5.3 After Event—No Switching Across Sectors

After the reform, becoming gainfully employed in another sector became less likely, substantially reducing the maximum predicted wage earned outside the semi-formal sector s , $\hat{W}_{i,d,s}(s = F,U)$. In the most extreme case, where the likelihood of earning a positive wage in another sector is zero, the permit price equation reduces to $P_{i,d} = \alpha\hat{W}_{i,d} + \beta\varepsilon_{i,d};\ \alpha,\beta > 0$. In this case, we expect workers of both industry types to be charged according to their predicted wages–based on highly valued observable characteristics–as well as their residual wages.

6 Empirical Strategy

In this section, we outline the empirical strategy for evaluating the reform based on five major outcomes. In order to understand the rise in black market revenue between June 2018 and June 2019, we then present an equation to estimate the determinants of permit prices before and after the reform. Our expectations are informed by the permit broker's maximization problem, outlined in the earlier section.

6.1 Changes After the Reform

To test whether the reform had a resounding impact beyond differences in statistical means provided in the stylized facts, we estimate the parameters of the following OLS model using the EGS:

$$Y_{i,t} = \delta_1 Ref_t + \delta_2 X_{i,t} + \varepsilon_{i,t} \tag{7}$$

where $Y_{i,t}$ is either the ln (gross) wage of payers or non-payers, the ln of the monthly permit price, the probability of being a permitholder[25] or the probability of being a payer; Ref_t refers to the period after 2018Q3, after which the reform is assumed to have been implemented; $X_{i,t}$ is a number of individual characteristics including: works for an official employer, worked for a single employer in the last three months, an interaction term between the latter two variables, one dummy variable for fluency in Hebrew, one dummy variable for fluency in English, 6 marital dummies (never married, engaged, married, divorced, widowed and separated), number of children, June 2019 dummy variable, 6 educational attainment dummies, (illiterate, can read/write, elementary, preparatory, secondary, and more than secondary), 2 industry dummies (construction, other), 8 occupational dummies (see questionnaire in Appendix B), tenure in Israel and its square, number of years since first work permit, days worked last month, weekly hours worked, and district dummies.

Our identification strategy rests on the assumption that unobserved determinants of the outcome variables are uncorrelated with the reform. The parameter of interest is δ_1. According to the stylized model, $\delta_1 < 0$ if the outcome variables is wages, and $\delta_1 > 0$ for the remaining outcome variables.

While the EGS includes a rich set of controls, we cannot account for unobserved individual heterogeneity in the form of fixed effects. Another major shortcoming of the EGS is that due to the absence of a control group, we cannot conduct a difference-in-difference analysis. This is because all permit-holders, payers and non-payers, were both affected by the reform. Using the PLFS, we can (partially) address both shortcomings when the dependent variable is the ln (gross) wage by estimating parameters of a difference-in-difference regression where wages of Palestinian permit-holders in Israel (and the settlements) are compared to their

[25] This is the only outcome variable where we need to use the PLFS since the EGS does not cover undocumented workers.

counterparts who are employed in the West Bank before and after the reform. In other words, the parameter of interest γ_3 is estimated using:

$$W_{i,t} = \gamma_1 Ref_t + \gamma_2 T_{i,t} + \gamma_3 Ref_t * T_{i,t} + \alpha_i + \varepsilon_{i,t} \tag{8}$$

where $W_{i,t}$ is the ln (gross) wage, $T_{i,t}$ is equal to 1 for wage-earners in Israel with a permit and 0 for wage-earners employed in the West Bank with a written or verbal contract, and α_i is a time-invariant characteristic.

6.2 Permit Broker's Pricing Strategy Towards Individual Payers

To determine the pricing strategy of brokers towards individual payers, wages of payers are decomposed into predicted wages and residual wages. Predicted wages are estimated using the parameters of an OLS regression where wages are regressed on year dummies and $X_{i,t}$. Using the EGS, we estimate the parameters of the following specification for each industry type:

$$\begin{aligned} PermitPrice_{it} = {} & \beta_1 Ref_t \; + \; \beta_2 PredWage_{it} \; + \\ & \beta_3 PredWage_{it} * Ref_t \; + \; \beta_4 ResidWage_{it} \; + \\ & \beta_5 ResidWage_{it} * Ref_t \; + \; \varepsilon_{it} \end{aligned} \tag{9}$$

where $PermitPrice_{i,t}$ refers to the individual permit price reported by individual payer i in year t (2018 or 2019); Ref_t refers to the post 2018Q3 dummy variable, after which the reform is assumed to have taken place; $PredWage_{it}$ and $ResidWage_{it}$ refer to individual payer i's ln predicted and ln residual wage respectively in year t; $\varepsilon_{i,t}$ is a well-behaved error term.

The permit broker's maximization problem suggests that β_3 and β_5 are weakly positive for all workers since after the event, skills can no longer be easily transferred across sectors. Prior to the reform, however, we can only predict the direction of predicted wages for non-construction workers ($\beta_2 < 0$) and the direction of residual wages for construction workers ($\beta_4 > 0$). The remaining parameters are theoretically ambiguous and are discussed in the results section.

6.3 Permit Broker's Pricing Strategy at the Local Level

Prior to the reform, when sector mobility was accessible, it may have been challenging for brokers to estimate the reservation price of payers since estimates concerning workers' propensity to switch sectors were noisy at best. Moreover, even if brokers had an estimate of the probability of switching for each payer, the predicted wage would be difficult to discern without knowing the alternative local opportunities presented to workers.

Hence, prior to the reform, permit brokers likely made use of local characteristics to gain insight into alternative wage offers for payers in other sectors. The logic is as follows. Palestinians living in close proximity to each other work in similar areas in Israel, to minimize commute, search and network costs. If these costs are sufficiently high and wages paid to Palestinian payers and non-payers vary across locations in Israel (due to differences in local demand), then sectoral mobility rates and thus, permit prices are to some extent shaped by variation in local opportunities. For example, given two payers who live in different

locations and work in different cities in Israel, but are otherwise identical, we expect brokers to charge a higher permit price to the one who resides in a location where non-payers earn relatively lower wages because the outside option for such a payer is likely an unattractive offer in the formal sector.[26] This only applies to workers whom the brokers predict are sufficiently qualified to switch. If a broker evaluates the likelihood of switching for a worker to be relatively low, then the worker will be charged a higher permit price regardless of where they live.

Ideally, to complete this exercise, one would need a geographic unit in the West Bank that is comparable to a commuting zone or neighborhood. In the EGS, we obtain information from workers about three geographic markers in the West Bank: their locality of residence (in many cases, this is a village), their corresponding district and the gate (one of four) they used to enter Israel. The first marker is too refined to be considered a commuting zone, while the latter two are too large [27] . For example, workers from a given gate may work in a number of areas in Israel. Thus, when estimating average local wages for payers and non-payers, we use two geographic units, the district-gate unit[28] and a local unit, which is constructed using ArcGIS technology in an attempt to define a more refined local unit (see Data Appendix—Appendix D)[29] . For both payers and non-payers, each cell is composed of average sectoral wages by geographic unit—industry type—year. We re-estimate the regressions such that each cell must include at least 10 observations; otherwise the observation is dropped[30].

We expect worker mobility across sectors in both industry types to have been reduced as a result of the reform, in June 2019. Thus, we expect to find that in June 2018, brokers practiced third-degree price discrimination by setting prices according to both locality and individual characteristics, but that in June 2019, as switching sectors became more difficult for workers, brokers relied heavily on individual characteristics, allowing them to charge higher prices and extract more profits. To test these predictions, we estimate the specification below for each industry type, (construction workers, other workers):

$$\begin{aligned} PermitPrice_{igt} = \beta_1 * Ref_t \; + \; \beta_2 * W_{ngt} \; + \\ \beta_3 * W_{ngt} * Ref_t \; + \; \beta_4 * W_{pgt} \; + \\ \beta_5 * W_{pgt} * Ref_t \; + \; \varepsilon_{igt} \end{aligned} \tag{10}$$

where $PermitPrice_{igt}$ refers to the individual permit price reported by individual payer i living in geographic unit g in year t (2018 or 2019); Ref_t refers to the 2018Q3 dummy variable, after which the reform is assumed to have taken place; W_{ngt} and W_{pgt} refer to average wages for non-payers and payers (respectively) residing in geographic unit g in year t ; ε_{igt} is a well-behaved error term. We expect $\beta_2 < 0$ because if non-payers earn relatively low (high) wages locally, payers have a lower (higher) propensity to switch to another sector, inducing permit brokers to raise (reduce) prices. On the other hand, β_4 is ambiguous because if payers earn relatively low wages locally, brokers may raise prices ($\beta_4 < 0$) if the probability of switching is perceived to be low or may reduce prices ($\beta_4 > 0$) if switching is considered highly likely. We believe

[26] Likewise, brokers are expected to charge more in areas where average wages for payers are high.

[27] In several cases, there are only a few observations per village.

[28] Technically, you can have a maximum of 176 cells: industry-type (construction/other) * year (2018/2019) *number of districts* number of gates=2*2*11*4=176, but in reality, the number of district-gate units with a positive number of observations is 43. This is primarily because individuals usually enter Israel from the gate that is closest to their district of residence. The number of cells with at least 10 observations per cell are 30.

[29] Specifically, we use the network analysis algorithm in ArcGIS in order to group localities such that the distance among them is no more than 10 km apart. The computation is based on georeferenced data on the existing road network in the West Bank. The ruggedness of the terrain is also considered, allowing us to estimate more precise commute times—an alternative measure for defining local labor markets.

[30] To minimize the number of dropped observations, if someone lives in a locality that is further than 10 km away and thus cannot be grouped with other localities, we increase the threshold distance from 10 km to 15 km.

the reform dampens the effect of local wages such that $|\beta_2 + \beta_3| < |\beta_2|$ and $|\beta_4 + \beta_5| < |\beta_4|$.

The next step is to incorporate individual wages such that:

$$\begin{aligned} PermitPrice_{igt} = \beta_1 Ref_t \ + \ \beta_2 W_{ngt} \ + \\ \beta_3 W_{ngt} * Ref_t \ + \ \beta_4 W_{pgt} + \\ \beta_5 * W_{pgt} * Ref_t \ + \ \beta_6 W_{igt} + \\ \beta_7 W_{igt} * Ref_t \ + \ \varepsilon_{igt} \end{aligned} \tag{11}$$

where W_{igt} refers to individual payer i's wage while living in geographic unit g in year t.

If the reform led to a reduction in the impact of average wages on permit prices but a rise in the role of individual wages, this suggests that in specification (4), the parameters should correspond to the following:

$$|\beta_2 + \beta_3| < |\beta_2| \ ; \ |\beta_4 + \beta_5| < |\beta_4| \ ; \ |\beta_6 + \beta_7| > |\beta_6| \tag{12}$$

7 Results

We present the results in the same order as the empirical strategy. We start out by quantifying the effect of the reform after including a rich set of controls; then we proceed to the difference-in-difference analysis. Next, we examine the changes in the brokers' pricing strategy using individual and local characteristics of payers before and after the reform. We report the results separately for workers in the construction industry and other industries.

7.1 Changes After the Reform

Table 4 presents the main results where parameter estimates reveal how the reform altered changes in a number of prominent outcomes needed to assess the welfare consequences of the reform: 1.) the probability of becoming a permit holder, 2.) the probability of becoming a payer (among permit holders), 3.) the (ln) of the monthly permit price, 4.) the (ln) wages of payers, and 5.) the (ln) wages of non-payers. Table 4 reveals that within one year, from June 2018 to June 2019, several outcomes changed considerably. For example, Panel A shows that construction workers entered legal employment rapidly (col 1), although the legal jobs offered were disproportionately allocated to less formal work (col 2). Moreover, the raw increase in the permit price was about 0.11 log points and wages for payers and non-payers declined by 0.16 and 0.22 log points respectively.

One explanation could be that the reform changed the composition of workers entering each sector (as shown in Table 2), and this can also have an impact on prices and wages. For example, if the reform led to changes in sorting such that overall language proficiency in Hebrew and English fell, this might explain the associated decline in wages. Likewise, if the reform allowed entry for a greater pool of workers, some of whom were inexperienced in negotiating with brokers, an increase in the permit price would follow. To address these explanations, Panel B controls for worker-related observable characteristics that proxy for demographics and skill level: education, language proficiency, personal demographic variables, experience, tenure (total and with work permit) in Israel, and employer characteristics. Parameter estimates are left largely unchanged except that the decline in non-payers' wages decreased in magnitude. This suggests that

among construction workers, non-payers were less skilled after the reform. Thus, non-payers experienced a similar decline in wages as payers if one controls for skill level and employer characteristics. This is perfectly consistent with our stylized model.

In Panels C and D, we replicate the exercise for workers outside the construction industry. Two prominent issues stand out. First, a much larger share of permit holders take jobs as payers than was previously seen in the construction industry (col 2). Second, non-payers' wages are left unchanged by the reform. These two trends may be related if formal jobs became more limited after the reform. In other words, for non-construction workers, the reform may have facilitated worker entry into legal semi-formal positions as payers but then complicated the possibility for securing or maintaining a formal position as a non-payer, allowing non-payers to earn a wage premium[31]. This can be seen in the descriptive statistics in Table 3 where the number of non-payers in non-construction industries declined by about 25% between June 2018 and June 2019, despite the 30% rise in permitholders. Both of these trends are exacerbated when controls for skill level and employer characteristics are included in Panel D. From this, we can infer that after the reform, non-payers in the non-construction industries are not positively selected based on the observable characteristics included in these regressions. Thus, with both construction and non-construction workers, raw estimates of the wage decline are overstated. We also show other consequences of the reform in Table A5, where commute time, hours worked and treatment by employer are outcome variables.

A diff-in-diff analysis is reported in Figures 10a to 10c where γ_3 is reported. In this specification, the treatment group consists of wage-earners in Israel who have a valid work permit while the control group are wage-earners in the domestic economy who have employment contracts in elementary occupations or crafts/skilled work. The samples consist of men between the ages of 25 and 60. Figure 10a shows that wages declined by a statistically significant 0.18 log points using an OLS specification and about 0.08 points for a fixed effects specification. Moreover, the decline in wages is driven by construction workers whose OLS and FE estimate is a statistically significant -0.14. For non-construction workers, the OLS effect is negative but when fixed effects are introduced, the parameter becomes positive. This is strongly consistent with our EGS wage results in Table 4 Panels B and D. Experimenting with a different control group (Figure 10b) and controlling for seasonal differences by running the regression only for quarter 2 samples (Figure 10c) does not change the qualitative nature of the results. /par Overall, our results support the predictions of the stylized model that the increased cost of being undocumented increases the share of permitholders, raises the permit price and decreases the gross wages of workers. However, to some extent, the raw estimates of the wage decreases overestimate the decline in take-home pay given compositional changes in the workers. In Table 3, black market revenue, take-home pay and employer labor costs are re-computed to account for compositional changes in the work force and the estimates suggest that the decline in worker surplus was over-estimated at 15% (8.74-7.41/8.74) while the more accurate estimate may be approximately 10% (8.74-7.89/8.74). In the next few sections, we aim to characterize how brokers used information on market forces, institutional changes, and individual-level worker characteristics to extract maximum illicit payments from workers.

7.2 Permit Broker's Pricing Strategy

The most natural way to test whether brokers practice price discrimination is to assess the degree to which wages are correlated with permit prices. We expect higher rates of price discrimination in 2019 since workers could not easily become undocumented workers, which incentivizes brokers to carefully target individuals based on their wages and/or other observable characteristics rather than set a flat fee.

[31] One possibility is that with a greater availability of payers–who are usually more flexible, work part-time and have multiple employers–employers could further limit the number of formal employees aka non-payers.

In Figure A2 (a-c), we display bin scatter plots where monthly permit payments are regressed on monthly wages. The correlation is positive in both years and stronger after the reform, especially for non-construction workers. Specifically, descriptive estimates reveal that for a 1000 NIS increase in the monthly wage, the monthly payment is expected to increase by 52 NIS in 2018 and 105 NIS in 2019. Another indicator of market power is to test the extent in which brokers created barriers to legal employment by imposing a regressive pricing structure, which is particularly relevant in 2018. We show in Figures A3 (a-c) that permit prices are extremely regressive.

7.2.1 Construction Workers

Now, we proceed by formally testing how changes in the reform led to a difference in the pricing strategy of brokers towards workers. For construction workers, column (1) of Table 5 estimates reveal that in June 2018, a 1% increase in the individual wage leads to a 0.32% increase in the permit price. This result is economically and statistically significant and the corresponding estimate is 0.41% for June 2019. Note that these three variables alone, (individual wages, year dummy and interaction term), account for 22% of the variation in permit prices.

When decomposing the individual wage into its predicted and residual components in col (2), residual wages were strongly positively related to permit prices while predicted wages were negatively related and marginally significant. One possibility is that those who faced the highest permit prices in 2018 were negatively selected in terms of observable characteristics, (less likelihood of switching), but positively selected in terms of unobservable characteristics (higher likelihood of making high payments). However, after the reform, permit brokers continued to charge workers based on their residual wage but were now able to target workers with more valuable observable characteristics. These findings are consistent with our earlier predictions in Section 5. Since there was an increase in permit holders after the reform, formal sector jobs might have been too scarce even for those with high observable characteristics. To test for this directly, the predicted wage in specification (2) is substituted by the individual observable characteristics used to predict it (unreported). We find that prior to the reform, workers with less valuable observable characteristics were charged higher permit prices[32] .

Further examination leads us to display quantile regression estimates of the specification in col (2) to investigate which parts of the wage distribution were most impacted. Figure A4 reveals that in 2018, permit brokers mostly targeted middle class (50-70 percentile of the predicted wage distribution) payers with low observable characteristics. Meanwhile, the positive relationship between residual wages and permit prices was primarily driven by the lowest decile of the residual wage distribution. After the reform, although permit prices across the entire distribution were statistically significantly impacted by predicted and residual wages, payers with lower observable and unobservable characteristics were the most adversely affected. This is consistent with the stylized fact that permit prices became more regressive for construction workers after the reform, with workers at the low end of the distribution being targeted more aggressively[33] .

7.2.2 Non-Construction Workers

For other workers, individual wages had almost no effect on permit prices in June 2018, but this changed in 2019 when wages played a prominent role (col (3)). Col (4) demonstrates that the absence of a correlation

[32] Specifically, prior to the reform, construction workers with the following observable characteristics had lower (higher) permit prices: those who had an official employer, spoke English (Hebrew) proficiently, worked more days (hours) and worked as laborers (building and related trades workers). After the reform, the only observable characteristic that had a statistically significant impact on permit prices for construction workers was the number of years worked in Israel, i.e. tenure.

[33] These results are consistent with the notion that even though the reform reduced the likelihood of switching between sectors for everyone, permit brokers were aware that those at the low end of the wage distribution were least likely to succeed in switching.

between individual wages and permit prices in 2018 is completely driven by residual wages since workers with less valuable observable characteristics were charged the highest permit prices in 2018. This is in line with the regressive pricing structure imposed on agricultural, manufacturing and other workers prior to the reform (Figure 3A (c)). When the predicted wage is substituted by individual observable characteristics, we find that there is a high wage penalty associated with less valuable observable characteristics such as not having an official employer[34].

In 2019, permit brokers used both predicted and residual wages to maximize profits, charging workers higher prices the higher the wage. We interpret the shift in brokers' strategy after the reform as a means of maximizing profits by exploiting a context where all groups—not only those with less valued observable characteristics– had a lower likelihood of switching to the formal sector[35]. As before, this is consistent with the predicted patterns discussed in Section 5.

Quantile regressions based on col (4) show that the impact of predicted and residual wages was fairly uniform across the distribution and imprecisely estimated prior to the reform. However, after the reform, those from the middle to the high end of the wage distribution were strongly targeted. These results corroborate the stylized fact that for non-construction workers, permit prices became increasingly progressive after the reform.

7.2.3 Local Wages

Table 6 displays how average wages in a payer's region of residence is reflected in the permit price charged by the broker. The results reveal that for construction workers in June 2018, as average local (gate-district) wages of payers rise, permit prices rise while the opposite is true for average wages of non-payers. In 2019, the results are strongly attenuated such that locality characteristics have no effect on permit prices. These findings are consistent with our theoretical predictions because prior to the reform, construction workers have relatively equal wages across sectors and are more likely to receive competitive wage offers in alternative sectors (Stylized Fact 1). This implies that local opportunities play an important role in their decision to switch sectors, hence shaping the permit price. Limiting the sample to cells with at least 10 observations does not alter the results (col 2). Including components of the individual wage in col(3) shows that controlling for individual wages, permit prices decline with average wages of payers, a counter-intuitive result. This result does not hold when we replicate the exercise using local clusters of municipalities (Table A6).

In col 4, we find that for workers in other industries, average wages for both non-payers and payers are negatively correlated with permit prices. This suggests that, prior to the reform, permit brokers target payers from all low-wage areas, where job opportunities are limited and mobility across sectors is less likely than is for construction workers. This is consistent with the fact that workers outside the construction industry had a lower propensity to switch sectors even prior to the reform. It is worth noting that these results are not robust to changing the geographic unit from district-gate to local clusters (Table A6).. Nevertheless, we find that these strong negative correlations are dampened by the reform such that in 2019, there is almost no impact of average local wages of payers and nonpayers on individual permit prices.

[34]For workers outside the construction industry, prior to the reform, lower permit prices were associated with: having an official employer, being young, shorter commutes, and fewer hours worked. After the reform, lower permit prices continued to be associated with having an official employer, but were now also associated with tenure (rather than age). Additionally, working fewer days was also associated with lower permit prices after the reform, replacing lower commute times and fewer hours.

[35]Note that in the presence of individual controls, the qualitative nature of parameter estimates for aggregate variables is not dramatically altered. In June 2018 payers living in low-wage areas were particularly targeted for higher permit prices, but after the reform, locality characteristics played little to no role.

8 Conclusion and Discussion

Should work permit markets exist? Are they welfare-enhancing? Given that migrant workers and sellers frequently engage in illicit trading of work permits (and other government issued documents), what are the factors that likely perpetuate the existence and expansion of these black markets? Should governments outsource the allocation process? This paper uses the unique circumstances of Palestinian cross-border commuters to examine these questions.

Although Palestinians secured better paying jobs in Israel than can be found in the West Bank, we find that the expansion of the work permit market came at a substantial welfare loss for workers. Furthermore, we show that outsourcing work permit allocation is problematic. Private agents have considerable market power in the permit market and devise pricing strategies that adversely affect workers. Moreover, if the market is unregulated, private agents are likely to adopt illicit and predatory practices that if left unchecked, can result in migrant workers becoming even more vulnerable than in the absence of a permit regime. In our study, sellers used a combination of institutional factors, market forces, locality characteristics and personal worker information (usually unobserved to employers) to infer workers' alternative employment opportunities, thereby charging them the highest possible price for the work permit.

Ultimately, the question of whether work permit markets are welfare-enhancing depends on the society's reference point. Relative to no immigration, work permit markets are clearly welfare-enhancing for both citizens and non-citizen migrants. However, if the reference point used is one of welfare-maximization, then we conclude that Israel's current work permit market is not welfare-enhancing. Our analysis implies this in two ways. First, we show that in each year, the pricing structure used could have been altered to improve the welfare of workers and/or semi-formal employers. For example, in 2018, an extremely regressive pricing structure was in place that limited entry into legal employment and forced semi-formal employers to pay the full cost of the permit price. This is both inefficient and inequitable. Alternatively, a more progressive pricing structure could have generated just as much revenue for permit brokers and official employers but allowed more workers to enter legal employment, increasing efficiency and equity. While semi-formal employers would still have had to bear the full cost of the permit price, at least they would have had more access to migrant workers than what actually took place in 2018. Such a pricing strategy was not in place, however, because workers had more mobility, limiting brokers' estimation of their reservation price. In 2019, the welfare loss to workers could have been mitigated if the average permit price was the same as in 2018. Thus, the combination of the low average permit price in 2018 and the relatively more progressive pricing strategy in 2019, if used in both years, could have improved welfare in both years.

We identify a few factors that undermine the usefulness of work permit markets: 1.) policies that reduce worker mobility and employment opportunities; 2.) deregulation such that the market power of sellers is unchecked and; 3.) the involvement of intermediaries (permit brokers) in the selling process, who have worker-specific information that is usually private. We conclude that while it is possible for work permit markets to maximize social welfare, such markets are ripe for manipulation and require rigorous monitoring by governmental agencies and appropriate intervention to prop-up the bargaining power of workers and employers with less political clout.

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Figures

Figure 1—Recruitment Costs by Origin-Destination Corridor

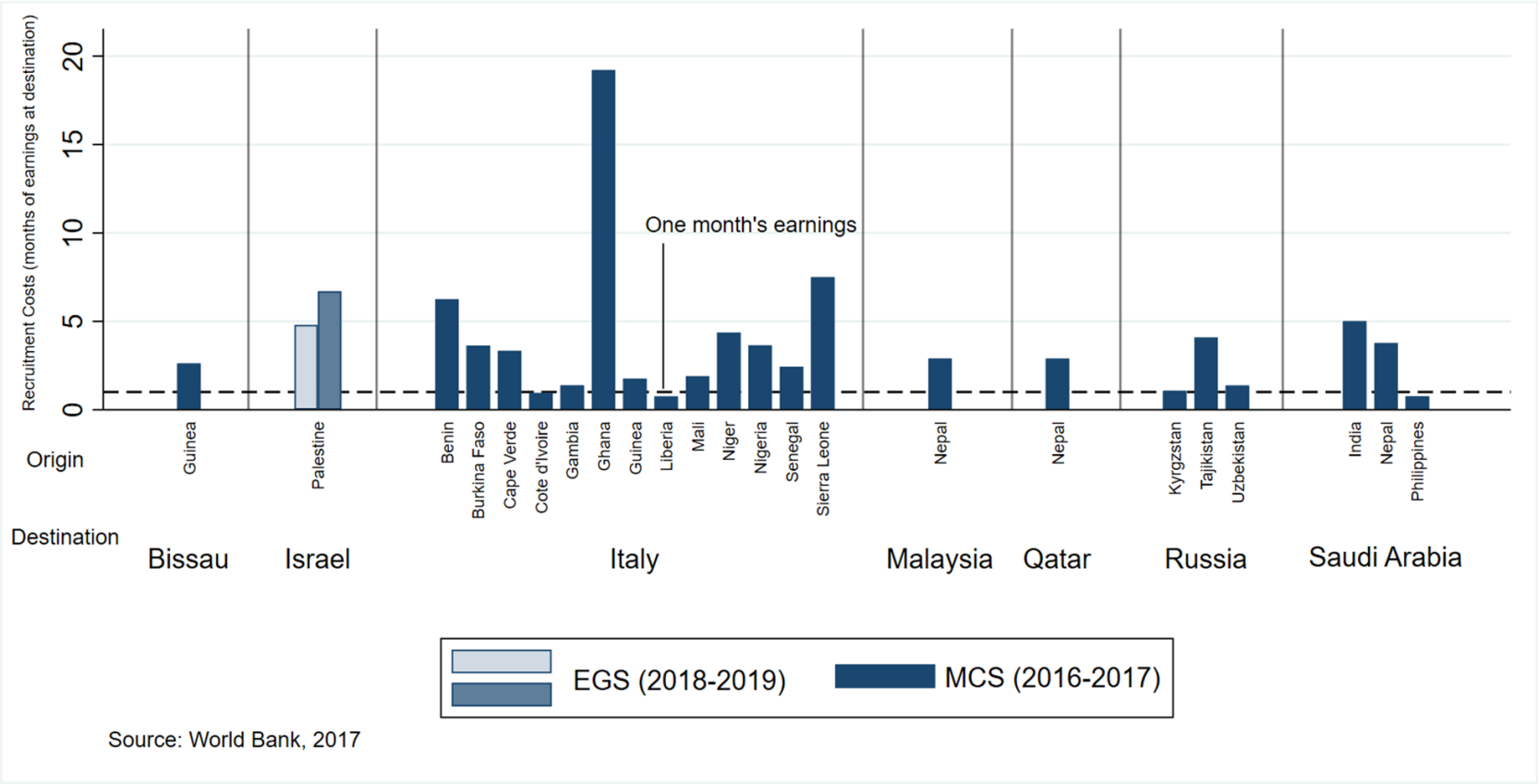
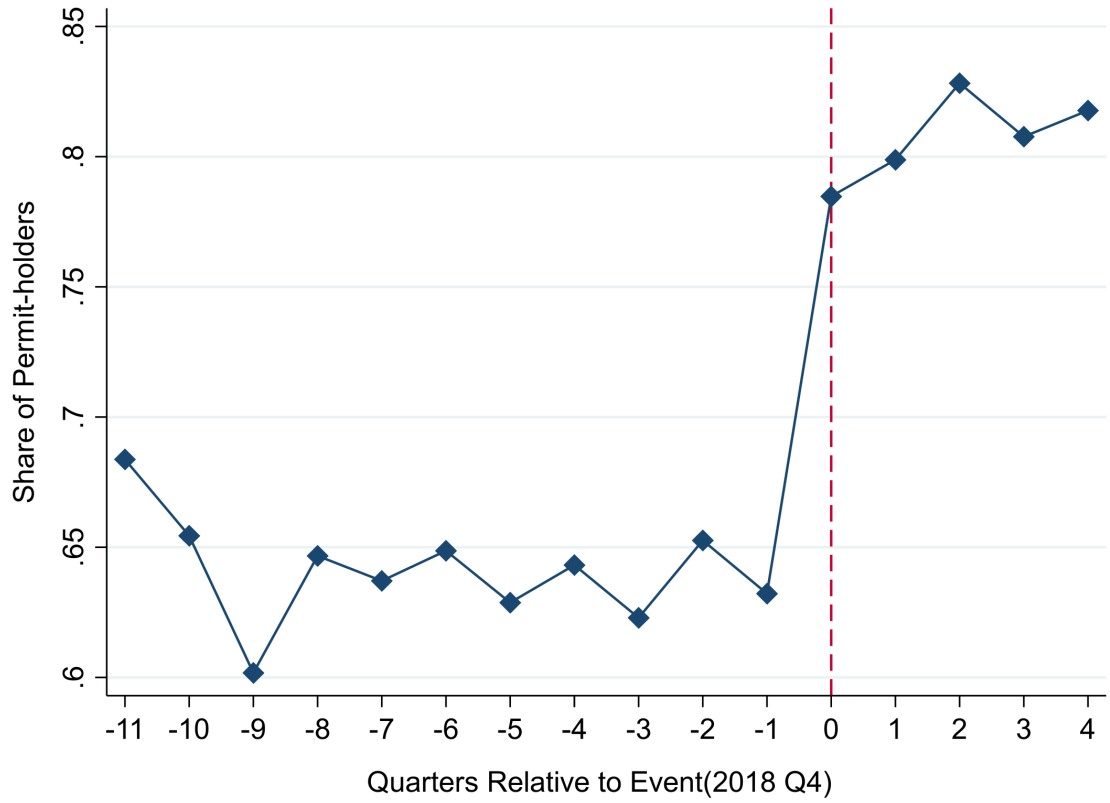
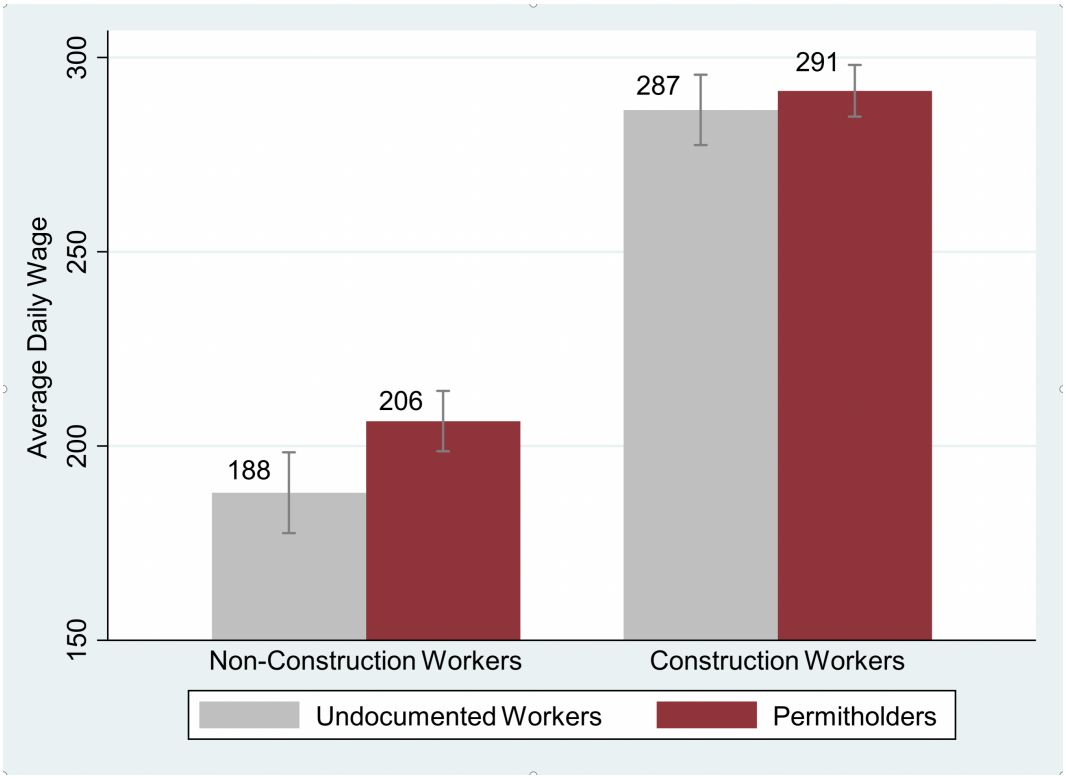


Figure 2—Share of Palestinian Migrant Workers with a Work Permit



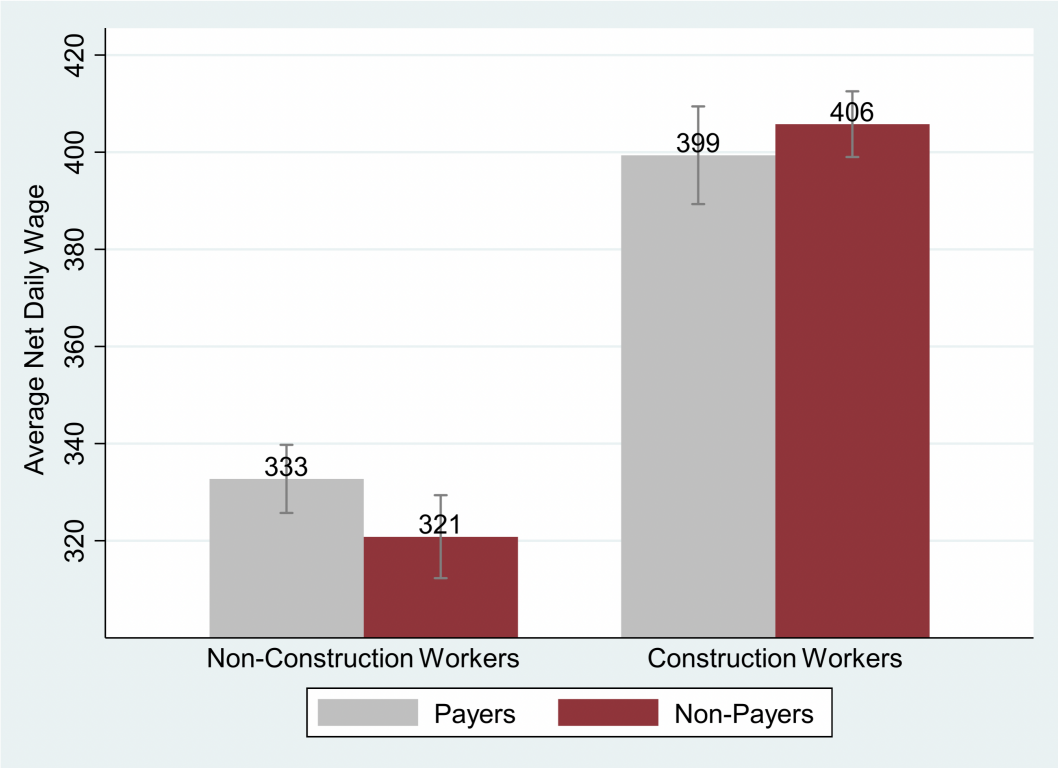
Note: Source: PLFS. This figure documents the share of Palestinian cross-border commuters who have a valid work permit between 2016Q1 and 2019Q4. Sample is restricted to wage-earning males who reside in the West Bank and are between the ages of 25 and 60.

Figure 3a—Wages of Undocumented Workers and Permitholders in 2018 Q1-Q3



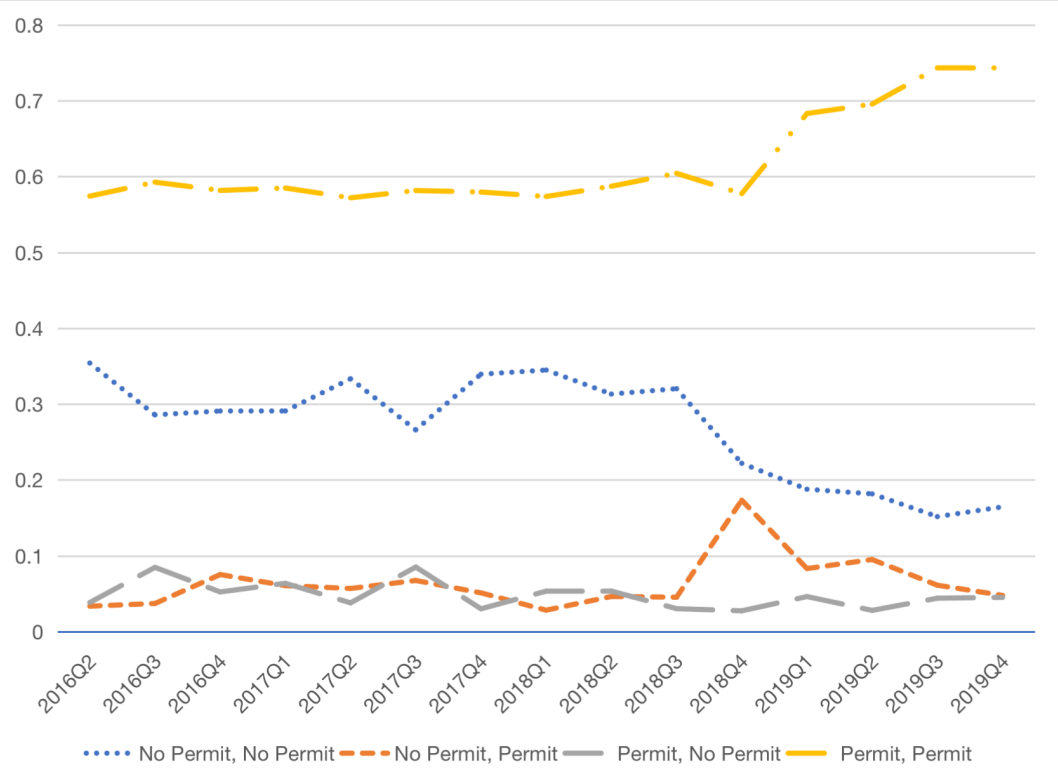
Note: (PLFS) The bar graph displays the mean of real daily wages in 2018 Q1-Q3 for undocumented workers and permitholders by industry affiliation. 95% confidence intervals are displayed and wages are deflated to NIS 2019.

Figure 3b—Net Wages of Payers and Non-Payers before the Event (June 2018)



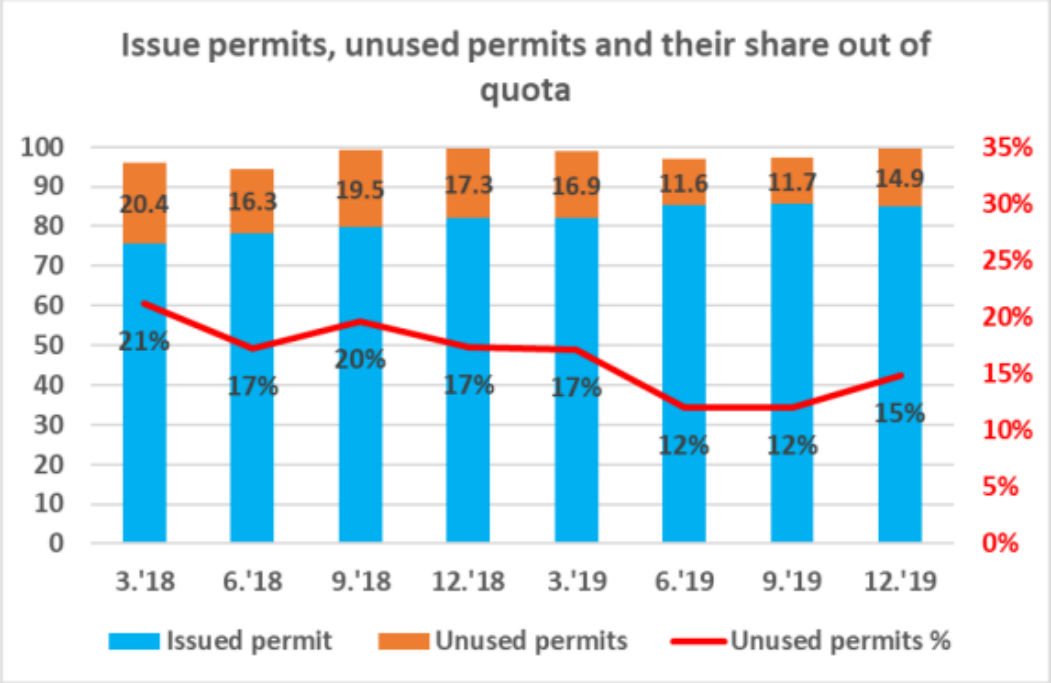
Note: EGS (2018-2019). The bar graph displays the mean of real net (gross daily wage- daily permit price) daily wages, before (June 2018) and after (June 2019) the event, for payers and non-payers by industry affiliation. 95% confidence intervals are displayed and wages are deflated to NIS 2019.

Figure 4a—Transitions between Permit holders and Non-Permit Holders



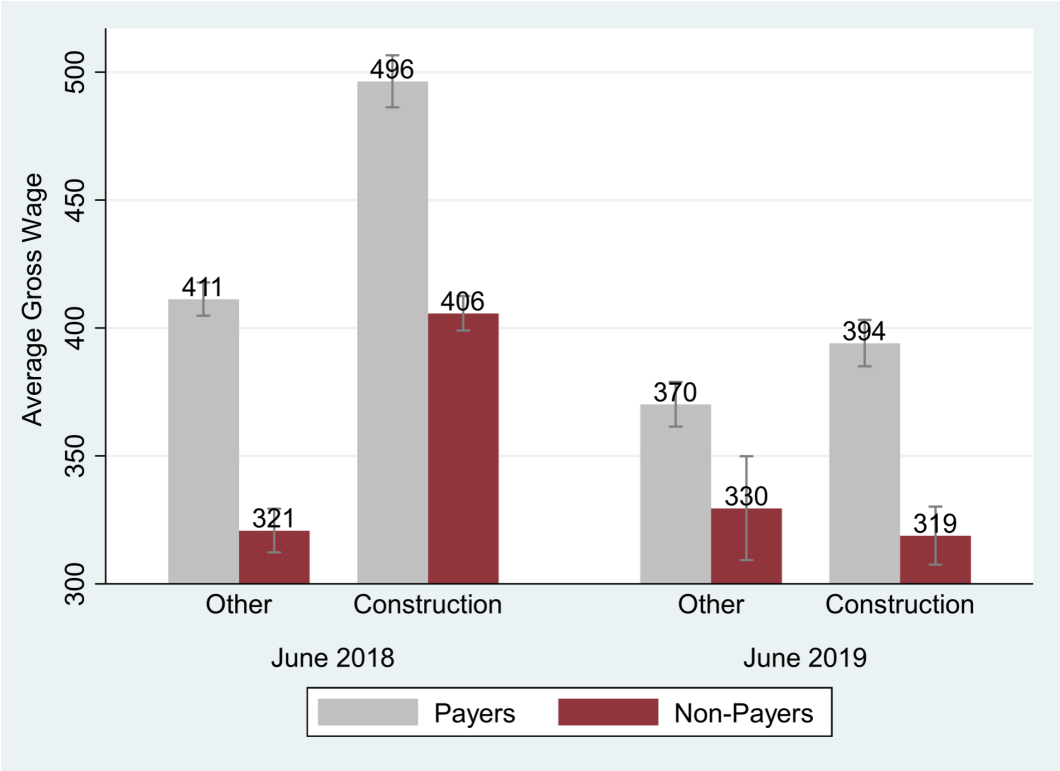
Note: PLFS(2016-2019). The figure above displays the shares associated with 4 types of workers during the period of interest: workers who did not possess a work permit during two consecutive visits (No permit, No permit), workers who did not have a work permit during their previous visit but then acquired a permit (No Permit, Permit), workers who had a work permit in the previous visit but no longer owned a work permit (Permit, No Permit) and workers who were in possession of a permit for two consecutive visits.

Figure 4b—Issued permits, unused permits and unused permits as a share of the quota.



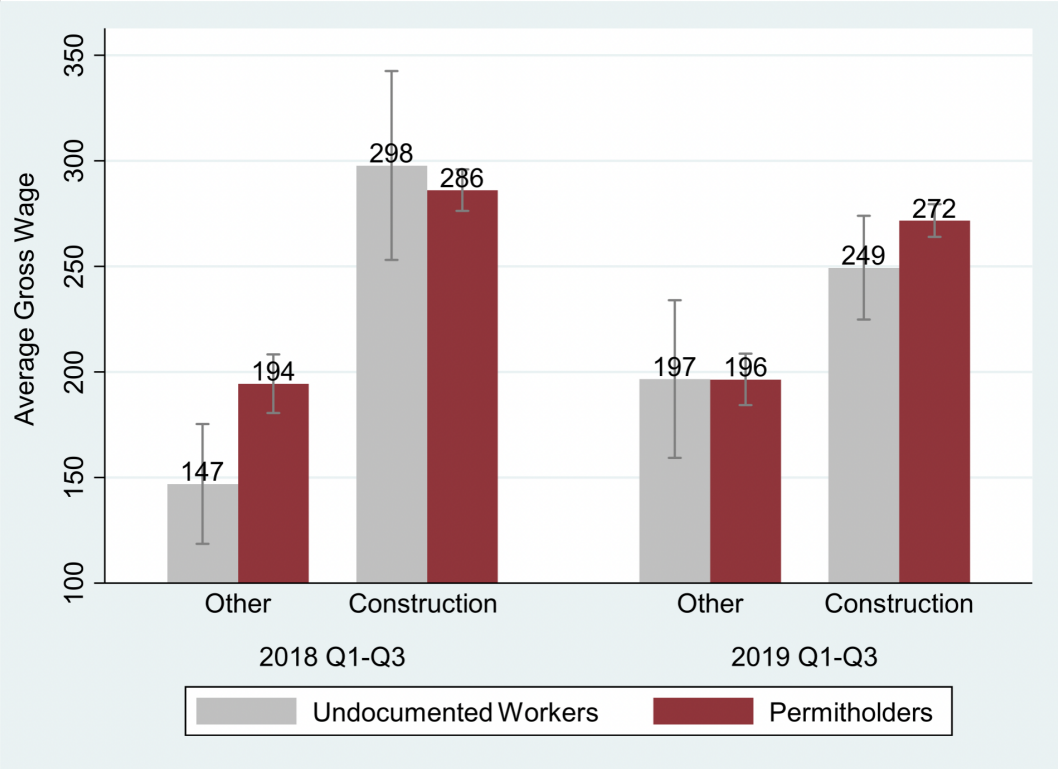
Source: Nathan (2021)

Figure 5a—Gross Wages of Payers and Non-Payers in 2018 and 2019 (EGS)



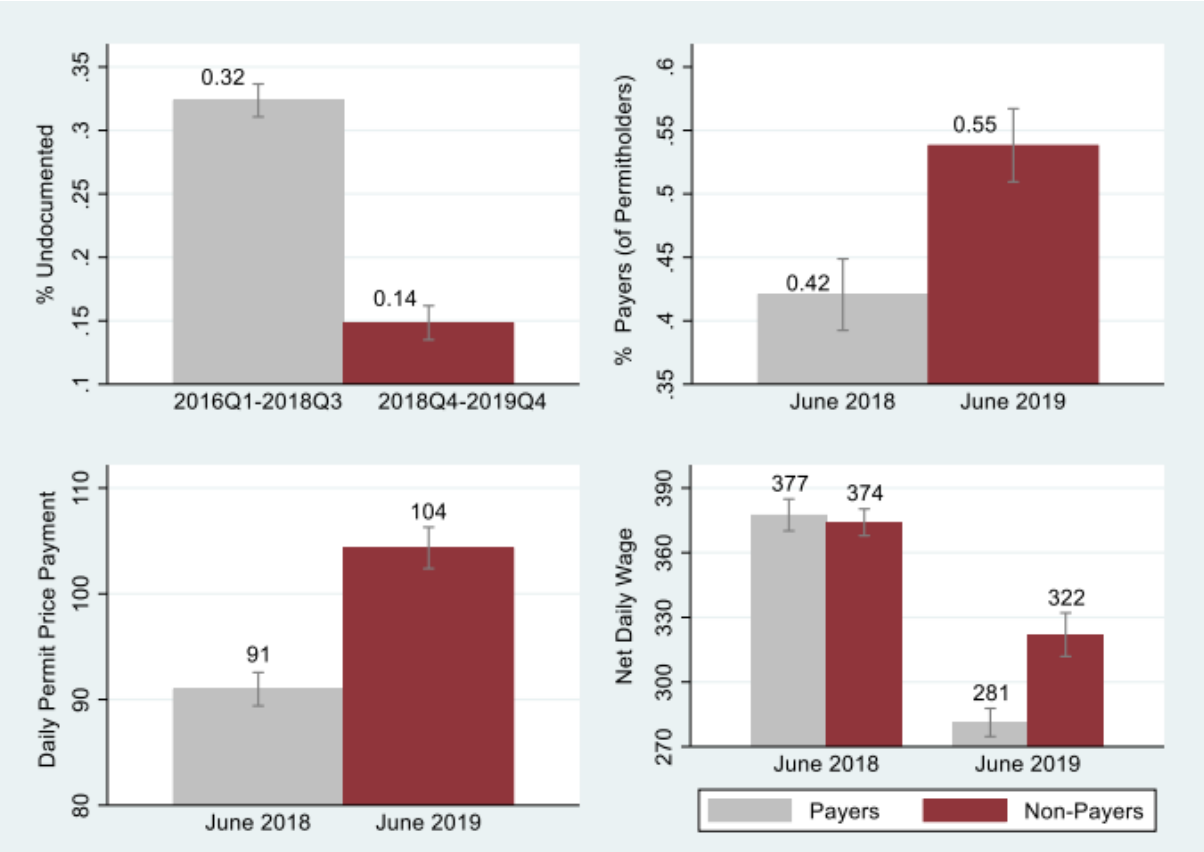
Note: EGS(2018-2019). The bar graph displays the mean of real daily wages, before (June 2018) and after (June 2019) the event, for payers and non-payers by industry affiliation. 95% confidence intervals are displayed and wages are deflated to NIS 2019.

Figure 5b—Gross Wages of Documented and Undocumented Workers in 2018 and 2019 (PLFS)



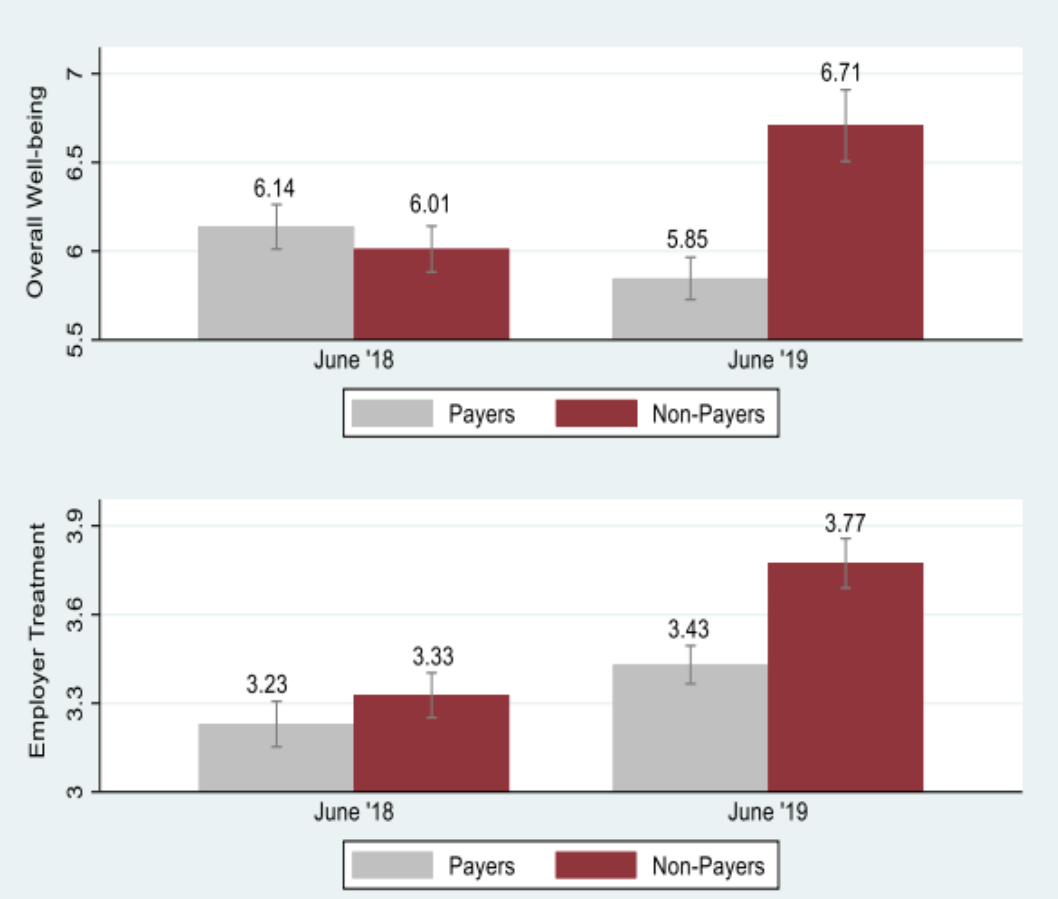
Note: PLFS(2018-2019). The bar graph displays the mean of real daily wages before (2018 Q1-Q3) and after (2019Q1-Q3) the event, for payers and non-payers by industry affiliation. . The sample is limited to 25-60-year-old men who have employment contracts. 95% confidence intervals are displayed and wages are deflated to NIS 2019.

Figure 6–Differences in Labor Shares and Prices Before and After the Event



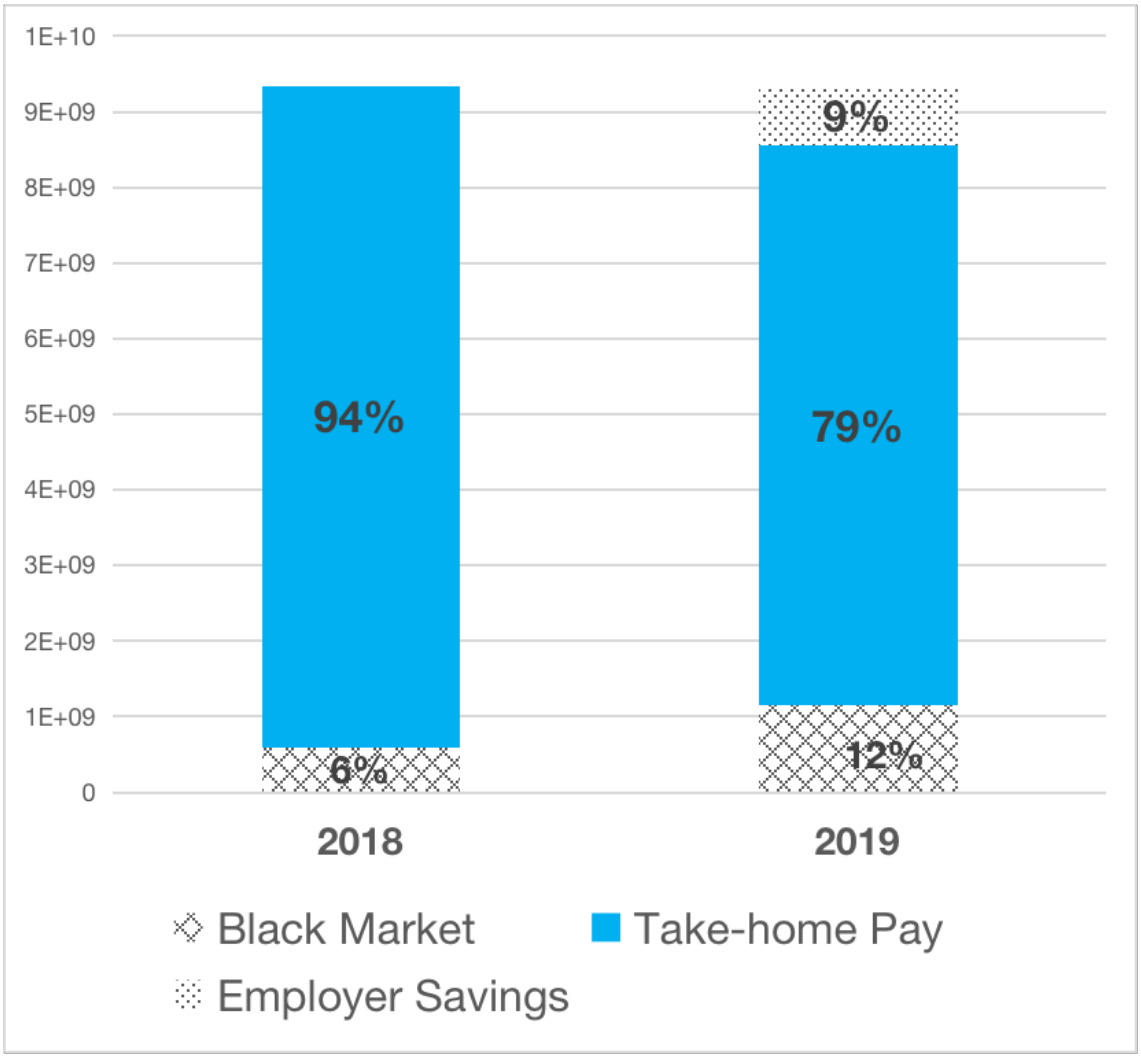
Note: The first graph (top left) displays the percentage of cross-border commuters that are undocumented using the PLFS waves of 2016-2019. The remaining figures use the EGS dataset to report (by round): the % of permit holders that are payers; the average daily permit price for payers and the net daily wage–gross daily wage minus daily permit price–for payers and non-payers (note that the daily permit price for non-payers=0). Prices are deflated to NIS 2019.

Figure 7—Well-being Measures of Payers and Non-Payers Before and After Event



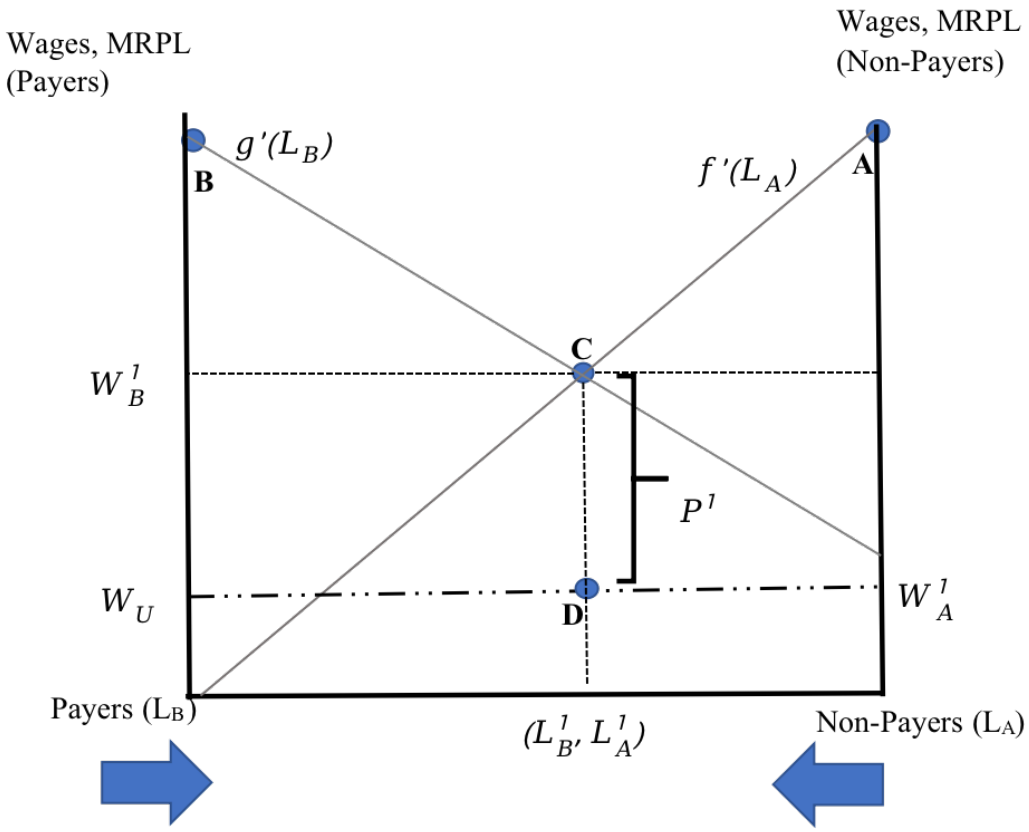
Note: EGS 2018 and 2019. The top graph displays the average well-being measure (by round and sector affiliation) to the question: Overall, on a scale of 1 to 10, how satisfied are you with your life nowadays? The bottom graph displays average responses to the question: How would you rate the way in which your current employer in Israel treats you (scale of 1 to 5)? Higher responses correspond to better well-being measures.

Figure 8—Redistribution of Total Wage Bill between 2018 (Q1-Q3) and 2019



Note: (EGS) The graph above displays distribution of the total wage bill in June 2018 (left bar) and in June 2019 plus employer labor costs (right bar). The wage bill is the sum of the product of each type of worker multiplied by the average wage for his group. Per year, black market revenue is computed as the estimated number of payers multiplied by the average permit price. Employer labor costs equal the difference between the total wage bills in June 2018 and June 2019.

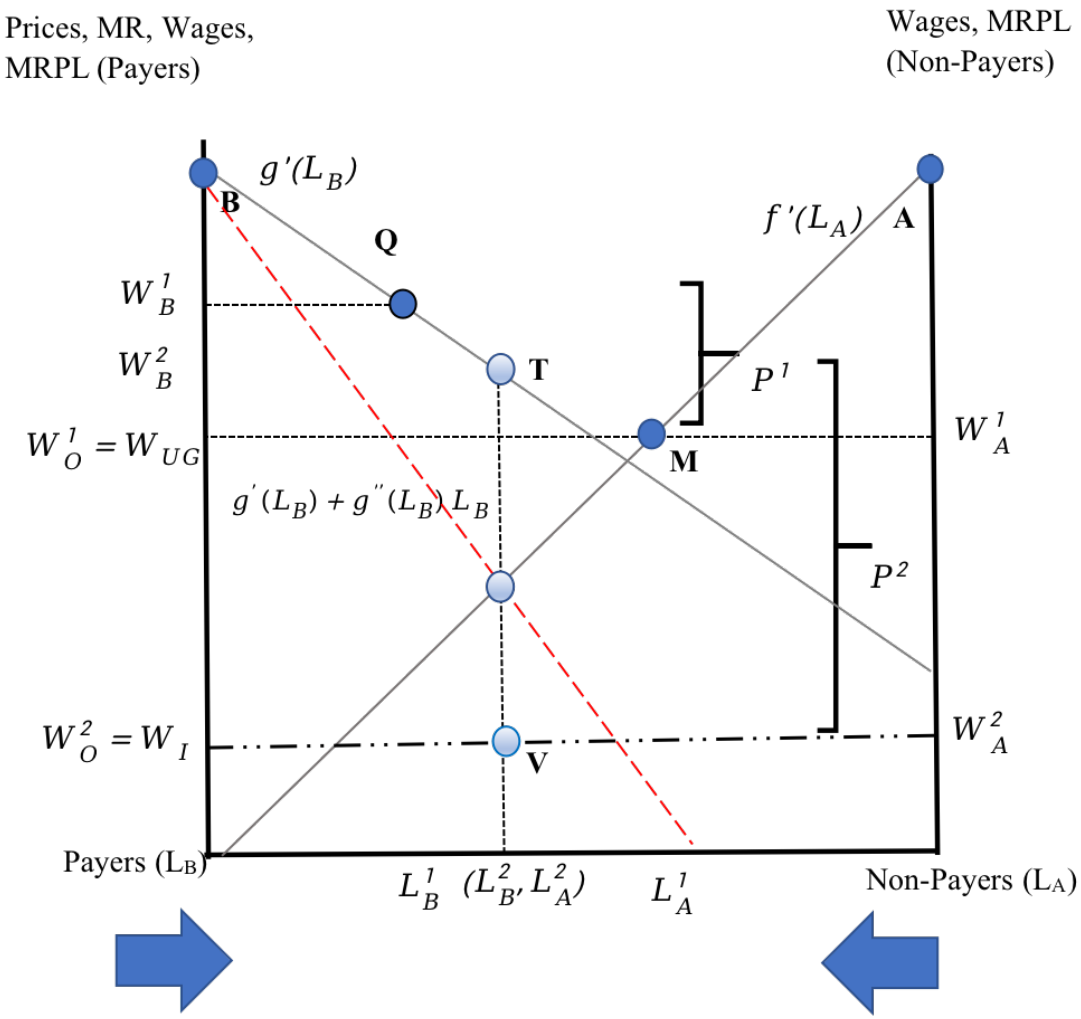
Figure 9a—Equilibrium in Basic Model



Note: In Figure 9a, Sector B (Semi-formal) moves left to right and the Sector A (Formal)moves right to left. All permits are used such that $L_A + L_B = \overline{L}$, where $\overline{L}$ is the industry quota. $f'(L_A)$ is the MRPL for non-payers and $g'(L_B)$ is the MRPL for payers. There is full mobility across sectors, such that $f'(\overline{L} - L_B) = g'(L_B)$. Equilibrium is displayed for the basic model. Using these equilibrium values, we show employer surplus, worker surplus and black-market revenue, which is shared between formal employers and brokers.

Sector	Type of Employer	Employer Surplus	Worker Surplus
Sector A	Formal	ACDW_A^1	Non-payers$(W_A^1 L_A^1)$
Sector B	Semi-formal	BCW_B^1	Payers $(W_B^1 L_B^1)$
Black -Market	Formal + Brokers	$P^1 L_B^1$	

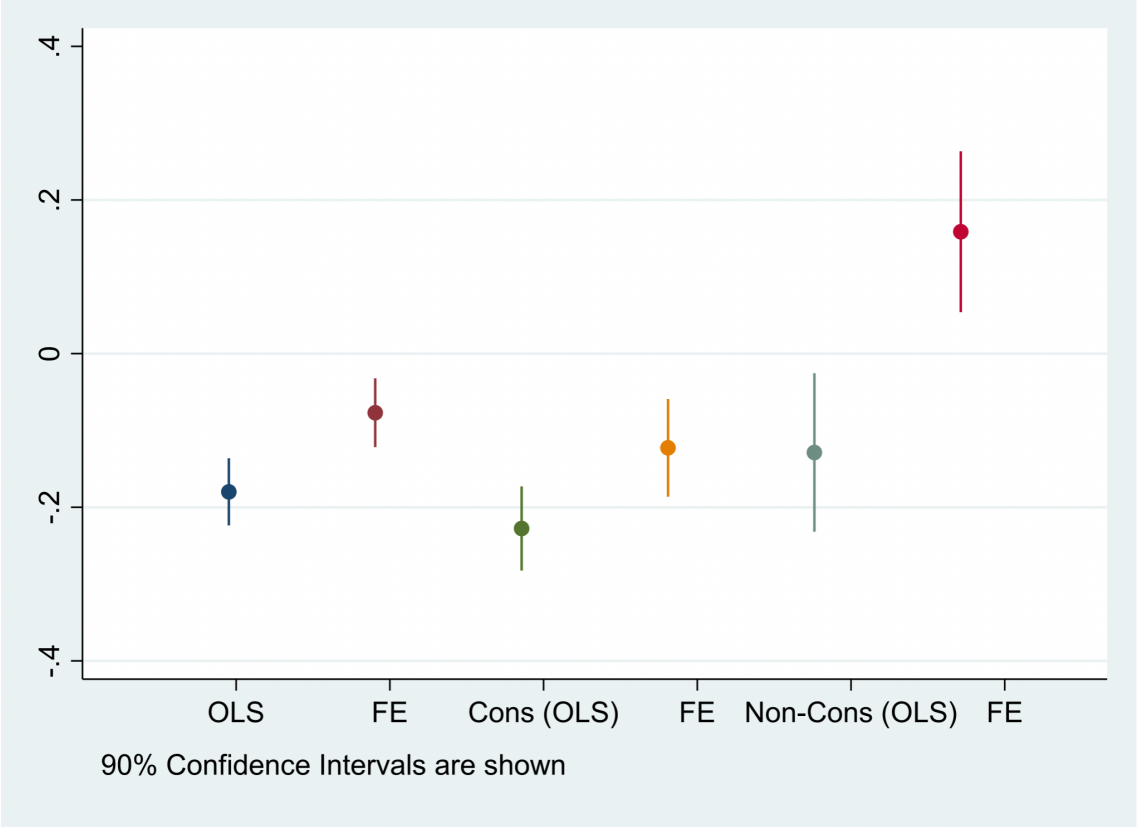
Figure 9b—Equilibrium in the Event of a Decline in the Outside Option



Note: In Figure 9b, Sector B (Semi-formal) moves left to right and the Sector A (Formal)moves right to left. Permit sellers have market power such that some permits are unused, i.e. $L_A + L_B < \overline{L}$, where $\overline{L}$ is the industry quota. $f'(L_A)$ is the MRPL for non-payers and $g'(L_B)$ is the MRPL for payers. The dashed line represents the marginal cost of labor for semi-formal employers, whose labor costs are $W_B L_B = g'(L_B)L_B$. The marginal cost of labor $(g'(L_B) + g''(L_B)L_B)$ is equivalent to the marginal revenue accrued by sector A plus the initial underground wage sector $MR(L_B) + W_{UG}$ (see equation 3). Thus, the equilibrium solution prior to the event is given by a dark point (Q,M) where labor and wages are allocated as (L_A^1, L_B^1) and (W_A^1, W_B^1) respectively, and the permit price is denoted by P^1. Due to the reform, the outside option decreases from W_{UG} to W_I. Here, the solution is depicted by a light shade (T,V) where labor and wages are allocated as (L_A^2, L_B^2) and (W_A^2, W_B^2), and the permit price is P^2. Employers and brokers gain while workers experience losses as shown below:

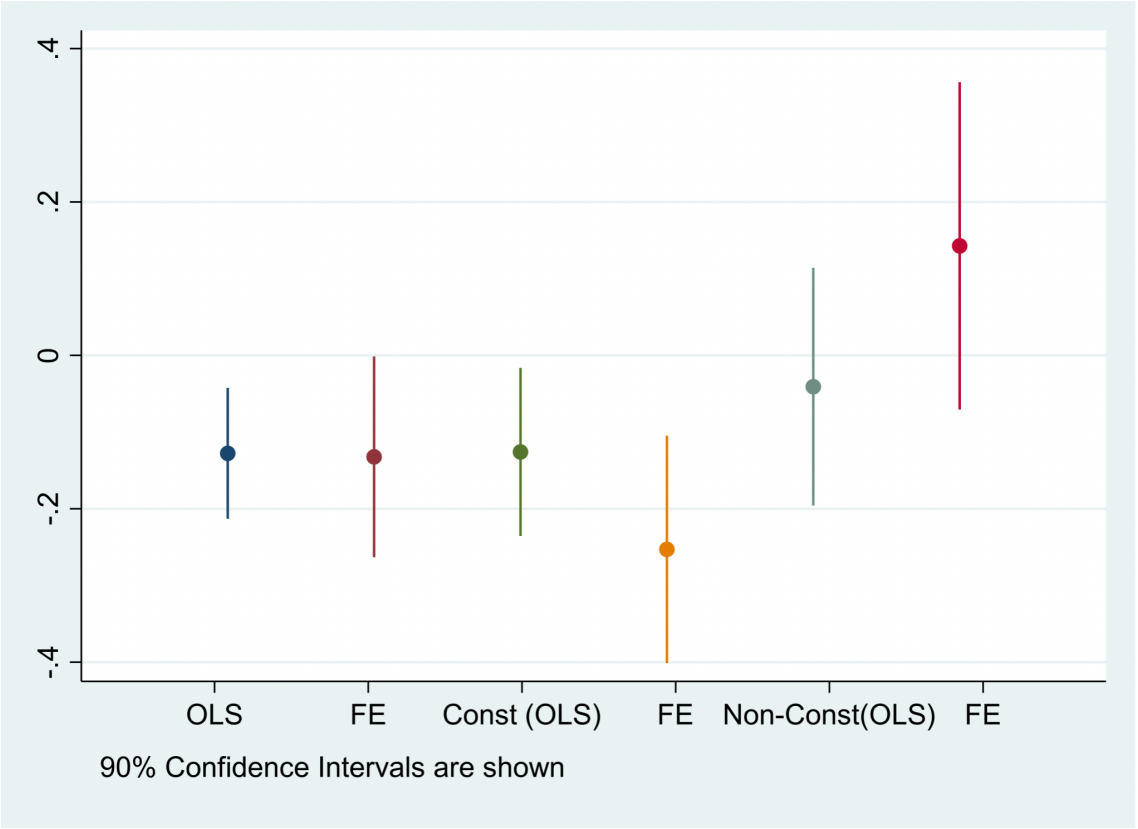
Sector	Employer	Gain in Employer Surplus	Loss in Worker Surplus
Sector A	Formal	$\text{AUV}W_A^2 - AMW_A^1$	$-(W_A^2 L_A^2 - W_A^1 L_A^1)$
Sector B	Semi-formal	$\text{BT}W_B^2 - BQW_B^1$	$-(W_B^2 L_B^2 - W_B^1 L_B^1)$
Black -Market	Formal + Brokers	$P^2 L_B^2 - P^1 L_B^1$	

Figure 10a—Difference in Difference OLS and FE Estimates of Wages (Control Group 1)



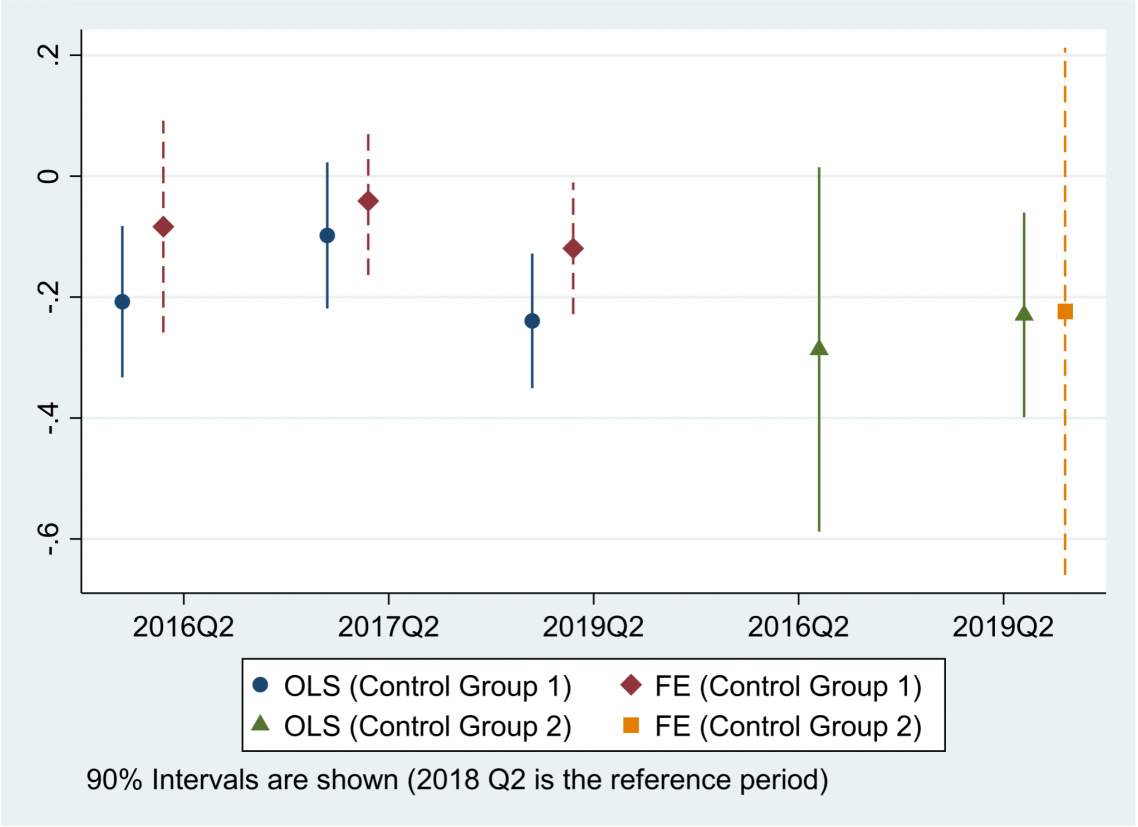
Note: Source: PLFS. This figure displays six difference in difference estimates where the treatment group consists of wage-earners in Israel who have a valid work permit and the control group are wage-earners in the domestic economy. The sample is limited to 25-60-year-old men who have employment contracts and are occupied in elementary occupations or crafts/skilled work. The time of the event is 2018 Q4. The OLS parameter is uncovered by regressing ln (real) daily wage on the treatment group, a post-2018Q4 dummy, the interaction term (variable of interest), and a construction industry dummy. In the FE specification, we include individual fixed effects. We repeat these two regressions separately for workers employed in the construction and non-construction industries.

Figure 10b—Difference in Difference OLS and FE Estimates of Wages (Control Group 2)



Note: Source: PLFS. This figure displays six difference in difference estimates where the treatment group consists of wage-earners in Israel who have a valid work permit and the control group are wage-earners in the domestic economy who have a Jerusalem ID card. The sample is limited to 25-60-year-old men who have employment contracts and are occupied in elementary occupations or crafts/skilled work. The time of the event is 2018 Q4. The OLS parameter is uncovered by regressing ln (real) daily wage on the treatment group, a post-2018Q4 dummy, the interaction term (variable of interest), and a construction industry dummy. In the FE specification, we include individual fixed effects. We repeat these two regressions separately for workers employed in the construction and non-construction industries.

Figure 10c— Difference in Difference Panel Estimates (Quarter 2 only)



Note: Source: PLFS. This figure displays parameters estimates of four regressions, an OLS and FE specification for each control group. In all specifications, the treatment group consists of wage-earners in Israel who have a valid work permit. The first control group are wage-earners in the domestic economy, while the second group consists of wage-earners in the domestic economy who have a Jerusalem ID card. Samples are limited to 25-60-year-old men who have employment contracts and are occupied in elementary occupations or crafts/skilled work. To control for seasonal changes, we limit the sample to those whose wages are observed in quarter 2. The OLS parameter for each control group is uncovered by regressing ln (real) daily wage on the treatment group dummy, four year dummies (2016Q2, 2017Q2, 2018Q2, and 2019Q2), the interaction terms (variables of interest), and a construction industry dummy. In the FE specification, we include individual fixed effects.

Table 1: Descriptive Statistics of Migrant Workers in Israel (PLFS)

Panel A: PLFS (2016-2019)	2016	2017	2018	2019
Labor Force Participation Rate	0.89	0.89	0.88	0.88
Unemployment Rate	0.18	0.18	0.20	0.18
Wage Sector Rate	0.70	0.71	0.70	0.71
% Employed in Israel	0.31	0.32	0.32	0.32
% Employed With a Work Permit	0.63	0.66	0.69	0.81
% Wage Earners with a Work Permit	0.67	0.68	0.73	0.86
% Construction Workers of Employed in Israel	0.65	0.63	0.64	0.65
% Construction of Permit holders	0.72	0.71	0.72	0.72
Real Daily Wage (NIS 2019) in Construction	263	272	285	292
Real Wage in Construction w/Permit	265	274	286	293
Real Wage in Construction w/o Permit	258	268	282	286
Real Wage in Other Industries	180	189	199	215
Real Wage in Other Industries with Permit	188	196	207	222
Real Wage in Other Industries w/o Permit	168	178	184	189

Panel B: EGS June 2018-19/PLFS 2019Q2	EGS June '18	EGS June '19	PLFS 2019Q2
% Payers among Permit holders	0.42	0.54	0.47
% Construction Workers among Payers	0.67	0.64	0.75
Real Daily Wages for Payers in Construction	492	394	330
Daily Payment for Payers in Construction	97	113	138
Real Daily Wages for Non-Payers in Construction	406	319	261
Real Daily Wages for Payers in Other Ind.'s	408	370	256
Daily Payment for Payers in Other Industries	79	88	108
Real Daily Wages for Non-Payers in Other Ind	321	330	194

Notes: PLFS (2016-2019) EGS (2018-2019). Sample size is limited to male migrant workers between ages 25 and 59. Survey weights are used to compute means. Daily payment for payers is computed by dividing the monthly payment made by the number of days worked last month

Table 2: Descriptive Statistics for Payers and Non-payers in June 2018 and June 2019

All Workers	2018			2019			2019-2018
Variable Name	Payers	Non-Payers	Diff	Payers	Non-Payers	Diff	Diff-in-Diff
Average Age	36.8	38.5	1.7**	36.8	38.9	2.0*	0.34
%Single	0.06	0.04	-0.02*	0.06	0.13	0.07*	0.09**
%Married	0.82	0.81	-0.01	0.91	0.81	-0.10**	-0.09*
Average Number of Kids	4.5	4.4	-0.07	3.9	4.0	0.06	0.13
%Illiterate	0.03	0.02	-0.01	0.01	0.00	-0.01	-0.00
%Can Read and Write	0.13	0.11	-0.02	0.01	0.05	0.04**	0.06**
%Primary Schooling	0.16	0.21	0.05	0.15	0.10	-0.04	-0.09*
%Preparatory Schooling	0.35	0.34	-0.01	0.37	0.36	-0.01	0.00
%Secondary Schooling	0.22	0.20	-0.02	0.28	0.28	0.00	0.02
%Post-Secondary Schooling	0.12	0.13	0.01	0.18	0.20	0.02	0.01
% Speak Hebrew	0.57	0.57	-0.00	0.37	0.43	0.06	0.06
% Speak English	0.06	0.03	-0.03**	0.08	0.20	0.13***	0.15***
Tenure in Months	86	99	13.3**	78	85	7.0	-6.3
Time since First Permit	7.9	9.2	1.2*	6.3	9.1	2.7***	1.5
% with a single employer	0.46	0.58	0.11***	0.34	0.67	0.33***	0.21***
Avg number of employers	1.8	1.7	-0.10	2.5	1.7	-0.78***	-0.68***
% works for Official Employer	0.28	0.91	0.63***	0.34	0.84	0.51***	-0.12**
% Official and single Employer	0.10	0.55	0.45***	0.20	0.62	0.42***	-0.04
Hours worked last week	34.8	35.8	0.97	41	44	2.6***	1.6
Commute time (minutes)	147	129	-18.2***	209	168	-41***	-22.8*
Days worked last month	21.7	21.1	-0.55***	21.5	20.6	-1.0**	-0.44
Real daily wage (NIS 2019)	468	374	-94***	386	322	-64***	30.8**
Daily permit payment	91	0.00	-91***	104	0.00	-104***	-13.4***
Net daily wage	377	374	-3.4	281	322	41***	44.2***
Number of Observations	561	622		707	456		

Notes: EGS(2018-2019). The table reports summary statistics by payer/non-payer status and year. T-tests are reported for differences in means between payers and non-payers for each year, and diff-in-diff estimates between 2019 and 2018. Statistical significance is reported at the 10% (*), 5% (**) and 1%(***) level.

Table 3: Changes in Wage Bill Between 2018 and 2019

	2018	Construction	Non-Construction	2019	Construction	Non-Construction
Number of Workers Total[1]	89,375	60,891	28,484	93,524	67,244	26,280
Permits Issued in Israel[2]	60,775	43,636	17,139	80,431	57,910	22,521
% Permitholders (PLFS)	0.68	0.728	0.61	0.86	0.89	0.78
% Payers (EGS)	0.42	0.44	0.39	0.54	0.51	0.59
Number Undocumented[3]	28600	16302	12298	13093	6677	6416
Number Payers[4]	25526	17102	8424	43433	27797	15636
Number Non-Payers[4]	35250	22208	13042	36998	26269	10729
Monthly Permit Price(EGS)	1955	2102	1652	2201	2343	1945
Wages Undocumented (PLFS)	374	406	294	290	309	267
Wages Payers (EGS)	468	496	411	385	394	370
Wages Non-Payers (EGS)	374	406	321	322	319	330
Black Market Revenue[5]	598 Mil	431 Mil	167 Mil	1.14 Bil	781 Mil	365 Mil
Wage Bill[6]	9.34 Bil	6.37 Bil	2.97 Bil	8.56 Bil	5.65 Bil	2.91 Bil
Take-home Pay[7]	8.74 Bil	5.94 Bil	2.8 Bil	7.41 Bil	4.86 Bil	2.55 Bil
Employer labor costs[8]	0	0	0	780 Mil	720 Mil	60 Mil
Black Market Revenue (Adj) [9]	598 Mil	431 Mil	167 Mil	1.18 Bil	813 Mil	372 Mil
Take-home Pay (Adj)	8.74 Bil	5.94 Bil	2.8 Bil	7.89 Bil	5.31 Bil	2.57 Bil
Employer labor costs (Adj)	0	0	0	268 Mil	241 Mil	27 Mil

All prices are deflated at NIS 2019. [1]Computed as Permits Issued in Israel divided by % Permitholders. [2]Taken from annual publication of PLFS administered by PBCS. [3]Computed as Number of workers Total times (1-%Permitholders). [4]Payers and Non-payers are computed as %Payers times Number of Workers. [5]Computed as Monthly Permit Price times Number of Payers *12. [6]Computed as sum of product of wages (payers, non-payers, undocumented) and the number associated with each, times 22 days per month times 12 months. [7]Computed as Wage Bill minus Black Market Revenue. [8]Equivalent to 0 because 2018 is the reference point and for 2019, computed as difference between wage bill in 2019 and wage bill in 2018. [9]For the last three rows, 2018 estimates are the same as before and 2019 estimates are produced from adjusted wages and permit prices, according to estimates in Panels B and D of Table 4.

Table 4: What are the Consequences of the Reform?

	Permit holders	Payers	Permit Price	Payers' Wages	Non-Payers' Wages
	(1)	(2)	(3)	(4)	(5)
Panel A: Construction Workers (No Controls)					
Reform	0.13***	0.06**	011***	-0.16***	-0.22***
	(0.02)	(0.03)	(0.01)	(0.01)	(0.02)
Observations	2,123	1,348	704	704	647
R-squared			0.09	0.15	0.16
Panel B: Construction Workers (W/ Controls)					
Reform	0.14***	0.05**	0.15***	-0.15***	-0.14***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	2,123	1,348	704	704	647
R-squared			0.25	0.39	0.38
Panel C: Non-Construction (No Controls)					
Reform	0.14***	0.22***	0.11***	-0.15***	0.03
	(0.03)	(0.03)	(0.02)	(0.02)	(0.03)
Observations	1,209	994	564	564	431
R-squared			0.06	0.12	0.00
Panel D: Non-Construction (W/ Controls)					
Reform	0.14***	0.30***	0.18***	-0.15***	0.13***
	(0.03)	(0.03)	(0.03)	(0.02)	(0.04)
Observations	1,209	994	564	564	431
R-squared			0.36	0.45	0.34

Note: (EGS and PLFS—2018 amp; 2019)— This table provides point estimates of the reform (post 2018Q3). Col (1) displays marginal effects of a probit model where the dependent variable equals 1 if the worker is a permit holder and 0 if undocumented using the 2018Q1-2019Q4 waves of the PLFS. The remaining columns use the June 2018 and June 2019 rounds of the EGS. In col (2), the dependent variable equals 1 if the worker is a payer and 0 if he is a non-payer. The dependent variable in the remaining columns is the natural log of the monthly permit payment (col 3), the natural log of real daily wages deflated to 2019 NIS for payers (col 4) and non-payers (col 5). The sample is limited to men between the ages of 25 and 59, who have no missing information on the controls included in Panels B and Panel C. In Panels A and C, there are no controls for the construction and non-construction industries respectively. Panels B and D include the following controls: whether or not a worker has an official employer, worked for a single employer in the last three months, an interaction term between the latter two variables, one dummy variable for fluency in Hebrew, one dummy variable for fluency in English, 6 marital dummies, number of children, 6 educational attainment dummies, 4 industry dummies, 8 occupational dummies, tenure in Israel and its square and number of years since first work permit. For col (1) specifications, the following variables are not included in the regression (since they are not asked in the questionnaire administered by the PLFS): official employer, worked for a single employer in the last three months, an interaction term between the latter two variables, one dummy variable for fluency in Hebrew, one dummy variable for fluency in English, number of years since first work permit, and total commute time. Heteroskedasticity-robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 5: Permit Prices and Individual Wages

Y=Ln(Permit Price)	Construction		Non-Construction	
	(1)	(2)	(3)	(4)
June 2019	-0.38	-4.45***	-3.61***	-6.16***
	(0.53)	(0.84)	(0.75)	(1.31)
Individual Wage	0.32***		-0.11	
	(0.06)		(0.12)	
June 2019 X Indiv Wage	0.09		0.63***	
	(0.09)		(0.13)	
Predicted Wage		-0.21*		-0.45**
		(0.11)		(0.20)
June 2019 X Pred Wage		0.75***		1.06***
		(0.14)		(0.22)
Residual Wage		0.38***		-0.08
		(0.06)		(0.12)
June 2019 X Resid Wage		0.00		0.57***
		(0.09)		(0.13)
Constant	5.61***	8.90***	8.05***	10.08***
	(0.38)	(0.68)	(0.70)	(1.20)
Observations	687	687	545	545
R-squared	0.22	0.26	0.25	0.26

Notes: EGS June 2018 and 2019 rounds. Parameters above are estimated using OLS where the dependent variable is the natural logarithm of the monthly permit price. In col (1)-(2), the sample size is limited to construction workers who were payers in June 2018 or June 2019, and for col(3)-(4), the sample consist of workers outside of construction. Heteroskedasticity-robust standard errors are reported in parenthesis *** p<0.01, ** p<0.05, * p<0.1.

Table 6: Permit Prices and Average Wages by Local Region of Residence

Y=Ln(Monthly Permit Price)	Construction Workers			Other Workers		
District-Gate Wages	(1)	(2)	(3)	(4)	(5)	(6)
June 2019	-4.16	-4.04	-6.05***	-13.03***	-12.89***	-14.25***
	(2.65)	(2.64)	(2.33)	(1.74)	(1.87)	(1.86)
Avg Wage (Non-Payers)	-0.50***	-0.50***	-0.43***	-1.19***	-1.24***	-1.20***
	(0.07)	(0.07)	(0.07)	(0.17)	(0.18)	(0.18)
X June 2019	0.53***	0.49***	0.36**	0.85***	0.89***	0.85***
	(0.17)	(0.18)	(0.16)	(0.22)	(0.23)	(0.23)
Avg Wage (Payers)	0.15**	0.15**	-0.36***	-1.22***	-1.22***	-1.51***
	(0.07)	(0.07)	(0.08)	(0.14)	(0.14)	(0.18)
X June 2019	0.19	0.21	0.13	1.37***	1.31***	0.87**
	(0.36)	(0.36)	(0.30)	(0.32)	(0.34)	(0.36)
Predicted Wage			0.00			0.09
			(0.12)			(0.15)
June 2019 X Pred Wage			0.52***			0.70***
			(0.15)			(0.17)
Residual Wage			0.53***			0.30***
			(0.07)			(0.10)
June 2019 X Resid Wage			-0.13			0.20*
			(0.10)			(0.11)
At least 10 observations/cell		X	X		X	X
Constant	9.64***	9.63***	12.40***	21.63***	21.84***	22.86***
	(0.42)	(0.43)	(0.76)	(1.15)	(1.17)	(1.23)
Observations	704	668	668	552	522	522
R-squared	0.13	0.13	0.32	0.21	0.21	0.43

Notes: EGS June 2018 and 2019 rounds. Parameters above are estimated using OLS where the dependent variable is the natural logarithm of the monthly permit price. All observations are payers either in June 2018 or June 2019. The sample in col (1)-(3) is limited to construction workers and in col (4)-(6), the sample is limited non-construction workers. In col(2),(3),(5) and (6), the sample is restricted to observations whose corresponding cell—non(payer)-industry type-districtgate-year— includes at least 10 observations.. Heteroskedasticity-robust standard errors are reported in parenthesis *** p<0.01, ** p<0.05, * p<0.1.

Table A1—Selection into Legal and Illegal Work

Probit Model (Marginal Effects)	From Underground to Permit-holder		From Permit-holder to Underground Worker	
	(1)	(2)	(3)	(4)
Construction Industry	0.84*	0.80*	-0.40***	-0.39***
	(0.43)	(0.43)	(0.14)	(0.14)
Ln(Wage) in Last Visit	0.15***	0.12**	-0.07***	-0.06***
	(0.04)	(0.06)	(0.02)	(0.02)
Ln(Wage) in Last Visit x	-0.16**	-0.15*	0.07***	0.07***
Construction Industry	(0.08)	(0.08)	(0.03)	(0.03)
2018-2019	0.14***	-0.11	-0.02**	0.04
	(0.03)	(0.34)	(0.01)	(0.12)
Ln(Wage) in Last Visit x		0.05		-0.01
(2018-2019)		(0.06)		(0.02)
Observations	769	769	1,994	1,994

Note: PLFS (2016-2019). Sample is restricted to wage-earning men between the ages of 25 and 59 who worked in Israel and/or settlements in current and previous visits for 18-27 days per month. The table displays marginal effects of a probit model where the dependent variable in cols (1) and (2) equals 1 if an individual works with a permit in Israel but worked without one in the previous visit, and 0 if they worked underground in both visits. In cols (3) and (4), the dependent variable equals 1 if the individual earned wages in Israel/settlements with a work permit in the previous visit but currently works underground and 0 if they worked with a work permit during both visits.

Table A2—Descriptive Statistics for Construction Workers in June 2018 and June 2019

Construction Workers	2018			2019			2019-2018
Variable Name	Payers	Non-Payers	Diff	Payers	Non-Payers	Diff	Diff-in-Diff
Average Age	36.5	39.2	2.7**	37.5	40	2.7*	-0.05
%Single	0.05	0.03	-0.02*	0.07	0.08	0.01	0.03
%Married	0.87	0.85	-0.02	0.91	0.84	-0.07	-0.05
Average Number of Kids	4.6	4.8	0.15	4.1	4.2	0.09	-0.06
%Illiterate	0.02	0.02	-0.00	0.01	0.00	-0.01	-0.01
%Can Read and Write	0.09	0.10	0.02	0.01	0.06	0.05**	0.04
%Primary Schooling	0.14	0.23	0.09*	0.14	0.12	-0.03	-0.12*
%Preparatory Schooling	0.39	0.36	-0.03	0.37	0.35	-0.03	0.00
%Secondary Schooling	0.24	0.16	-0.08***	0.26	0.27	0.00	0.09
%Post-Secondary Schooling	0.12	0.13	0.01	0.20	0.21	0.01	-0.00
% Speak Hebrew	0.59	0.63	0.03	0.44	0.42	-0.02	-0.05
% Speak English	0.07	0.03	-0.04**	0.07	0.21	0.14***	0.18***
Tenure in Months	87	111	23.9**	88.3	88	-0.77	-24.6*
Time since First Permit	8.1	10.1	2.0**	6.9	10.0	3.0**	1.0
% with a single employer	0.39	0.58	0.18***	0.29	0.69	0.40***	0.22***
% Avg number of employers	1.9	1.8	-0.15	2.7	1.7	-1.1***	-0.90***
% works for Official Employer	0.34	0.91	0.57***	0.24	0.85	0.61***	0.03
% Official and single Employer	0.10	0.56	0.46***	0.13	0.65	0.52***	0.06
Hours worked last week	36.3	37.3	0.99	41.3	44	3.1***	2.1
Commute time (minutes)	164	132	-31.7***	204	163	-42***	-9.9
Days worked last month	21.9	21.1	-0.71***	21.0	20.2	-0.84	-0.13
Real daily wage (NIS 2019)	496	406	-91***	394	319	-75***	15.4
Daily permit payment	97	0.00	-97***	113	0.00	-113.5***	-16.4***
Net daily wage	399	406	6.4	281	319	38.2**	31.8*
Number of Observations	342	356		362	291		

Notes: EGS(2018-2019). The table reports summary statistics by payer/non-payer status and year. T-tests are reported for differences in means between payers and non-payers for each year, and diff-in-diff estimates between 2019 and 2018. Statistical significance is reported at the 10% (*), 5% (**) and 1%(***) level.

Table A3—Descriptive Statistics for Non-Construction Workers in June 2018 and June 2019

Non-Construction Workers	2018			2019			2019-2018
Variable Name	Payers	Non-Payers	Diff	Payers	Non-Payers	Diff	Diff-in-Diff
Average Age	37.4	37.3	-0.09	35.7	35.8	0.15	0.24
%Single	0.07	0.04	-0.02	0.04	0.24	0.19**	0.21***
%Married	0.73	0.75	0.02	0.91	0.74	-0.17**	-0.18**
Average Number of Kids	4.2	3.8	-0.38	3.6	3.5	-0.11	0.27
%Illiterate	0.05	0.03	-0.02	0.00	0.00	0.00	0.02
%Can Read and Write	0.20	0.11	-0.10***	0.02	0.01	-0.01	0.09**
%Primary Schooling	0.19	0.17	-0.02	0.15	0.07	-0.08	-0.06
%Preparatory Schooling	0.27	0.30	0.03	0.37	0.39	0.03	0.00
%Secondary Schooling	0.16	0.26	0.09**	0.30	0.32	0.01	-0.08
%Post-Secondary Schooling	0.12	0.13	0.01	0.16	0.20	0.04	0.03
% Speak Hebrew	0.52	0.48	-0.04	0.23	0.44	0.21**	0.25**
% Speak English	0.05	0.04	-0.02	0.10	0.19	0.09	0.11
Tenure in Months	83	79	-3.8	61	81	19.7	23.6*
Time since First Permit	7.6	7.6	0.05	5.3	6.9	1.6*	1.5
% with a single employer	0.60	0.57	-0.03	0.43	0.62	0.19***	0.22**
Avg number of employers	1.6	1.6	0.03	2.1	1.8	-0.26	-0.29
% works for Official Employer	0.16	0.90	0.74***	0.50	0.82	0.32***	-0.42***
% Official and single Employer	0.10	0.54	0.44***	0.33	0.54	0.21***	-0.23***
Hours worked last week	31.6	33.1	1.5	41	42	1.1	-0.39
Commute time (minutes)	113	124	10.6**	217	180	-36.8**	-47***
Days worked last month	21.2	21.0	-0.21	22	21	-1.1**	-0.86*
Real daily wage (NIS 2019)	411	321	-90***	370	330	-41**	50**
Daily permit payment	79	0.00	-79***	88	0.00	-88***	-9.3***
Net daily wage	333	321	-11.9*	282	330	47***	59***
Number of Observations	219	266		345	165		

Notes: EGS(2018-2019). The table reports summary statistics by payer/non-payer status and year. T-tests are reported for differences in means between payers and non-payers for each year, and diff-in-diff estimates between 2019 and 2018. Statistical significance is reported at the 10% (*), 5% (**) and 1%(***) level.

Table A4—Are Payers' Observable and Unobservable Skills transferable to Other Sectors

June 2018 EGS	$\hat{W}_{i,d,s}$	$\hat{W}_{i,d,s}$	$\hat{W}_{i,d,s}$	$\hat{W}_{i,d}$	$\hat{W}_{i,d,s}$	$\hat{W}_{i,d}$
	(1)	(2)	(3)	(4)	(5)	(6)
Predicted Wage ($\hat{W}_{i,d}$	0.80***	1.13***				
	(0.06)	(0.06)				
Residual Wage ($\varepsilon_{i,d}$	0.01	-0.03	-0.22***	-0.33***		
			(0.03)	(0.02)	(0.07)	(0.04)
Constant	1.03***	-1.00***	5.97***	6.18***	5.73***	5.98***
	(0.39)	(0.37)	(0.01)	(0.00)	(0.01)	(0.01)
Sample	Construction	Other	Construction	Construction	Other	Other
Observations	330	208	330	330	208	208
R-squared	0.30	0.53	0.00	0.01	0.04	0.24

Note: The sample is limited to payers in the June 2018 round of the EGS. Estimates are produced separately for construction workers and those in other industries. The exercise is supposed to reveal the extent to which predicted wages–as measured by individual's observable characteristics– and residual wages shape the maximum predicted wage for a payer in an alternative sector ($\hat{W}_{i,d,s}; s = F,U$). Heteroskedasticity-robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A5—Other Consequences of the Reform

	Commute Time		Hours Worked		Treatment by Employer	
	Payers	Non-Payers	Payers	Non-Payers	Payers	Non-Payers
	(1)	(2)	(3)	(4)	(5)	(6)
Construction Workers (No Controls)						
Reform	0.59***	0.37***	0.64***	0.90***	0.05	0.23***
	(0.06)	(0.06)	(0.08)	(0.08)	(0.07)	(0.08)
Observations	704	647	704	647	704	647
R-squared	0.40	0.35	0.44	0.44	0.13	0.15
Construction Workers (W/ Controls)						
Reform	0.52***	0.25***	0.80***	0.96***	0.10	0.22**
	(0.07)	(0.06)	(0.09)	(0.08)	(0.08)	(0.09)
Observations	704	647	704	647	704	647
R-squared	0.40	0.35	0.44	0.44	0.13	0.15
Non-Construction (No Controls)						
Reform	0.99***	0.59***	1.02***	0.59***	0.51***	0.33***
	(0.04)	(0.07)	(0.08)	(0.08)	(0.08)	(0.09)
Observations	564	431	564	431	564	431
R-squared	0.45	0.16	0.25	0.10	0.06	0.03
Non-Construction (W/ Controls)						
Reform	0.81***	0.35***	1.07***	0.87***	0.45***	0.43***
	(0.08)	(0.10)	(0.13)	(0.13)	(0.13)	(0.13)
Observations	564	431	564	431	564	431
R-squared	0.55	0.32	0.44	0.37	0.20	0.17

Note: (EGS and PLFS—2018 amp; 2019)— This table provides OLS estimates of the impact of the reform using the June 2018 and June 2019 rounds of the EGS. There are three dependent variables: commute time (in minutes) divided by 100, weekly hours worked and treatment by employer (0 to 5). The sample is limited to men between the ages of 25 and 59. In Panels A and C, there are no controls for the construction and non-construction industries respectively. Panels B and D include the same controls as those in Table 3. Heteroskedasticity-robust standard errors are in parentheses *** p<0.01, ** p<0.05, * p<0.1.

Table A6—Permit Prices and Average Wages at Local Labor Market Level

Y=Ln(Monthly Permit Prices)	Construction Workers			Other Workers		
ArcGIS local clusters	(1)	(2)	(3)	(4)	(5)	(6)
June 2019	-2.20	-4.97**	-2.20	-2.14	-3.51	-2.16
	(2.31)	(2.27)	(2.21)	(2.44)	(2.70)	(2.36)
Average Wage (Non-Payers)	-0.31***	-0.42***	-0.31***	-0.27	-0.34*	-0.28
	(0.10)	(0.13)	(0.09)	(0.17)	(0.18)	(0.17)
X June 2019	0.41**	0.92***	0.41***	0.07	0.36*	0.08
	(0.17)	(0.18)	(0.16)	(0.21)	(0.20)	(0.20)
Average Wage (Payers)	0.28***	0.35***	-0.09	-0.12	-0.17	-0.28
	(0.10)	(0.08)	(0.11)	(0.28)	(0.32)	(0.32)
X June 2019	-0.02	-0.05	-0.04	0.31	0.27	-0.08
	(0.29)	(0.28)	(0.30)	(0.34)	(0.37)	(0.37)
Individual Wage			0.37***			0.16
			(0.08)			(0.16)
X June 2019			0.02			0.39**
			(0.10)			(0.17)
Controls		X			X	
Constant	7.75***	8.12***	7.75***	9.68***	10.03***	9.69***
	(0.83)	(0.86)	(0.81)	(2.16)	(2.53)	(2.15)
Observations	594	594	594	433	433	433
R-squared	0.11	0.39	0.22	0.09	0.43	0.30

Notes: EGS June 2018 and 2019 rounds. Parameters above are estimated using OLS where the dependent variable is the natural logarithm of the monthly permit price. All observations are payers either in June 2018 or June 2019. The sample in col (1)-(3) is limited to construction workers and in col (4)-(6), the sample is limited non-construction workers. In col(2),(3),(5) and (6), the sample is restricted to observations whose corresponding cell—non(payer)-industry type-local cluster-year— includes at least 10 observations.. Heteroskedasticity-robust standard errors are reported in parenthesis *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Figure A1

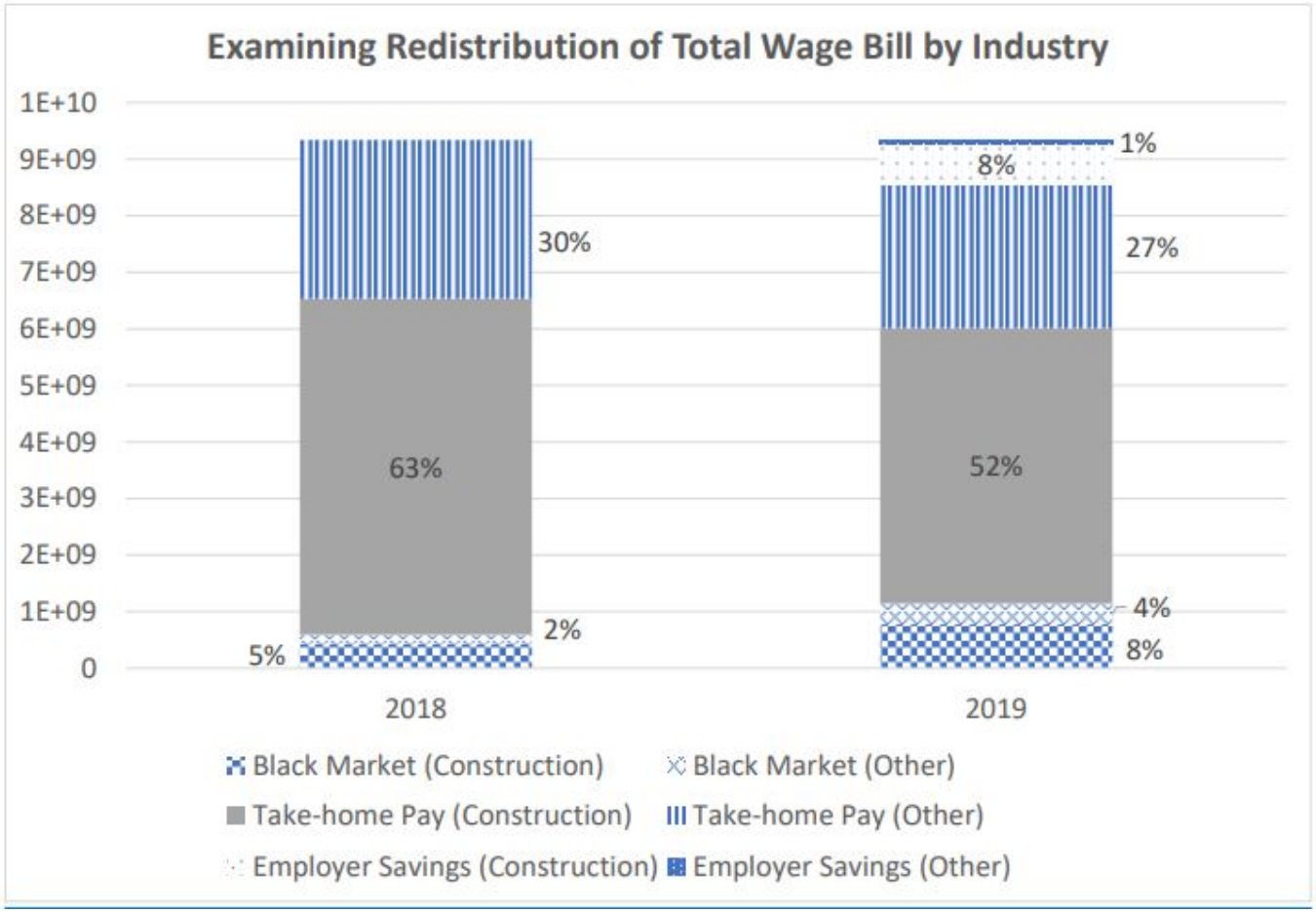
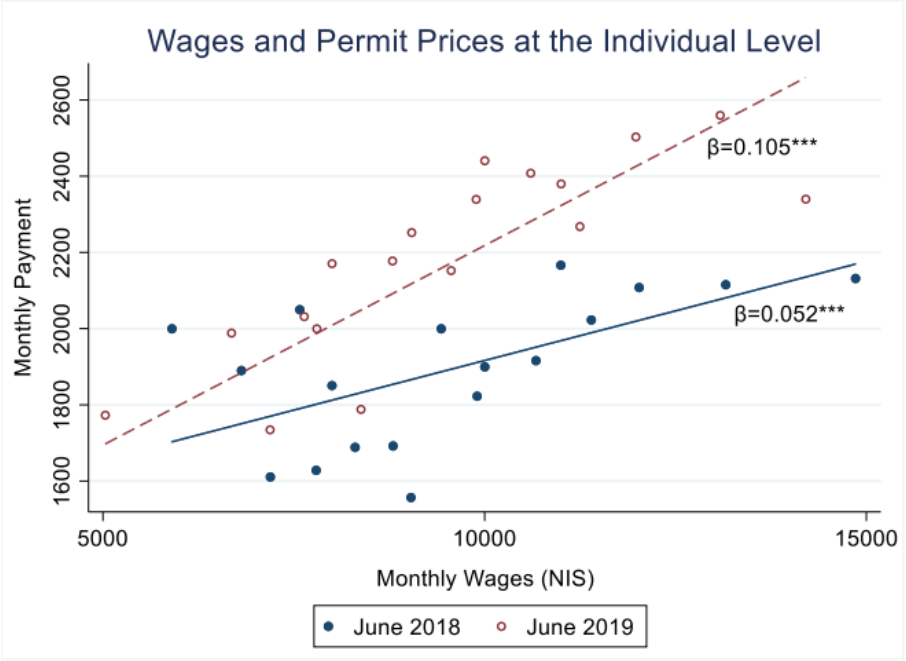
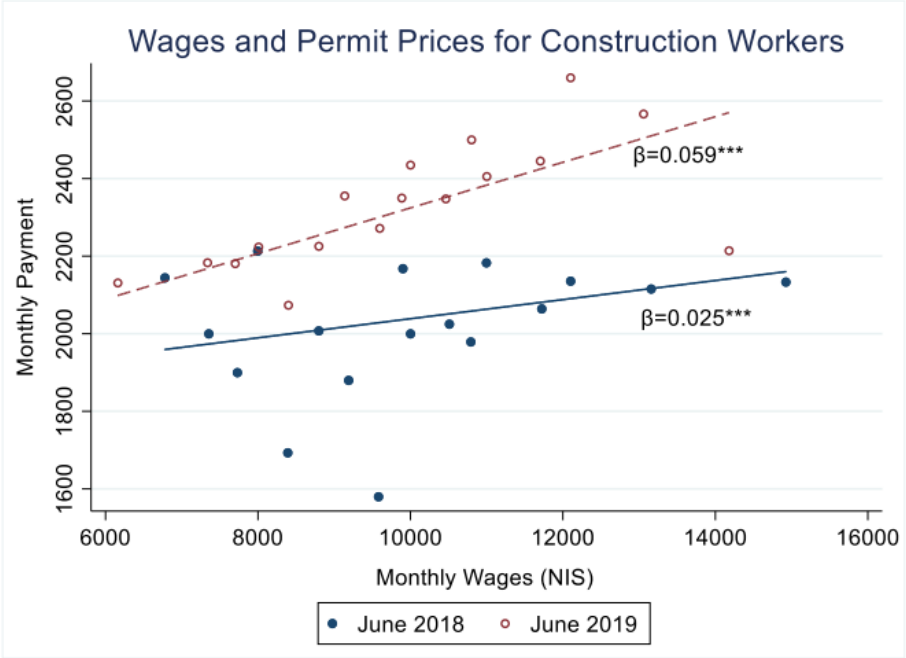
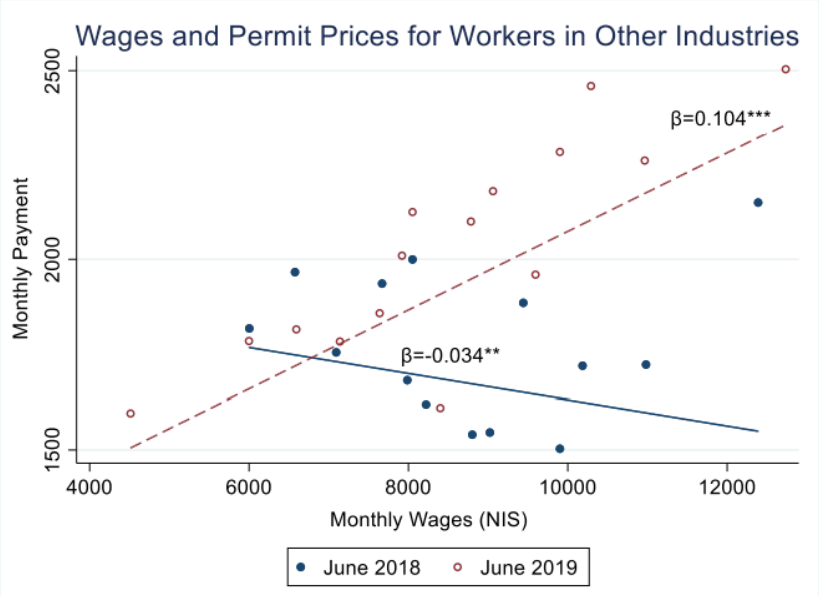

Examining Redistribution of Total Wage Bill by Industry
1E+10
9E+09
8E+09
7E+09
6E+09
5E+09
4E+09
3E+09
2E+09
1E+09
0
30%
63%
2%
5%
1%
8%
27%
52%
4%
8%
2018
2019
Black Market (Construction)
Black Market (Other)
Take-home Pay (Construction)
Take-home Pay (Other)
Employer Savings (Construction)
Employer Savings (Other)

Figure A2(a-c)—Wages and Permit Prices by Year and Industry Type

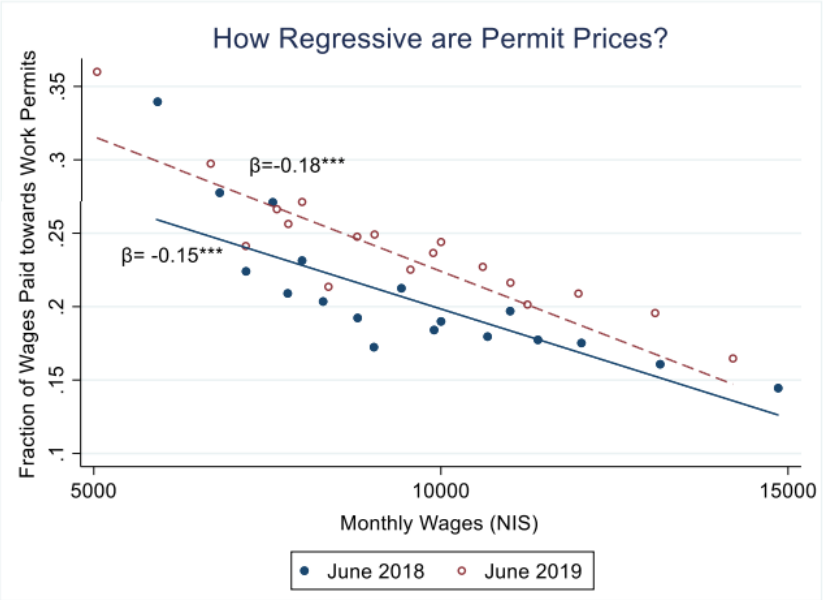


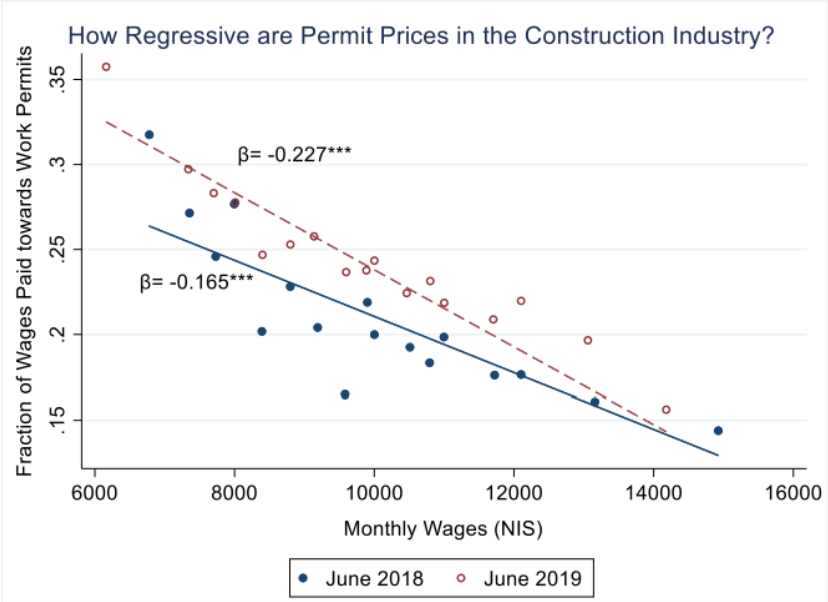


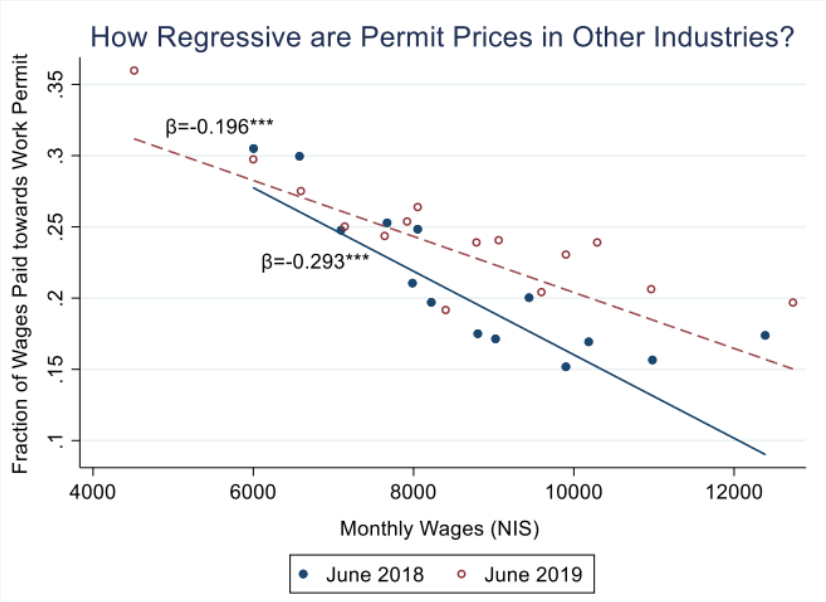


Note: Entry Gates Survey. Figures 4a displays bin scatter plots where the monthly payment is regressed on monthly wages, separately by year. In 4b and 4c, the plots are displayed for each industry type. Parameter estimates reflect the change in the month permit payment given a 1 NIS increase in monthly wages.

Figure A3(a-c)—How Regressive are Permit Prices?







Note: Entry Gates Survey. Figures 5a-c above shows bin scatter plots where the fraction of wages paid towards the work permit (monthly payment/monthly wages) is regressed on monthly wages, separately by year. In Figures 4b and 4c, the figures are replicated by industry type. Parameter estimates reflect the decline in fraction of wages paid given a 10,000 NIS increase in wages.

Figure A4—The above graphs are quantile regressions where the specifications correspond to col(2) of Table 4.

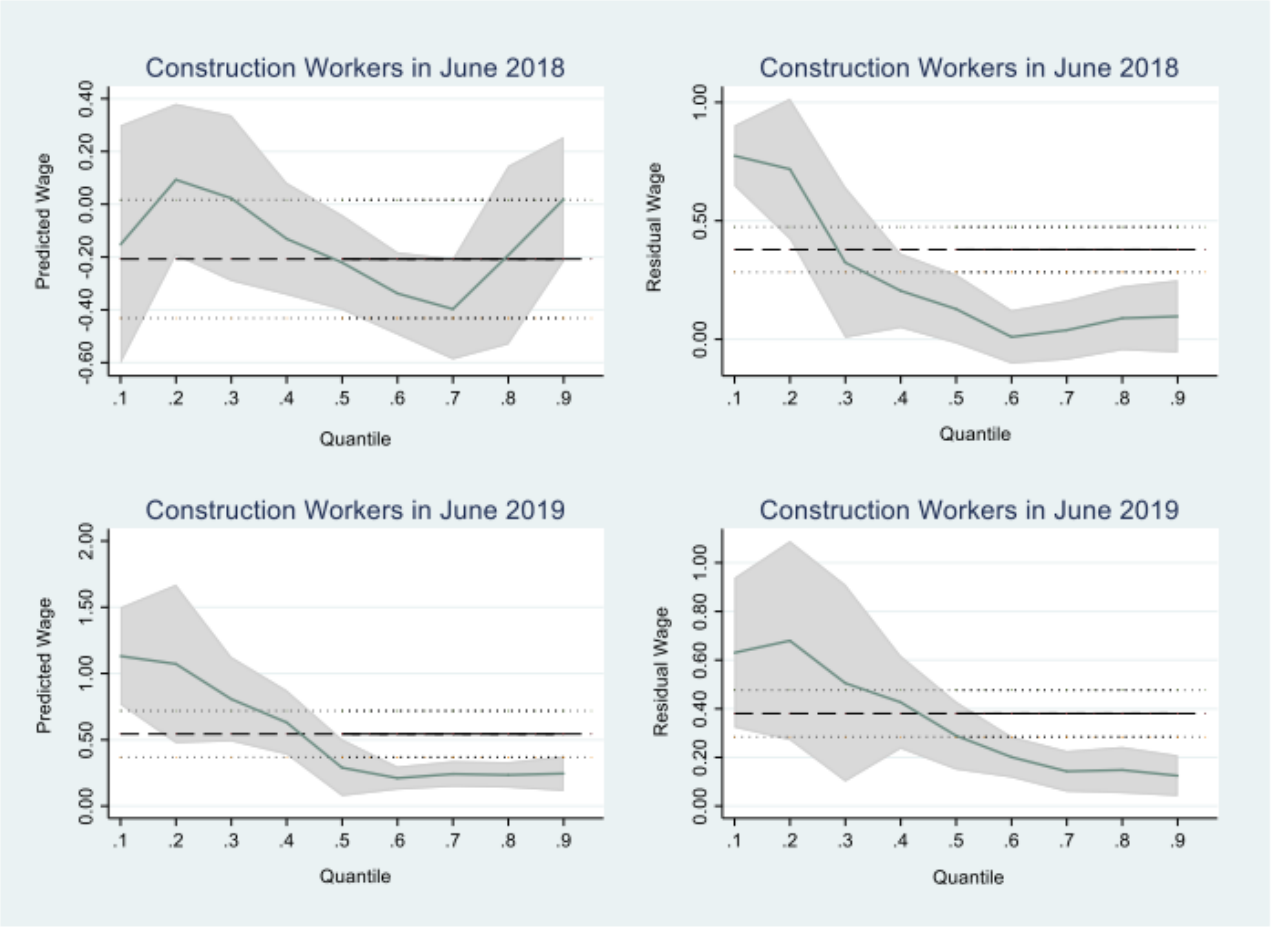
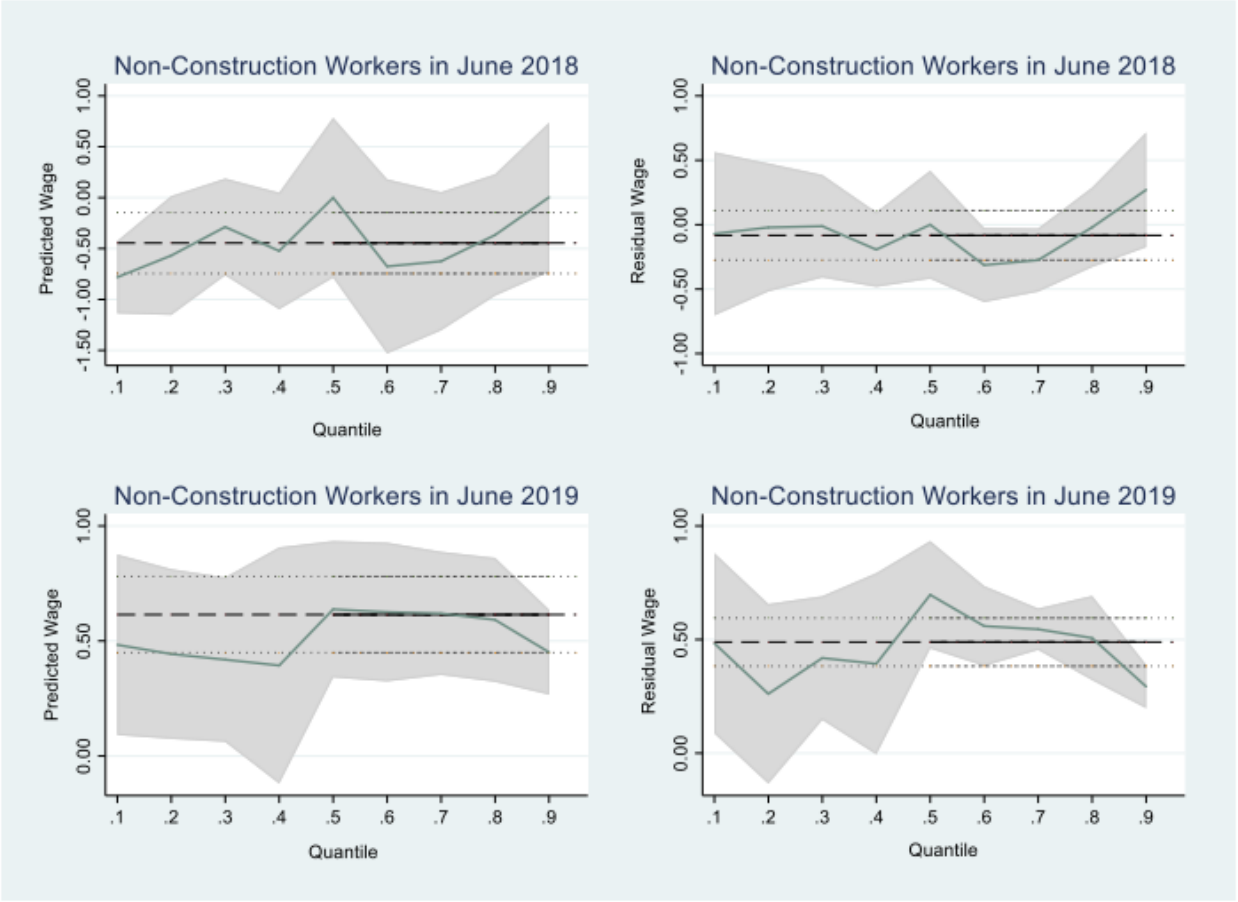
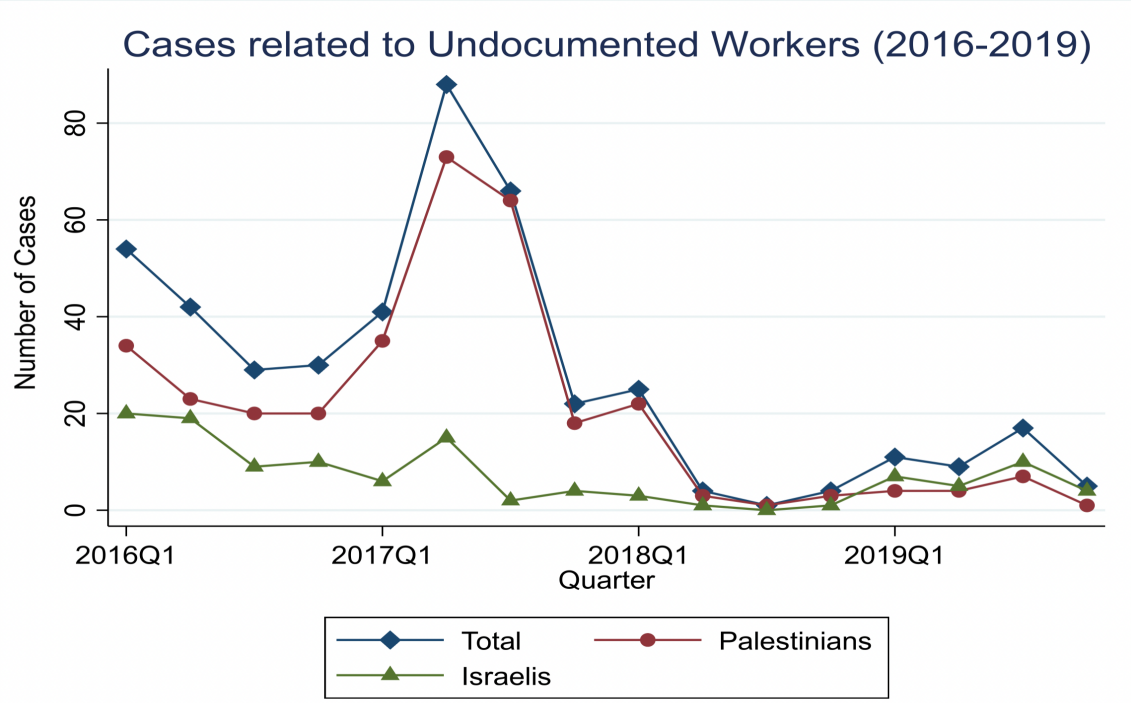


Figure A5—The above graphs are quantile regressions where the specifications correspond to col(4) of Table 4.



Appendix A (Forthcoming)

Figure A1



Note: Data constructed from Nevot Database. The figure reports the number of cases related to the unlawful entry of undocumented workers into Israel proper for each quarter between 2016 and 2019.

Table A.1—Number of Convictions, Percentage Fined, and Average Fine (2016-2021) by Nationality
Case Type 1: Palestinian Undocumented Workers Convicted of Illegal Entry:

Year of Verdict	% Fined	Number of Cases	Average Fine
2016	.278	97	1926
2017	.316	190	1052
2018	.172	29	4600
2019	.375	16	1583

Case Type 2: Israeli Arab/Jewish Citizens Convicted of Transporting, Employing and Housing Undocumented Workers:

Year of Verdict	% Fined	Number of Cases	Average Fine
2016	.79	58	5337
2017	.89	27	3620
2018	.60	5	5667
2019	.81	26	7333

Note: Data constructed from Nevot Database. The table reports the number of cases related to the unlawful entry of undocumented workers into Israel proper for each year and case type between 2016 and 2019. The table also reports the percentage of cases where the defendant is fine and the average fine associated with each penalty.

Appendix B—Entry Gates Survey (EGS) Questionnaire

Good morning / afternoon / evening. My name is from the Palestinian Center for Public Opinion, an independent market research company run by Dr. Nabil Kukali. We are currently collecting data for academic research about the employment of Palestinian workers in Israel and Occupied Jerusalem. We believe this research will provide insights into how to improve working conditions in the region. If you have any questions or insights about the research or would like to report any potential negative effects, please feel free to contact irbnyuad@nyu.edu. We have randomly selected you to participate in this survey as the inclusion of your opinion is important. You will have to answer a few questions about your current employment situation, some of which are sensitive. However, the survey is anonymous and all your information and answers remain fully confidential. The interview would take about 10-15 minutes. Given the nature of the research, only completed questionnaires are valid. We would really appreciate your participation but we also emphasize that participation is voluntary and you may withdraw at any time and abort the survey. Do you wish to participate?

1. Interviewer Code: _____Individual Code: _____Birth month_____ year_____
2. Locality: _____District: _____.
3. Gate Interviewed: _____.Time of Interview: _____. Date of Interview:_____.
4. Check language(s) spoke fluently:_____. Hebrew_____.English _____.None
5. Educational Attainment: 1.) Illiterate 2.) Can Read/Write 3.) Elementary 4.) Preparatory 5.) Secondary 6.) More than Secondary
6. a.) What is your marital status: 1.) Never Married 2.) Engaged 3.) Married 4.) Divorced 5.) Widowed 6.) Separated. b.) How many children do you have _____.?

7. Industry: 1.) Construction 2.) Agriculture 3.) Manufacturing 4.) Other
8. Check the occupation that most closely fits your current job description. If none of the occupations listed below are suitable, state your occupation here: _____.
   a. Cleaners and Helpers
   b. Agricultural, Forestry and Fishery Labourers
   c. Laborers in Mining, Construction, Manufacturing and Transport
   d. Building and Related Trades Workers (excluding Electricians)

e. Metal, Machinery and Related Trades Workers
f. Market-oriented Skilled Agricultural Workers
g. Market-oriented Skilled Forestry, Fishery and Hunting Workers
h. Subsistence Farmers, Fishers, Hunters and Gatherers.

9. How many hours did you work in total last week (excluding commute time)? _____usual days worked per month?_____
10. How long do you usually spend commuting to and from Israel?_____ minutes.
11. How many employers did you have in Israel in the past three months?_____
12. How would you rate the way in which your current employer in Israel treats you? 1. very fairly; 2. somewhat fairly; 3. ok; 4. somewhat unfairly; 5. very unfairly
13. How long have you worked in Israel?_____years_____months
14. Do you have a valid work permit?_____
15. When (year) did you procure your first valid work permit?_____
16. Do you work for the (same) employer named on your work permit ? (Is the employer you work for the same as the one named on your work permit?) _____
17. Did you spend any money to acquire your current work permit?_____(write Yes/No) How much money (in NIS) did you spend to acquire your current work permit?_____every month / one time lump sum (circle the relevant option)
18. What are your daily wages (in NIS)?_____(NIS) per day / month (circle the relevant option)
19. Do you know the minimum wage in your industry?_____(write Yes/No). If so, please state it below_____daily/monthly (circle the relevant option).
20. Overall, on a scale of 1 to 10, how satisfied are you with your life nowadays? _____(1 is Very Unsatisfied and 10 is Very Satisfied)

Appendix C—Constructing Weights for the EGS from the PLFS

We focus on two questions in the PLFS that are of critical importance for constructing weights: the question on the place of employment, which specifies 'Israel and the settlements' as one of the possible answers, as well as whether the worker has a permit for employment in Israel or not. Despite the high response rates, we are confronted with two main challenges to producing weights for the EGS. First, the PLFS does not distinguish between employees in Israel and those in the settlements, while all of the workers surveyed in the EGS work in Israel proper. To address this discrepancy, we first limit the sample of workers in the PLFS to those who both had a valid work permit and were employed in the Israeli economy or the settlements during the week prior to the interview. Then we drop workers who are younger than 25 years old, since until recently, they could not get a work permit in Israel but were allowed to secure permits for employment in the settlements. As a result, we reduce the population of permit holders represented in the PLFS microdata by approximately 10% (see Table B1).[36]

The second challenge stems from the inherent selection bias in the EGS regarding the place of the interview. Since the EGS sampled workers on their way to work in Israel, while the PLFS sampled households in their residence, workers who worked more days per month are oversampled in the EGS (Figure B1). In fact, the EGS contains only a handful of workers who report working less than 18 days per month, while the corresponding figure in the PLFS was 22%. To make the sample of PLFS respondents more comparable to our sample of interest, we drop permit holders (in the PLFS) who worked less than 18 days from the detailed empirical analysis. Table B1 summarizes which groups were included and excluded from the samples of the PLFS and the corresponding population that is represented. Table B1 shows that our final sample from the two surveys, (where the PLFS consists of 960 observations and the EGS has 1,179 observations), represents 47,341 workers with permits, who are 25-59 years old and reported working 18-2 7days per month (Middle row in column ii in Table 1).

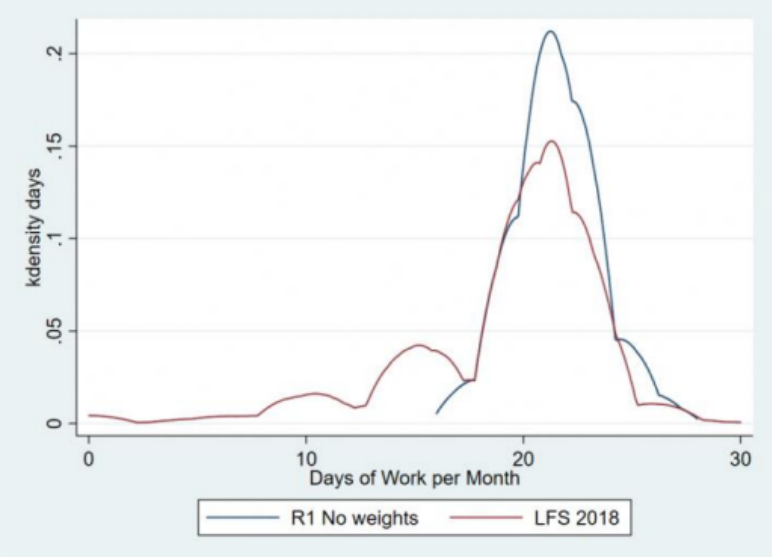
[36] According to the published LFS report, the share of workers in the settlements (out of) as a proportion of the workers with or without permits in 2018 was 17% (PCBS, 2019).

Table C1: Distribution of represented population in and out of our research group by age and working days

		1-17 Days	18-27 Days	28-31 Days	Total
		(i)	(ii)	(iii)	
	In/out of Sample	Out	In	Out	
Age $<$ 25	Out	1,837	4,742	78	6,657
24 $<$ Age $<$ 60	In	12,545	47,341	96	59,982
59 $<$ Age	Out	253	228		481
Total		14,635	52,312	174	67,121

Source: Calculations based on the Palestinian LFS

Figure B1: Distribution of formal workers in the EGS and PLFS by days of work/month



Source: PLFS(2018) and EGS (2018)

Appendix D (Incomplete)

This section provides a detailed explanation of how municipalities of residence for Palestinian workers in the EGS are clustered into a geographic unit (a local cluster) that is broader than the municipality level but more refined than the district level. Our motivation for doing this procedure is that if 1.) Palestinians who live in close proximity to each other–but not necessarily in the same locality– also work in similar areas in Israel, and 2.) the wages of payers and non-payers differ across locations in Israel, then one's location of residence in the West Bank will play a role in their propensity to switch sectors as well as the permit price. Additionally, we are concerned that the district-gate unit might be too broad for this analysis if workers who live in the same district and enter through the same gate still commute to different areas of Israel.

Clusters are created for each of the 8 group of workers in our sample–Industry(Construction, Other) X Year of Survey (2018, 2019) X Payment Status (Payer/Non-Payer)=2X2X2=8.

To cluster the data we utilised the online geographic information system services in ArcGIS. This software allowed us to calculate the distances between localities using Palestinian road-networks and create clusters depending on these distances. Clustering allowed use to represent a district-level labour market. We use the following 2-step logic to form a cluster:

(Step 1)
Cluster/ term standalone observations if: (a) Localities are within the same district.
(b) Distance between localities is less than 15 km (Subject to minor exceptions).
(c) Only the Palestinian road-network is used to compute distances.
(d) Localities may be termed standalone observations if they cannot be grouped according to requirements (a)(b)(c).

(Step 2)
If clustered or termed standalone observations and observation count is more than or equal to 9, define a unique cluster number.

If clustered or termed standalone observations and observation count is less than 9, then define a cluster number that is the same for such all observations in the particular group of workers.

The results of this data are demonstrated below for each group of workers.

Note: The comment (Vendor) indicates that data on distances was provided by the data

provider in the region and not collected via ArcGIS.

9 Group 1–Construction Workers/Payers/June 2019

9.1 Localities Successfully Combined and Standalone Observations

Region	Localities Combined	Distance Between Localities (km)	Observations
Tulkarm	Anabta-Beit Lid - Kafr Rumman	12 (Vendor)	14
Tulkarm	Attil-Saida- A'lar	$<$ 10 (Vendor)	33
Tulkarm	Kafr al-Labad - Shufa - Kafr Jammal	12 (Vendor)	13
Tulkarm	Shuweika- Far'un -Irtah - Tulkarem - Al Ras - Nur Shams Camp - Tulkarem Camp	10 (Vendor)	21
Tulkarm	Qaffin - Alnazla Alsharqiya	5.16	4
Nablus	Nablus - Huawara	10.7	3
Jenin	Ajjah - Fahma- Kafr Rai - Alrama	5 (Vendor)	36
Jenin	Fandaqumiya - Jaba' - Sanur - Anzah	5-6 (Vendor)	6
Jenin	A'raba	NA	11
Hebron	Hebron - Taffuh	11	15
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	13
Hebron	Yatta -Alsamoa'	11	23
Hebron	Si'ir - Halhul - Nuba	15	11
Hebron	Fawwar-Dura-Deir Sammit	12.18	14
Hebron	ad-Dhahiriya	NA	14
Qalqilya	Jayyous-Kafr Thulth	9.28	27
Qalqilya	Kafr Zibad -Kafr Abbush - Kafr Sur	6	20
Qalqilya	Kafr laqif - Kafr Qaddum	11	20
Qalqilya	Jinsafut - Baqa	5.05	12
Qalqilya	Qalqilya-Azzun	9.63	46

9.2 The following localities could not be located using ArcGIS and had to be dropped

Region	Localities	Observations
Nablus	Alsaweyya	1
Jenin	Azzaweya	1
Hebron	Alreheyya	1

9.3 The following list of localities are (i) too far away to be grouped with other localities and (ii) contain too few observations to be standalone observations

Region	Localities	Observations
Hebron	Alreheyya	1
Hebron	Bani Na'im	1
Salfit	Salfit	2

10 Group 2–Construction Workers/Non-Payers/June 2019

10.1 Localities Successfully Combined and Standalone Observations:

Region	Localities Combined	Distance Between Localities	Observations
Tulkarm	Attil-Saida - A'lar	$<$ 10 (Vendor)	16
Tulkarm	Al Ras - Shuweika - Far'un - Irtah - Tulkarm - Nur Shams Camp	10 (Vendor)	8
Tulkarm	Kafr Rumman - Anabta - Bal'a	9	6
Hebron	Yatta -Alsamoa'	11	15
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	80
Hebron	Si'ir - Halhul - Ashyukh	11	19
Hebron	Fawwar -Dura - Deir Sammit	11.97	17
Hebron	Beit Ula- Kharas- Nuba	4.45	31
Hebron	Surif- Beit Ummar	6.5	8
Hebron	ad-Dhahiriya	NA	16
Jenin	Anzah-Sanur	10.33	2
Jenin	Ajjah -Fahma- Kafr Ra'i - Al-rama	5	15
Qalqilya	Qalqilya-Azzun	9.63	14
Qalqilya	Jayyous-Kafr Thulth	9.28	5
Qalqilya	Kafr Laqif - Kafr Qaddum	11	14

10.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Hebron	Alreheyya	1
Jenin	Azzaweya	2
Hebron	Alhadab	1

10.3 The following list of localities were too far away to be grouped with other localities and contain too few observations to be standalone observations:

Region	Localities	Observations
Tulkarm	Qaffin	4
Tulkarm	Shufa	1
Tulkarm	Taybeh	1
Jenin	A'raba	5
Salfit	Salfit	1
Jericho	Jericho	2
Nablus	Nablus	1

11 Group 3–Non-Construction Workers/Payers/June 2019

11.1 Localities Successfully Combined and Standalone Observations:

Region	Localities Combined	Distance Between Localities	Observations
Tulkarm	Alnazla Alsharqiya - Qaffin	5.16	4
Tulkarm	Anabta - Beit Lid	8.6	6
Tulkarm	Attil - Saida - A'lar	$<$ 10 (Vendor)	23
Tulkarm	Kafr al-Labad - Shufa - Kafr Jamal	12 (Vendor)	17
Tulkarm	Shuweika - Far'un -Irtah - Tulkarem - Nur Shams Camp	10 (Vendor)	9
Bayt Lahim	Beit Jala - Bethlehem	2.38	2
Hebron	Halhul - Si'ir - Beit Ummar	14.36	16
Hebron	Hebron - Taffuh	11	13
Hebron	Yatta -Alsamoa'	11	11
Hebron	ad-Dhahiriya	NA	9
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	14
Hebron	Fawwar-Dura	5.8	13
Hebron	Beit Ula - Nuba	3.65	4
Jenin	Ajjah - Kafr Ra'i	6.9	8
Jenin	Jaba' - Anzah -Silat ad-Dhahr	12.3	4
Qalqilya	Kafr Zibad - Kafr Abbush - Kafr Sur	6	45
Qalqilya	Kafr Laqif - Kafr Qaddum	11	29
Qalqilya	Jinsafut - Baqa	5.05	17
Qalqilya	Jayyous-Kafr Thulth	9.28	42
Qalqilya	Qalqilya-Azzun	9.63	38
Nablus	Nablus - Huawara	10.7	4

11.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Jenin	Azzaweya	1

11.3 The following list of localities were too far away to be grouped with other localities or are the only observation within their region:

Region	Localities	Observations
Jenin	A'raba	3
Hebron	Bani Na'im	4
Salfit	Salfit	3
Jericho	Jericho	1

12 Group 4–Non-Construction Workers/Non-Payers/June 2019

12.1 Localities Successfully Combined:

Region	Localities Combined	Distance Between Localities	Observations
Tulkarm	Alnazla Alsharqiya - Qaffin	5.16	3
Tulkarm	Anabta - Beit Lid	8.6	2
Tulkarm	Attil - Saida - A'lar	$<$ 10 (Vendor)	16
Tulkarm	Alras - Shuweika - Far'un - Irtah	10 (Vendor)	8
Jenin	Ajjah - Kafr Ra'i - Fahma - Alrama	5 (Vendor)	12
Nablus	Nablus - Huawara	10.7 km	2
Hebron	Hebron - Taffuh	11 km	9
Hebron	Si'ir - Halhul	7.56km	16
Hebron	Fawwar-Dura	5.8 km	8
Hebron	Yatta -Alsamoa'	11km	13
Hebron	Tarqumiyah - Beit Kahil - Idhna	12 km	14
Hebron	Ad-Dhahiriya - Karaza	5.5 km	10
Hebron	Surif - Beit Ummar	6.51 km	4
Hebron	Beit Ula - Nuba	3.65 km	8
Qalqilya	Jayyous - Kafr Laqif	9.51 km	9
Qalqilya	Qalqilya-Azzun	9.63 km	9
Hebron	ad-Dhahiriya - Karaza	5.5km	10

12.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Jenin	A'raba	7
Jenin	Azzaweya	1

12.3 The following list of localities were too far away to be grouped with other localities and contain too few observations to be standalone observations:

Region	Localities	Observations
Jenin	Anzah	1
Salfit	Salfit	3
Bayt Lahim	Bethlehem	2
Hebron	Beit A'wwa	1
Tulkarm	Bal'a	2
Tulkarm	Shufa	1

13 Group 5–Construction Workers/Payers/June 2018

13.1 Localities Successfully Combined:

Region	Localities Combined	Distance Between Localities	Observations
Jenin	Fandaqumiya-Jaba-Anzah-Silat ad-Dhahr	11.7km	8
Jenin	Jenin-Bir al Basha	9.09	6
Jenin	Kafr Dan-Kafr Qud-Kufeirit - Lmon	10	5
Jenin	Arraba-Qabatiya	8.04	14
Jenin	Aqqaba-Siris - Aljadeeda	8-10 (Vendor)	4
Jenin	Ajjah - Kafr Ra'i -Fahma - Alrama	5	20
Bayt Lahim	Alkhader-Bethlehem-Doha(al Dawha)-Husan	14.29	11
Hebron	Hebron - Taffuh	11	20
Hebron	Si'ir - Halhul	7.56	9
Hebron	Fawwar-Dura-Kharsa	10-12	15
Hebron	Yatta -Alsamoa'	11k	17
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	27
Hebron	Beit Ula - Nuba - Kharas	5.31	28
Qalqilya	Kafr Qaddum-Hajjah-Baqat al-Hatab-Jit	12.6	9
Qalqilya	Qalqilya-Azzun - Kafr Thulth	13.73	13
Salfit	Bruqin-Kafr ad-Dik - Farda - Sakakah	15	4
Nablus	A'zmout-Balata Camp-Burin	11.92	6
Nablus	Asira ash Shamaliya- Nablus-Rafidia	8.44	16
Tulkarm	Alnazla Alsharqiya - Qaffin	5.16	3
Tulkarm	Anabta - Bal'a	6.87	4
Tulkarm	Attil- Deir al Ghusun- Illar	10.17	29
Tulkarm	Shuweika-Irtah-Tulkarm - Nur Shams Camp	10	17

13.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Tulkarm	Beit Illed	1
Tulkarm	Hida	3
Tulkarm	Kafr Jamal	2
Tulkarm	Sidon	4

13.3 The following list of localities were too far away to be grouped with other localities and contain too few observations to be standalone observations:

Region	Localities	Observations
Bayt Lahim	Tuqu’	1
Hebron	Beit Ummar	1
Hebron	Ghawwar	3
Hebron	Bani Na’im	7
Hebron	ad-Dhahiriya	6
Salfit	5	Salfit
Salfit	Yasuf	1
Jenin	Alhraha	3
Jenin	Ifrit	2
Jenin	Tubas	1
Jenin	Ya’bad	4
Jenin	Faqqua	5
Nablus	Sebastia	1
Tulkarm	Taybeh	5
Tulkarm	Zeita	3

14 Group 6–Construction Workers/Non-Payers/June 2018

14.1 Localities Successfully Combined:

Region	Localities Combined	Distance Between Localities	Observations
Jenin	Aqqaba -Tubas	4.86	5
Jenin	Arabbuna-Faqqua	10.01	3
Jenin	Arraba - Qabatiya - Shuhada	9.57	8
Jenin	Arraba-Qabatiya	8.04	14
Jenin	Aqqaba-Siris	10.04	3
Jenin	Ajjah - Kafr Ra'i	6.57	7
Jenin	Jaba'-Sanur	4.78	8
Jenin	Jenin - Ash-Shuhada - Jenin Camp	5.9	6
Jenin	Kufeirit - Ya'bad - Alyamun	10 (Vendor)	7
Hebron	Beit Ula - Nuba - Kharas	5.31	46
Hebron	Hebron - Taffuh	11	32
Hebron	Si'ir - Halhul	7.56	11
Hebron	Fawwar-Dura - Kharsa	10-12 (Vendor)	19
Hebron	Yatta -Alsamoa'	11	12
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	52
Hebron	Beit Ummar - Surif - Idhna	6.51	3
Qalqilya	Qalqilya-Azzun-Kafr Thulth	13.73	22
Salfit	Bruqin - Kafr ad-Dik - Farda - Sakakah	15 (Vendor)	6
Bayt Lahim	Alkhader-Bethlehem-Doha - Nahalin	10	8
Nablus	Asira ash-Shamaliya - Nablus - Rafidia	8.44	28
Nablus	Beit Furik - Balata Camp - Askar Camp	9.46	8
Nablus	Sebastia-Zawata	8.89	2
Tulkarm	Alnazla Alsharqiya - Qaffin	5.16	2
Tulkarm	Anabta - Bal'a	6.87	5
Tulkarm	Attil- Deir al Ghusun- Illar	10.17	9
Tulkarm	Shuweika - Irtah - Tulkarm - Nur Shams Camp - Dhanaba	10 (Vendor)	10

14.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Bayt Lahim	Al-Asakra	2
Jenin	Dahha	2
Jenin	Lmon	1
Tulkarm	Hida	1

14.3 The following list of localities were too far away to be grouped with other localities and contain too few observations to be standalone observations:

Region	Localities	Observations
Bayt Lahim	Tuqu'	1
Hebron	Bani Na'im	1
Hebron	ad-Dhahiriya	6
Qalqilya	Baqt al-Hatab	2
Jenin	Salim	1
Jenin	Ifrit	1
Salfit	Salfit	4
Salfit	Yasuf	1
Nablus	Beit Surik	1
Tulkarm	Nazlat 'Isa	1
Tulkarm	Taybeh	6
Tulkarm	Zeita	2

15 Group 7–Non-Construction Workers/Payers/June 2018

15.1 Localities Successfully Combined:

Region	Localities Combined	Distance Between Localities	Observations
Jenin	Bir al-Basha - Jenin	9.57	3
Jenin	Qabatiya-Sanur	8.86	4
Nablus	Asira ash-Shamaliya - Nablus - Rafidia	8.44	19
Nablus	Beit Furik-Balata Camp-Askar Camp	9.46	6
Hebron	Beit Ula-Nuba-Kharas-Hatta	8.27	29
Hebron	Fawwar-Dura	5.8	11
Hebron	Hebron - Taffuh	11	11
Hebron	Yatta -Alsamoa'	11	19
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	9
Bayt Lahim	Alkhader - Bethlehem -Doha - Nahalin	10 (Vendor)	9
Qalqilya	Kafr Qaddum-Hajjah-Baqat al-Hatab-Jit	12.6	6
Qalqilya	Qalqilya-Azzun	9.63	19
Salfit	Bruqin - Kafr ad-Dik - Farda - Sakakah	15 (Vendor)	7
Salfit	Salfit	NA	9
Tulkarm	Attil-Illar -Sidon	9.57	3
Tulkarm	Shuweika - Irtah - Tulkarem	6.57	5

15.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Bayt Lahim	Al-Asakra	1
Hebron	Beit Kamel	1
Hebron	Ghawar	2
Nablus	Lor'eel	2
Nablus	Zamout	1

15.3 The following list of localities were too far away to be grouped with other localities and contain too few observations to be standalone observations:

Region	Localities	Observations
Hebron	Bani Na'im	1
Hebron	Si'ir	7
Hebron	Kharsa	4
Hebron	ad-Dhahiriya	6
Qalqilya	Kafr Abbush	2
Qalqilya	Kafr Thulth	1
Qalqilya	Sir	1
Salfit	Yasuf	4
Nablus	Burin	3
Nablus	Sebastia	1
Jenin	Arraba	3
Jenin	Fandaqumiya	1
Jenin	Faqqua	3
Jenin	Kafr Ra'i	1
Jenin	Tubas	5

16 Group 8–Non-Construction Workers/Non-Payers/June 2018

16.1 Localities Successfully Combined:

Region	Localities Combined	Distance Between Localities(km)	Observations
Bayt Lahim	Alkhader-Bethlehem-Doha-Husan	7.96	8
Hebron	Beit Ula-Nuba-Kharas-Hatta	8.27	27
Hebron	Fawwar - Dura - Kharsa	10-12 (Vendor)	9
Hebron	Hebron - Taffuh	11	7
Hebron	Yatta -Alsamoa'	11	8
Hebron	Tarqumiyah - Beit Kahil - Idhna	12	10
Hebron	Halhul-Si'ir	7.56	9
Jenin	Aqqaba - Siris	10.04	2
Jenin	Arraba - Qabatiya	8.10	5
Jenin	Ajjah- Kafr Ra'i - Fahma - Alrama	5	13
Jenin	Fandaqumiya - Jaba' - Sanur - Anzah	15	9
Jenin	Anin-Zububa	9.53	2
Jenin	Jenin - Ash-Shuhada	5.78	6
Jenin	Faqqua - Arabbuna	10.01	7
Nablus	Asira ash-Shamaliya - Nablus - Rafidia	8.44	31
Nablus	Beit Furik-Balata Camp-Askar Camp	9.46	10
Nablus	Sebastia - Zawata - Deir Sharaf	9.17	6
Nablus	Burin-Tell	7.46	2
Tulkarm	Nazlat 'Isa-Qaffin	8.4	2
Tulkarm	Shuweika - Irtah - Tulkarm - Tulkarem Camp - Nur Shams Camp	10	12
Tulkarm	Attil - Der al-Ghusun - Illar	11.23	14
Tulkarm	Anabta - Bal'a	6.13	8
Qalqilya	Qalqilya -Azzun	9.63	17
Qalqilya	Kafr Qaddum - Hajjah - Baqat al-Hatab	5.35	7

16.2 The following localities could not be located and had to be dropped:

Region	Localities	Observations
Hebron	Wad Al-seryya	2
Bayt Lahim	Al-Asakra	1
Nablus	Lor'eel	2
Tulkarm	Hida	1
Tulkarm	Sidon	1
Qalqilya	Dahha	1

16.3 The following list of localities were too far away to be grouped with other localities and contain too few observations to be standalone observations:

Region	Localities	Observations
Bayt Lahim	Tuqu'	3
Bayt Lahim	Husan	1
Hebron	Bani Na'im	2
Hebron	ad-Dhahiriya	6
Qalqilya	Kafr Abbush	1
Salfit	Salfit	3
Nablus	Nisf Jubeil	1
Nablus	Zeita	2
Jenin	Aljadeeda	1
Jenin	Alraha	1
Jenin	Zububa	1
Jenin	Tubas	3
Tulkarm	Taybeh	4