**Centre for Economic Research and Graduate Education**

Charles University


# Economics of density: The case of Palestine

Master's thesis

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# Declaration

I hereby declare that this thesis is my work and has not been submitted in any form for another degree or diploma at any university or other institution of higher education.

All sources used have been acknowledged and referenced appropriately.

To enhance the clarity and quality of the writing, I used tools such as ChatGPT and Grammarly to help sharpen the text. I then carefully revisited and revised the content independently to ensure its accuracy and originality

Mahmoud Erman

Date: July 29, 2025

# Acknowledgment

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*Master's Thesis Proposal

**Author's Name:** Mahmoud Erman

**Supervisor's Name:** Paolo Zachhia, Ph.D.

**Proposed Topic:**

*Economics of Density: the case of Palestine*

## Research Question and Motivation

The thesis explores the urban benefits in the Palestinian economy. I review theoretical and empirical literature on the agglomeration economies. I apply the urban density and wages framework to explore the existence of agglomeration economies. In the sense that dense areas have benefits for the firm and labor outcomes. I have data on the district level across 16 districts in the West Bank and Gaza Strip between 1999-2022.

## Methodology

The thesis utilizes a quasi-experimental design to estimate the causal relationship between population density and labor earnings. By identifying historical exogenous shocks on the Palestinian population density between 1947-1950. This exogenous shock had led to a refugee influx; these refugees were resettled in dense camps across the West Bank and Gaza Strip districts.

## Outline

1. Introduction
2. Literature Review
3. Review of Theoretical Models

# References

Erman, Mahmoud. Economics of density: The case of Palestine. Praha, 2025. Master's thesis. Charles University, Center for Economic Research and Graduate Education – Economics Institute, A joint workplace of Charles University and the Economics Institute of the Czech Academy of Sciences. Supervisor Paolo Zacchia, Ph.D

# Abstract

This thesis explores the economic benefits of urban density on labor earnings in Palestine. To do so, I draw on literature on agglomeration economies and use it as a basis to explain the productivity gains from population density. I identify a shock between 1947-1950 from the Israeli-Palestinian conflict that might have disrupted the population density distribution. Using this identification strategy, I apply an instrumental variable methodology with the argument that an exogenous shock to the Palestinian economy had affected labor earnings through the population density channel. The results show the significant existence of agglomeration economies in the Palestinian economy, which is consistent with the literature on agglomeration economies in developing and developed countries. In addition, Palestinian districts that experienced an increase in population density due to the historical shock had experienced higher labor earnings, with an elasticity of approximately 0.12 percent.

Keywords: urban density, agglomeration economies, labor productivity, Israeli-Palestinian conflict

# Abstrakt

Tato diplomová práce zkoumá ekonomické přínosy městské hustoty obyvatelstva na výdělky pracovní síly v Palestině. Opírám se přitom o literaturu zabývající se ekonomikami aglomerace, která slouží jako základ pro vysvětlení produktivních přínosů plynoucích z hustoty osídlení. Následně identifikuji šok v letech 1947–1950 v důsledku izraelsko-palestinského konfliktu, který mohl narušit prostorové rozložení hustoty obyvatelstva.Na základě této identifikační strategie aplikuji metodologii instrumentálních proměnných s argumentem, že exogenní šok v palestinské ekonomice ovlivnil výdělky pracovní síly právě skrze kanál hustoty obyvatelstva.Výsledky ukazují významnou existenci aglomeračních ekonomik v palestinské ekonomice, což je v souladu s literaturou zabývající se aglomeračními efekty v rozvojových i rozvinutých zemích. Navíc okresy, které v důsledku historického šoku zaznamenaly nárůst hustoty obyvatelstva, vykázaly vyšší výdělky pracovní síly, s elasticitou přibližně 0,12 procent.

Klíčová slova: hustota měst, aglomerační ekonomiky, produktivita práce, izraelsko-palestinský konflikt

# Contents

# 1 Introduction

Economic activity is not uniformly distributed across geographical areas. Higher concentrations of human and physical capital in a specific geographical area can reflect higher economic activity. In the literature on urban economies, firms and labor in dense areas are more productive, and the productivity gains are attributed to the clustering of economic activity, referred to as agglomeration economies. (Puga, 2010)

Agglomeration economies can be seen through three different channels. First, sharing inputs and amenities. Second, pooled local markets boost the matching process between firms and labor. Third, in dense areas, the knowledge spillovers exist at a higher rate. These agglomeration mechanisms form the theoretical basis for explaining the urban density benefits on the outcomes of firms and labor. However, urban density can also reflect a congestion effect on the agent's outcome. for example, using transportation can be time-ineffective due to crowded movements. Finally, urban density has pros and cons on the agent's outcome, and the ability to estimate at what level the density spillovers have a positive or negative effect on the economy can be influential for policy making.

The related literature on urban density benefits and agglomeration economies is traced to Marshallian economies of scale since the latter half of the 19th century. Additionally, the empirical direction of agglomeration economies in quantifying productivity gains has expanded over the previous three decades. (Puga, 2010)

In addition, there are three main approaches used to test the nature of agglomeration economies. First, clustering of production can be explained by comparative advantage. Second, spatial patterns of wages and rents. Third, systematic variations in productivity for the density of the area. (Puga, 2010)

However, the empirical direction of urban density still faces several challenges. First, there is a limitation in data availability at smaller spatial scales, which restricts the ability to accurately

test agglomeration mechanisms that operate over short distances between economic agents. Second, constructing a valid proxy for density is difficult, as it must accurately reflect the number of people relative to a given land area. Third, there is a scarcity of cases where causal inference is feasible (Duranton and Puga, 2020).

Despite these challenges, economists have explored the existence and nature of agglomeration economies and urbanization using quantitative methods. For example, Ciccone and Hall (1993) investigate the benefits of density by estimating the elasticity of labor productivity concerning density, specifying a model based on local geographic externalities within U.S. states. Similarly, Addario and Patacchini (2008) examine the urban wage premium, modeling workers' earnings while controlling for workplace density. In the empirical study of density, it is important to distinguish between two main approaches used to test the presence of agglomeration economies and their relationship with economic outcomes. The first is a direct approach, which estimates the production function relative to density. The second is an indirect approach, which captures productivity gains through labor earnings, under the assumption that areas with higher density tend to exhibit higher wages.

The thesis investigates the urban density benefits on the labor outcomes in the case of Palestine. I apply an indirect empirical approach, which estimates the labor earnings differences concerning the density to test productivity gains if they exist. In the case of Palestine, the population density rate is 880 inhabitants per square kilometer, which is relatively high. Investigating the role of density in explaining labor productivity can be novel to see what positive or negative the density spill on the Palestinian economy. In addition, the Palestinian case can be seen as unique settings for the question of density-wages framework because the Israeli-Palestinian conflict had influenced the distribution of density throughout the history, this can help to design a causal inference for the effect of density on labor earnings if one argue that a historical shock from the Israeli-Palestinian conflict played role in the distribution of population density in West Bank and Gaza Strip.

Consequently, I use the years 1947-1950 in the Israeli-Palestinian conflict as an exogenous shock that affected the current population density distribution in the West Bank and Gaza Strip. During these years, Moris (2004) reported that an evacuation of 700,000 Palestinians from their land. As a result, evacuated Palestinians became refugees living in high-density camps in Jordan, Lebanon, Syria, and mainly the West Bank and Gaza Strip. This artificially increased the population density of Palestinian districts in the West Bank and Gaza Strip. Furthermore, I utilize a panel data structure on labor earnings and population density extracted and collected from the Palestinian Central Bureau of Statistics (PCBS). The data varies across 16 districts in the West Bank and Gaza Strip and spans 23 years. The main limitation regarding the data is the inability to construct density proxies on a scale smaller than the district scale for deeper analysis of the agglomeration effect with respect to distance.

Finally, I hypothesize that the 1947-1950 exogenous shock from the Israeli-Palestinian conflict had an indirect effect on the current labor earnings in the Palestinian economy in the West Bank and Gaza Strip through the population density channel. To test this, I optimize the Instrumental variable (IV) methodology to expose such a relationship in the Palestinian case. Moreover, I identify the shock between 1947-1950 as a proxy for the number of camps established in each district in the West Bank and Gaza. Also, as the number of camps increases in one district, the population density increases directly. Hence, to defend the restriction exclusion assumption, I argue that the number of camps established between 1947 and 1950 had an indirect effect on the Palestinian labor earnings through the period 1999-2022 exclusively via population density.

To my knowledge, this is the first study to examine the role of urban density and agglomeration economies in the Palestinian economy. This thesis contributes to three strands of literature: (1) the economics of urban density and agglomeration in developing and conflict-affected contexts; (2) the empirical literature on the wage-density relationship; and (3) the economics of conflict, by examining how historical shocks can have long-term consequences on economic performance.

The remainder of this thesis is structured as follows: the next section provides a literature review on the agglomeration economies and exhibits an overview of the agglomeration mechanisms. I then present related papers on the existence of agglomeration economies in developed and developing countries. Then I present a specific history of the Israeli-Palestinian conflict related to the disruption of density in the West Bank and Gaza Strip due to the influx. Afterwards, I present the identification strategy with a descriptive summary of the data and methodology used in the model. Subsequently, I present my empirical results, including the estimation of the baseline model, robustness checks, and heterogeneity over time. Finally, I conclude by summarizing my findings.

# 2 Literature Review

## 2.1 Agglomeration economies and urban density benefits

The urban economics literature emphasizes how the concentration of economic activity in densely populated areas can enhance overall productivity. Agents who are located in dense areas are likely to benefit from urban externalities. The literature on urban economies is traced back to Alfred Marshal, who provided insights on the economic advantage of location in the process of production. Alfred Marshal also laid the ground to understand the advantages of clustering economic activities. (Marshall, 1890)

In addition, Porter (1998) elaborates that agglomeration economies exist when firms are near each other and produce similar or complementary kinds of goods. Hence, the clustering of economic activity is a sign of productivity gains. So, the decision of location is crucial for the firms and depends on the advantages gained through allocating in a specific place.

There are three scales of agglomeration economies. internal economies, where a firm's productivity increases with its scale of production; localization economies, where firms in the same industry benefit from being geographically concentrated; and urbanization economies, where firms across diverse industries gain from the overall scale and diversity of economic activity in a city. (Hoover, 1993)

Urbanization economies reflect the productivity gains with respect to population density. These productivity gains can be explained by either positive externalities or urban increasing returns (Fujita and Thisse, 1996).

Goldstein and Gronberg (1984) further contribute to this framework by introducing the concept of agglomerative economies, which considers spatial production dynamics and operational costs. They argue that when firms are co-located, their average production costs are

lower compared to when they are dispersed, due to spatial efficiencies.

The literature on agglomeration economies provides the theoretical foundation for explaining productivity gains in firms and labors outcomes resulting from urban externalities. Marshallian economies of scale operate through three main mechanisms: (1) input sharing, (2) labor market pooling, and (3) knowledge spillovers. These mechanisms manifest in various ways, including reduced transportation costs, improved access to goods and services, shared amenities, more efficient matching between firms and workers, and the diffusion of knowledge among firms and employees. Meanwhile, there is also a type of agglomeration gains that declines with distance. Some urbanization benefits are gained because of a shorter distance between the economic agents. (Audretsch and Feldman, 2004)

The estimation of urban density benefits can be tested through the relationship between population density and agent outcome. The higher the productivity of the firm with respect to the density rate reflects urban benefits. Also, the higher the earnings of the laborers benefits are known as the density-wage framework that explores the existence of agglomeration economies reflected as urban premium wage.

Ciccone and Hall (1993) estimate the productivity of labor to the density of economic activity across the US states. Ciccone and Hall (1993) estimate models based on local geographical externalities and urban aggregate increasing returns. Both models confirmed the existence of productivity with respect to population density variations. Finally, Ciccone and Hall (1993) find that a doubling of employment density increases average labor productivity by around 6 percent across the US states.

In the following section, I draw on existing literature that empirically investigates the presence of agglomeration effects through the aforementioned mechanisms. The aim is to demonstrate how urban density contributes to productivity gains by enhancing both firm performance and labor market outcomes.

## 2.2 Agglomeration mechanisms

### 2.2.1 Sharing

To explore the existence of agglomeration economies. It is crucial to explore it through the channels that exhibit the productivity gains. For example, sharing inputs can be beneficial to the firm's outcome. Eberts and McMillen (1999) state that agglomeration economies depend on the existence of shareable inputs.. In addition, Eberts and McMillen (1999) specify public infrastructure as an example of beneficial shareable inputs, as it assists in lowering the commuting and transportation costs.

Similarly, Kline and Moretti (2014) estimate the long-run effects of the regional development program in the US, the Tennessee Valley Authority (TVA). Kline and Moretti (2014) studied the policy of developing efficient infrastructure and extending the capacity of electricity accessibility in marginalized geographical areas. The results show an increased level of productivity for different sectors, specifically manufacturing. Kline and Moretti (2014) argued that the indirect effect of such policies can be explained by the local economies and urbanization economies of scale. Finally, the main takeaway from the paper is that when the output is traded in markets that involve agglomeration forces, it forms positive externalities for the agents.

Furthermore, Calem and Carlino (1991) provide evidence of the benefits of sharing input on productivity gains in the US states. By estimating models on the production functions using a fixed effects approach at the metropolitan level. Calem and Carlino (1991) argued that the reduced costs due to shared infrastructure are the main component of the existence of agglomeration economies in the US states. In Germany, there exists a decreasing cost elasticity of public infrastructure (Seitz 1993)

To summarize, the existence of agglomeration economies can be explored through the benefits of sharing inputs. So, the ability to firm to become more productive with the reduced cost of production is a sign of productivity gain from allocating in clusters of urban areas.

### 2.2.2 Matching

Another main mechanism to explain the productivity gains due to agglomeration economies is the process of matching. Firms and laborers in a larger labor pool match their needs with each other. A study within the US states explores the channel of the matching mechanism between employers and employees in explaining the urban productivity premium. Andersson et al. (2007) re-estimated the model of production function using a cross-sectional dataset on the matching process between economic agents. Their results suggest that assortative matching in thick urban labor markets and complementarities in production play an important role in generating high productivity in cities. In addition, the degree of match between employees and employers differs with the density of human capital in a specific area.

In addition, the concentration of human capital in specific urban areas is linked to the diversity of labor in terms of skills, education, and abilities. This diversity contributes to productivity gains associated with locating areas dense with human capital. Backman and Kohlhase (2013) investigate how variations in workers' skills, education, and abilities affect firm productivity. They also explore how workforce diversity—across dimensions such as age, gender, background, education, and occupation—impacts a firm's likelihood of survival and growth. Their findings support the presence of agglomeration economies driven by human capital diversity and enhanced innovation.

Finally, Kazekami (2017) examines the relationship between agglomeration economies and labor mobility multipliers. Specifically, the study highlights how denser areas tend to attract more external workers, which in turn fosters job creation and boosts overall economic productivity. Kazekami (2017) finds that for each additional job created in the tradable sector within a commuting zone, 0.41 jobs and 2.28 jobs are generated in the non-tradable sector of the same zone.

### 2.2.3 Learning

The last channel expected to explain the productivity gains due to agglomeration economies is knowledge spillovers. It does describe the ability of firms to learn from each other through intense interactions in the environment. And the innovation rate is higher since firms can improve their production when they compete on the quality of their products.

Urban density reflects the concentration of economic activity. Due to agglomeration economies, a firm or labor located in dense areas experiences a higher level of productivity. of Abel Et. al (2012) utilize a model on the urban density effect on the overall productivity across US labor outcomes. The model estimates the relationship between output per worker and the density of human capital in the area. Meanwhile, omitted variable bias or endogeneity is tackled through the estimation. The results show that doubling the density increases productivity between 2-4 percent. Abel Et. al (2012) conclude that the results are consistent with theories of learning and knowledge spillovers in cities, providing positive elasticity of labor productivity with respect to human capital concentration.

Acemoglu (1997) refers to the fact that productivity gains in specific urban areas initially depend on knowledge and innovation. Firms can provide training for workers and enhance their performance; these productivity improvements will spill over to both parties. Acemoglu (1997) concludes that paid training and worker knowledge are the main channels through which agglomeration economies exist in certain urban areas.

Furthermore, Audretsch and Feldman (2004) introduce the concept of innovative activity. They attribute this term to the benefits of agglomeration economies in a knowledge-based economy. They emphasize that the main reason for productivity gains in certain regions is primarily due to a skilled, knowledge-based economy.

Furthermore, Storper and Venables (2004) refer to the main foundations for the existence of agglomeration economies. Storper and Venables (2004) use the term “buzz city” to describe

the efficient face-to-face interaction between firms and workers. In the sense that the efficiency of networks builds a systematic relationship between firms and workers, where common inputs exist and common clients are fixed for the supply chain. Finally, Storper and Venables (2004) conclude that the main channel for agglomeration economies' productivity gains is knowledge spillovers, which require the existence of intense face-to-face interactions between economic agents.

In addition, Glaeser and Resseger (2010) argue that the main channel for agglomeration economies is knowledge spillovers. They present a model upon which cities with skilled firms and workers most probably receive productivity gains, and cities with less skilled firms and workers do not benefit from agglomeration economies. Highlighting the difference in productivity depending on the knowledge of the economic agents.

Finally, Barrios Et al. (2006) studied the coagglomeration of plants and multinationals on domestic plant productivity, specifying the role of the knowledge transfer channel. Barrios Et al. (2006) use data on Irish manufacturing. Their results reveal the existence of productivity for local plants through knowledge spillovers from multinationals. Also, the spillovers have resulted in more jobs.

Hence, the Firm and labor locations can contribute to the scale of productivity gains. Reason behind this productivity includes: the reduction of the transportation cost, the benefits of clustering in the pool market through efficient matching, and the access to knowledge transfer between the economic agents. These agglomeration mechanisms drive insights into the productivity gains in urban areas.

In the case of Palestine, exploring the agglomeration economies can be beneficial. This might shed light on agglomeration mechanisms functioning in conflict-oriented cases. The benefits of infrastructure are disrupted by conflict confounders like the Israeli checkpoints between the West Bank and the Gaza Strip districts.

In the year 2013, the number of checkpoints between the districts in the West Bank exceeded 100 checkpoints. (B'Tselem, 2025, The Israeli Information Center for Human Rights in the Occupied Territories) Consequently, due to conflict confounders, the productivity gains in the Palestinian urban areas can be disrupted by an increase in transportation and commuting costs.

## 2.3 Congestion Effects and Urban Diseconomies

While the literature on agglomeration economies provides explanations for the urban density productivity gains. The literature on congestion externalities provides evidence of the existence of a crowdedness cost that might be encountered by the gains of density. Urban productivity is shaped by the balance of centripetal forces and centrifugal forces. Centripetal forces are agglomeration benefits channeled through shared inputs, labor market pooling, and knowledge spillovers. Centrifugal forces are congestion, high commuting costs, and rent increases. (Duranton and Puga, 2004)

In addition, Glaeser and Gottlieb (2009) argue that urbanization results in higher wages and higher housing prices and suggest considering population, income, and housing prices simultaneously in their research on agglomeration economies.

Furthermore, Henderson (2003) discusses the urban density effect in African countries and argues that during the last 30 years, urbanization has had a negative effect on the productivity of the economy. Henderson (2003) argues that the degree of urban concentration strongly affects productivity growth. Also, the best degree of concentration declines with country size.

Empirical research supports this theoretical insight. Duranton and Puga (2004) find that productivity increases with city size up to a point at which urban diseconomies emerge. Duranton and Turner (2011) explore road traffic congestion in U.S. cities and show that increases in road capacity induce more driving, leading to persistent congestion.

The Palestinian urban context may reflect these broader patterns. High population density in areas with restricted mobility, limited land access, and conflict-related infrastructure con-

straints can exacerbate congestion and reduce the economic benefits of agglomeration. Thus, estimates showing a negative or diminishing elasticity of wages concerning population density in fixed effects models could capture these urban diseconomies.

Finally, it is important to mention again the main methods used for empirical estimation of agglomeration economies. First, the most common approach to estimating the productivity advantages of urban areas uses a production function or cost functions aggregated to the metropolitan level that include shared inputs in the equation. For example, using public infrastructure as input and estimate the total factor productivity. The second approach to estimating agglomeration economies relates city size to average wages and average rents. So, the urban wage premium shows the agglomeration productivity gains.

In the setting of this thesis, I explore the benefits of urban density through the existence of an urban premium wage. The higher the population density, the higher the average daily wages. I indirectly estimate the relationship between the population density and average daily wages. Assuming that the higher the elasticity of average daily wages with respect to population density reflects agglomeration economies in the Palestinian economy.

## 2.4 Urban density and labor wages framework

### 2.4.1 Developed countries

I review different papers on urban density benefits and agglomeration economies within developed countries, detailing methodologies used to expose the association or causal relationship between urban density and wages. The reviewed papers show consistent results, a positive elasticity between density and wages with relatively different coefficients (Addario and Patacchini 2008; Alberto et.al 2018; Larsson 2014; Wheaton and Lewis 2002; Fingleton and Longhi 2013).

In a study of the Italian labor market, Addario and Patacchini (2008) research the existence of agglomeration economies. Using the density-wages framework, they search for the effect of

density on workers' earnings. They use 22000 observations of workers from 1995-2022. The data are collected from the Italian Bank of Household Survey and Wealth. They estimate the agglomeration effect through productive wages and test the agglomeration mechanisms functioning with respect to distance. The methodology used under the Mincer equation controls for education, experience, tenure, and employment density. The results show a significant agglomeration effect on labor productivity, and every additional 100000 inhabitants in the local labor market raises earnings by 0.1 percent. However, the results are significant until it crosses 12 kilometers, then agglomeration economies do not show any effect on the earnings productivity.

Similarly, Díaz Et al. (2018) research the agglomeration effect at the level of local labor markets. Optimizing individual-level cross-sectional data collected by the Spanish Fiscal Studies Institute from the year 2011, they search for the effect of agglomeration on labor earnings across Spanish municipalities. The study uses different methodologies to expose the effect of agglomeration on labor productivity. First, ordinary least squares; second, instrumenting values of soil fertility and different geological measures of employment density. Third, quantile regression, and finally, instrumental variable quantile regression. And the results of the study show a significant agglomeration effect on the conditional labor earnings located at the Spanish municipality level. The agglomeration effect on labor earnings goes from 2.5 to 4.2 percent depending on the estimator used. Finally, the specific advantage of these results is that they are applied to different spatial clusters, including rural areas.

Moreover, a study of the Swedish economy by Larsson (2014) explores the agglomeration economies in the Swedish economy. Using cross-sectional data on the individual level, he studies the nature of agglomeration by testing the effect of density on the average wages of workers. The uniqueness of the study is the use of geocoded data at the worker's level. The author estimates that depth analysis of the externalities coming from social interaction is supposed to be traced to the dense level of a specific area using the Mincer equation with controlling for the education and skill differences between workers. The analysis includes experienced density scale of choice,

in which the agglomeration effect is tested under three different scales: neighborhood, district, and regional level. The results show that doubling density is associated with a wage increase of 1.2 percent, and the elasticity is the highest on the neighborhood level, which is consistent with the literature on agglomeration mechanisms that fail with longer distances; some interactions require a closer distance to be achieved. Finally, the study is unique in using an improved level of data and achieved a deeper analysis of the agglomeration effect on the labor earnings.

Furthermore, a study in the US market explores the agglomeration effect on the workers' earnings. The paper also seeks to understand the difference between localization and urbanization economies. The cross-sectional data are spread across 220 metropolitan areas with 400000 observations. The methodology used in previous studies included, mincer equation with control for education, skill, and tenure, and controlling for employment concentration and specialization. The results are large, the elasticity of wages concerning density is between 1.2 to 3.6 percent. The main takeaway from the study is that the firm's ability to pay workers who are dense urban areas higher wages is evidence of agglomeration economies. (Wheaton and Lewis, 2002)

Finally, a study in the UK explores the agglomeration effects using micro-level data. Using a data database of data called unitary authority and local authority districts (UALAD) from the years 1998-2008, covering the area of Great Britain. The data include commuting frequencies, and the data are normalized after being divided by a specific multiplier. IV methodology is used to estimate the relationship between density and wages, controlling for individual characteristics. The results show the impact of potential markets on wages under the urban economic theory. Finally, the uniqueness of this study is that it shows a significant existence of agglomeration when the sample is for females, not for males. ( Fingleton and Longhi, 2013)

### 2.4.2 Developing and emerging countries

In comparison, the agglomeration forces function between developed and developing countries. A meta-analysis study by Grover et al. (2023) investigates the agglomeration functioning in

developing countries for 34 countries, including Latin America and Africa. The authors find that the elasticity of wages with respect to density is less than 1 percent higher than in developed countries.

In addition, Özgüzel (2023) studies the urban density and agglomeration effect in Turkey to contribute to the gap between developed and developing countries' agglomeration effects. Using data on households spanning from 2008 to 2016. Özgüzel (2023) optimizes IV methodology, using historical instruments on long-lagged values measuring agglomeration economies. The results show the elasticity of wages with respect to employment density to be around 059-0.06 when controlling for local characteristics and an instrumented equation.

Furthermore, a study on the agglomeration effects in developing Latin American countries contains cross-sectional data for 16 countries. The methodology used on the Mincer equation. The study specifically explores human labor externalities and positive externalities due to agglomeration. The results show positive agglomeration in economies in all countries. Despite that heterogeneity in the wage premiums between countries(Quintero and Roberts, 2018).

Moreover, a study on the agglomeration effects in Brazil optimizes cross-sectional data. The study specifies different models depending on the mincer equation that include education and skill, and instrument variables. The results show the significant existence of agglomeration economies, and the study specifies that businesses that require knowledge benefit more from agglomeration economies (Barufi Et al. 2016).

Finally, Duranton (2016) explores the agglomeration effects within Colombia. The results are consistent with the literature on agglomeration in developing countries. And the estimation of the elasticity of wages to density is about 5 percent.

Hence, applying the urban density-wages framework to explore the agglomeration effects could fill the gap of the literature on aggloemration economies between developed, and de-

veloping countres. Furthermore, specifying on conflict-related confounders in the model drive insights about the context of conflicted-settings.

## 2.5 The Palestinian case

The Palestinian economy presents a unique setting to explore the relationship between urban density and labor market outcomes. Characterized by one of the highest population densities in the world and is influenced by ongoing geopolitical conflict. Despite this, there has been limited research directly addressing whether urban concentration is associated with economic benefits such as higher average wages.

To date, no studies have specifically examined the benefits of urban density or agglomeration economies in the Palestinian economy. Existing research on labor productivity in Palestine has largely focused on the composition and performance of individual economic sectors, with particular emphasis on the services sector. For example, Morrar and Gallouj (2016) analyze the services sector by distinguishing between modern and traditional services to assess productivity differences. They find that the dominance of traditional services—typically low-skilled—shapes the overall productivity pattern of the sector, exposing a structural reliance on less productive service activities.

### 2.5.1 Sectoral employment shares

Understanding the composition of the labor force is essential to assessing the role of agglomeration economies. Data from the Palestinian Central Bureau of Statistics (PCBS) for the period 1999–2022 show that the services sector accounts for the largest share of employment, with an average of 45.8 percent, followed by industry at 25.7 percent, and agriculture at 12.3 percent. These figures suggest a labor market heavily oriented toward services, which are often associated with stronger agglomeration effects due to their reliance on information exchange, client proximity, and specialized inputs.

| | Agriculture | Industrial | Services |
|---|---|---|---|
| Mean | 12.3 | 25.7 | 45.8 |
| Standard Deviation | 3.1 | 4.5 | 5.2 |
| Minimum | 6.0 | 18.0 | 30.1 |
| Maximum | 18.9 | 32.4 | 60.5 |

Table 1: Descriptive Statistics by Sector

### 2.5.2 Population density rates

To overview of the demographic details of the Palestinians. The density rate in Palestine is 880 inhabitants per square kilometer, considered to be one of the highest density rates in the world. To detail the distribution in the case of Palestine, it is crucial to decompose the description onto a regional scale. Palestine is divided into two regions. First, the West Bank consists of 11 districts. Second, the Gaza Strip, which consists of 5 districts. (PCBS 2025)

In the West Bank, the area land is estimated to be 5660 square kilometers, with a density rate of 509 inhabitants per square kilometer. The densest district in the West Bank is Eastern Jerusalem, with a density rate of 1247 inhabitants per square kilometer. In the Gaza Strip, the area of land is 365 square kilometers. And with a density rate of 5204 inhabitants per square kilometer. The densest district in the Gaza Strip is called the Gaza district, with a density rate of 5204 inhabitants per square kilometer (PCBS 2025).

Combining the demographic and sectoral context with labor market data provides an opportunity to investigate whether urban density translates into economic advantages for Palestinian workers. The central questions guiding this research are: Do agglomeration economies exist in Palestine, allowing workers in denser districts to earn wage premiums? Are spatial differences in labor productivity and earnings explained by population density, or do political and infrastructural constraints negate these benefits? Addressing these questions will shed light on the potential for urban concentration to foster economic growth in conflict-affected and highly dense settings, informing both academic understanding and policy interventions.

### 2.5.3 (1947-1950) in the Israeli-Palestinian conflict

Between 1947 and 1950, approximately 700,000 Palestinians were displaced due to the Arab-Israeli War of 1948. Many became refugees, fleeing to neighboring countries such as Jordan, Lebanon, and Syria, and primarily to the West Bank and Gaza Strip (Morris, 2004).

Morris (2004) adds that the Palestinian refugee population had grown to over 4 million, with about one-third residing in camps recognized by the United Nations Relief and Works Agency for Palestine Refugees in the Near East.

These camps, often located in or near major urban centers, represent some of the most densely populated areas in the West Bank and Gaza (UNRWA 2025).

Nearly one-third of the registered Palestinian refugees, more than 1.5 million individuals, live in 58 recognized Palestinian refugee camps in Jordan, Lebanon, the Syrian Arab Republic, the Gaza Strip, and the West Bank, including East Jerusalem. (UNRWA 2025)

More than 912,879 registered refugees live in the West Bank, around a quarter of whom live in 19 refugee camps. Most of the others live in West Bank towns and villages. Some camps are located next to major towns, and others are in rural areas. While the West Bank has the 26th largest number of recognized Palestinian refugee camps in the five UNRWA fields, the largest of them, Balata, has a population like that of the smallest camp in Gaza (UNRWA 2025).

The Palestinian population in the Gaza Strip has a population of approximately 2.4 million people, including some 1.4 million Palestinian refugees. For at least the last decade and a half, the socioeconomic situation in Gaza has been in steady decline. Besides, 8 recognized Palestinian refugee camps span the Gaza Strip and have some of the highest population densities in the world. (UNRWA 2025)

In the West Bank, refugee camps are distributed across several districts. Tulkarem and Nur Shams are located in Tulkarem; Jenin camp in the Jenin district; and Dheisheh, Deir Ammar, and Aida in Bethlehem. Am'ari, Jalazone, and Kalandia camps are situated in Ramallah, while

Far'a is in Tubas. Hebron hosts Fawwar and Arroub camps. In Nablus, Camp No. 1, Askar, and Ein Beit el Ma are located. Shu'fat camp is in Jerusalem, and both Aqbat Jabr and Ein el Sultan are in Jericho (UNRWA 2025).

In addition, Ein Beit el Ma was the first refugee camp established in the Nablus district, near the border with Tulkarem. Balata camp, also in Nablus, is among the most densely populated camps in the West Bank. In contrast, Alazza camp in Bethlehem is the smallest recognized refugee camp in the region (UNRWA 2025).

In the Gaza Strip, refugee camps are distributed across several districts. Rafah camp is located in Rafah, while Khan Yunis camp is situated in Khan Yunis. Jabalia and Beach camps are located in North Gaza, and the camps of Bureij, Maghazi, Deir al-Balah, and Nuseirat are in the Deir al-Balah area. Jabalia is the largest refugee camp in Gaza, with an estimated population of 49,462 in 2017. Khan Yunis camp is the second-largest in the Gaza Strip (UNRWA 2025).

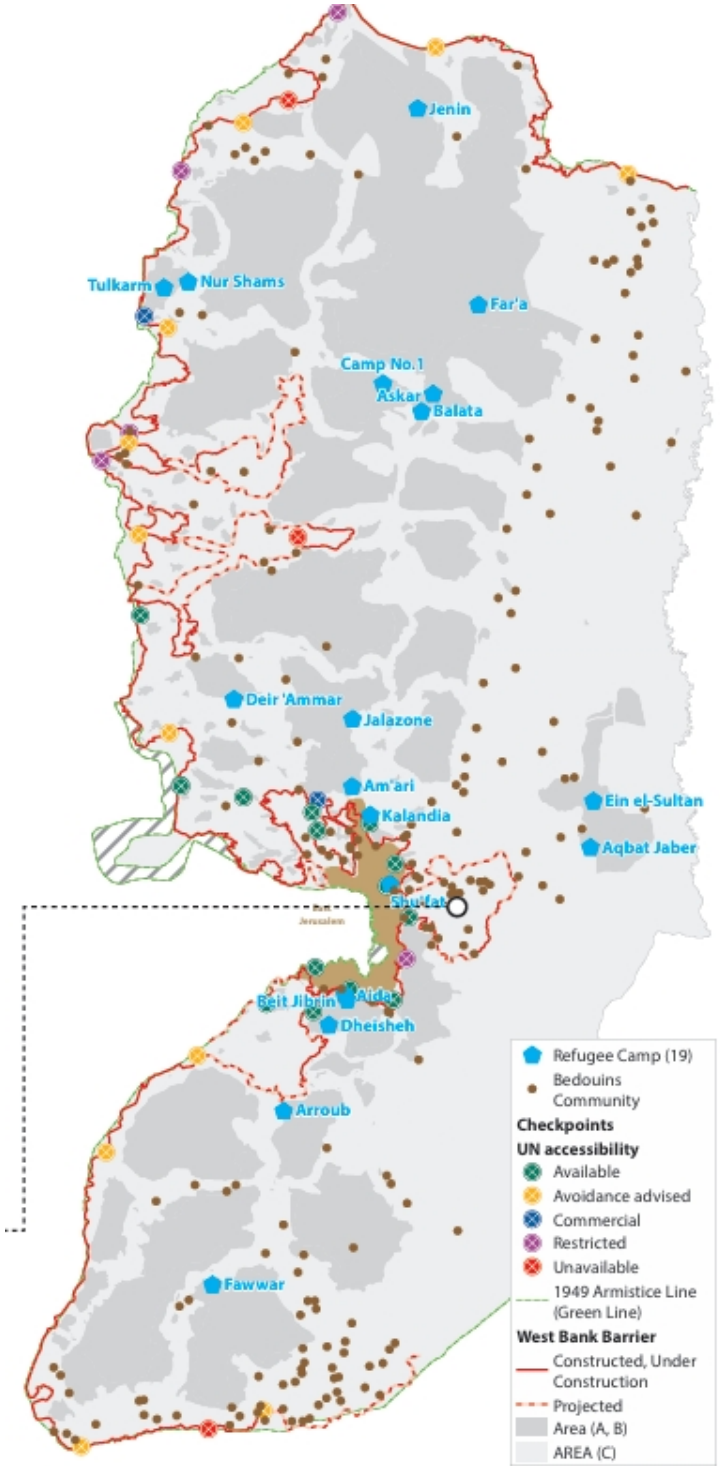


Figure 1: Camps distribution across the West Bank from United Nations Office for the Coordination of Humanitarian Affairs 2018

# 3 Identification strategy

I utilize a quasi-experimental design to estimate the causal effect of population density on the average daily wage in the Palestinian economy. To address endogeneity concerns—such as reverse causality or omitted variable bias—I use an instrumental variable strategy. The instrument is a historical exogenous shock: the presence of refugee camps established between 1947 and 1950 as a result of the Israeli-Palestinian conflict. I argue that the location of these camps was determined by geopolitical events rather than economic considerations, and their presence remains constant over time. This instrument is a time-invariant proxy for historical population displacement that continues to influence present-day population density.

To explore agglomeration economies through the Palestinian economy, I apply the first regression analysis on 16 districts, from the period 1999-2022. To test whether the districts that include a higher number of refugee camps experienced higher population density. Then I run a second regression analysis to test if the districts that experienced higher population density enjoy a higher level of average daily wage. If the results show positive results, this means that districts that experienced an increase in their population density enjoy the urbanization benefits through sharing inputs, pooling labor markets, and spillover effects. If the results show negative results, it means the districts that experienced increases in their population density had congestion costs through crowding or was influenced conflict constraints.

To validate the analysis, the restriction exclusion assumption must be defended. So, I argue that the distribution of camps was not driven by the economic potential of those districts, but rather by geopolitical constraints like the proximity to the 1948 ceasefire lines or the availability of land controlled by international agencies (UNRWA). Hence, the presence of camps affected the average daily wage only through the population density. In the analysis, I address potential confounding factors through district and year fixed effects, and control variables (the employment share of the agriculture sector, the employment share of the industrial sector, the employment share of the services sector).

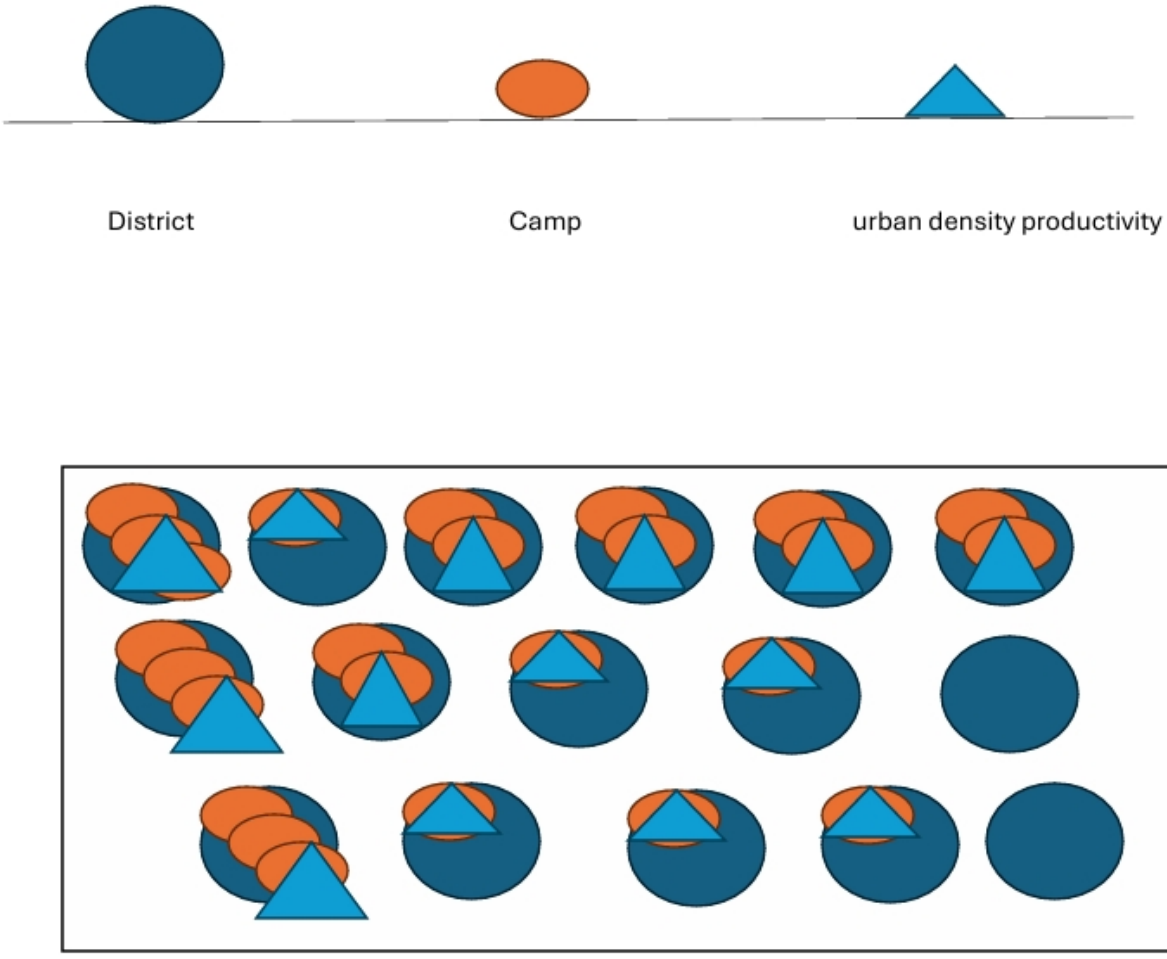


Figure 2: Visualization for the existence of agglomeration economies

The figure shows a visualization of existing agglomeration economies across the Palestinian districts. Assuming that the presence of camps reflects a higher density. Thus, the district experience higher average daily wages

# 4 Data

In this section, I describe the data used to empirically estimate the relationship between population density and labor wages as a proxy for urban density benefits. The source used to collect the data is the Palestinian Central Bureau of Statistics (PCBS). The dataset spans from 1999 to 2022 and across sixteen districts across the West Bank and Gaza, including:

Average daily wage: the variable represents the nominal average daily wage (in NIS), disaggregated by district and region. The variable shows variations across the average daily wage observations across both the regional and district levels. At the regional level, Jerusalem, Bethlehem, and Ramallah report the highest average daily wages, which are in the West Bank. On the other hand, Gaza, Rafah, and Khan Yunis report the lowest values of average daily wage, which are in the Gaza Strip. In addition, variations are included at the district level. For example, Jerusalem, Bethlehem, and Ramallah report the highest average daily wages, which might correspond to their high concentration of economic activity. In the temporal dimension, the average daily wage data shows explicit variations at the regional level. For example, the average daily wage in the West Bank shows a linear increasing function with time. But the average daily wage in the Gaza Strip shows an increasing function with time until the year 2009, and then the curve shows a decrease.

Population density: variable is the estimated population in Palestine at mid-year by district. The data shows explicit variations across the regional and district levels. Specifically, if we compare the estimated value of the population across the area of the region. For example, the average population density in the West Bank is 471 inhabitants per square kilometer. In the Gaza Strip, the average population density is 4439 inhabitants per square kilometer. At the district level, Jerusalem has an average 1,252 average population density, but Jericho has 74 inhabitants per square kilometer in the West Bank. Also, the Gaza district has 7342 inhabitants per square kilometer, but Khan Yunis has 2795 471 inhabitants per square kilometer. The temporal direction shows an increasing curve of population numbers between

Sectoral employment Shares: data on employment shares in agriculture, industry, and services for 16 districts, used to control sector-specific productivity differences. The data shows the domination of services across the 16 districts. In addition, Tubas and Jericho districts benefit mostly from the agriculture sector compared to the rest of the districts. Furthermore, the districts in the Gaza Strip region benefit from access to the sea for fishing, which contributes higher value to the agricultural sector compared to the West Bank region. Finally, the industrial sector shows the lowest employment share and a very even distribution across the 16 districts.

Refugee camp distribution: data on the spatial distribution of refugee camps in the West Bank, with 19 camps, and the Gaza Strip, 8 camps, used for instrumental variable construction and contextual analysis. The data show a variation in the distribution of camps across the 16 districts.

Regarding data Limitations, in line with the urban economics literature (Duranton and Puga, 2020), population density, calculated as the number of people per square kilometer, is referred to as "naïve density." A more accurate measure, "experienced density," requires geo-coded data on the individual level to estimate the density encountered by individuals in their daily environment. Unfortunately, such spatially detailed data are not available in the Palestinian context. As a result, the naive density measure may misrepresent actual exposure to urban agglomeration, particularly in mixed urban-rural districts. the

## 4.1 Descriptive figures

Table 2: Summary Statistics of Key Variables

| Variable | Mean | Std. Dev. | N |
|---|---|---|---|
| Wage | 80.15 | 25.74 | 384 |
| Population count | 255792 | 167658 | 384 |
| Camps count | 1.62 | 0.99 | 384 |
| Agriculture sector share of employment | 13.7 | 10.08 | 384 |
| Industrial sector share of employment | 11.7 | 5.59 | 384 |
| Services sector share of employment | 36.72 | 12.78 | 384 |
| log(Wage) | 4.34 | 0.28 | 384 |
| log(Population count) | 12.19 | 0.79 | 384 |
| log(Agriculture sector share of employment) | 2.27 | 0.94 | 384 |
| log(Industrial sector share of employment) | 2.32 | 0.58 | 384 |
| log(Services sector share of employment) | 3.55 | 0.34 | 384 |

Table 2 summarizes descriptive statistics about the variables used in the empirical estimation. Also, to deal with elasticity measurements, I transform the data into logarithmic form.

Table 3: Average daily Wage (NIS) by District in Palestine (1999–2022)

| **No.** | **District** | **Average Wage** |
|---|---|---|
| 1 | Bethlehem | 104.0 |
| 2 | Dier Balah | 65.5 |
| 3 | Gaza | 60.7 |
| 4 | Hebron | 96.2 |
| 5 | Jenin | 79.4 |
| 6 | Jericho | 76.0 |
| 7 | Jerusalem | 117.0 |
| 8 | Khan Yunis | 60.7 |
| 9 | Nablus | 79.6 |
| 10 | North Gaza | 61.9 |
| 11 | Qalqilya | 78.1 |
| 12 | Rafah | 60.3 |
| 13 | Ramallah | 98.2 |
| 14 | Salfit | 85.0 |
| 15 | Tubas | 80.1 |
| 16 | Tulkarem | 80.0 |

The table shows the average daily wage across districts in Palestine. The district of Jerusalem has the highest average daily wage, with 117 NIS. However, the Rafah district has the lowest average daily wage, with 60.3 NIS. In addition, heterogeneous values of the average daily wage across the districts. I study the question: Does the higher average daily wage reflect

urbanization benefits?

Table 4: Average Population Density by District in Palestine (1999–2022)

| **No.** | **District** | **Average Population Density rate** |
|---|---|---|
| 1 | Bethlehem | 288.0 |
| 2 | Dier Balah | 4019.0 |
| 3 | Gaza | 7342.0 |
| 4 | Hebron | 601.0 |
| 5 | Jenin | 470.0 |
| 6 | Jericho | 74.4 |
| 7 | Jerusalem | 1125.0 |
| 8 | Khan Yunis | 2795.0 |
| 9 | Nablus | 570.0 |
| 10 | North Gaza | 4975.0 |
| 11 | Qalqilya | 592.0 |
| 12 | Rafah | 3067.0 |
| 13 | Ramallah | 340.0 |
| 14 | Salfit | 319.0 |
| 15 | Tubas | 129.0 |
| 16 | Tulkarem | 678.0 |

The table shows the average population density across the Palestinian districts. The district of Gaza has the highest value of average population density rate with 7342 inhabitants per square kilometer. However, the district of Jericho has the lowest value of average population density rate with 74 inhabitants per square kilometer. In this thesis, we related demographic data of population density with average daily wages to explore the existence of agglomeration economies.

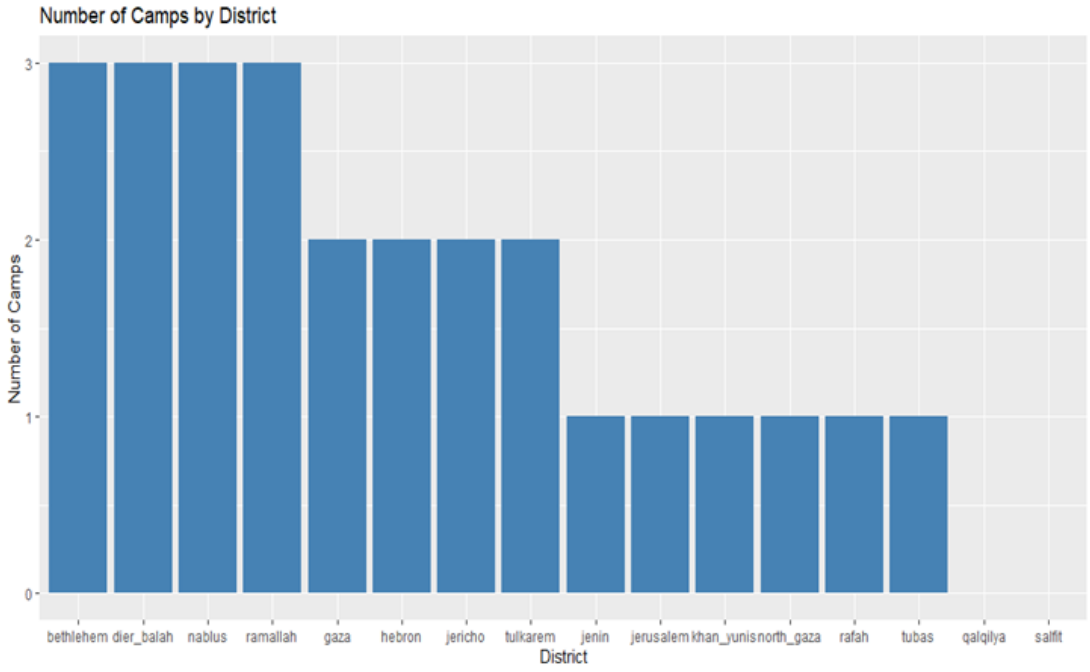


Figure 3: camps distribution across districts

The figure shows the distribution of camps established between 1947-1950 across the West Bank and the Gaza Strip. With respect to the methodology used in the analysis, I assume that the presence of camps in the district has affected the population density directly and affected the labor average daily wages indirectly.

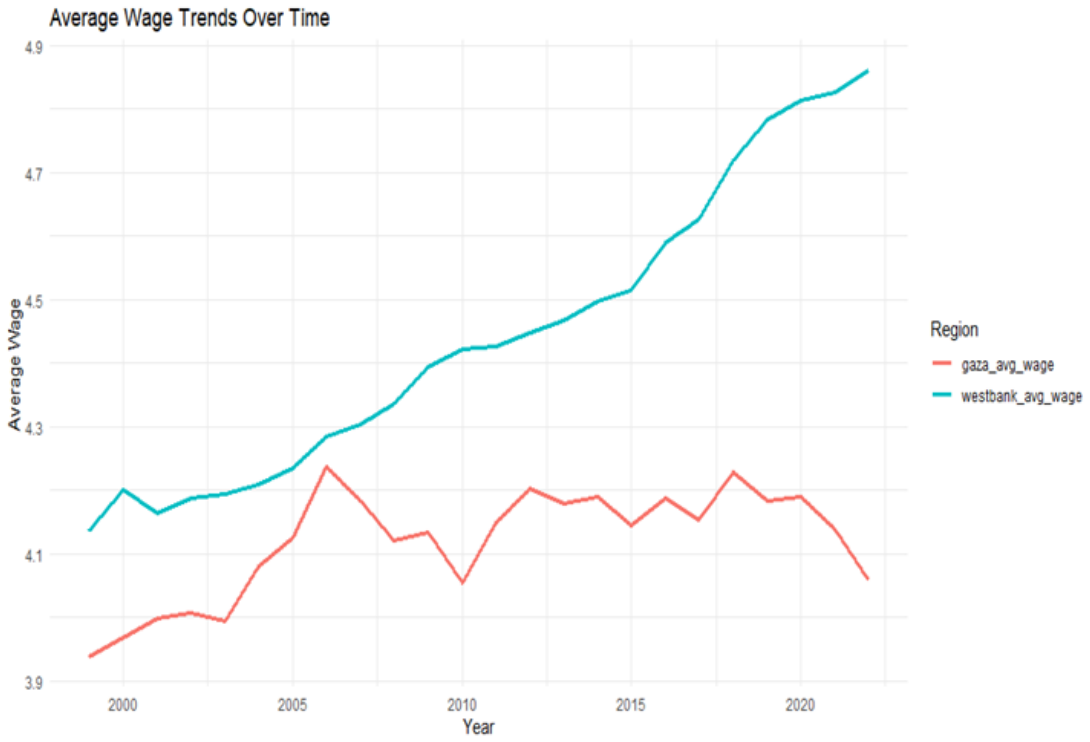


Figure 4: average wage over time between West Bank and Gaza regions (1999–2022)

The figure shows the trend of average daily wages in the West Bank and Gaza Strip between 1999-2022. The trend for the West Bank region is increasing over the whole period of time. However, the trend for the Gaza Strip shows higher volatility. In the analysis, i estimate if the population density can explain of the variation in the average daily wages.

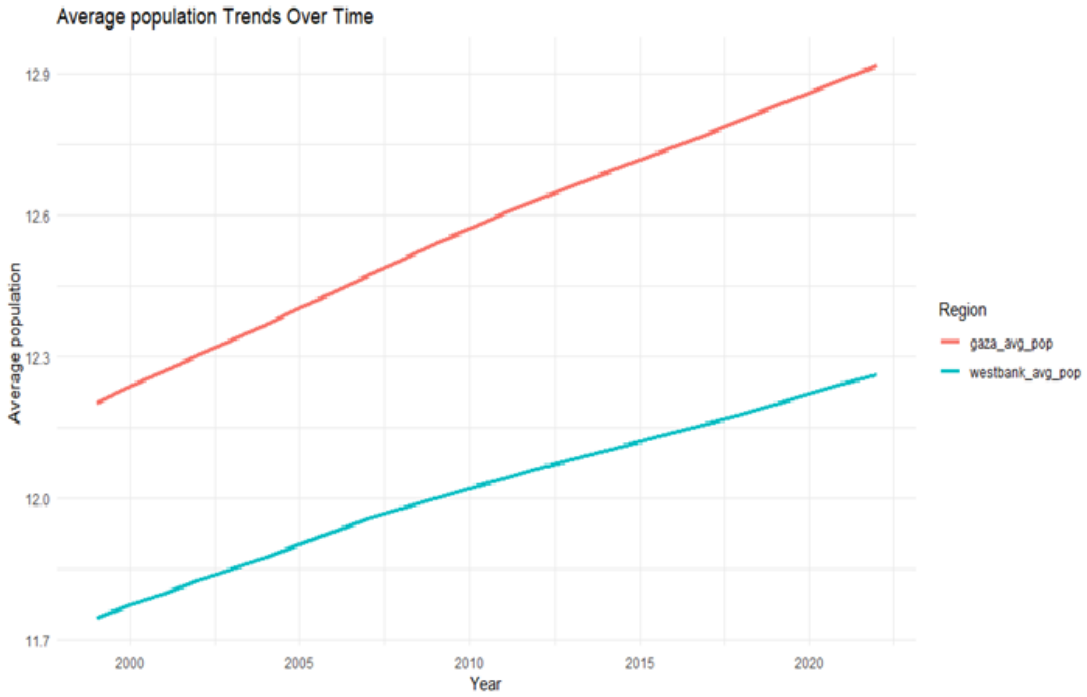


Figure 5: population count over time between West Bank and Gaza regions (1999–2022)

The figure shows the increasing trend of population across the regional level in Palestine between 1999-2022. The direct insight of the graph is that the average population number in the Gaza Strip is much higher compared to the West Bank.

Finally, the goal of the thesis is to explore the urban density benefits on labor earnings. Then, from the data descriptions, we notice that Jerusalem has the highest average wage in the West Bank and the highest density rate in the West Bank. Does this correspond with the question of the thesis?

# 5 Methodology

## 5.1 Related papers on IV

Ciccone and Hall (1993), in the study of labor productivity across US states, use geological instruments for their identification strategy. Ciccone and Hall (1993) argue that the history of agglomeration economies in the US was based on the existence of ports. Thus, Ciccone and Hall (1993) IV the presence of port or not in the given state to expose the causal relationship between the population density and labor productivity. In addition, Ciccone and Hall (1996) identify historical variables like long lags of population density as instruments for current local population density. Similarly, Combes Et. Al (2010) estimate the productivity of laborers across France. They follow Hall and Jones (1996) framework by applying the instrumental variable approach and introducing a new set of geological instruments in addition to standard historical instruments.

In a different identification strategy, Redding and Sturm (2008) use IV methodology to investigate the causal effect of market access on economic development, which can be seen as an agglomeration effect. They identify a natural experiment using the historical division and reunification of East and West Germany in 1990.

Furthermore, Jedwab and Moradi (2016) study the historical construction of the colonial railroads in Ghana and most other parts of African poor countries' effect on current economic productivity. They identify Initial colonial choices that affect modern urban patterns that are exogenous to today's economic productivity.

Finally, in my thesis, I build upon the IV methodology framework to construct an empirical estimation of agglomeration economies. The thesis identification strategy is built upon the historical shock to the Palestinian economy that had disrupted the population density in specific districts in the West Bank and Gaza Strip. So, I identify this exogenous shock in a quasi-experiment design to investigate if these districts where the population increased experienced

productivity gains or not, to align with the literature theory of agglomeration economies.

To do this, I utilize the IV methodology with the following formula:

**First Stage (instrumentation of population density):**

$$\log(Population_{it}) = \pi_0 + \pi_1 NumberOfCamps_i + \delta X_{it} + \mu_i + \lambda_t + \eta_{it} \tag{1}$$

$\log(Population_{it})$: the population count in district $i$ and year $t$

$NumberOfCamps_i$: the number of camps in district $i$

$X_{it}$: vector of control variables

$\mu_i$: district fixed effect

$\lambda_t$: year fixed effect

**Second Stage (Main Equation):**

$$\log(Earnings_{it}) = \alpha + \beta \log(Population_{it}) + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{2}$$

$\log(wages_{it})$: the average wage in district $i$ and year $t$

$\log(Population_{it})$: the population count in district $i$ and year $t$

$X_{it}$: vector of control variables

$\mu_i$: district fixed effect

$\lambda_t$: year fixed effect

I start the analysis by presenting the baseline model:

**Baseline model:**

$$\log(Earnings_{it}) = \alpha + \beta \log(Population_{it}) + \mu_i + \lambda_t + \varepsilon_{it} \tag{3}$$

$\log(wages_{it})$: the average wage in district $i$ and year $t$

$\log(Population_{it})$: the population count in district $i$ and year $t$

**Extended model that includes control variables :**

$$\log(Earnings_{it}) = \alpha + \beta \log(Population_{it}) + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{4}$$

$\log(wages_{it})$: the average wage in district $i$ and year $t$

$\log(Population_{it})$: the population count in district $i$ and year $t$

$X_{it}$: vector of control variables

**Extended model that includes control variables and year fixed effects:**

$$\log(Earnings_{it}) = \alpha + \beta \log(Population_{it}) + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{5}$$

$\log(wages_{it})$: the average wage in district $i$ and year $t$

$\log(Population_{it})$: the population count in district $i$ and year $t$

$X_{it}$: vector of control variables

$\lambda_t$: year fixed effect

**Extended model that includes control variables and year fixed effects and district fixed effects:**

$$\log(Earnings_{it}) = \alpha + \beta \log(Population_{it}) + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{6}$$

$\log(wages_{it})$: the average wage in district $i$ and year $t$

$\log(Population_{it})$: the population count in district $i$ and year $t$

$X_{it}$: vector of control variables

$\mu_i$: district fixed effect

$\lambda_t$: year fixed effect

# 6 Main results

Table 5: OLS Estimates of Population Density on Wages

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| log(population) | 0.046* | -0.027 | -0.033** | -1.59*** |
| | ( 0.017) | (0.018) | (0.012) | (0.193) |
| Controls | No | Yes | Yes | Yes |
| District | No | No | No | Yes |
| Year FE | No | No | Yes | Yes |
| Observations | 384 | 384 | 384 | 384 |
| R-squared | 0.01 | 0.39 | 0.67 | 0.87 |

*Note:* Robust standard errors in parentheses. Dependent variable: log average wage.

Table 5 – OLS Estimates (Associations Only)

Model 1, the baseline model, estimates the association between the population and labor earnings. The estimate shows that a one percent increase in the population is associated with a 0.046 percent increase in the average daily wage. The estimate is significant at the 1 percent level after the usage of robust standard errors, which reflects a positive and small effect coming from the population on labor earnings. Finally, the adjusted R-squared shows the low fitness of the model, which means a lot of variation in the average daily wage data is not explained by the total population number.

Model 2, the model, estimates the association between the population and labor earnings after controlling for the sectoral employment shares. The estimate shows that a one percent increase in the population is associated with a 0.033 percent decrease in the average daily wages. The estimate is not significant at any level after using robust standard errors. However, the fitness of the model increased, which shows that the sectoral employment shares explain some of the variations in the average daily wage. Finally, this model highlights the possibility that the baseline model suffers from omitted variable bias.

Model 3, the model, estimates the association between the population and labor earnings

after controlling for the sectoral employment shares and yearly effects. The estimates show that a one percent increase in the population is associated with a 0.012 percent decrease in the average daily wage. The estimate is significant at the 5 percent level after the usage of robust standard errors. The fitness of the model has increased compared to previous models, which might reflect that a higher population might depress the average daily wages, which can be either explained by inflation or national shocks to the economy.

Model4, the model, estimates the association between the population and labor earnings after controlling for sectoral employment shares, district, and year fixed effects. The estimates show that a one percent increase in the population is associated with a 1.59 percent decrease in the average daily wages. The estimate is significant at the 1 percent level after the usage of robust standard errors. The sharp increase in the value of the estimate might indicate that the negative effect is sharp within districts. If the model specification is assumed to be significant, this might reflect either the urban congestion effect, commuting, or conflict-related channels like the checkpoints between districts or settlement patterns.

Finally, from table number 3 the results cannot be guaranteed as significant results due to the endogeneity problem, reverse causality. Thus, in the next table I estimate the IV regression to obtain results that can be interpreted as causality effect between the population and labor earnings.

Table 6: First Stage: Instrumental Variable Relevance

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Instrument (camps number) | 0.267*** | 0.240*** | 0.241*** | 0.115*** |
| | (0.026) | ( 0.027) | (0.028) | (0.011) |
| Controls | No | Yes | Yes | Yes |
| District | No | No | No | Yes |
| Year FE | No | No | Yes | Yes |
| Observations | 384 | 384 | 384 | 384 |
| R-squared | 0.11 | 0.40 | 0.41 | 0.99 |

*Note:* Robust standard errors in parentheses. Dependent variable: log population.

Table 6 – First Stage (Instrument Relevance)

Model 1, the baseline model estimates the instrument relevance which estimates how much the instrument variable (presence of camps due to historical shock) can describe the variation of population. The estimate shows that any additional camp in one district led to 35 percent increase in the population . The models are significant at 1 percent level after using robustness standard errors. This model might indicate that the instrument variable is valid for the IV estimation. The fitness of the model is relatively high since no other controls are included in the equation.

Model2, the model estimates the instrument relevance after controlling for the sectoral employment shares. The estimate shows that the presence of one additional camp in one district increases the population by 28 percent. The estimate is significant at 1 percent level after using robustness standard errors. The second model shows that the instrument is robust to the inclusion of the controls.

Model3, the model estimates the instrument relevance after controlling the sectoral employment shares and the year fixed effects. The estimate shows that the presence of one additional camp in one district increases the population by 22 percent. The estimate is significant at 1 percent level after controlling robust standard errors. The third model shows robustness of the instrument variable after accounting for year specific shocks.

Model4, the model estimates the instrument's relevance after controlling the sectoral employment shares and the year fixed effects. The estimate shows that after controlling observed and non-observed district and time effect the instrument still shows significancy. The results validate the use of the instrument in the second stage IV estimation.

Model 1, the baseline model represents the IV second stage estimation. Which estimates the relationship between the population density and the labor earnings, instrumented on the presence of camps in one district. The estimate shows that a 1 percent increase in population density causes a 0.117 percent increase in the average daily wage. The estimate is significant

Table 7: IV Estimates of Population Density on Wages

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| log(Population) (IV) | 0.117* | 0.094. | 0.108** | 1.53*** |
| | (0.052) | ( 0.048) | (0.041) | (0.390) |
| Controls | No | Yes | Yes | Yes |
| District | No | No | No | Yes |
| Year FE | No | No | Yes | Yes |
| Observations | 384 | 384 | 384 | 384 |
| R-squared | -0.02 | 0.305 | 0.535 | 0.69 |

*Note:* Robust standard errors in parentheses. Dependent variable: log average wage.

at the 10 percent level after using robustness standard errors.

Model 2, the model represents the estimation of the relationship between population density and the labor earnings, instrumented on the presence of camps in one district. After controlling sectoral employment shares. The estimate shows that a 1 percent increase in population density causes a 0.094 percent increase in the average daily wage. The estimate coefficient drops slightly and shows marginal significance after using robust standard errors, which might indicate omitted variable issues in the first model.

Model 3, the model represents the estimation of the relationship between population density and the labor earnings, instrumented on the presence of camps in one district. After controlling sectoral employment shares and year fixed effects. The estimate shows that a 1 percent increase in population density causes a 0.108 percent increase in the average daily wages. The estimate is significant at the 5 percent level after using robust standard errors. This model shows robust evidence on the significancy of the elasticity of average daily wages with respect to population density after controlling for time fixed effects.

Model 4, the model represents the estimation of the relationship between population density and labor earnings, instrumented on the presence of camps in one district. After controlling for sectoral employment shares and year, and district fixed effects. The estimate shows that

a 1 percent increase in population density causes a 1.5 percent increase in the average daily wages. The estimate is significant at 1 percent level. This model reflects the within-district variation is stronger, or possible overfitting due to the inclusion of many dummies in relatively small samples.

The elasticity of average daily wages with respect to population density is 0.117 percent. This coefficient aligns with the literature of agglomeration economies and assures that the urban density benefits are reflected in the average wages. For a robust check, I run a heterogeneity test over time, and the estimate shows a positive and significant causal relationship between the population density and labor earnings in the Palestinian economy.

The results provide some insights into the relationship between population density and labor earnings in Palestine. OLS models show positive results in the baseline model. However, controlling for observed characteristics, district fixed effects, and year fixed effects, the model shows a negative association between the population density and labor earnings. Generally, the results from the OLS table indicate potential endogeneity or omitted variable bias.

Hence, OLS results highlight the importance of exploring causal effects. In the context of Palestine, conflict dynamics, infrastructure constraints may confound the relationship. In line with the literature on urban density, the density effect is unclear whether it creates a congestion effect or an agglomeration effect. To estimate the relationship between the population density and labor earnings, I use the historical shock of refugees as exogenous variation for the population. Afterward, the first stage results show that the presence of the camps increases the population of the district. Satisfying the relevance condition for the IV. The second stage regression estimates indicate that a 1 percent increase in population density causes a 0.108 percent increase in average daily wages.

The findings of the thesis suggest the existence of agglomeration economies or urban productivity gains in the Palestinian economy. Especially after checking the number of camps in

each district. Thus, the districts that were affected by the refugee influx and the population density increase experienced productivity gains and an increase in the average daily wage.

# 7 Discussion

The positive outcome is that the result of the thesis intersect with the results of empirical studies on urban density and agglomeration economies. The results show existence of agglomeration economies in the Palestinian economy, and the Palestinian labor in urban dense areas tend to earn higher average daily wage due to agglomeration economies. These results align with findings from both developed and developing countries, as highlighted in the literature review.

However, the data used in the study was performed on district level. While studies on empirical agglomeration economies highlighted in the literature review relies on individual-level data. The use of individual-level data allows for capturing more observed characteristics such as education and experience through the application of mincer equation. These covariates are difficult to estimate at the district level. In addition, the number of observations for the analysis totals 384 observations. This low number of observations would lead to the probability of bias estimators.

Furthermore, I assume that the historical placement of refugee camps affects current economic outcomes only through its effect on population density, and not through any other channel. I only can defend the assumption by relating the settlement choice of displaced Palestinians was exogenous to the economic potential or productivity of the host locations. Also, the initial location of camps was driven by logistical or political factors, such as proximity to borders, unused land, or ease of humanitarian access—not economic fundamentals. Another concern regarding the instrument, that the presence of camps does not exhibit high variations across districts which might rise concenr about the instrument relevence.

Moreover, This is the first study on the benefits of urban density on labor wages in Palestine. The study contributes to the literature of agglomeration economies with consistent results on the presence of agglomeration effects from the case of developing-conflicted countries.

For future considerations, I aim to extend the analysis by optimizing geo-coded data and

deepen the analysis on the individual level. Furthermore, i aim to optimize another instrument variable that counts the space the distance between each district in the West Bank and Gaza Strip with respect to the districts in Israel. To drive insights on the choice of allocation for refugees and explore if the decision was built on economic conditions or driven by logistical and geopolitical conditions.

The study design follows a quasi-experimental design, and the feasibility of the identification strategy cannot be proven only by theoretical arguments. I suspect that the restriction exclusion assumption might not hold, because educational, skills characteristics cannot be observed. In addition, these camps were subject to foreign aid for economic and educational purposes, which might also have affected the labor wages.

Beyond these methodological concerns, the study also opens the door to several broader insights and areas for further exploration:

The findings have important implications for urban and labor market policy. If denser urban areas are associated with higher wages, then investment in urban infrastructure, housing, and transportation may further enhance agglomeration benefits. At the same time, policymakers must be cautious not to exacerbate regional inequalities by over-concentrating resources in already-dense areas. Targeted support for peripheral districts or rural areas may be necessary to balance growth.

In addition, the Palestinian labor market includes a large share of informal employment and underemployment, especially in dense urban areas. While average wages are higher in these regions, informal workers may not fully benefit from agglomeration due to job insecurity, lack of labor protections, or wage volatility. Future research using micro-level data could investigate whether agglomeration benefits extend to informal workers or are concentrated among formal sector employees.

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Finally, while this study focuses on agglomeration economies, it must be emphasized that the broader conflict environment imposes significant constraints on labor market functioning. Movement restrictions, border closures, and economic fragmentation limit the extent to which Palestinian cities can realize the full benefits of agglomeration. In this sense, the observed wage gains in dense areas may understate the potential gains in the absence of conflict-related frictions.

# 8 Conclusion

In this thesis, I estimate the urban density benefits or agglomeration economies in the Palestinian economy. Using data on labor earnings and population density for 16 districts located in the West Bank and Gaza Strip from 1999-2022. Then I utilize IV methodology to expose the causal relationship between the population density and labor earnings. I instrument the exogenous shock from the Israeli-Palestinian economy within the years 1947-1950, assuming that it disrupted the population density distribution in the West Bank and Gaza Strip.

To defend the IV methodology, I show the relevance of the instrument variable. Also, I argue that the restriction exclusion assumption is not violated, and the presence of cmaps has affected the average daily wages only through the population density channel. Adding that the refugee influx between 1947-1950 was not directed by economic potentials, but a logistical and geopolitical reasons.

The results of the analysis show a significant existence of agglomeration economies and urban benefits in the economy. In addition, Palestinian districts that experienced an increase in population density due to the historical shock had experienced higher labor earnings, with an elasticity of approximately 0.12 percent

For future research, I plan to estimate a more accurate relationship between population density and labor earnings using geo-coded cross-sectional data. This method will deepen the analysis to test how agglomeration mechanisms behave with respect to distance.

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# 10 Appendix

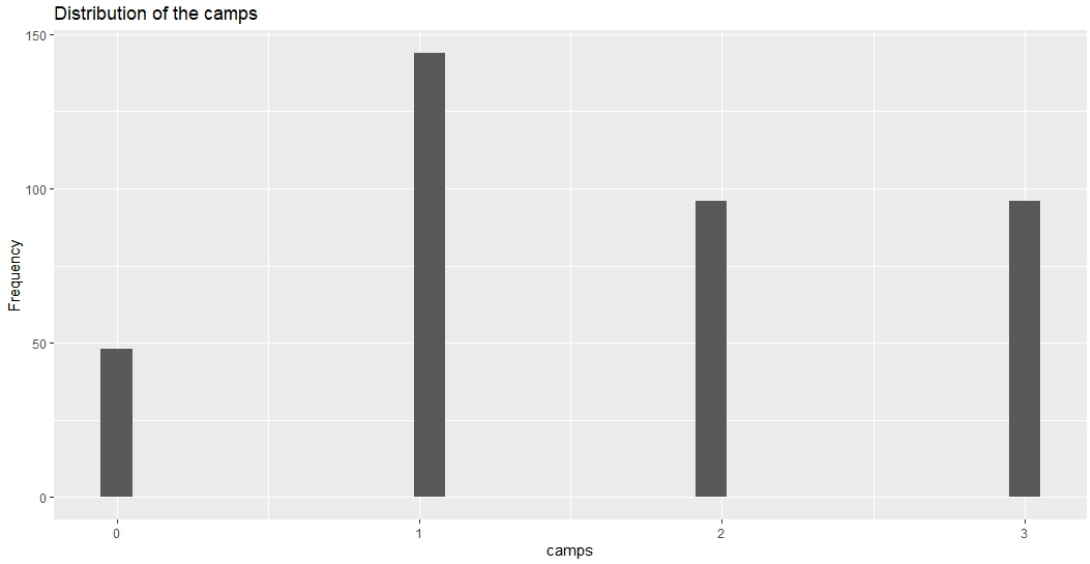


Figure 6: Distriution of camps

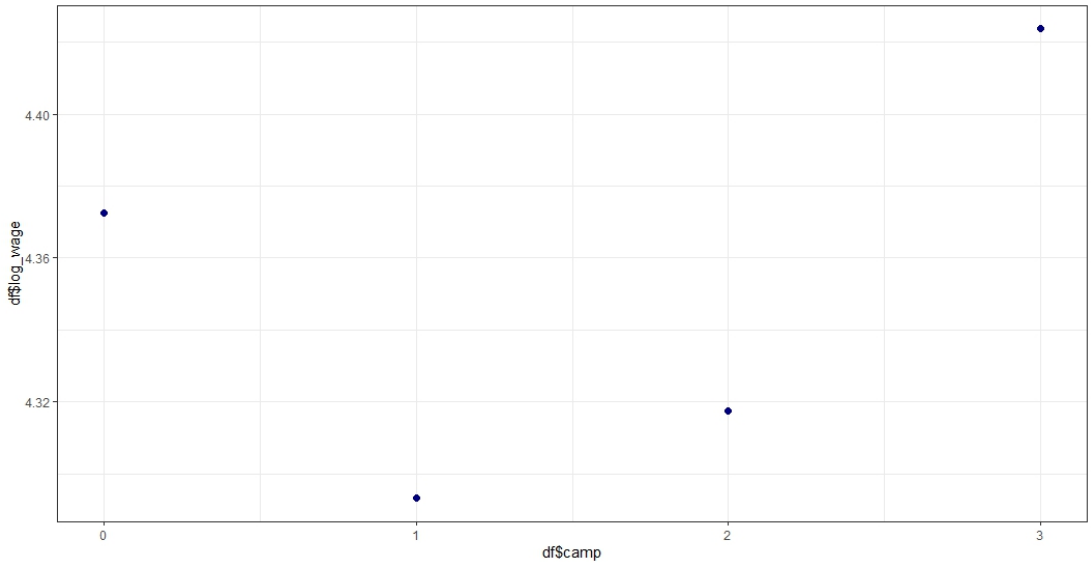


Figure 7: binned scatter plots for First-Stage regression

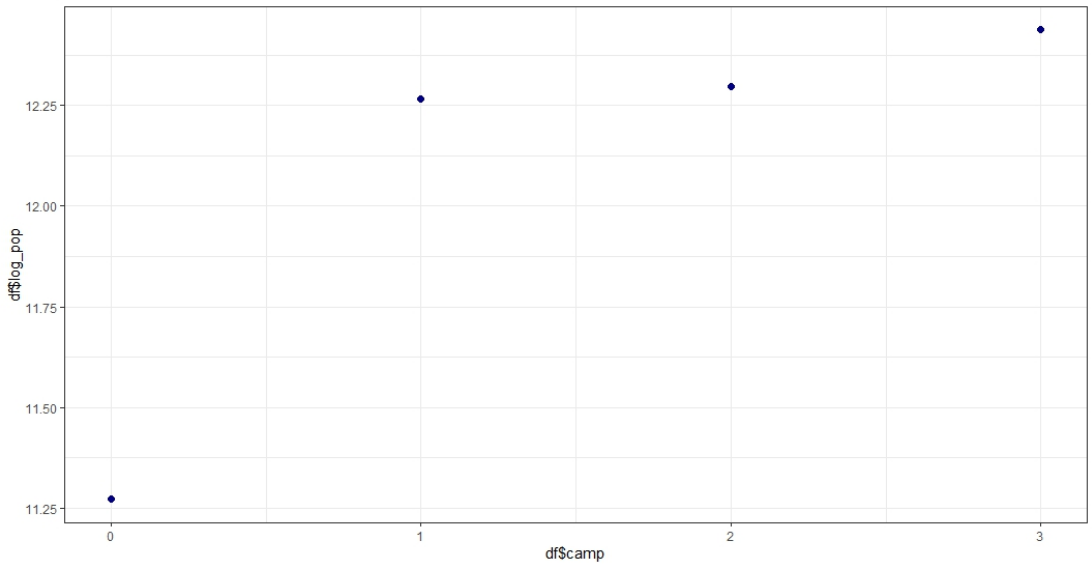


Figure 8: binned scatter plots for reduced form regression

Table 8: OLS Regression Results: Log Wages and Controls

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| **Dependent variable:** | log_wage | | | |
| log_pop | 0.0461** | -0.0279 | -0.0339** | -1.5935*** |
| | (0.0179) | (0.0171) | (0.0130) | (0.1573) |
| log_agr | | -0.1639*** | -0.1058*** | -0.0884*** |
| | | (0.0161) | (0.0130) | (0.0161) |
| log_ind | | -0.0064 | 0.0427* | -0.0188 |
| | | (0.0317) | (0.0244) | (0.0267) |
| log_serv | | -0.3483*** | -0.3284*** | 0.0422 |
| | | (0.0525) | (0.0405) | (0.0404) |
| Year FE | No | No | Yes | Yes |
| District FE | No | No | No | Yes |
| Observations | 384 | 384 | 384 | 384 |
| R-squared | 0.017 | 0.394 | 0.678 | 0.874 |
| Adj. R-squared | 0.014 | 0.387 | 0.653 | 0.858 |

standard errors in parentheses

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$

Table 9: IV Regression Results: Effect of Population on Wages

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Basic IV | + Sector Controls | + Year FE | + Year & District FE |
| **log(pop)** | 0.118** | 0.094* | 0.109*** | 1.537*** |
| | (0.054) | (0.051) | (0.042) | (0.423) |
| **log(agr)** | | -0.104*** | -0.034 | -0.042 |
| | | (0.029) | (0.025) | (0.026) |
| **log(ind)** | | 0.026 | 0.082*** | 0.068* |
| | | (0.036) | (0.030) | (0.038) |
| **log(serv)** | | -0.347*** | -0.322*** | -0.050 |
| | | (0.056) | (0.047) | (0.060) |
| **Year FE** | No | No | Yes | Yes |
| **District FE** | No | No | No | Yes |
| Observations | 384 | 384 | 384 | 384 |
| R-squared | -0.024 | 0.312 | 0.568 | 0.727 |
| Adj. R-squared | -0.027 | 0.305 | 0.535 | 0.694 |
| Residual Std. Error | 0.282 | 0.232 | 0.190 | 0.154 |
| Wald Test (F-stat) | 4.70* | 54.49*** | 20.73*** | 25.48*** |

Standard errors in parentheses

*$p < 0.1$, **$p < 0.05$, ***$p < 0.01$