Connecting Disadvantaged Communities to Work and Higher Education Opportunities: Evidence from Public Transportation Penetration to Arab Towns in Israel

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December 2019

Abstract

Disadvantaged communities are often geographically segregated from employment and higher education opportunities. Increasing access can entail substantial welfare gains, but this can also affect the tradeoff faced by young adults between investing in higher education and working for pay. We evaluate the introduction of bus services to Arab towns in Israel, which substantially and differentially increased access either to work only or to work and higher education opportunities among a disadvantaged population. Exploiting the variation that different bus line connections created in the opportunity cost of schooling, we find that young adult responses are consistent with a tradeoff between investing in higher education and working for pay. For females, under certain circumstances, there is a simultaneous decrease in both labor market and educational attainment outcomes. We argue that this is due to a combination of a household income effect and social stigma that is associated with female labor force participation. Our results demonstrate the importance of accounting for potential reductions in educational attainment when expanding work opportunities to disadvantaged communities and that traditional barriers can play a large role in female integration into the labor market.

JEL Classifications: I24; I25; J22; J61; O18.

Keywords: Public Transportation; Spatial Mismatch; Higher Education; Opportunity Cost

We extend our thanks and appreciation to Ahmad Sheikh Muhammad, the general director of the Galilee Society for providing the complete datasets of the Arab socio-economic surveys. Thanks are also due to Sarit Levi and Amihai Levi from the Israeli Ministry of Transportation for data on all bus lines and their frequencies. We thank Danny Cohen-Zada, Naomi Gershoni, Yi Jiang, Moshe Justman, Hadas Stiassnie, and participants at the 2nd IZA/World Bank/NJD Conference on Jobs and Development and the 1st Conference on Urban Economics and Public Services in Developing Countries (Jinan University, China) for helpful conversations and comments. Our project was funded by the National Insurance Institute of Israel, The Maurice Falk Institute for Economic Research in Israel, and the Heth Academic Center for Research of Competition and Regulation.

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1 Introduction

Economic and social disparities can persist or even widen if disadvantaged communities have limited access to work and/or education opportunities. However, increased access to economic opportunities can affect the tradeoff individuals face between long-term investment in educational attainment or working for pay. On the one hand, increased access to education institutions should encourage greater schooling through decreases in the cost of attending school, and this in turn could contemporaneously decrease labor market outcomes (Becker (1965)). On the other hand, greater access to unskilled work opportunities can increase the opportunity cost of schooling and can negatively or positively affect the returns to schooling, depending on how this increase compares with increased access to skilled work opportunities. Policies intended to improve the economic welfare of disadvantaged communities through increased access to work and/or education opportunities should take into account these potential equilibrium implications.

This study assesses a reform that introduced public transportation to Arab towns in Israel and substantially increased the access of disadvantaged communities to work and higher education opportunities. Most Arabs in Israel reside in segregated and peripheral towns with very limited employment opportunities. Higher education institutions in Israel are almost entirely in Jewish towns and cities. Despite this, their significant economic disadvantage and their low vehicle ownership rates, Arab communities in Israel have been historically deprived of public transportation infrastructure. This began to change in 2007, when the Ministry of Transportation (MOT) announced a reform to invest heavily in public transportation services to and within Arab towns in Israel. The new bus lines connected Arab towns to Jewish cities with large labor markets as well as higher education institutions. We evaluate how this increased access affected the labor market and educational attainment decisions of young adults residing in these newly connected Arab towns in Israel.

Our empirical strategy enables us to differentiate between two potentially opposing effects that the introduction of public transportation may have on the opportunity cost of schooling and the impact this may have on young adults' educational attainment and labor market decisions. We distinguish between bus lines that connect Arab towns to higher educational institutions and bus lines that do not and evaluate their effects on educational attainment and labor market outcomes. Our underlying assumption is that both bus types connect to new employment opportunities, thereby increasing the opportunity cost of schooling. However, buses that connect to higher education institutions also decrease the opportunity cost of schooling due to greater access to higher education institutions. Our analysis thus enables us to empirically address the tradeoff faced by young adults between time allocated to work and to education and examine the choices of individuals who experienced increased accessibility to both opportunities in a developed economy.

A common challenge in estimating the effects of greater accessibility to labor markets or higher education institutions is the endogeneity of the mode that increases access. In our case, it seems highly plausible that additional bus lines and their frequencies are correlated with town characteristics that may also be determinants of residents' labor market outcomes and educational attainment. We overcome this potential bias by relying on randomness in the timing of bus line introductions and frequency changes. This randomness is generated due to an often prolonged bureaucratic process required by the MOT, which bears the regulatory responsibility for all public transportation networks and any changes to their routes or frequencies. The exact length for MOT approval is random, and we assume that it is exogenous to our outcomes of interest. An additional source of randomness within our analytical framework is based on assigning to each surveyed individual the extent of public transportation penetration in their town at their interview date, which we assume is orthogonal to our outcomes of interest. We note that even within towns, the time span between the earliest and the latest interviewee for a given year can be several months. In accordance with these institutional and data characteristics, our regressions include town and subdistrict-year fixed effects. Town fixed effects control for unobserved town-specific factors that may be correlated with the timing or intensity of bus services. Subdistrict-year fixed effects control for time-variant shocks or policies among clusters of towns that are in geographic proximity to each other.

Our data links respondents in four cross-sectional surveys covering several thousand Arab households from 2004-2014 to detailed bus line data - including their frequencies and routes - provided by Israel's MOT three times annually for the years 2008-2014. Our analysis is separate for males and females due to considerable gender differences in terms of labor force participation within this highly traditional population. The following work outcomes are observed: the probability of working last week, usual weekly work hours, and monthly salary. For educational outcomes, we observe whether the individual is currently studying. We focus our analysis on young adults (males ages 18-30 and females ages 18-27), the primary population segment that faces a choice between higher education and work, and who rely heavily on public transportation as their major mode of transport.

We find that the response of young adult males to buses that are not destined to higher education institutions exhibits a tradeoff between work and higher education, namely labor market outcomes increase and the probability of studying decreases. However, in response to buses destined to higher education institutions we observe an increase in the probability of studying, without a decrease in labor market outcomes, thereby suggesting that these bus lines increase the pool of young adult males that are either studying or working. The lack of change in labor market outcomes in response to college-destined buses also indicates that male labor force attachment is strong within this population.

For young adult females, many of our regression results suggest negative responses to bus lines both in terms of labor force participation and educational attainment, without exhibiting a tradeoff between the two. This is consistent with the possibility that household income effects following greater public transportation services decrease female labor force participation and even human capital accumulation, due to stigmas associated with females working in this traditional society. Goldin (1995) and Mammen and Paxson (2000) present theory and evidence on decreased female labor force participation in response to positive income effects in low-income economies where females are considered secondary earners. We corroborate this hypothesis by showing that the negative effects are indeed larger in magnitude among females residing in more traditional towns. Nevertheless, in regard to estimates observed more than two years past the initial introduction of public transportation to their town, responses are consistent with a tradeoff between working and investing in higher education. These results highlight the centrality of traditional barriers in female integration into labor markets and that it can take several years for barriers to weaken.

The adverse effects of spatial mismatch on labor market outcomes have been widely documented in the U.S. (Kain (1968); Holzer (1991); Stoll (1999); Weinberg (2000); Andersson et al. (2018); Miller (2018)) and to a much lesser extent internationally or in developing countries (Franklin (2017)). Numerous place-based policy measures have been proposed and evaluated for the purpose of addressing spatial mismatch - enterprise zones, transport infrastructure, telecommunication and internet infrastructure, mobilizing communities, and much more (see Neumark and Simpson (2015) for a review). Our work contributes to the literature on alleviating spatial mismatch through increased access to modes of transit that connect disadvantaged communities to labor markets and employment opportunities.[1] However, our work is distinct from this literature in that we also examine educational attainment responses, rather than just focusing on employment outcomes. We further expand upon the spatial mismatch literature by specifically evaluating access to higher education institutions, in addition to access to labor markets. Our work thus integrates the interplay between investing in schooling and working for pay with the spatial mismatch literature, which to our knowledge has not considered educational attainment implications of greater labor market access, despite this being a fundamental component of human capital accumulation theories.

Our work is closely-related to research on the development and economic effects of transport infrastructure. While most transport infrastructure literature focuses on either roads or railroads,[2] our work evaluates bus lines. Bus lines differ from roads or railroads, as they primarily serve the residential population and to a much lesser extent local businesses or economic establishments in the newly connected locality that now face new import and export opportunities (Duranton and Turner (2012); Duranton et al. (2014); Ghani et al. (2016)). This allows us to more precisely isolate the effect of greater access to work and education opportunities from other economic factors that may simultaneously change when roads or railways connect disadvantaged communities to outside markets.

We are familiar with two recent studies on transport infrastructure that specifically evaluate the effect of greater access to labor markets on educational attainment. Adukia et al. (Forthcoming) and Aggarwal (2018) study India's national rural road construction program and its effect on middle school enrollment and child and adolescent educational attainment, respectively. Both studies find increases in middle school enrollment in response to greater connectivity to outside labor markets, although Aggarwal (2018) also finds

[1]Kawabata (2003), Baum (2009) and Gautier and Zenou (2010) show how vehicle ownership positively affects labor market outcomes for low-skilled workers, single mothers with low education levels, and minority workers, respectively. Holzer et al. (2003), Sanchez (1999), and Tyndall (2017) show that public transportation can decrease spatial mismatch of employment prospects among minorities in U.S. metropolitan areas, and Ong and Houston (2002) show this for women on welfare in Los Angeles. In Phillips (2014) and Franklin (2017), when public transit travel subsidies are provided to job seekers from segregated areas in Washington D.C. or the outskirts of Addis Ababa in Ethiopia, respectively, job searches intensify and their time spans shorten. Martinez et al. (2018) find that improvements in the bus transit network in Lima, Peru increased employment rates and earnings among women.

[2]See Jacoby (2000); Jacoby and Minten (2009); Donaldson and Hornbeck (2016); Donaldson (2018).

decreases in high school enrollment accompanied by greater adolescent labor force participation. Our work complements Adukia et al. (Forthcoming) and Aggarwal (2018) by highlighting the importance of accounting for changes in the opportunity cost of schooling when evaluating disadvantaged communities' increased access to labor markets. Our analysis exploits variation in the opportunity cost of schooling due to varying degrees of increased access to higher education institutions, and this is in contrast to the variation in Adukia et al. (Forthcoming)'s heterogeneous analysis that is based on labor market characteristics or the discrete measure of having a road or not in Aggarwal (2018). Both Adukia et al. (Forthcoming) and Aggarwal (2018) do not exploit the new connectivity in the context of greater access to higher education institutions, as we do. Furthermore, while Adukia et al. (Forthcoming) focus in their work solely on schooling outcomes resulting from increased access to regional markets,[3] Aggarwal (2018) evaluates both school enrollment and labor force participation simultaneously, as in our study, although our population of interest is young adults, slightly older than the population evaluated in Aggarwal (2018).

Our study is also related to past studies that have shown a positive relationship between educational attainment and the wage premium gap between higher skilled work and lower skilled work using cyclical variation in the demand for unskilled labor.[4,5] In these studies, the opportunity cost of investing in education changes due to labor demand conditions. We analyze the tradeoff between work and education when demand conditions in the labor market remain constant in terms of macroeconomic shocks and all that changes is the accessibility of work and/or education opportunities.

Most existent studies - whether evaluating changes in the opportunity cost of schooling through increased accessibility to labor markets or through cyclical variation in the demand for unskilled labor - focus on school enrollment or completion among youth, rather than higher education responses among young adults. In addition, studies evaluating high school dropout rates in developed economies mostly exploit changes in market wages occurring several decades ago. It may be that more recently the economically important margin of educational attainment is higher education rather than high school completion, as the returns to a high school degree have declined substantially in many economies worldwide.[6] Our study assesses the

[3]In Asher and Novosad (2018), the authors from Adukia et al. (Forthcoming) separately evaluate the effect of the Indian road project on economic outcomes and employment, although for the entire adult population, while their school enrollment analysis is at the middle school level.

[4]In Charles et al. (2018), housing market booms improved labor market opportunities for young adults without a college education, thus reducing educational attainment for those with the smallest expected gains from a college degree. Natural resource industries typically employ larger shares of unskilled workers, and Cascio and Narayan (2015), Morissette et al. (2015), and Black et al. (2005) show lower high school completion rates or college degree attainment in response to tighter labor markets in the natural gas, oil, and coal industries, respectively. However, these responses may reflect only a delay of educational attainment rather than an overall decrease, as Emery et al. (2012) demonstrate following the oil boom affecting Alberta, Canada in the 1970's. In developing economies, Shah and Steinberg (2017) show that variation in agricultural output due to drought shocks in India affected educational attainment, and Atkin (2016) shows that greater labor demand in Mexico due to export expansions following international trade reforms decreased educational attainment.

[5]There is also literature demonstrating a negative relationship between child labor and educational attainment (Edmonds (2006); Edmonds and Pavcnik (2006); De Hoop and Rosati (2013); Baker et al. (2018)).

[6]On the growing differential between the high school graduation wage premium and the college graduation wage premium, see Lemieux (2008) for the U.S and Canada and Han et al. (2012) and Tansel and Bodur (2012) for emerging economies, such as China and Turkey, respectively. For Israel, the only comparisons between the two skill premiums we are aware of are presented in Gottschalk and Smeeding (1997) and Acemoglu (2003), which document a *decrease* in the wage premium for college degrees, while for most other countries covered in these studies the opposite is true. However, both studies cover Israel during the 1980's and 1990's when Israel experienced a large influx of migrants from the former U.S.S.R. with high education levels. It may be

higher education margin, thus addressing potentially more relevant educational attainment decisions faced by disadvantaged young adults in a developed economy.

The paper proceeds as follows. Section 2 outlines our conceptual framework concerning greater accessibility to work and higher education opportunities, the tradeoff between work and higher education, and changes in the opportunity cost of obtaining an education. Section 3.2 provides background on public transportation in Israel and in particular within Arab communities, while highlighting the long bureaucratic process often involved with introducing bus lines or changing them. Section 4 discusses our data on public transportation in Arab towns and labor market and education outcomes among the Arab population in Israel. Section 5 discusses the empirical strategy and identification, followed by results presented and discussed in Section 6, and then in Section 7 robustness checks are presented. Concluding remarks are provided in Section 8.

2 Conceptual Framework - Access to Work and Higher Education Opportunities and the Tradeoff between them

In standard models of human capital accumulation, individuals initially choose whether or not to make a long-term investment in education and forego current earnings in exchange for greater earnings in later periods (Becker (2009)). Factors affecting whether or not investment in education is beneficial include: the opportunity cost of obtaining an education, determined by the earnings from unskilled work that are foregone when investing in education, as well as other costs of obtaining education, such as the time it takes to reach education institutions or the effort required to succeed in obtaining the desired education level; and the returns to schooling, determined by the wage premium for high skilled versus low skilled jobs.

When public transportation networks are introduced to disadvantaged communities, work and higher education opportunities may become more accessible, thereby decreasing transportation costs to work or higher education institutions located outside these communities. As such, both the opportunity cost of obtaining an education and the returns to schooling may be affected, thereby potentially changing work and human capital investment decisions of young adults in these newly connected towns.

The effect on the opportunity cost of obtaining an education is ambiguous. On the one hand, public transportation networks can connect to more unskilled job opportunities, thereby *increasing* the opportunity cost of obtaining an education. On the other hand, public transportation networks can also connect to higher education institutions, thereby *decreasing* the opportunity cost of obtaining a higher education. Our empirical strategy addresses these opposing effects by distinguishing between those bus lines destined to higher education institutions and those that are not. We assume that both bus line types positively affect town residents' opportunity cost of schooling as they expand labor market opportunities outside the town.[7] However, bus lines that connect to higher education institutions also have a negative effect on the opportunity

that 15 years later, this trend changed, and aligned with many other economies worldwide.

[7] Note that buses connecting to higher education institutions also connect to work opportunities.

cost of obtaining an education through the reduced transportation costs to higher education institutions.[8] While it is not clear whether the latter effect is more dominant than the former effect for buses destined to higher education institutions, it should be the case that if the decrease in the opportunity cost of schooling due to connectivity to higher education institutions is sufficiently large, then different responses in terms of educational attainment and labor market outcomes will be observed in response to the two different bus types.

The effect on the returns to schooling depends on the types of jobs that become available through greater bus connectivity. Increased access to high skilled jobs should entail an increase, whereas greater access to lower skilled jobs should entail a decrease. In practice, it is difficult to assess for each bus line whether it connects to more high skilled or low skilled job opportunities, due to diverse labor markets in many bus destinations and numerous labor markets served by single bus lines. Furthermore, data on the labor market in each locality in Israel is quite limited. In addition, disadvantaged young adults may *perceive* their high/low skilled job opportunities differently from what is accessible to them, as they are often surrounded primarily by individuals with low skilled jobs and may not be entirely aware of the full set of higher skilled job opportunities, especially if the have recently become available. Due to these limitations, we do not integrate changes in the returns to schooling into our empirical framework; however, we do bear these potential changes in mind when interpreting the results of our regression analysis.

While it is true that access to opportunities outside of town is more precisely measured using time traveled to get to various destinations, rather than whether buses serve the town or whether they connect directly or indirectly to higher education institutions, we argue that our bus intensity measures provide a rough proxy for travel time.[9] First, bus frequency captures a time component because waiting for the bus can be considered part of the travel time. Second, as buses in Israel generally do not run frequently and their timing often lacks coordination with the arrival of other bus lines, having to change buses in order to get to a higher education institution should entail longer travel time than a direct bus. We thus acknowledge that buses that do not directly connect to higher education institutions may also increase access to higher education through connections to other buses that are destined to higher education institutions. However, it is still reasonable to assume that direct connection to a higher education institution eases access in terms of time, effort and monetary cost of two buses versus one, more than an indirect connection.

[8] Distance to higher education institutions has been shown to affect educational attainment (Frenette (2006)), and this has been further validated by studies using proximity to colleges or their availability as instrumental variables for college education (Card (1993); Currie and Moretti (2003)).

[9] Unfortunately, data is also not available on bus travel time (especially historical data).

3 Background

3.1 The Arab Population in Israel

Arabs in Israel comprise roughly 20% of the population of Israel (8 million in 2014). They are citizens of Israel, although the majority of them identify themselves as Arab or Palestinian by nationality and Israeli by citizenship. In terms of religious affiliation, most are Muslim (~85%), but there is a significant Arab Christian minority and a Druze minority. Their language is Arabic, although most are bilingual with their second language being modern Hebrew.

The vast majority of the Arab population in Israel resides in separate towns and cities, which for the most part are ranked low socioeconomically - Arab towns and cities comprise a very large part of the most economically disadvantaged communities in Israel, and their population is characterized by low income, low employment rates, low educational attainment and high fertility rates. Many of these communities are traditional in that they set barriers for women to obtain a higher education and developing careers, although this is slowly changing.[10]

Arab communities in Israel lack employment opportunities. Industrial and commercial zones hardly exist in or near Arab localities. According to data from the Israel Ministry of Economy, in 2010, over 250,000 acres of land in Northern and Southern Israel were designated for industrial development in local municipalities, out of which only 3.2% were located in 20 Arab local municipalities (Hai and Shoham (2013)). Although Arabs comprise 51% of the population in Northern Israel, only 18% of the industrial areas in that region are under the jurisdiction of Arab localities (Jabareen (2010)). Thus, Arabs who wish to expand their work opportunities often need to find modes of transportation to outside their home town.

3.2 Public Transportation in Israel and within Arab Communities

Public transportation in Israel is primarily via buses, taxis or inter-city trains. Public transportation services are not provided within a free market - rather, they are under the regulatory supervision of the Israeli Ministry of Transportation (MOT), which determines the extent of competition between operators for each region and locality, provides permits and licenses for each route, and sets the routes, stations, frequencies and prices.

Despite private car ownership rates being relatively low among Arabs, due to economic constraints, and many women not being able to drive due to traditional barriers, Arab communities within Israel have been significantly deprived of public transportation infrastructure until the last decade. According to an Israeli Government report from 2016, in 2009 41% of Arab localities in Israel had no public transportation services and an additional 43% had only a low level of public transportation services (Greenwald et al. (2018)).

[10] Car ownership and driving licenses among females within the Arab population have become much more common in recent years. Furthermore, fertility levels for the Arab population have declined substantially over the last 15 years and in 2016 have actually reached nearly identical levels to that of the Jewish population. During 2000-2004 the average number of children for Muslim women was 4.6, in comparison to 2.9 for Jewish women. Arab women employment rates have increased substantially in recent years. In 2009, employment among Arab women was 25%, in comparison to 73% for Jewish women (*The Arab Population in Israel: Facts & Figures 2018* (2018)).

For many communities (including cities with populations of several tens of thousands), the only option for mobility prior to the introduction of public transportation was either walking to a bus/train station outside the community (usually more than a few kilometers) or taking pirate vans that served these communities, which cost significantly more than public transportation bus services in Israel, were sporadic in their time schedules, and posed a constraint on women from these traditional communities, who could not travel in crowded vans among men.

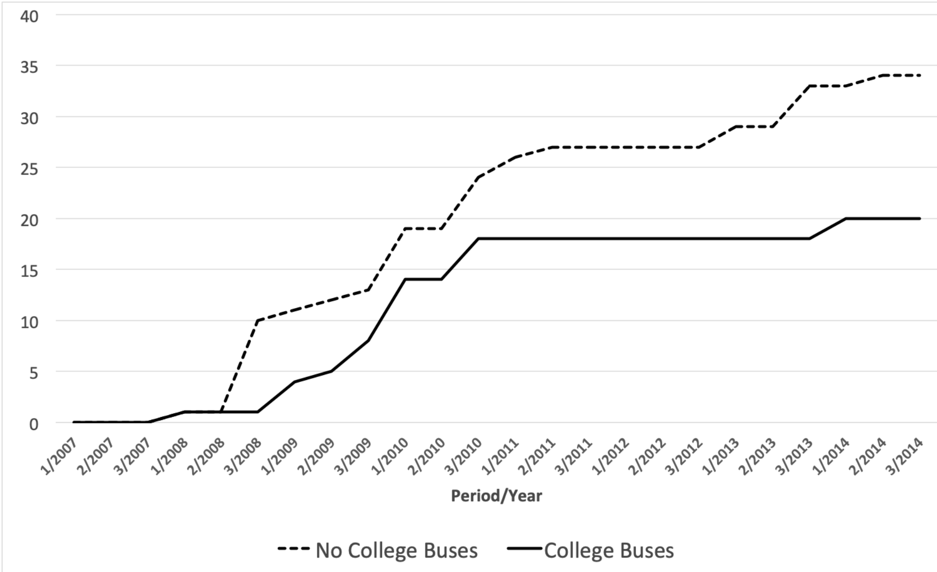
After several decades of historical neglect of public transportation infrastructure in Israel's non-Jewish communities, in 2007 the minister of transportation announced a 5-year plan to invest over 200 million NIS annually[11] in public transportation infrastructure within Arab communities. At the same time, a few Arab communities were already seeing greater investment in public transportation with new tenders being issued for bus line operators, and this was following local campaigning for the introduction of public transportation in these communities.[12] The actual investment in public transportation infrastructure ended up being substantially less than what was announced by the MOT in 2007. In 2011, the new minister of transportation announced that over 400 million NIS were spent on infrastructure and public transportation over the last few years and that 3.5 million passengers from Arab towns and communities utilize the improved public transportation network annually. The new bus networks gradually developed over the next years and increased significantly residents' mobility within and between their communities and access to large Jewish cities located close to them, thus expanding work and education opportunities to these residents. Despite substantial investment and improvements, the gaps in public transportation between Jewish and non-Jewish communities remain considerable, as demonstrated in a 2012 report by a non-profit organization (Naali-Yosef and Cohen (2012)).

Two recent studies evaluate public transportation expansions to Arab communities in Israel and the effect of this on labor market participation among Arabs. Barak (2019) and Greenwald et al. (2018) assign town-level bus line frequencies for the period 2010-2015 to individual-level or town-level data, respectively. These studies find either no effect or very small effects in response to greater bus line intensities. Neither Greenwald et al. (2018) nor Barak (2019) focus in their analysis on young adults, the population segment having the lowest vehicle ownership and which public transportation is likely to affect most. Moreover, Barak (2019) and Greenwald et al. (2018) do not separately evaluate the effects of buses connecting to higher education institutions as opposed to buses not connecting to higher education institutions, but rather examine the effects of bus networks in general. Our study demonstrates that this is vital for fully understanding the underlying effects of public transportation penetration on Arab communities, as the two different types of bus lines have opposite effects and evaluating them together can produce a null effect. In addition, our bus line data begins two years earlier than the bus line data utilized in Barak (2019) and Greenwald et al. (2018).

[11] roughly equivalent to 57 million USD in 2007.

[12] In July 2007, the MOT announced that it will operate the first public transportation network serving Bedouin communities in Southern Israel in 3 towns - Rahat, Lakiya and Hura. This was shortly after the MOT's announcement of its 5-year public transportation plan in Arab communities, but it was after roughly two years of local campaigns run by the Bedouin community for the introduction of public transportation into their communities.

Figure 1: The Number of Sample Towns with Public Transportation Penetration



Notes: The sample includes 38 towns. Periods 1, 2, and 3 refer to representative Tuesdays in March, June, and end of December, respectively. No College Buses refers to buses that serve the town and connect to labor markets but not to a higher education institution. College Buses refers to buses that serve the town and connect both to labor markets and to higher education institutions. See Data Section for further details on our bus line data.

This is important methodologically, as it is during 2008-2009 that many Arab communities transitioned from having no public transportation to having some public transportation, and as such, we are able to limit our sample to towns that had no public transportation until the start of 2008 and compare changes in response to public transportation penetration using a larger time span, beginning already in 2004. We believe that it is due to these methodological and data precision differences that our results for the young adult Arab population are stronger and more robust than those presented for the broader Arab population in Barak (2019) and Greenwald et al. (2018).

Figure 1 presents the gradual penetration of public transportation to the towns in our sample. By construction, all 38 towns in our sample had no public transportation services at the end of 2007, whereas by the end of 2014, all sample towns were served by at least one bus type - 34 towns were served by at least one bus line that did not connect to higher education institutions, and 20 towns were served by at least one bus line that connected to a higher education institution.

3.3 Higher Education Enrollment in Israel

The academic school year in Israeli universities and colleges begins during the second half of October. Enrollment is by field of study, with acceptance based on high school matriculation exam scores combined with test scores from a standardized test. For a large fraction of fields of study, with the exception of those in highest demand (medicine, computer science, etc.), enrollment is generally still open even a few weeks prior to the start of the school year, as long as the minimal score threshold set in advance for acceptance to the institution and field is met. This is even more so for college enrollment, despite having lower acceptance thresholds for comparable fields of study. In addition, for most fields of study, it is possible to begin studying in the Spring semester, which generally starts at the beginning of March. Thus, individuals experiencing changes in the availability of bus lines to various opportunities outside their home town can have the flexibility to adjust their higher education investment decision within a short time frame.

4 Data

Our data are obtained primarily from two sources. Data on all bus lines in Israel, their frequencies, origin and final destination were provided to us by the Israeli MOT for the period 2008-2014. Data on outcomes concerning educational attainment, school attendance and labor force participation of individuals in Arab communities in Israel were extracted from a survey of the Arab minority in Israel conducted by the Galilee Society in 2004, 2007, 2010, and 2014 (Arab Survey, hereafter).

Each cycle of the Arab Survey covers roughly 15,000 individuals from about 3,000 households , with the exception of the 2010 cycle which was limited to 8,500 individuals from 1,900 households. All four cycles are repeat cross-sections, and it is not possible to follow households through the years of the survey. Household members were asked about household and demographic characteristics, as well as their employment and education. We complement our data with general statistics concerning the population of each Arab community for each year available from the Israeli Central Bureau of Statistics (CBS).

The MOT data on bus lines details every bus line in Israel, its frequency, and other details on three representative Tuesdays - at the end of March, June and December each year between 2008 and 2014.[13] Bus line data could not be obtained from prior to 2008. As such, if a town was served by bus lines as of early 2008, we could not know when these bus lines were introduced.[14] We thus could not determine what the treatment variable values should be for these towns prior to 2008. As a result, we excluded 17 towns from our sample that were served by bus lines as of early 2008.[15]

To avoid potentially biasing our results by comparing towns that experienced public transportation penetration to towns that did not experience pubic transportation penetration, we limit our sample to towns that had bus services by the end of 2014, the last year in our sample period. Thus, out of 58 towns covered in the Arab Survey and without bus services as of late 2007, we exclude 20 towns that received no public transportation penetration, resulting in a final sample of 38 towns. A list of the towns in our analysis,

[13] Note that the end of December is a normal work week in Israel. The dates selected - at the end of March, June and December - were determined by the MOT based on its capabilities in terms of extracting data from its system.

[14] MOT data for bus lines begin only in 2008 because prior to that all documentation of bus lines in Israel were not digitized by the MOT and no data was found available (we further contacted bus companies for this purpose and they could not provide us with data prior to 2008).

[15] A total of 26 Arab towns were served by bus lines as of early 2008, according to our data. Out of these, 19 towns are covered in the Arab Survey, but for two of those towns we were able to verify that public transportation was indeed only introduced to them in January 2008, so we kept them in the sample.

when public transportation was introduced to them, and the years each of these towns is covered in the Arab Survey is in Table 8 in the Appendix. Results are also provided in Appendix Table 10 for regressions including all 58 Arab Survey towns, rather than the 38 treated towns, and these are very similar to the results presented in the paper.

We dened two important route characteristics on which we based the construction of our variables of interest concerning public transportation penetration. First, we defined a town as being served by public transportation only if that town had a bus line entering and stopping inside the town. If the town was only served by bus lines that stopped outside the town, then this town was not considered as being served by public transportation. Second, we distinguished between two types of bus lines: those serving at least one destination with a higher education institution and those not. In order to define relevant higher education destinations, we listed from the 2007, 2010 and 2014 Arab Surveys the institutions that the adult population (ages 30-45) reported receiving a higher education certificate from. Any bus line that connected to a destination with a higher education institution that more than 3% of Arab higher education certificate holders reported attending was considered a bus line serving a higher education institution.[16] Based on this, we constructed two measures of public transportation penetration for each town at a given time during the year - a measure of buses connecting to higher education institutions and a measure of buses not connecting to higher education institutions. Each of these measures is the aggregated sum of the overall frequency of relevant buses at a given date, standardized by the town population that year, as reported by the CBS. We stress that both bus types - those connecting to higher education institutions and those that do not - connect the town to outside labor markets, thereby increasing resdients' employment opportunities.

The bus line data was then merged with individual-level data from the Arab Survey for the years 2004, 2007, 2010 and 2014. For each year, we know individuals' interview date,[17] and as such, individuals are assigned the bus intensities that are documented for the date that is closest to their interview date. While the bus measures are intended to represent the prevailing intensity of bus services while the individual in the Arab Survey is interviewed, the effect measured in our regression analysis does not necessarily represent an immediate effect, as it may also be that these bus intensities prevailed for some time (e.g., several months) prior to the individual's interview date.

Because our analysis focuses on the choice between work and educational attainment, our sample covers the young adult population - males ages 18-30 and females ages 18-27. For females we chose a slightly younger age range due to substantial differences between young adult males and young adult females in the Arab population in terms of fertility and marriage patterns, which can affect labor market outcomes and human capital investment.[18] The young adult population should also be more responsive to public

[16]Our higher education institutions were the following: Achva Academic College, Ariel University, Beit Berl College, Ben-Gurion University of the Negev, Haifa University, Hebrew University of Jerusalem, Sakhnin College, Sapir College, Tel Aviv University.

[17]In some cases, the interview date was not provided. When this occurred, we derived the interview date from the median date for that town and year.

[18]Different age ranges that can still be representative of the young adult population for each gender resulted in similar estimates, although less precise at times.

transportation, as car ownership is more relevant among the older population in Arab communities. Given the significant traditional differences between men and women within the Arab population in Israel, which are most pronounced in terms of labor force participation patterns (Yashiv and Kasir (2011, 2013)), all results are reported separately by gender. For analyzing work and education outcomes, our dependent variables are: whether the individual reported working last week, usual weekly hours worked, monthly salary, and whether the individual is currently studying in a higher education institution. All monthly salary figures are in 2014 New Israeli Shekel (NIS).

Our sample of treated towns that did not have public transportation services at the end of 2007 consists of over 2,300 male observations and roughly 1,800 female observations - the number of observations for each regression varies due to missing values for some of the dependent variables.

Some of our regression specifications examine differential effects based on Arab towns' socioeconomic (SE) ranking according to Israel's Central Bureau of Statistics. Towns' SE rankings are based on demographic variables, such as the mean age, dependency ratio, the share of families with 4 or more children, educational attainment, employment and retirement, and living standards (mean income, vehicle ownership and travel abroad). The ranking is in integers ranging from 1 - the lowest - to 10 - the highest. The index is updated every 2-3 years, with the exception of a break in updates between 2008 and 2013. Arab towns in Israel are ranked low in this index - in our sample of 38 towns, more than half are ranked 1 or 2. A SE ranking of 1 (2) in 2013 implied a mean of 9 (11) years of schooling for those aged 25-54, in comparison to the national Israeli mean of 13.5 years of schooling. Mean per capita monthly income in towns with a SE ranking of 1 (2) was 1,181 (1,994) NIS, equivalent at the time to \$325 (\$549), in comparison to the national Israeli mean of 4,057 NIS (\$1,118). The Arab towns that are not ranked 1 or 2 according to the SE index are also not very highly ranked SE, with the vast majority ranked at 3 or 4. For a SE ranking of 4, the mean years of schooling for the population aged 25-54 in 2013 was 12.7 and the mean per capita monthly income was 3,183 NIS (\$877).

Our regression specifications control for time-variant region-specific shocks and policies using subdistrict-year fixed effects. Israel is divided into 6 administrative districts - North, Haifa, Tel Aviv, Central, Jerusalem, and South. Within these districts, there is further division into subdistricts. Overall, there are 16 subdistricts in Israel, 3 of which cover an entire district (the districts that are smaller geographically). A subdistrict reflects a small geographic division with towns and localities that are in close proximity to each other and exhibit closer economic and social ties. Towns are defined part of a subdistrict based on the large (Jewish) city that serves these towns for local economic activity. Public transportation bus lines are also more likely to be intertwined between localities within a subdistrict.

4.1 Summary Statistics

In Table 1, we present summary statistics for our sample of males aged 18-30 and females aged 18-27 in the 38 Arab towns covered in the Arab Survey.

According to Table 1, there are significant differences between men and women in our sample. Women participate much less in the labor market and are much more likely to be married, though they are hardly household heads. Women, however, are more likely to be studying in higher education institutions than men.[19] This is consistent with evidence on gender gaps in favor of females in educational attainment among disadvantaged populations (Autor et al. (2019)) and specifically among the Israeli Arab population, although primarily in STEM fields (Friedman-Sokuler and Justman (2019)).

Differences in the intensity of treatment between towns ranked differently socioeconomically are also documented in Table 1. Towns ranked lower socioeconomically have substantially lower frequencies of buses (normalized by their population) that are not destined to higher education institutions (No College Bus Intensity), conditional on non-zero values. Town fixed effects in our regression specifications control for systematic differences between towns with earlier or later introduction of bus lines, as well as lower or higher frequencies of bus lines. Furthermore, as detailed in Section 5.2, our identification of a causal relationship between bus penetration and changes in our outcomes stems primarily from differences within towns or groups of towns with close proximity to each other over time.

5 Empirical Strategy

5.1 Regression Specification

Our detailed bus line data enable us to assign for each individual a measure for the intensity of bus lines serving their town at the time of the interview. We are further able to distinguish between the intensity of bus lines that serve destinations with higher education institutions and bus lines that do not. Thus, when estimating the effect of public transportation within a locality on various outcomes, our baseline specification takes the following form:

$$\begin{aligned} Outcome_{itmy} &= \alpha_0 + \alpha_1 NoCollegeBusIntensity_{tmy} + \alpha_2 CollegeBusIntensity_{tmy} \\ &\quad + \eta X_{itmy} + \mu_{s,y} + \gamma_l + \rho_m + \varepsilon_{itmy} \end{aligned} \tag{1}$$

We evaluate outcomes related to labor force participation or educational attainment for individual i in town t surveyed in month m in year y. Town t is part of subdistrict s. $NoCollegeBusIntensity_{tmy}$ and $CollegeBusIntensity_{tmy}$ measure the intensity of buses that do not connect or do connect to higher education institutions, respectively, and serve town t in month m in year y. We control for individual-level and town-level demographic characteristics in equation (1) (X_{ity}) - quadratic function of age, a series of

[19] The difference between males and females that are studying is still substantial (although slightly smaller) using the same age range for the two.

Table 1: Summary Statistics

	All Towns		Low Socioeconomically Ranked Towns		Higher Socioeconomically Ranked Towns	
Variable	Males	Females	Males	Females	Males	Females
Observations	2386	1814	1271	1021	1115	793
Worked Last Week	0.618	0.212	0.633	0.191	0.602	0.239
	(0.486)	(0.409)	(0.482)	(0.393)	(0.490)	(0.427)
Currently Studying	0.162	0.268	0.159	0.251	0.166	0.291
	(0.369)	(0.443)	(0.366)	(0.434)	(0.372)	(0.454)
Usual Work Hours	24.28	6.55	24.78	5.62	23.72	7.74
	(24.04)	(14.71)	(24.35)	(13.61)	(23.68)	(15.94)
Usual Work Hours	45.54	34.57	46.00	33.33	45.01	35.82
Conditional on Non-Zero	(10.73)	(13.16)	(11.13)	(13.23)	(10.24)	(13.00)
Monthly Salary (2014 NIS)	2298.3	678.1	2276.9	610.3	2322.8	765.4
	(3231.3)	(1636.8)	(2683.4)	(1546.7)	(3760.8)	(1743.0)
Monthly Salary (2014 NIS)	4931.5	3596.9	4807.1	3500.9	5078.2	3701.1
Conditional on Non-Zero	(3068.7)	(1927.3)	(1741.3)	(1900.0)	(4115.2)	(1957.0)
No College Bus Intensity	1.021	1.010	1.227	1.149	0.787	0.830
	(2.277)	(2.311)	(2.330)	(2.302)	(2.193)	(2.312)
No College Bus Intensity	2.423	2.334	1.891	1.745	3.287	3.211
Conditional on Non-Zero	(3.064)	(2.643)	(1.536)	(1.597)	(4.437)	(3.516)
College Bus Intensity	0.510	0.471	0.463	0.374	0.563	0.595
	(1.717)	(1.511)	(1.112)	(1.029)	(2.212)	(1.959)
College Bus Intensity	3.789	3.939	3.897	4.018	3.610	3.805
Conditional on Non-Zero	(2.959)	(3.051)	(2.615)	(2.647)	(3.450)	(3.636)
Age	23.25	21.98	23.18	21.84	23.32	22.15
	(3.71)	(2.87)	(3.75)	(2.89)	(3.66)	(2.83)
Married	0.197	0.350	0.222	0.341	0.170	0.361
	(0.398)	(0.477)	(0.416)	(0.474)	(0.375)	(0.480)
Household Head	0.194	0.004	0.212	0.004	0.173	0.005
	(0.396)	(0.066)	(0.409)	(0.062)	(0.378)	(0.071)
Son/Daughter of HH Head	0.794	0.636	0.779	0.647	0.811	0.622
	(0.405)	(0.481)	(0.415)	(0.478)	(0.392)	(0.485)
Num of HH Members	5.785	5.684	6.346	6.148	5.146	5.086
	(2.499)	(2.624)	(2.861)	(2.923)	(1.807)	(2.030)
Interview Month	6.766	6.961	6.773	7.030	6.759	6.871
	(2.807)	(2.808)	(2.760)	(2.832)	(2.861)	(2.777)

Notes: The sample is males aged 18-30 and females aged 18-27. Standard deviations are in parenthesis. No College Bus Intensity and College Bus Intensity refer to the weekday frequency of buses serving the town for each 1000 town residents. Low socioeconomically ranked towns are ranked 1 and 2 in the CBS ranking (scale of 1-10). Higher socioeconomically ranked towns are for the most part ranked 3 and 4 and the highest value in the sample is 5.

indicators for the individual's relation to household head, the number of household members, and the town's socioeconomic ranking. $\mu_{s,y}$ is subdistrict-year fixed effects, γ_t is town-level fixed effects, and ρ_m is fixed effects for the month of interview. All standard errors are clustered at the town level, to account for the possibility of within-town correlation of the error term, ε_{itmy} (Bertrand et al. (2004)).

Two coefficient estimates are of greatest interest in equation (1): α_1 and α_2. α_1 measures the impact of buses that connect the town to potential employment opportunities but are not destined to higher education institutions. α_2 measures the impact of buses that connect the town both to employment opportunities *and* higher education institutions. α_1 and α_2 tell us how our dependent variable changes when an additional bus per day per 1000 residents serves the town without or with connecting to higher education institutions, respectively. The underlying assumption is that all buses connect to potential employment opportunities, but buses that connect to higher education institutions have a differential negative effect on the opportunity cost of schooling in comparison to the effect of buses that do not connect to higher education institutions.

Equation (1) is similar to a standard difference-in-differences (DID) specification, only the main variable of interest is an intensity of treatment measure, rather than an indicator variable, and it is split into two - the intensity of treatment in terms of non-college buses and the intensity of treatment for buses reaching higher education institutions. All towns are treated at some point during the sample period but there are varying points in time when public transportation is introduced so individuals in some of the treated towns serve as a control before the introduction of buses in their town, and the post-treatment period varies between towns, based on the timing that bus lines began to serve them.

In addition to a general assessment of the effect of public transportation penetration, the coefficients of interest in equation (1) can provide insights to our two additional research agendas: whether we can find evidence of a tradeoff between investment in education and work, and what is actually chosen when access to both increases. α_1 in equation (1) provides an answer to the former question - if the results show increases in work outcomes and decreases in the probability of studying in response to greater public transportation solely to work opportunities (*No College Buses*), then this is evidence of a tradeoff between education and work. α_2 in equation (1) can provide answers to both research agendas. Its sign for work or education outcomes shows what is actually chosen when both education and work opportunities become more available; furthermore, opposite signs for α_2 in regressions with work versus education outcomes as dependent variables is evidence of the tradeoff between the two.

The effect of public transportation can vary based on an individual's socioeconomic (SE) background or on how long it has been since the initial introduction of public transportation to their town. Individuals from towns with a lower SE background have less access to a private vehicle[20] and may perceive their economic opportunities in terms of employment differently, given potentially reduced exposure to individuals in high skilled occupations. The time span that has elapsed since the initial introduction of public transportation to

[20]This is verified in town-level CBS data on private vehicle ownership. In 2013, Arab towns ranked socioeconomically 2 or less had 0.4 private vehicles for each adult resident in the town aged 20-64; Arab towns ranked 3-5 socioeconomically had 0.49 private vehicles for each adult resident in the town aged 20-64.

one's town may matter in terms of awareness, adaptation, and social and traditional perceptions - particularly concerning females - that may need time to change for individuals to fully exploit opportunities in newly connected localities. Furthermore, differential effects based on SE status and the amount of time since the initial introduction of public transportation may interplay with each other, as lower SE ranked Arab towns are typically more traditional in their nature.[21]

In order to test for these hypotheses, we alter equation (1) such that separate estimates are obtained for the effects on individuals from low versus higher SE ranked towns and depending on whether an individual is observed more or less than 2 years since bus lines were initially introduced to their town. We thus estimate the following specification:

$$\begin{aligned} Outcome_{itmy} = {} & \beta_0 + \beta_1 ShortTermNoCollegeBusIntensLowSocio_{tmy} + \beta_2 ShortTermCollegeBusIntensLowSocio_{tmy} \\ & + \beta_3 LongTermNoCollegeBusIntensLowSocio_{tmy} + \beta_4 LongTermCollegeBusIntensLowSocio_{tmy} \\ & + \beta_5 ShortTermNoCollegeBusIntensHighSocio_{tmy} + \beta_6 ShortTermCollegeBusIntensHighSocio_{tmy} \\ & + \beta_7 LongTermNoCollegeBusIntensHighSocio_{tmy} + \beta_8 LongTermCollegeBusIntensHighSocio_{tmy} \qquad (2) \\ & + \eta X_{itmy} + \mu_{s,y} + \gamma_t + \rho_m + \varepsilon_{itmy} \end{aligned}$$

Equation (2) has 8 coefficients of interest: β_1 through β_8 each estimate the effect of one additional no college/college bus for individuals who reside either in low or higher SE ranked towns (*LowSocio* versus *HighSocio*) and are observed either up to 2 years since the initial introduction of public transportation in their town or 2 years or more since the initial introduction of public transportation to their towns (*ShortTerm* versus *LongTerm*).[22] All other variables in equation (2) are as defined in equation (1).

5.2 Identification

An ideal setting for causally identifying the effect of public transportation on labor market and educational attainment outcomes would randomly assign bus line penetrations and their frequency changes across towns. Obviously, it is plausible that these factors are not randomly assigned but rather are correlated with town characteristics that are also determinants of residents' labor market and educational attainment outcomes. To overcome this potential bias, our identification strategy exploits randomness in the timing of bus line penetration and frequency changes within clusters of towns that are in geographic proximity to each other, and in accordance with this, our regression specifications include town and subdistrict-year fixed effects.

[21]This has been verified using CBS data. For example, lower SE-ranked Arab towns have a higher rate of intra-family marriages, a lower age of first marriage, a lower ratio of female/male drivers license holders and a larger fraction of a Muslim population (see Yonay et al. (2015) for evidence that the Muslim population in Israel is more conservative than the Arab-Christian population, in particular with regards to female labor force participation).

[22]An event study analysis would have been ideal for evaluating differential effects of the reform over time. However, in our specification, the effect of non-college buses is estimated separately from the effect of college buses, and the introduction timing of the two differs for many towns. As such, it is not possible to define a base time for an event study.

Our identification assumption is that absent the introduction of public transportation or changes in bus line frequencies in the towns in our sample, outcomes for individuals residing in towns that received bus line services would have followed the same path over time as outcomes for individuals residing in towns that received bus line services later in our sample period, after controlling for town and subdistrict-year fixed effects. Subdistrict-year fixed effects flexibly control for differential changes over time within clusters of towns with geographic proximity to each other and alleviate concerns that clusters of towns with populations tending more towards higher labor force participation rates or higher educational attainment received greater public transportation services. Town fixed effects control for systematic differences between towns that received public transportation services earlier versus later and between towns with lower or higher intensity levels of public transportation services.[23] Month of interview fixed effects control for seasonality in our outcomes of interest, which may be correlated with changes in bus intensity, particularly given the subdistrict-year fixed effects which entail that some of the variation in our regression analysis is derived from variation within year.

We stress that the exact timing of implementing changes in public transportation in Israel does have a random component to it, and this is due to the highly centralized approval process that characterizes Israel's public transportation infrastructure. In essence, all decisions - even at the most local level - must pass through the MOT.[24] This relatively prolonged bureaucratic process generates randomness in the timing of bus line introductions and their frequency changes.[25]

The randomness in the exact timing of bus line introductions and frequency changes is coupled with plausibly random variation in individuals' exact interview timing in the Arab Survey. Because the interview timing determines the bus intensity assigned to individuals, this generates additional randomness in our main variables of interest. Table 2 exhibits a lack of correlation between the timing of an individual's interview and our outcomes of interest for individuals who did not experience bus lines in their towns - 2004 individuals, 2007 individuals, and 2010 individuals in towns that did not receive any bus lines by the end of 2010. Coefficient estimates are presented from regressions with our outcomes of interest or individual-level characteristics as dependent variables, and the number of days since the town's first interview for the year the individual is observed as the main explanatory variable. Separate regressions are run for males and females and out of 14 coefficient estimates presented, only one is statistically significant at the 10 percent level or lower, which is consistent with a 10 percent chance of statistical significance in a series of regressions.

[23] Town-Year fixed effects could not be implemented in our regression analysis, as the variation at the town-year level - while exists for quite a few town-year combinations (see explanation below) - is still relatively minimal, especially concerning the *College Bus* intensity measure (see Table 8 in the Appendix).

[24] As reference to this out-of-the-ordinary centralized planning held by the MOT, see the newspaper article in Ha'aretz from March 2019 (in Hebrew): https://www.themarker.com/dynamo/cars/.premium-1.7041329 - "Katz's Single Mistake - that we're all paying for" by Meirav Arlozorov. In this article, Israel's centralized transportation planning is described as unprecedented anywhere else in the world and extreme examples are provided such as the need for MOT approval even for local road signs or traffic lights.

[25] One example of the randomness in the time until MOT approval is the introduction of bus lines to Beduin communities in Southern Israel. The MOT announced its plan to introduce public transportation networks to three Beduin communities in Southern Israel in July 2007 - Rahat, Laqiye and Hura (all in our sample). In practice, Hura was introduced its first bus line in the beginning of 2008, Rahat in the middle of 2009, and Laqiye at the end of 2010.

Table 2: Interview Timing and Outcomes of Interest

Dependent Variable	Worked Last Week	Usual Weekly	Monthly Salary	Currently Studying	Married	Age	Number HH Members
				Males			
Days Since First Town Interview	6.64e-05	0.00365	1.103	-0.000636**	-0.000452	-0.00142	0.00148
	(0.000326)	(0.0160)	(2.420)	(0.000244)	(0.000311)	(0.00228)	(0.00224)
Number of Observations	1,429	1,422	1,436	1,432	1,436	1,436	1,436
R^2	0.082	0.090	0.064	0.054	0.125	0.054	0.213
				Females			
Days Since First Town Interview	3.52e-05	-0.00915	-0.548	0.000108	-7.53e-05	-0.00277	0.00139
	(0.000321)	(0.0114)	(0.956)	(0.000395)	(0.000317)	(0.00218)	(0.00240)
Number of Observations	1,140	1,148	1,150	1,144	1,150	1,150	1,150
R^2	0.090	0.085	0.091	0.087	0.155	0.078	0.226

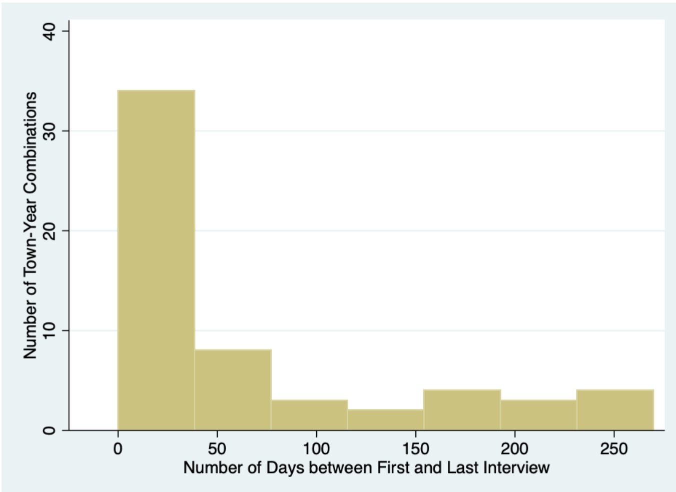
Notes: The coefficient estimate presented is for the variable indicating the number of days since the first interview in the town for that year in regressions at the individual level for our sample population - males ages 18-30 and females ages 18-27 in the top and bottom panel, respectively. The sample is further limited to the years 2004 and 2007 and to towns in 2010 that did not have any bus lines by the end of the year. Town, year, and month fixed effects are included in the regressions. Standard errors clustered at the town level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

In Figure 2 we plot the distribution of the number of days between the first and last interview for our sample towns during 2010 and 2014 - when public transportation changed over the course of the year for many towns. As can be seen, for over 25 town-year combinations during 2010 and 2014 (out of 58 town-year combinations in our sample for 2010 and 2014), the time span between the first and last interview exceeded 40 days and can be as high as 260 days.

Thus, we argue that the exact intensity of treatment an individual is assigned to - which can vary for a given year within some towns - is exogenous due to two sources of random variation: the exact timing of bus line introductions and changes, and the timing of an individual's interview in the Arab Survey. While the randomness in the interview date does not necessarily generate variation within a town for a given year in bus intensity measures, it still generates exogeneity if bus line intensities changed over the course of the year and an individual is surveyed on a particular date that has a particular value of bus intensities rather than an alternative value that prevailed that year. We exhibit the variation within town-years in bus intensity measures with Figure 3, which shows that quite a few town-year combinations had non-zero changes in their bus frequencies during 2010 and 2014 - over 30 for the non-college-bus measure and over 20 for the college-bus measure.

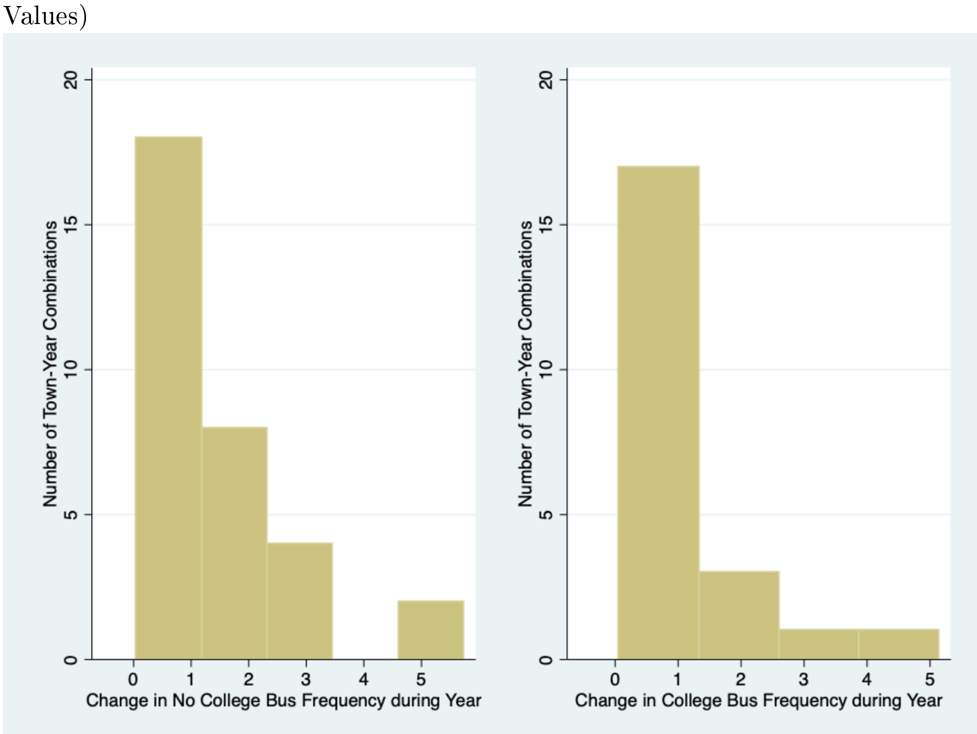
Our claims of causality would be compromised if the Arab population responds to changes in public transportation penetration by migrating across towns. We stress that the Arab population in Israel is highly immobile with the vast majority residing in the same town they were born in for their entire life. The main exception is females who get married to someone outside of their home town, in which case they move to the husband's hometown. The top panel of Table 9 in the Appendix presents regression results for the link between bus penetration lagged one year and various migration or population composition measures, such

Figure 2: Time Span (Days) between First and Last Interview for Town-Year Combinations



Notes: The town-year combinations in the figure are only from 2010 and 2014, years when public transportation penetration could have varied substantially both at the extensive and intensive margin for some towns over the course of the year.

Figure 3: Difference in Public Transportation Penetration between Beginning and End of the Year (Non-Zero Values)



Notes: The figure presents the distribution of the difference in public transportation penetration between the beginning and end of the year for town-year combinations that had non-zero values (from 2010 and 2014). The left panel presents this difference for the no-college-bus intensity variable and the right panel presents this difference for the college-bus intensity variable.

as migration balance and age distribution, while controlling for town and year fixed effects. None of the coefficient estimates is statistically significant, thus validating our argument that there is not a migratory response to public transportation within the Arab sector in Israel. Table 9 also shows that the mean outward and inward migration flows for our sample towns range from 2.6 to 5.2 persons per 1000 residents, which is very small.[26]

In addition to presenting evidence that there is no link between migration and population composition patterns and public transportation penetration, Table 9 also tests for a link between town-level characteristics and same-year public transportation intensity measures. The bottom panel presents the results of these regressions that have town-level characteristics as the dependent variable and this year's all bus intensity measure as the main variable of interest, while controlling for town and year fixed effects. One of seven coefficient estimates is statistically significant at the 10% level (one of 14 for all of Table 9). Thus, it appears that public transportation intensity is not correlated with time-varying town-level characteristics.

6 Results

6.1 Baseline Regression Results - Young Adult Population

Table 3 presents results for our baseline specification - equation (1) - which differentiates between the effect of buses that are destined to higher education institutions and buses that are not. The top panel of Table 3 presents results for the young adult male population and the bottom panel for the young adult female population. For each dependent variable, we present results for specifications without individual-level controls, followed by results for specifications with individual-level controls. For the most part, the coefficient estimates do not vary substantially between the two specifications for each dependent variable, especially when they are statistically significant, thus validating to some extent that our variables of interest are not correlated with individual-level characteristics.

The top panel of Table 3 suggests that for the young adult male population, the probability of working, weekly hours usually worked (p-value 0.155), and monthly salary increase in response to buses that do not connect to higher education institutions. Furthermore, the probability of currently studying decreases in response to these bus lines. When assessing the effect of buses that do connect to higher education institutions, we observe an increase in the probability of studying but the coefficient estimates on *College Bus Intensity* for labor market outcomes are not statistically significant (despite being consistently negative). We interpret this as evidence that non-college buses result in young adult males trading off greater work opportunities at the expense of higher education. However, college buses increase higher education enrollment, though this may largely be in addition to those individuals who were working or studying as is - i.e., new individuals are joining the pool of young adult males who were working or studying without the additional college buses.

[26]As a comparison, these figures are in the 40's for similarly-sized Jewish towns. Adukia et al. (Forthcoming) rule out meaningful migration patterns in their analysis of the effect of roads in India on middle school enrollment based on showing that no more than 4 individuals exit or enter villages with average populations that are around 1000.

Quantitatively, each non-college bus per 1000 residents increases the probability of male young adults to be currently working by 3.2 percentage points, usual weekly hours worked by 0.95 hours, and monthly salary by 168 NIS. With a mean non-college bus value in our sample of 2.42 per 1000 residents among treated individuals, this implies a mean increase equivalent to 12.3, 8.1, and 19.1 percent of the pre-treatment mean probability of working, weekly hours worked, and monthly salary, respectively, in response to non-college buses. For the probability of studying, the mean intensity value of non-college buses decreases the probability of young adult males studying by 36 percent of the pre-treatment mean in this population. The probability of studying in response to college buses increases by 2.43 percentage points. With a mean college bus value in our sample of 3.79 among treated individuals, this implies a mean increase in the probability of studying that is equivalent to 63 percent of the pre-treatment mean. The magnitude of the estimated effects on studying are very large, but one has to bear in mind that most Arab towns in our sample were served by both college and non-college buses, thus offsetting the large effects of each bus type separately.

For the female young adult population, we do not observe any changes in labor force participation outcomes, but we do observe opposite studying responses to non-college and college buses, as for the males. Quantitatively, these changes represent 20-38 percent of the pre-treatment mean among female young adults. While increases in the probability of studying without changes in labor market outcomes may imply an influx of new students from the population of young adult females who without the policy change would not study or work, it is more difficult to explain a decrease in the probability of studying without changes in labor force participation. We will argue in Table 4 below that the null effects observed for females in response to college buses in Table 3 mask heterogeneous responses based on SE status and the time that has elapsed since the initial introduction of public transportation to one's town.

6.2 Differential Effects based on Socioeconomic Status and Time Elapsed Since Initial Public Transportation Penetration

We now proceed to examine whether the results observed in Table 3 depend on the individual's town SE ranking or the time that has elapsed since the initial introduction of public transportation to their town. Section 5 explains why such differential effects are reasonable to hypothesize, thus leading to the specification in equation (2), which generates 8 coefficients of interest, each separately estimating effects based on college-no-college buses, low-high SE-ranked towns, and the amount of time since the initial introduction of public transportation.

For males from low SE-ranked towns, Table 4 shows that both in the short and long term non-college buses increase labor force participation outcomes but this is at the expense of investment in higher education.[27] This effect of non-college buses is also observed for males from higher SE-ranked towns although only in the long-term. For the short-term, non-college buses appear to produce positive responses in terms of labor

[27] P-values for the No College Short Term Low Socio coefficient estimates in the Monthly Salary and Currently Studying regressions are 0.12 and 0.135, respectively.

Table 3: Public Transportation Penetration - Differential Effect for Buses destined to Higher Education Institutions

Dependent Variable	Worked Last Week		Hours Worked Usual		Monthly Salary		Currently Studying	
				Males - Ages 18-30				
Non-College Bus Intensity	0.0389***	0.0319***	1.131*	0.946	192.6***	167.7***	-0.0229***	-0.0217***
	(0.00957)	(0.0101)	(0.624)	(0.652)	(60.91)	(60.70)	(0.00672)	(0.00675)
College Bus Intensity	-0.0284**	-0.0162	-1.057	-0.342	-66.93	-57.30	0.0353***	0.0243**
	(0.0105)	(0.0131)	(1.089)	(1.242)	(53.49)	(55.05)	(0.0100)	(0.0106)
Number of Observations	2,352	2,352	2,365	2,365	2,386	2,386	2,370	2,370
R^2	0.078	0.203	0.143	0.250	0.069	0.153	0.064	0.123
Mean Dependent Variable (Pre-Treatment)	0.631	0.631	28.31	28.31	2129	2129	0.146	0.146
				Females - Ages 18-27				
Non-College Bus Intensity	0.00328	-0.00113	0.0645	-0.137	32.24	12.13	-0.0226***	-0.0214***
	(0.0108)	(0.0106)	(0.290)	(0.329)	(43.55)	(40.03)	(0.00706)	(0.00690)
College Bus Intensity	0.0143	0.00886	0.600	0.441	36.63	-11.10	0.0247**	0.0239**
	(0.0108)	(0.0114)	(0.580)	(0.593)	(34.95)	(44.91)	(0.00956)	(0.0102)
Number of Observations	1,791	1,791	1,811	1,811	1,814	1,814	1,804	1,804
R^2	0.092	0.173	0.083	0.141	0.086	0.183	0.083	0.189
Mean Dependent Variable (Pre-Treatment)	0.186	0.186	6.353	6.353	529.4	529.4	0.250	0.250
Town Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Individual Controls		✓		✓		✓		✓

Notes: Each column in each panel (males vs. females) presents the coefficient estimate for α_1 and α_2 from equation (1). Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. Standard errors clustered at the town level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

force participation outcomes among males from higher SE ranked towns, but the point estimates are highly inflated, possibly due to a small subgroup of the sample being the base for these coefficient estimates. In terms of males' response to college buses, Table 4 shows increases in the probability of studying in response to greater intensities of college bus services, but we do not see concrete evidence that this is at the expense of labor market outcomes, thus suggesting - as in Table 3 - that college buses increase the pool of young adult males that are either studying or working. These new participants may have joined through attending higher education institutions, or alternatively, new joiners are choosing the labor market while persons otherwise in the labor market are shifting to educational attainment in response to college buses (or a mix of both of these compositional shifts).

Quantitatively, males' responses in Table 4 are substantial: in response to non-college buses, the mean change in the probability of working last week is 11.3-14.9 percent of the mean, weekly hours work increase by 14.6-21 percent of the mean, and the salary increases by 9.7-37.2 percent of the mean. The probability of studying decreases by 23.7-74 percent of the mean, but one must bear in mind that this is also accompanied by very large increases in the probability of studying in response to college buses.

Overall, the results in Table 4 suggest that non-college buses lead young adult males in our sample to increases their labor force participation and this is at the expense of investment in higher education. College buses are increasing educational attainment, although this may not be among those who would have otherwise worked without the increased bus services to higher educational institutions. Thus, young adult males in our setting seem to be highly attached to the labor market and more inclined to work, even when opportunities for obtaining higher education expand. Apparently, for males in our setting, reductions in the opportunity cost of schooling through more accessible higher education institutions do not sufficiently offset increases in the opportunity cost of a higher education or decreases in the returns to schooling through more unskilled job opportunities. Lastly, males from low SE-ranked towns are responding to changes in bus services both in the short term and long term, whereas males from higher SE-ranked towns are responding to changes in bus services primarily in the long term.

Many of the female coefficient estimates presented in Table 4 suggest that *both* labor force participation and educational attainment in response to public transportation penetration decreases among young adult females. This is the case when examining the responses to non-college buses in the short term for females from both low and higher SE-ranked towns.[28] Long term female responses to college buses among low SE-ranked towns also exhibit decreases in labor force participation outcomes without an increase in the probability studying. Female responses to college buses in the short term exhibit less conclusive decreases in economic activity, with mixed effects in terms of labor force participation outcomes for low SE-ranked towns and null effects for higher SE-ranked towns.

The decrease in females' economic activity in response to bus penetration is somewhat surprising at first

[28]P-values for No College Short Term Low Socio Worked Last Week and No College Short Term High Socio Monthly Salary are 0.11 and 0.108, respectively. P-values for No College Short Term Low Socio and No College Long Term High Socio Currently Studying are 0.176 and 0.100, respectively.

glance. However, it may be that labor force participation increases among other household members with the introduction of buses, or that they experience higher income due greater accessibility of jobs, which generates a household income effect. If young adult females in the household are regarded as secondary earners, and there is a social stigma associated with their labor force participation, then this may explain a negative response to public transportation penetration. Goldin (1995) and Mammen and Paxson (2000) have shown that female labor force participation rates in the first half of the 20^{th} century in the U.S. or in modern developing economies decrease as household income increases from low income levels, due to social stigmas concerning female labor force participation in traditional societies. In our setting, the drop in young adult female economic activity may persist until local norms and perceptions gradually weaken in order to enable better exploitation of new economic opportunities available to women.[29]

Along with the decrease in female economic activity observed in Table 4, there is also evidence of females trading off between work and investment in education - and thus demonstrating increased economic activity - in the long term in response to non-college buses among females from low SE-ranked towns and in response to college buses among females from higher SE-ranked towns.[30] Females from low SE-ranked towns improve their labor market outcomes in response to non-college buses in the long term at the expense of higher education investment, and females from higher SE-ranked towns choose to increase educational attainment in response to college buses and this decreases their labor force participation.

Overall, females appear to respond negatively to public transportation in the short term and to some extent in the long term, and these decreases in labor market outcomes or the probability of studying are not being traded off - rather, in some cases, the decreases even occur simultaneously both to labor market outcomes and the probability of studying. However, Table 4 also presents evidence of a tradeoff between working and higher educational attainment in the long term in response to non-college buses among low SE females and in response to college buses among higher SE females.

The results for females contrast with the male results, where we find responses consistent with a tradeoff between work and investment in higher education in response to non-college buses already in the short term (particularly among individuals in low SE-ranked towns) and long-term increases in the probability of studying in response to college although not at the expense of work outcomes. We interpret this as evidence that female positive responses to bus penetration - whether in terms of labor market outcomes or investment in education - take longer to materialize than those of males, possibly due to cultural and traditional barriers. In addition, the differences between male and female responses to college buses can be attributed to two potential explanations (not necessarily mutually exclusive). First, males may be more attached to the labor market than females and even when they choose greater educational attainment, it is not at the expense of labor market outcomes, as is slightly more pronounced among females in the results in

[29]We are not suggesting that the differential results based on the years since public transportation penetration reflect the U-shaped relationship between income and female labor force participation described in Goldin (1995), a process for which drastic changes may take several decades to materialize. However, the underlying negative relationship between income and female labor force participation within traditional societies that have a social stigma on female labor force participation provides a reasonable framework to explain the decreases in economic activities observed among young adult females in Table 4.

[30]P-value for the College Long Term High Socio Currently Studying estimate is 0.115.

Table 4: Public Transportation Penetration - Differential Effects based on Bus Destination, Town's Socioeconomic Ranking, and the Time Elapsed Since Initial Public Transportation Introduction

	Dependent Variable	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying
				Males				Females	
Low Socio Coeff's	No College Bus Intensity - Short Term	0.0378***	2.187***	109.4	-0.0183	-0.0114	0.274	-102.1**	-0.00912
		(0.0127)	(0.732)	(68.76)	(0.0120)	(0.00697)	(0.244)	(45.46)	(0.00661)
	College Bus Intensity - Short Term	-0.0326	-4.184**	58.06	0.0515***	0.0237*	-0.891**	214.2**	0.0115
		(0.0333)	(1.947)	(154.7)	(0.0137)	(0.0136)	(0.337)	(81.93)	(0.0220)
	No College Bus Intensity - Long Term	0.0497***	3.140***	419.1***	-0.0574***	0.0319**	1.346***	163.2***	-0.0631***
		(0.0123)	(0.627)	(61.40)	(0.0149)	(0.0118)	(0.370)	(33.66)	(0.0163)
	College Bus Intensity - Long Term	0.0267	-1.033	-80.35	0.0522***	-0.0972***	-2.472***	-436.8***	0.0277
		(0.0212)	(1.505)	(130.5)	(0.0183)	(0.0236)	(0.720)	(84.39)	(0.0445)
High Socio Coeff's	No College Bus Intensity - Short Term	0.117	10.35	1,467*	0.00935	-0.142**	-1.947	-430.4	-0.0214
		(0.0985)	(7.102)	(724.6)	(0.0451)	(0.0602)	(1.943)	(261.2)	(0.0755)
	College Bus Intensity - Short Term	0.00382	-5.276	-504.0	-0.0815	-0.0232	-1.636	-76.87	0.00774
		(0.0507)	(3.977)	(390.3)	(0.0566)	(0.0760)	(2.669)	(161.0)	(0.0542)
	No College Bus Intensity - Long Term	0.0289*	0.259	161.0*	-0.0296***	-0.00630	-0.738*	26.71	-0.0214
		(0.0150)	(0.812)	(90.53)	(0.00800)	(0.0201)	(0.373)	(66.60)	(0.0127)
	College Bus Intensity - Long Term	-0.00179	0.393	-51.79	0.0198**	-0.0245**	-0.118	-176.0***	0.0283
		(0.0124)	(0.714)	(62.36)	(0.00815)	(0.0116)	(0.338)	(42.36)	(0.0175)
	Number of Observations	2,352	2,365	2,386	2,370	1,791	1,811	1,814	1,804
	R-Squared	0.205	0.259	0.157	0.129	0.178	0.147	0.191	0.193
	Mean Dependent Variable (Pre-Treatment)	0.631	28.31	2129	0.146	0.186	6.353	529.4	0.250
	Town Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Individual Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column presents the coefficient estimate β_1-β_8 from equation (2). Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. Low (High) Socio Coeff's refers to coefficient estimates β_1-β_4 (β_5-β_8) from equation (2) that measure the effect of bus intensities for individuals from towns ranked 1-2 (3-5) in the CBS socioeconomic ranking - see Section 4 for details on the CBS socioeconomic town ranking. Short term refers to less than 2 years since the initial introduction of public transportation in one's town, whereas long term refers to 2 years or more since the initial introduction of public transportation in one's town. Standard errors clustered at the town level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Second, expanding public transportation may have a greater positive effect on men's opportunity cost of obtaining a higher education, as opposed to females', as Arab males' unskilled work opportunities are greater quantitatively and more diverse than those of Arab women.[31]

6.3 Differential Effects based on Traditionality and Time Elapsed Since Initial Public Transportation Penetration

We wish to examine whether our explanation for females' decreases in economic activity in response to more bus lines - as shown for some of the cases in Table 4 - can be corroborated by the data. If what is driving these negative responses is indeed a combination of a household income effect and social stigma associated with female labor force participation, then we should see a stronger negative effect among females residing in more traditional towns.

[31]For example, according to Gharrah (2016), in 2013, 43% of male Arabs employed in Israel were in the agriculture, manufacturing or construction sector, in comparison with 10% of female Arabs employed.

To characterize the role of tradition in Arab towns, we construct 4 measures using data from prior to 2008, when public transportation was introduced to our sample: the ratio of female-to-male driver license holders; the fraction of married females under age 30 that report marrying before age 18; the fraction of married females under age 40 that report an intra-family marriage (related to a cousin or closer); and the fraction of households that have a male household member age 19-35 with a cellphone but a similar-aged female household member without one.[32] We characterize towns as traditional if for at least one of the measures they exceeded the 85^{th} percentile for that year. This resulted in roughly 40% of our sample - or 15 out of 38 towns in our sample - to be characterized as traditional. We then construct variables that interact the intensity of the different types of buses and the dummies for the time elapsed since public transportation introduction with a dummy for an individual's town traditionality, thus enabling us to estimate the same regression specified in equation (2), only the differential effect is based on towns' traditionality rather than towns' socioeconomic status.[33]

Table 5 presents the results of this variation of equation (2). All 8 coefficients of interest are presented, with the addition of the coefficient on a dummy for traditionality at the household level.[34] As can be seen, household traditionality negatively effects all our outcomes of interest for females (and not males). At the bottom of Table 5, for each regression, the p-value is presented for a t-test of the difference between the coefficient estimates on *No College Short Term Traditional* and *No College Short Term Less Traditional.* In Table 5, these two coefficient estimates show the strongest and most consistent negative response among females that is not consistent with a tradeoff between work and higher education. The p-values for testing the difference between these coefficient estimates in regressions with labor force participation dependent variables range from 0.035 to 0.075, thus demonstrating that females from traditional towns are responding more negatively to non-college buses in the short-term than females from non-traditional towns, lending support to our explanation that this positive response is driven by social stigma concerning female labor

[32]With the exception of the drivers license sex ratio, which was made available to us at the town level for 2006 from the Israel CBS, all other measures were constructed using data from the Arab Survey for 2004 and 2007. For a young age at first marriage, we limit the females' age to 30 due to substantial differences in the age at first marriage across cohorts that are just 10 years apart, as the Arab population in Israel modernizes and females' age at first marriage steadily increases. Intra-family marriage trends among the Arab population in Israel are decreasing as well, although at a much slower pace, thereby allowing us to examine marriages of females up to age 40 and increasing precision at the town level with more marriages. The cell phone measure constructed was deemed most appropriate for capturing traditionality while neutralizing income effects that may also determine whether individuals in the Arab population have a cell phone.

[33]We note that theoretically we could also test for our hypothesis of an income effect and the young adult female being a secondary earner by checking whether the negative response is driven more by households where it is more pronounced that the young adult female is a secondary earner - i.e. households with more adults in them. However, in our sample only 7% of females reside in households with 3 or less adults (ages 18-60), thus not enabling us to capture this effect in a regression specification with differential effects.

[34]This variable equals one if the female's household satisfied at least one of the 3 measures discussed above - had at least one female household member under 30 who married before age 18 or under age 40 who was in an inter-family marriage, or had apparent discrimination towards a female household member in cell phone ownership. In our sample 37% of females are from traditional households based on this definition, 33% from non-traditional towns and 43% from traditional towns. It is interesting that regression specifications with differential effects based on traditionality at the household level, as opposed to the town level, resulted in mostly non-significant coefficient estimates (as in Table 3). When compared with the results from Table 5, this strengthens the notion that it is social stigma that is driving the negative effects, rather than just traditionality, as traditionality at the town level should drive responses to social stigma much more than traditionality at the household level - see reinforcement of this in Yonay et al. (2015), discussing the importance of neighbors as determinants of female labor force participation in the Arab sector in Israel.

force participation. This is also in contrast to the p-values for the same tests for males, which range from 0.23 to 0.83.

In terms of the other results in Table 5, for females we see less statistically significant responses, with the exception of the *No College Short Term* responses discussed above. This may suggest that for females an analysis with differential effects based on SE ranking is more appropriate than an analysis with differential effects based on traditionality. For males, many results support the findings in Table 4 - for example, males' responses to non-college buses both in the long and short term suggest a tradeoff between work and higher education,[35] or the increase in the probability of studying in response to college buses in the long term without corresponding decreases in labor force participation outcomes among males from both traditional and less traditional towns. However, the male short term college results are slightly different, with an increase in weekly hours among traditional towns and decreases in labor force participation outcomes among less traditional towns, which is consistent with a tradeoff between work and education but different from the results in Table 4 that show strong labor force attachment among males (as is shown in Table 5 in response to college buses in the long term).

7 Robustness Checks

7.1 Older Adult Population

Evidence of the tradeoff between work and educational attainment should only be relevant for the young adult population and not for the older adult population. We therefore ran the same regressions in equation (2) on all individuals aged 35-50 from our sample of 38 towns. Our dependent variables were the same work-related dependent variables as in the main analysis - whether the individual worked last week, usual weekly hours worked, and monthly salary.

The results of these regressions are presented in Table 6. Increases in the work-related dependent variables in response to public transportation measures make sense, considering that public transportation penetration can also increase labor force participation among older adults, in addition to its effect on younger adults. However, decreases in labor force participation in response to public transportation measures would be difficult to explain, as older adults should not face a tradeoff between work and investing in higher education. Indeed, most of the effects of public transportation penetration that are observed in Table 6 are either null or positive. One negative effect is observed, a decrease in low SE status males' monthly salary in response to no college buses in the short term. It is worth noting that for females from low SE ranked towns there are positive labor market responses for almost all outcomes in response to short term college and long term no college bus intensities. This suggests that older adult females are responding more than males to public transportation penetration in terms of labor market outcomes, although it is not clear why the response is

[35] Some of these coefficient estimates are only marginally statistically significant - the p-value for Worked *No College Long Term Traditional* is 0.13; the p-value for Studying *No College Short Term Traditional* is 0.15; the p-value for Monthly Salary *No College Long Term Traditional* is 0.11.

Table 5: Public Transportation Penetration - Differential Effects based on Bus Destination, Town's Traditionality, and the Time Elapsed Since Initial Public Transportation Introduction

	Dependent Variable	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying
			Males				Females		
Traditional Coeff's	No College Bus Intensity - Short Term	0.0313	6.606*	-208.0	-0.0734	-0.118**	-3.837*	-585.1**	-0.00157
		(0.0583)	(3.767)	(351.7)	(0.0503)	(0.0529)	(2.113)	(218.1)	(0.0942)
	College Bus Intensity - Short Term	0.0935*	-2.228	933.2***	0.0965**	-0.0186	-0.762	96.53	-0.0399
		(0.0534)	(3.810)	(159.3)	(0.0398)	(0.0495)	(1.777)	(202.1)	(0.0661)
	No College Bus Intensity - Long Term	0.0239	-0.385	141.4	-0.0180*	0.0301	0.198	118.6	-0.0419*
		(0.0153)	(1.389)	(86.54)	(0.00965)	(0.0205)	(0.563)	(88.91)	(0.0219)
	College Bus Intensity - Long Term	-0.00307	-2.249	-189.8	0.109***	0.0246	1.540	-56.97	0.0382
		(0.0404)	(3.011)	(299.7)	(0.0316)	(0.0371)	(1.544)	(174.5)	(0.0666)
Less Traditional Coeff	No College Bus Intensity - Short Term	0.0445***	2.066***	174.9***	-0.00910	-0.0199**	0.00409	-120.5**	-0.00807
		(0.0121)	(0.666)	(58.67)	(0.0127)	(0.00912)	(0.299)	(47.96)	(0.00939)
	College Bus Intensity - Short Term	-0.0590**	-4.455**	-139.6*	0.0257	0.0442***	-0.318	267.0***	0.0164
		(0.0268)	(1.706)	(76.93)	(0.0247)	(0.0149)	(0.543)	(76.28)	(0.0224)
	No College Bus Intensity - Long Term	0.0428**	1.165	276.6**	-0.0311***	-0.000620	-0.161	52.68	-0.0355**
		(0.0197)	(0.899)	(129.0)	(0.00659)	(0.0151)	(0.522)	(49.75)	(0.0164)
	College Bus Intensity - Long Term	-0.00413	0.736	4.406	0.0116**	0.0139	1.101**	-43.67	0.0140
		(0.0153)	(0.628)	(71.63)	(0.00518)	(0.0171)	(0.527)	(69.92)	(0.0139)
	Traditional Household	0.00244	1.287	-19.36	-0.0141	-0.0721***	-1.831**	-245.8**	-0.0702***
		(0.0215)	(1.229)	(110.1)	(0.0197)	(0.0260)	(0.862)	(90.82)	(0.0201)
	Number of Observations	2,352	2,365	2,386	2,370	1,791	1,811	1,814	1,804
	R-Squared	0.205	0.257	0.157	0.128	0.184	0.147	0.195	0.196
	Mean Dependent Variable (Pre-Treatment)	0.631	28.31	2129	0.146	0.186	6.353	529.4	0.250
	P-Value No College Short Term Traditionality Difference	0.827	0.225	0.300	0.195	0.0693	0.0748	0.0350	0.947
	Town Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Individual Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column presents the coefficient estimate β_1-β_8 from a variation of equation (2), with differential effects based town's traditionality rather than town's socioeconomic status. Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members, and household traditionality. Traditional (Less Traditional) Coeff's refers to the equivalent of coefficient estimates β_1-β_4 (β_5-β_8) from equation (2) that measure the effect of bus intensities for individuals from traditional (less traditional) towns. Short term refers to less than 2 years since the initial introduction of public transportation in one's town, whereas long term refers to 2 years or more since the initial introduction of public transportation in one's town. Standard errors clustered at the town level are in parenthesis. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table 6: Public Transportation Penetration and the Older Adult Population

	Dependent Variable	Worked Last Week	Weekly Hours Worked	Monthly Salary	Worked Last Week	Weekly Hours Worked	Monthly Salary
			Males			Females	
Low Socio Coeff's	No College Bus Intensity - Short Term	0.00416	1.956	-329.5***	-0.0118	-0.0661	-31.80
		(0.0183)	(1.333)	(107.3)	(0.0158)	(0.603)	(73.79)
	College Bus Intensity - Short Term	0.0309	-3.273	646.5**	0.0429**	-0.507	228.3**
		(0.0297)	(2.288)	(264.4)	(0.0170)	(0.925)	(90.13)
	No College Bus Intensity - Long Term	0.00619	2.311***	-121.3	0.0626***	2.526***	229.5**
		(0.0114)	(0.612)	(145.9)	(0.0166)	(0.532)	(96.79)
	College Bus Intensity - Long Term	0.0590**	-0.703	470.4	-0.0578	-1.737	-62.16
		(0.0240)	(1.263)	(433.6)	(0.0391)	(1.803)	(271.5)
High Socio Coeff's	No College Bus Intensity - Short Term	0.126*	-1.068	43.93	0.00660	-0.426	432.8
		(0.0697)	(4.079)	(1,229)	(0.0693)	(3.400)	(626.0)
	College Bus Intensity - Short Term	0.145**	5.162	1,956***	-0.00740	0.833	-285.8
		(0.0643)	(4.362)	(623.1)	(0.0673)	(2.921)	(334.0)
	No College Bus Intensity - Long Term	0.0154	0.726	287.7**	-0.00616	-0.615	84.27
		(0.0146)	(1.055)	(131.3)	(0.0168)	(0.686)	(75.86)
	College Bus Intensity - Long Term	0.0107	0.666	-79.50	-0.00676	0.0407	0.430
		(0.00975)	(0.539)	(189.8)	(0.0179)	(0.823)	(107.9)
	Number of Observations	1,665	1,638	1,671	1,731	1,742	1,744
	R-Squared	0.148	0.246	0.126	0.149	0.115	0.144
	Mean Dependent Variable (Pre-Treatment)	0.753	34.99	2603	0.174	5.697	525.6
	Town Fixed Effects	✓	✓	✓	✓	✓	✓
	Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓
	Individual Controls	✓	✓	✓	✓	✓	✓

Notes: Each column presents the coefficient estimate β_1-β_8 from equation (2). Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. Low (High) Socio Coeff's refers to coefficient estimates β_1-β_4 (β_5-β_8) from equation (2) that measure the effect of bus intensities for individuals from towns ranked 1-2 (3-5) in the CBS socioeconomic ranking - see Section 4 for details on the CBS socioeconomic town ranking. Short term refers to less than 2 years since the initial introduction of public transportation in one's town, whereas long term refers to 2 years or more since the initial introduction of public transportation in one's town. Standard errors clustered at the town level are in parenthesis. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

confined to particular bus types in the long and short run. The fact that the response to public transportation is among females from low SE-ranked towns rather than higher SE-towns may be due to much lower car ownership rates among females from low SE ranked towns.[36]

7.2 Placebo Analysis

In Table 7, we test for pre-existing trends in our outcomes of interest by using the same sample of individuals from our analysis, only excluding 2014, and for 2004, 2007, and 2010 observations, we assign bus intensities, as documented in our MOT bus line data for 2009, 2012, and 2015, respectively. We note that in 2010, many towns already had positive bus service measures in our data, but we still maintain that year in our analysis

[36]See footnotes 20 and 21 on lower private vehicle ownership rates and less females with driving licenses in low SE-ranked towns.

Table 7: Placebo Analysis - Assigning Bus Intensities Five Years Later for 2004-2010 Data

Dependent Variable	Worked Last Week		Usual Weekly Hours Worked		Monthly Salary		Currently Studying	
	Males	Females	Males	Females	Males	Females	Males	Females
				Placebo Results				
No College Bus Intensity	-0.0203	-0.0157	0.470	-0.541	31.59	-52.95	-1.13e-06	-0.00676
	(0.0123)	(0.0102)	(0.638)	(0.344)	(77.64)	(36.09)	(0.00484)	(0.0121)
College Bus Intensity	-0.0156	0.0122	-0.683	0.613	18.78	20.51	0.00735	0.0317
	(0.0240)	(0.0123)	(0.836)	(0.517)	(112.0)	(46.33)	(0.0132)	(0.0259)
Number of Observations	1,994	1,502	1,986	1,514	2,005	1,517	2,001	1,510
R-Squared	0.197	0.174	0.233	0.147	0.141	0.181	0.116	0.194
Mean Dependent Variable (2004-2007)	0.631	0.186	28.31	6.353	2129	529.4	0.146	0.250
				3-Year Analysis				
No College Bus Intensity	0.0300**	-0.00670	0.995	-0.224	186.7**	7.721	-0.0188**	-0.0175**
	(0.0127)	(0.0110)	(0.781)	(0.361)	(78.28)	(43.48)	(0.00802)	(0.00776)
College Bus Intensity	-0.0242*	0.0162	-0.492	0.752	-86.62	17.70	0.0305***	0.0207**
	(0.0133)	(0.0122)	(1.291)	(0.610)	(74.02)	(43.87)	(0.0110)	(0.00962)
Number of Observations	1,758	1,299	1,773	1,321	1,792	1,322	1,776	1,312
R-Squared	0.209	0.190	0.268	0.160	0.187	0.200	0.136	0.207
Mean Dependent Variable (Pre-Treatment)	0.628	0.158	27.51	5.585	2122	460.3	0.145	0.231
Town Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Individual Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column presents the coefficient estimate for α_1 and α_2 from equation (1) for regressions with either males or females for each dependent variable. Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. The placebo results (top panel) use 2004, 2007 and 2010 data and assign to individuals in these years 2009, 2012 and 2015 bus measures, respectively. The bottom panel uses the true bus intensity measures with 2007, 2010 and 2014 data. Standard errors clustered at the town level are in parenthesis. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

so that null effects will not be driven by a substantially smaller sample size without statistical power. In the top panel of Table 7, the placebo analysis is presented. In the bottom panel of Table 7, an analysis with the true bus intensity measures is presented with just 3 years of data - 2007, 2010 and 2014 - for the purpose of showing that the null effects observed in the top panel of Table 7 are not driven by lack of statistical power. Indeed, many of the results from Table 3 still hold in the bottom panel of Table 7.

7.3 Additional Robustness Checks

In the Appendix, we present results for three additional robustness checks: Expanding the sample for the regression analysis to all towns in the Arab Survey that did not have public transportation as of the end of 2007 (58 towns), rather than our limitation to treated towns that had at least one bus line during our sample period (Table 10). The results are quite similar; Adding to the regression specification in equation (2) an explanatory variable for the difference between the individual's interview date and the town's first interview date that year (Table 11). This controls for interview timing in the regression framework and the fact that the results remain is additional evidence (beyond the results in Table 2) that individuals' interview timings are not correlated with our treatment variables; Excluding districts from our regression analysis (Table 12) - this alleviates concern that our results are driven by a single district or a group of towns in close proximity to each other.

8 Concluding Remarks

Improving access to employment and higher education institutions for disadvantaged communities has received much priority in the past few decades, as this is expected to generate benefits economically, socially, and ethically in terms of equal opportunities. This study evaluates one policy measure - public transportation investment - and shows that it yields improvements in employment and educational attainment. Nonetheless, consideration of the tradeoff between investing in education and working for pay among young adults is essential in order to fully assess the impact of any policy measure expected to increase access to employment and/or education opportunities. In line with this, our results demonstrate that greater connectivity to work opportunities should be accompanied by greater connectivity to higher education as well - otherwise, the greater connectivity can backfire in terms of the long-run human capital investment decisions among the young adult population.

Our results additionally suggest that physical accessibility may not be the only factor inhibiting proper integration of females from traditional communities into the economy - traditional barriers may also play a role and overcoming them may take up to several years. It is therefore important to account for this when integrating greater access to work and higher education opportunities into traditional communities. An interesting avenue for future research is whether specific interventions can speed up this process.

We believe our results concerning the tradeoff between work and higher education can be relevant to numerous geographically segregated disadvantaged communities in many developed economies. Our results on the importance of traditional barriers to female labor force participation when increasing access to work and education opportunities may also be generalizable to communities in developing economies.

When compared to the costs of schooling and road infrastructure, or establishing mass employment centers within disadvantaged communities, the cost of public transportation seems rather minimal, especially if it is in terms of bus lines. Thus, public transportation may not only be effective in enhancing the welfare of disadvantaged communities but also cost-beneficial, especially when compared to numerous alternative policy measures.

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Table 8: Town List

Town Name	District	No College Bus Introduction	College Bus Introduction	2004 Obs	2007 Obs	2010 Obs	2014 Obs	2010 Interview Differenc e	2010 Difference in No College	2010 Difference in College Buses	2010 Sample Difference in No	2010 Sample Difference in College	2014 Interview Differenc e	2014 Difference in No College	2014 Difference in College Buses	2014 Sample Difference in No	2014 Sample Difference in College
Jaljulye	Central	Q3-4 2008	-	30		9	18	1	0.115	0.000	0.000	0.000	11	0.000	0.000	0.000	0.000
Kafar Bara	Central	Q3-4 2008	-	18	33	18	-	174	5.000	0.000	5.000	0.000	-	-	-	-	-
Kafar Qasem	Central	Q2 2011	-	21	57	28	8	1	0.000	0.000	0.000	0.000	5	0.000	0.000	0.000	0.000
Qalansawe	Central	Q3-4 2013	Q1 2010	20	45	46	20	4	0.000	0.729	0.000	0.000	6	0.000	0.429	0.000	0.000
Tayibe	Central	Q3-4 2013	Q1 2010	80	47	41	37	251	0.000	0.375	0.000	0.375	50	0.050	0.199	0.000	0.000
Tire	Central	Q3-4 2013	Q1 2010	78	128	32	38	5	0.000	0.611	0.000	0.000	23	5.738	0.369	0.000	0.000
Zemer	Central	Q3-4 2008	-		25	26	-	123	2.542	0.000	0.000	0.000	-	-	-	-	-
Ar'Ara	Haifa	Q3-4 2010	Q1 2014	46	25	40	-	64	0.531	0.000	0.000	0.000	-	-	-	-	-
Daliyat Al-Karme	Haifa	Q1 2011	Q1 2010	66	61	61	32	183	0.000	3.376	0.000	0.318	24	0.000	0.060	0.000	0.000
Jisr Az-Zarqa	Haifa	Q3-4 2013	-	40	28	11	24	6	0.000	0.000	0.000	0.000	1	0.292	0.000	0.000	0.000
Kafar Qara	Haifa	Q3-4 2010	Q1 2014	36	19	40	-	212	0.764	0.000	0.000	0.000	-	-	-	-	-
Ma'Ale Iron	Haifa	Q1 2013	-	86	26	19	20	2	0.000	0.000	0.000	0.000	2	0.000	0.000	0.000	0.000
Meiser	Haifa	Q3-4 2008	-	-	-	12	15	141	0.573	0.000	0.000	0.000	6	3.235	0.000	0.000	0.000
Umm Al-Fahm	Haifa	Q3-4 2010	Q3-4 2010	109	145	14	11	3	0.759	0.084	0.000	0.000	0	0.156	0.000	0.000	0.000
Abu Ghosh	Jerusalem	-	Q1 2009	-	26	-	16	-	-	-	-	-	35	0.000	0.000	0.000	0.000
Ein Rafa	Jerusalem	-	Q1 2009	-	33	-	14	-	-	-	-	-	1	0.000	0.000	0.000	0.000
Beit Jann	North	Q3-4 2008	-	41	32	-	28	-	-	-	-	-	6	0.000	0.000	0.000	0.000
Fassuta	North	Q1 2011	-	-	-	28	-	61	0.000	0.000	0.000	0.000	-	-	-	-	-
I'Billin	North	Q1 2010	Q1 2010	-	33	36	18	37	0.085	1.538	0.000	0.000	23	2.560	0.080	0.000	0.000
Iksal	North	Q3-4 2008	-	27	48	16	27	184	0.161	0.000	0.081	0.000	0	0.000	0.000	0.000	0.000
Judeide-Maker	North	Q1 2010	-	36	42	26	25	216	1.720	0.000	1.075	0.000	58	0.305	0.000	0.000	0.000
Julis	North	Q1 2010	-	-	-	30	-	7	2.931	0.000	0.000	0.000	-	-	-	-	-
Kabul	North	Q1 2010	Q3-4 2009	-	29	41	-	200	1.371	0.403	1.371	0.403	-	-	-	-	-
Kisra-Sumei	North	Q3-4 2008	-	-	23	39	-	9	0.000	0.000	0.000	0.000	-	-	-	-	-
Majd Al-Kurum	North	Q1 2009	Q1 2010	-	12	62	15	243	2.029	5.145	2.029	4.855	0	0.897	0.000	0.000	0.000
Muqeible	North	Q3-4 2008	-	33	-	-	12	-	-	-	-	-	51	0.000	0.000	0.000	0.000
Nahef	North	Q1 2010	Q1 2009	47	-	58	16	270	1.468	0.000	1.468	0.000	0	0.336	0.000	0.000	0.000
Peqi'In (Buqei'A)	North	Q3-4 2008	-	-	33	-	22	-	-	-	-	-	15	1.429	0.000	0.000	0.000
Sajur	North	Q3-4 2009	-	44	-	-	23	-	-	-	-	-	4	1.000	0.000	0.250	0.000
Sha'Ab	North	-	Q3-4 2009	35	38	34	-	49	0.000	1.167	0.000	0.000	-	-	-	-	-
Tuba-Zangariyye	North	Q1 2013	-	-	27	-	30	-	-	-	-	-	14	0.000	0.000	0.000	0.000
Yirka	North	Q1 2010	-	33	32	29	35	234	1.200	0.000	1.200	0.000	33	0.000	0.000	0.000	0.000
Ar'Ara-Banegev	South	Q3-4 2010	Q3-4 2010	47	54	29	35	69	1.811	0.472	0.000	0.000	0	0.000	0.000	0.000	0.000
Hura	South	Q2 2014	Q1 2008	-	41	27	38	49	0.000	0.800	0.000	0.000	2	1.809	0.160	0.000	0.000
Kuseife	South	Q1 2008	Q3-4 2009	-	46	32	21	30	0.747	0.345	0.000	0.000	13	0.215	1.344	0.000	0.000
Laqye	South	Q3-4 2010	Q3-4 2010	-	56	-	26	-	-	-	-	-	93	0.893	0.089	0.893	0.000
Rahat	South	Q2 2009	Q2 2009	79	138	109	54	183	0.000	0.000	0.000	0.000	79	0.166	0.083	0.166	0.066
Tel Sheva	South	-	Q3-4 2010	34	32	29	-	115	0.000	1.847	0.000	1.847	-	-	-	-	-

Notes: Total number of towns: 38. No College/College Bus Introduction is quarter during which the relevant type of bus was initially introduced. Interview Difference is the number of days between the first and last interview for that year in the sample. Obs is the number of males ages 18-30 and females ages 18-27 interviewed from that town in that year. Difference in Buses is the difference in bus frequency between the start and end of the year, while Sample Difference in Buses is the difference observe in the sample, due to differences in interview timing within towns.

Appendix

A List of Towns in the Sample

Table 8 provides a list of all 38 towns in our sample with information on when the different types of buses were initially introduced, the number of observations (males ages 18-30 and females 18-27) during each year and the differences in interview timing and bus penetration measures for 2010 and 2014, the years after the introduction of public transportation to the towns in the sample.

B Public Transportation and Town Characteristics

Table 9 tests for a correlation between town-level characteristics during 2003-2015 and our public transportation penetration measures. We run regressions with the migration/population composition variables (top

Table 9: Public Transportation and Town Characteristics

	Migration / Population Comoposition Dependent Variables						
Dependent Variable	Migration Balance (per 1K Residents)	Percent Age 0-19	Percent Age 20-44	Male Internal Migration (per 1K Residents)	Female Internal Migration (per 1K Residents)	Male Out Migration (per 1K Residents)	Female Out Migration (per 1K Residents)
End of Last Year All Buses	0.184	-0.0971	0.0809	0.0418	0.0920	-0.0307	-0.00779
Intensity (per 1K Residents)	(0.163)	(0.0708)	(0.0775)	(0.0664)	(0.0819)	(0.0347)	(0.0560)
Number of Observations	417	455	455	449	455	450	453
R^2	0.418	0.983	0.942	0.456	0.430	0.573	0.603
Mean Dependent Variable	1.011	48.48	35.46	3.011	5.172	2.601	4.811

	Other Town Characteristics Dependent Variables						
Dependent Variable	Infant Mortality per 1000 Births (Last 5 Years)	Mean Class Size Elementary School	Percent Graduating with Matriculation Certificate	Last Year Number Self Employed (per 1K Adults)	Private Cars (per 1K Adults)	Mean Age Private Cars	Accidents with Injuries (per 1000 Residents)
End of This Year All Buses	0.0847	-0.0612	-0.377	0.753	3.706	-0.0457*	-0.0130
Intensity (per 1K Residents)	(0.0870)	(0.104)	(0.321)	(4.421)	(2.916)	(0.0247)	(0.0120)
Number of Observations	333	417	401	414	402	454	425
R^2	0.769	0.480	0.611	0.191	0.899	0.534	0.510
Mean Dependent Variable	8.371	28.03	51	81.06	372.2	10.20	0.723

Notes: The sample period is 2003-2015. The towns are from our sample of 38 towns. Total number of towns varies based on dependent variable availability from 30 to 35. All Bus Intensity refers to the sum of No College and College Buses per 1000 residents. The top panel (migration dependent variables) coefficient estimate presented is for last year's bus intensity measure and the bottom panel (other town characteristics) coefficient estimate presented is for this year's bus intensity measure. All regressions include town and year fixed effects. Standard errors clustered at the town level are in parenthesis. Data source for town-level characteristics is Israel CBS. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

panel) or other town-level characteristics (bottom panel) as dependent variables and bus intensity measures as of last year or as of the current year, respectively, as the variable of interest, while controlling for town and year fixed effects. The choice of last year's versus the current year bus measures is to allow for testing for a delayed effect in terms of migration patterns as opposed to testing for correlations between current town characteristic and current bus intensity.

The results in Table 9 do not suggest a statistically significant correlation between bus intensity and town-level characteristics. Only one of 14 coefficient estimates presented is statistically significant at the 10% level. These results are reassuring, showing us that our results cannot be driven by migration responses across towns and that the timing of the introduction of public transportation and the changes in bus intensity measures is indeed random, while controlling for non-time-varying town characteristics through town-level fixed effects.

Table 10: Public Transportation Penetration and Labor Market and Schooling Outcomes - Including Towns without Bus Lines at the end of 2014

	Dependent Variable	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying
				Males				Females	
Low Socio Coeff's	No College Bus Intensity - Short Term	0.0335***	1.716**	66.87	-0.0171	-0.0132**	0.150	-114.6***	-0.00656
		(0.0117)	(0.679)	(66.43)	(0.0111)	(0.00631)	(0.236)	(42.83)	(0.00619)
	College Bus Intensity - Short Term	-0.0368	-4.414**	44.58	0.0527***	0.0277**	-0.706*	226.0***	0.0105
		(0.0303)	(1.815)	(136.1)	(0.0145)	(0.0135)	(0.366)	(84.12)	(0.0205)
	No College Bus Intensity - Long Term	0.0317**	1.006	284.5**	-0.0408***	0.0274***	0.868**	133.8***	-0.0463***
		(0.0158)	(1.276)	(120.2)	(0.0153)	(0.00966)	(0.384)	(31.19)	(0.0134)
	College Bus Intensity - Long Term	0.0207	-0.155	-2.190	0.0549**	-0.0776***	-1.861*	-375.1***	0.0250
		(0.0269)	(1.610)	(162.4)	(0.0215)	(0.0277)	(0.963)	(96.12)	(0.0466)
High Socio Coeff's	No College Bus Intensity - Short Term	0.0798	8.753	1,280*	0.0564	-0.113**	-1.327	-376.5	-0.00491
		(0.0917)	(6.442)	(655.7)	(0.0508)	(0.0558)	(1.826)	(267.5)	(0.0794)
	College Bus Intensity - Short Term	-0.0279	-6.071	-605.2	-0.0504	0.00466	-0.529	10.43	0.0242
		(0.0539)	(4.375)	(407.4)	(0.0688)	(0.0682)	(2.381)	(150.1)	(0.0477)
	No College Bus Intensity - Long Term	0.0187	-0.0316	140.6	-0.0201**	0.00243	-0.514	48.99	-0.0121
		(0.0156)	(0.769)	(87.52)	(0.00829)	(0.0212)	(0.470)	(66.36)	(0.0111)
	College Bus Intensity - Long Term	-0.0107	0.327	-52.43	0.0262**	-0.0144	0.173	-146.0***	0.0326*
		(0.0145)	(0.765)	(72.20)	(0.0102)	(0.0149)	(0.495)	(50.29)	(0.0186)
	Number of Observations	2,786	2,803	2,830	2,808	2,091	2,116	2,119	1,804
	R-Squared	0.198	0.253	0.156	0.126	0.180	0.147	0.191	0.193
	Mean Dependent Variable (Pre-Treatment, Treated Towns)	0.631	28.31	2129	0.146	0.186	6.353	529.4	0.250
	Town Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Individual Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column presents the coefficient estimates for $\beta_1$through $\beta_8$from equation (2) with the entire sample of towns in the Arab Survey that did not have bus lines serving them before 2008. Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. Standard errors clustered at the town level are in parenthesis. Number of towns in these regressions is 58. *** p<0.01, ** p<0.05, * p<0.1

C The Effect of Public Transportation on Labor Market and Schooling Outcomes - Including Towns that had no Bus Lines at the End of the Sample Period

Table 10 presents our regression results with the sample of towns that includes towns without bus lines at the end of 2014. As can be seen, the results are highly similar to the results in Table 4.

D The Effect of Public Transportation on Labor Market and Schooling Outcomes - Including Interview Timing as a Control Variable

Table 11 presents our regression results from equation (2) when the number of days between the individual's interview date and the town's first interview is controlled for in the regression analysis. As can be seen, the results are highly similar to the results in Table 4.

Table 11: Public Transportation Penetration and Labor Market and Schooling Outcomes - Including Interview Timing as a Control Variable

	Dependent Variable	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying	Worked Last Week	Weekly Hours Worked	Monthly Salary	Currently Studying
		Males				Females			
Low Socio Coeff's	No College Bus Intensity - Short Term	0.0376***	2.000***	133.9*	-0.0189	-0.0136*	0.0887	-116.7**	-0.00709
		(0.0131)	(0.725)	(74.58)	(0.0117)	(0.00713)	(0.235)	(48.93)	(0.00676)
	College Bus Intensity - Short Term	-0.0325	-4.045**	40.41	0.0519***	0.0255*	-0.735**	226.4**	0.00974
		(0.0332)	(1.844)	(165.2)	(0.0137)	(0.0130)	(0.325)	(84.02)	(0.0213)
	No College Bus Intensity - Long Term	0.0495***	2.837***	459.5***	-0.0584***	0.0287**	1.073**	141.6***	-0.0601***
		(0.0119)	(0.739)	(72.65)	(0.0161)	(0.0128)	(0.405)	(43.21)	(0.0159)
	College Bus Intensity - Long Term	0.0268	-0.882	-100.2	0.0527***	-0.0957***	-2.342***	-426.5***	0.0262
		(0.0210)	(1.459)	(134.8)	(0.0187)	(0.0233)	(0.718)	(84.76)	(0.0446)
High Socio Coeff's	No College Bus Intensity - Short Term	0.117	10.99	1,376*	0.0118	-0.132**	-1.038	-358.5	-0.0315
		(0.0982)	(6.957)	(723.6)	(0.0433)	(0.0586)	(2.136)	(275.1)	(0.0809)
	College Bus Intensity - Short Term	0.00370	-5.496	-483.0	-0.0820	-0.0238	-1.693	-81.28	0.00835
		(0.0510)	(3.927)	(376.0)	(0.0577)	(0.0724)	(2.361)	(156.7)	(0.0567)
	No College Bus Intensity - Long Term	0.0289*	0.302	155.3	-0.0295***	-0.00601	-0.713*	28.69	-0.0217
		(0.0151)	(0.736)	(92.37)	(0.00796)	(0.0202)	(0.367)	(67.60)	(0.0129)
	College Bus Intensity - Long Term	-0.00173	0.471	-61.84	0.0201**	-0.0237**	-0.0511	-170.8***	0.0275
		(0.0124)	(0.683)	(64.80)	(0.00835)	(0.0116)	(0.342)	(41.53)	(0.0175)
	Number of Observations	2,352	2,365	2,386	2,370	1,791	1,811	1,814	1,804
	R-Squared	0.205	0.259	0.158	0.129	0.179	0.149	0.192	0.193
	Mean Dependent Variable (Pre-Treatment)	0.631	28.31	2129	0.146	0.186	6.353	529.4	0.250
	Town Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Subdistrict-Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
	Individual Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Each column presents the coefficient estimates for $\beta_1$through $\beta_8$from equation (2) while controlling for the number of days between the individual's interview date and the town's first interview date for that year. Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. Standard errors clustered at the town level are in parenthesis. Number of towns in the sample is 38. *** p<0.01, ** p<0.05, * p<0.1

E The Effect of Public Transportation on Labor Market and Schooling Outcomes - Excluding Districts

Table 12 presents our regression results from equation (1) with a different set of towns (based on their district) excluded in each panel. The results for the most part remain quite similar to the results observed in Table 3.

Table 12: Public Transportation Penetration and Labor Market and Schooling Outcomes - Excluding Districts

Dependent Variable	Worked Last Week		Usual Weekly Hours		Monthly Salary		Currently Studying	
	Males	Females	Males	Females	Males	Females	Males	Females
				Excluding North				
No College Bus Intensity	0.0478***	0.0150	1.612**	0.231	268.2***	54.15	-0.0237**	-0.0321***
	(0.00616)	(0.00995)	(0.683)	(0.285)	(45.18)	(46.07)	(0.0106)	(0.00686)
College Bus Intensity	-0.0223**	-0.0305**	1.196	0.961*	-184.6**	-243.2***	0.0257	0.0336*
	(0.0103)	(0.0135)	(0.716)	(0.526)	(77.30)	(45.89)	(0.0156)	(0.0170)
Number of Observations	1,612	1,260	1,621	1,271	1,632	1,273	1,624	1,265
R^2	0.200	0.198	0.246	0.152	0.175	0.202	0.122	0.182
Mean Dependent Variable (Pre-Treatment)	0.634	0.185	28.96	6.361	2106	534	0.153	0.253
				Excluding Haifa				
No College Bus Intensity	0.0312***	-0.00708	0.575	-0.349	149.5**	4.451	-0.0216***	-0.0199***
	(0.0107)	(0.00948)	(0.641)	(0.320)	(60.06)	(39.31)	(0.00672)	(0.00657)
College Bus Intensity	-0.0153	0.0164	-0.224	0.706	-5.823	4.295	0.0252**	0.0178*
	(0.0133)	(0.0111)	(1.222)	(0.605)	(65.34)	(43.64)	(0.0113)	(0.0103)
Number of Observations	1,814	1,349	1,826	1,369	1,844	1,370	1,830	1,365
R^2	0.196	0.176	0.263	0.151	0.134	0.180	0.125	0.191
Mean Dependent Variable (Pre-Treatment)	0.640	0.178	28.31	6.042	2214	514.6	0.135	0.242
				Excluding Center & Jerusalem				
No College Bus Intensity	0.0253**	-0.00262	1.425**	0.0978	145.7**	-9.613	-0.0250***	-0.0176**
	(0.0100)	(0.0113)	(0.646)	(0.423)	(67.34)	(35.00)	(0.00716)	(0.00691)
College Bus Intensity	0.00860	-0.00729	-1.577	-0.675	65.12	-6.849	0.0421***	0.0207
	(0.0330)	(0.0182)	(1.832)	(0.622)	(132.5)	(64.24)	(0.0125)	(0.0210)
Number of Observations	1,755	1,404	1,767	1,419	1,786	1,422	1,771	1,413
R^2	0.206	0.162	0.255	0.136	0.176	0.184	0.132	0.190
Mean Dependent Variable (Pre-Treatment)	0.605	0.171	27.23	5.861	1997	491.9	0.149	0.244
				Excluding South				
No College Bus Intensity	0.0184	0.00308	-0.139	-0.545	131.2	62.61	-0.0159*	-0.0184
	(0.0145)	(0.0207)	(1.014)	(0.499)	(91.65)	(67.72)	(0.00874)	(0.0117)
College Bus Intensity	-0.0285***	0.0139	-0.886	0.342	-77.55*	26.49	0.0189*	0.0238**
	(0.0100)	(0.0106)	(1.169)	(0.577)	(45.23)	(43.90)	(0.0100)	(0.00934)
Number of Observations	1,875	1,360	1,881	1,374	1,896	1,377	1,885	1,369
R^2	0.219	0.182	0.253	0.153	0.148	0.188	0.119	0.203
Mean Dependent Variable (Pre-Treatment)	0.644	0.209	28.67	7.135	2192	576.6	0.148	0.260

Notes: Each column presents the coefficient estimates for $\alpha_1$and $\alpha_2$from equation (1). Each panel excludes towns from the district listed at the top of the panel. Control variables are the following: quadratic function of age, indicators for relation to household head, indicators for month of interview, number of household members. Standard errors clustered at the town level are in parenthesis. *** p<0.01, ** p<0.05, * p<0.1