The Elasticity of Labor Supply: Evidence from the Biblical Land of Israel

Nadav Ben Zeev* Ori Shai†

October 29, 2017

Abstract

The Bible-mandated Sabbath year, during which consumption of agricultural products produced in the Biblical land of Israel is prohibited by Jewish law, takes place every seventh year and applies only to some part of contemporary Israel. Utilizing an instrumental variable strategy based on the distance of localities from the Biblical land of Israel, we exploit this old Biblical rule and its temporary, anticipated nature to investigate the elasticity of labor supply. Using the 2008 Israeli Census, we show that during the Sabbath year income of workers in localities outside of the Biblical land of Israel is significantly higher than for those inside it. Further, in line with the neoclassical model of labor supply, we find that men's hours worked are higher for the former due to their increased income. However, we do not find an effect on labor force participation rates. Throughout the analysis we strengthen our findings by also using difference-in-differences identification strategy; conducting placebo analysis by examining labor market behavior of workers who are less likely to work in agriculture and thus to be affected by the Biblical rule; and showing that there were no differences in workers' incomes between localities inside and outside the Biblical land in the years before or after the Sabbath year.

JEL classification: J22

Key words: Sabbath year, labor supply, transitory income increase

*Corresponding author: Department of Economics, Ben-Gurion University of the Negev. P.O.B 653, Beer-Sheva 84105, Israel. *E-mail:* nadavbz@bgu.ac.il.

†Hebrew University of Jerusalem. *E-mail:* ori.shai@mail.huji.ac.il .

1 Introduction

"When you come to the land that I am giving you, the land must be given a rest period, a Sabbath to God. For six years you may plant your fields, prune your vineyards, and harvest your crops, but the seventh year is a Sabbath of Sabbaths for the land..."

Book of Leviticus 25

It has been a major concern in the public policy arena whether increasing workers' wages affects labor supply. Although many policy makers have tried over the years to increase workers' labor supply by setting different rules and applying various reforms, there is still a long lasting debate in the literature on the effects of increasing workers' remuneration on labor supply. Contributing toward resolving this debate on labor supply responsiveness can better our understanding of the effects of a multitude of economic forces, from labor-income tax policy changes through various other economic shocks whose propagation mechanism operates partly via labor markets (e.g., technology shocks).

In order to identify the elasticity of labor supply (both at the intensive and the extensive margin), this study takes advantage of an old Biblical rule, called Sabbath year, which prohibits farmers who reside within Biblical Israel from cultivating their land and selling their products every seven years to the Jewish orthodox population in Israel. Since the borders of Biblical Israel differ from those of contemporary Israel, farmers who reside outside of Biblical Israel are not affected by this old rule. Therefore, they are able to sell their products to a larger share of the Israeli population and to enjoy higher income levels. In other words, we identify the causal effect of a temporary, anticipated income increase on labor supply by using the income variation between localities inside and outside Biblical Israel during the Sabbath year.[1,2]

Importantly, there are two facts that render our research design particularly appealing and

[1]For more information on the official regulation visit:
http://www.moag.gov.il/en/Ministrys%20Units/Foreign%20Trade/Fruit%20and%20Vegetables%20Import%20on%20a%20Sabbatical%20Year%20(Shmita)/Pages/default.aspx.

[2]More information can be found in the media:
https://translate.google.co.il/translate?hl=en&sl=iw&u=https://www.themarker.com/1.2339015&prev=search;
http://www.haaretz.com/print-edition/features/fallower-than-thou-1.233480.

suitable for addressing our research question. First, the Sabbath year induced wage variation is transitory and anticipated, thus allowing us to ignore wealth effects and in turn focus on estimating the substitution effect of wage changes. (Specifically, the labor supply elasticity we are aiming at identifying in this paper is the Frisch elasticity of labor supply, i.e., the responsiveness of labor supply to wage changes keeping constant the marginal utility of wealth.[3]) Second, that farmers are mostly autonomous in terms of their ability to change their labor supply in response to wage fluctuations also makes possible and facilitates addressing our research question.

Our main results can be summarized as follows. First, over the course of the 2008 Sabbath year, incomes among localities outside Biblical Israel increased by 20% relative to localities inside Biblical Israel. Second, the results reveal that men's hours worked positively respond to increases in income from work: a 1% increase in earnings leads to a 0.23%-0.64% increase in hours worked. However, we do not find any effect on men's labor force participation rates nor on women's working behavior (neither on women's hours worked nor on women's participation rates). Throughout the analysis, we show that individuals did not select to reside outside the borders of Biblical Israel. This robustness check provides further support to the claim that the income change was truly exogenous, and that the results are not driven by changes in individuals' behavior just before the Sabbath year. Moreover, we show that there were no differences in income between localities inside and outside Biblical Israel before and after the Sabbath year of 2008, and that there were no socio-economic and demographic differences between men and women who reside outside and inside Biblical Israel. These robustness checks demonstrate that the Sabbath year was the true force behind the results rather than non–Sabbath year related differences in income or generic differences in socio-economic conditions between the affected and the non-affected workers.

There are two competing theories that try to explain workers' behavior in response to tran-

[3]Given that this elasticity is a micro-founded structural parameter, various works have attempted to estimate this elasticity by fitting structural models to both micro data (see, e.g., Heckman and Macurdy (1980), Heckman and MaCurdy (1982), Blundell et al. (1993), Ziliak and Kniesner (2005), French (2005), Kimball and Shapiro (2008), and Blundell et al. (2016)) as well as macro data (see, e.g., Prescott (2002), Ohanian et al. (2008), and Chetty et al. (2011). Below we discuss in detail the literature that has tried to use more reduced-form, model-free identification approaches to identifying this elasticity, which we view as being more comparable to our approach.

sitory income changes. Kahneman and Tversky (1979) argue that individuals have reference-dependent preferences. Therefore, it is possible that workers will choose to work until the reach a certain level of income. By contrast, in the standard neoclassical inter-temporal model of labor supply, a transitory positive income change should lead to an increase in labor supply. Hence, in addition to being crucially important from a policy-making standpoint, pinning down labor supply elasticity is also vital from an intellectual curiosity standpoint as it can help researchers choose between these two contrasting, competing theories.

According to the neoclassical inter-temporal model of labor supply, a wage increase induces a substitution effect by which an economic agent desires to substitute leisure for work, thereby positivity affecting labor supply. However, the main empirical difficulty in estimating this relationship is that the wage increase may affect individuals' wealth by increasing their lifetime earnings (income effect). As such, if non-working activities (e.g., leisure) are normal goods, the wage increase may have a negative impact on working behavior (along both the intensive and the extensive margin). Thus, in order to reveal the substitution-induced impact of a wage increase on labor supply, the income change must be transitory.

In previous years, researchers have tried to address this concern by controlling for the wealth effect throughout estimations (see, e.g., Altonji (1986)). However, it is still not clear whether these strategies truly purged the wealth effect of the estimated elasticities. Recently, a few studies have investigated the effect of a transitory wage increase on labor supply. However, the empirical results and findings are still mixed. Camerer et al. (1997) and Chou (2002) study the daily labor supply of New York and Singapore taxicab drivers, respectively, and reveal that cabdrivers tend to work fewer hours on high-wage days. Farber (2005) finds that daily income has only a small effect on the decision of taxi cabdrivers to stop working. The author argues that the decision to stop working is substantially related to the cumulative hours of work to that point.

More recently, Fehr and Goette (2007) conduct a field experiment using bicycle messengers in Zurich, Switzerland. In their study, the bicycle messengers were free to choose working hours and effort per hour. The authors find a positive effect of wage increase on hours worked, but a negative

effect on effort per hour. The authors argue that workers' loss aversion contributes significantly to the negative effort elasticity. Farber (2008) shows that taxi cabdrivers stop working when they reach their income target level, in accordance with reference-dependent preferences theory. Crawford and Meng (2011) use the datasets from Farber (2005, 2008) and find that reference-dependence is the main force driving the results in Farbers studies. Doran (2014) finds the New York City taxi drivers decrease their hours worked in response to a short term wage increase, but do not respond to a long term wage increase. Stafford (2015) studies the daily labor supply of fishermen in Florida using the moon phase as an instrument for wage. The author finds that hours worked increase when earnings are temporary higher. Recently, Farber (2015) uses all trips taken in New York city taxicabs during the years of 2009 to 2013 and finds that cabdrivers responds positively and increase their hours of work in response to both anticipated and unanticipated increases in income. Therefore, the author rejects the reference-dependent model. Finally, using non-parametric methods, Thakral and Tô (2017) estimate the effect of daily earnings of New York cab drivers on their labor supply. The authors analyze all cab fares in New York during 2013, and conclude that in contrast to the neoclassical labor supply model, cab drivers are more likely to stop working when the cumulative daily earnings are higher.

Most of the aforementioned papers focus on the intensive margin (hours of work). Other studies identify the effect of income shocks on whether to work at all (the extensive margin). Oettinger (1999) analyzes the labor supply behavior of food and beverage stadium vendors during one baseball season. Using game attendance as an instrument for wage, the author finds a substantial positive labor supply elasticity in the 0.55-0.65 range. Goldberg (2016), using data from rural Malawi, conducts a field experiment and estimates whether unexpected transitory income shocks affect the probability of accepting employment on particular day. The author reveals that the labor supply extensive margin elasticity is low (approximately 0.15). Gin et al. (2017) analyze the extensive margin of labor supply decisions of boat owners in south India. By exploiting exogenous wage changes (e.g., lunar calendar, variation in internationally determined prices of fish, and the price of intermediate inputs), the authors find that labor participation is positivity affected

by expected earnings. In particular, their estimated labor supply elasticities range between 0.8 and 1.3.

The above literature suffers from four main limitations, which to our knowledge are not wholly overcome by any one study. The first is that using permanent income changes while controlling for the wealth effect throughout estimations may not effectively purge the wealth effect of the estimated elasticities. The second is that focusing exclusively on the intensive margin is insufficient; individuals may decide also to join the labor market or to postpone their retirement decision in response to an income change, rendering it important to also study the impact of income change on the extensive margin. The third is that conducting controlled experiments to reveal the impact of a transitory wage increase on labor supply could be problematic given that it is difficult to generate a realistic labor market environment in an experiment. The last limitation is that some of the instrumental variables used in literature (e.g., average hourly earnings of other workers) may be correlated with individuals' unobserved characteristics that may affect their working behavior.

In this study, we make a step forward in addressing these four issues and contribute to the literature in four substantial ways. First, we take advantage of an old Biblical rule, one that targets a substantial part of the Israeli population which has similar characteristics to those of other cohorts. Second, to the best of our knowledge, this study is the first to exploit a Biblical rule in its identification strategy. Third, most of the previous studies use data sources that were targeted at a specific local population (New York cab drivers, food and beverage vendors at a single baseball stadium, etc.). In this study, the main data source comes from the Israeli 2008 Integrated Census which provides information on all the localities in Israel and combines data from administrative sources and from samples collected in surveys.[4] Fourth, since our study focuses on a developed country, the affected group largely has full access to credit markets which in turn enables our paper to produce finding with valuable implications for labor market policies that can be implemented in other developed countries as well. Moreover, the income change is not associated with any work efforts, and in contrast to other studies that had short time study periods, the period of

[4]For more detailed information on the Israeli 2008 Integrated Census visit: http://www.cbs.gov.il/census/census/pnimi_page_e.html?id_topic=7.

study in our paper lasts for an entire year.

The remainder of the paper is organized as follows. Section 2 describes the Sabbath year and the Biblical land of Israel. We introduce the data in section 3. In Section 4 we outline the econometric identification strategy. The results and some robustness checks are discussed in Section 5 and we conclude the analysis in Section 6.

2 The Sabbath Year and the Biblical Land of Israel

According to Jewish tradition, every seventh year the land of Israel must be left alone and get a rest period for one year during which all agricultural activity (e.g., planting, harvesting, etc.) is prohibited. Importantly, these restrictions also prohibit the consumption and sale of agriculture products that were cultivated within the borders of the Biblical land. (Nowadays, the main economic implication of the Sabbath year is that it prohibits the religious Jewish population, which makes up about 20% of Israel's population, from the consumption of agricultural products grown inside Biblical Israel.[5])

This old rule which is called the Sabbath year (in Hebrew Shmita) is mentioned a few times in the Bible,[6] and it is still observed by ultra-orthodox Jews in the contemporary state of Israel these days.[7] The most important issue of this old, Biblical rule and most relevant to our context lies in the distinction between Biblical and contemporary Israel. I.e., the Biblical land of Israel differs in its borders from contemporary Israel, due to which farmers who reside outside the borders of Biblical Israel do not face any obstacle to selling their agricultural products. Therefore, during the Sabbath year these farmers experience higher income rates relative to farmers who reside within the borders of Biblical Israel.

Figure 1 depicts the geographical spread of Israel's districts. According to the Jewish law, the HaArava district (which is located below the Dead Sea) is defined as the area outside Biblical

[5]Source: Israel Central Bureau of Statistics 2007 report entitled 'Characterization of the Jewish Population by Level of Religiosity Based on Linkage to Educational Institutions'.

[6]In the books of Exodus, Leviticus, Deuteronomy, etc.

[7]In general we refer to religious Jews as ultra-orthodox Jews.

Israel, while all other districts are defined as the area inside Biblical Israel.[8,9] Importantly, since the Sabbath year mainly affects farmers, this paper focuses on Israel's districts; these districts contain only rural localities where all the Israeli farmers reside.

The average income in 2008 for districts within and outside Biblical Israel is presented in Figure 2. The figure shows that the average income in the HaArava district (the treated group, depicted in solid outline) which is located outside Biblical Israel, is higher by approximately 20% relative to districts that are located within Biblical Israel (the control groups, depicted in dashed outlines). In sum, the figure reveals that the Sabbath year has a substantial economic impact, whereby localities that were not affected by the Biblical rule experienced higher incomes compared with the affected localities.

One should bear in mind that Israel's size is relatively small.[10] Thus, it is less likely that the treated and the control districts are differently exposed to economic factors such as tourism, recessions, etc. Notwithstanding this reasonable assumption, throughout the paper we use different ranges of distances from the border of Biblical Israel to assess our findings.

3 Data

In order to identify the effect of a transitory income increase on labor supply, we use the 2008 Israeli Integrated Census that combines data from administrative sources and from samples collected in surveys. The census contains locality-level information on employment, socio-economic conditions and other demographic characteristics of all the localities in Israel. The 2008 Israeli Census sampled 20% of the Israeli population (which was approximately 7.3 million people in 2008) through personal interviews combined with administrative data from the population registry. Since localities with a population size of less than 300 are fully sampled, more than 40%

[8] HaArava district is also called Arava in some publications.

[9] For more information on the official regulation visit:
http://www.moag.gov.il/en/Ministrys%20Units/Foreign%20Trade/Fruit%20and%20Vegetables%20Import%20on%20a%20Sabbatical%20Year%20(Shmita)/Pages/default.aspx.

[10] According to the CIA's fact book, Israel's size is slightly larger than New Jersey, which is the fourth smallest state in the U.S.

of the HaArava district (our treated group, which contains 7 relatively small localities) was sampled.[11] The Israeli population census was conducted in 2008, and since the penultimate Sabbath year was also observed in 2008, it provides us with a unique opportunity to identify the impact of a transitory income increase on labor supply.

As previously mentioned, during the Sabbath year, a substantial part of the Israeli population does not purchase agricultural products that were cultivated within Biblical Israel. Since Israeli farmers reside within rural areas, we focus our analysis on all the rural localities in Israel. Each rural locality/community contains approximately 850 people who live in individual farms, which are called in Hebrew Kibbutzim or Moshavim. Note that during the 1990's most of the Kibbutzim became private and each one of their members earns his own income and pays his own costs.[12,13]

Importantly, farmers who are self-employed can allocate their time between working and leisure and decide whether to continue working or to retire. During the Sabbath year of 2008, third of the workers in the HaArave district, were self-employed. Since these workers can determine their labor supply in response to a transitory income increase, the effect of the Sabbath year is potentially prominent.

The 2008 Israeli census contains data on hours worked and labor force participation rates (defined separately for men and women for every rural locality in Israel), but it does not have information on incomes. However, since each locality is located within a specific district, we merge each locality with district-level administrative information on income and other socio-economic and demographic characteristics taken from the Central Bureau of Statistics (CBS) Local Authorities in Israel dataset.[14] See Appendix A for more details on the variables used in our analysis.

Table 1 displays summary statistics for the 2008 Israeli Census. Panel A of Table 1 shows that the average income in rural districts in Israel is NIS 7,538. On average, in each rural locality 25

[11] For more information on the Israeli 2008 census visit: http://www.cbs.gov.il/census/census/main_mifkad08_e.html .

[12] See Ebenstein et al. (2015) for more information on the process of privatization in the Kibbutzim.

[13] Each member of the Moshavim (and nowadays in most of the Kibbutzim) is a private entity. Namely, each member is responsible for his own costs and expenses.

[14] Our data on districts' income is taken from here: http://www.cbs.gov.il/reader/?MIval=cw_usr_view_SHTML&ID=446.

percent of all people hold an academic degree. The average men working week is 46 hours, while women average workweek is only 35 hours. Men's labor force participation rate is 73 percent, whereas women's labor force participation rate is only 68 percent. There is a mean distance of 229 kilometers separating rural localities from the borders of Biblical Israel, and 59 percent of the rural localities' population is between the age of 18 and 64.

Panels B-D display similar results using localities with smaller distance ranges from the border of Biblical Israel. As can be seen, the locality-level characteristics remain similar when we limit the distance from the border of the Biblical Israel.[15] In particular, the main key variables: average income, men's employment rates and men's working week, remain almost the same when using different borders from the HaArava district, suggesting that we can use localities that are located within various ranges from the borders of Biblical Israel as control groups in the upcoming analysis. (Part of the agriculture workers in Israel are foreign; therefore, they are not included in our datasets.)

Finally, it is important to stress that we also examine labor force participation rates (in addition to hours worked) because farmers can decide whether to continue working, re-enter the labor market or to retire. Thus, is it also important to examine labor force participation in response to a transitory income increase. Notably, in the following sections we will separate the analysis to men and women, since 81% of the agriculture labor market in Israel is composed by men.[16]

4 Identification Strategy

We aim to estimate the effect of a transitory income increase on labor supply. Therefore, our basic econometric model is:

$$LS_j = \alpha_0 + \alpha_1 Income_s + \alpha_2 X_j + u_j, \tag{1}$$

[15]We use the 280 kilometer as the smallest range from the border of the Biblical Israel because there are some Bedouins localities within smaller ranges which may differ in their characteristics from the HaArava localities.

[16]This statistic appears in Figure E-4 of this CBS document:
http://www.cbs.gov.il/www/statistical/mw2013_e.pdf.

Where LS_j represents either average hours worked or labor force participation rates in locality j separated for men and women; $Income_s$ is the average income in district s; X_j is a vector of locality-level control variables that includes: establishment year, the proportion of people that holds an academic degree and the proportion of people between the age of 18 and 64 in locality j (presented in Table 1); and u_j represents unobservable characteristics of locality j.

One could proceed by estimating Equation (1) via OLS. The possible drawback of such an approach is that locality labor supply probably affects average locality income. Moreover, income might be correlated with unobserved locality characteristics (e.g., economic conditions) that also affect labor supply. Therefore, OLS estimate of α_1 would likely to be inconsistent.

We address this concern by exploiting the old Biblical rule (Sabbath year) as an instrument variable. Toward this end, we define the border of Biblical Israel as the threshold and construct an instrument variable for income as follows:

$$Z = \begin{cases} 1, & \text{if locality j is located outside the Biblical land,} \\ 0, & \text{otherwise.} \end{cases} \tag{2}$$

I.e., the instrument is an indicator variable that receives the value 1 if locality j is located outside Biblical Israel (in the HaArava district) and zero otherwise. Importantly, throughout all estimations we control for the distance of the localities from the borders of Biblical Israel. Thus, our econometric method can be considered as a regression discontinuity design.[17,18] Controlling for the distance from the borders of Biblical Israel accounts for the differences between the treated and the control localities (e.g., weather, pollution, labor market characteristics, etc.). Moreover, throughout estimations we provide several robustness checks by limiting the distance from the border of Biblical Israel.[19]

[17]See Lee and Lemieux (2010) for more information.

[18]I.e., the distance from the borders of Biblical Israel is the running variable in our econometric specification.

[19]Importantly, one may argue that our instrumental variable identification strategy should control for different effects on both sides of the cutoff (the border of Biblical Israel). However, there is no reason why localities in the HaArava district would be affected differently by the Sabbath year. The impact variation of the Sabbath year appears only in localities inside the Biblical land, therefore, throughout all estimations we

The identifying assumption is that there is no other factor that affected the treated group's (localities in the HaArava) working behavior in 2008 other than the income change. We will support this claim by showing below that there were no other discrete changes rather than the income change. Moreover, previous studies acknowledged the concern of "division bias". However, using the borders of Biblical Israel as an instrumental variable addresses this issue.[20]

One should notice that the unit of measure in our analysis is the locality-level. The focus on the locality-level is necessary, since our identification strategies rely on the distance of each locality from the border of the Biblical Israel. Thus, we are interested in placing similar emphasis on each locality rather than to be affected by the number of observations in large localities. Moreover, the focus of the analysis on measures at the locality-level is in line with some of the recent literature (e.g., Goldberg (2016)).

We end this section with an important comment on the interpretation of our estimated labor supply responses. As previously explained, throughout the analysis, we use localities within the Biblical land as the control group. These localities were affected indirectly by the Sabbath year and experienced a decrease in their income relative to the income increase outside the Biblical land (since many ultra orthodox Jews avoid purchasing agricultural products that were cultivated inside the Biblical land). As such, our identification strategy captures the entire effect of the income increase in localities outside the Biblical land on hours of work relative to localities inside it.

5 Results

5.1 First Stage Results

We aim to identify the causal effect of a transitory income increase on men's labor supply by exploiting the old Biblical rule as an instrument variable for income. For this econometric approach to succeed, a strong correlation must exist between the instrument described above and income,

control the distance from the HaArava district using the KM variable.

[20]See the discussion in Farber (2005).

the endogenous explanatory variable. Table 2 demonstrates that this is indeed the case, with F-statistics in the First Stage regressions exceeding 10 (Staiger and Stock (1997)).

These findings justify the use of this instrument to estimate the causal effect of income on labor supply. Moreover, as can be seen in Panels A through D of Table 2, our results do not change when we limit the sample size to localities within smaller distance ranges from the borders of Biblical Israel. The robustness of the results to the use of different distance ranges, and to the inclusion or exclusion of several control variables shows that our main findings are not due to the treatment variable being correlated with observable factors that affect income.

5.2 Intensive Margin

OLS versus 2SLS Results. Table 3 presents the estimated effects for Equation (1) from OLS and 2SLS for men. In this analysis we compare the treated group (localities outside Biblical Israel) with localities inside Biblical Israel within different distance ranges from the borders of Biblical Israel, while controlling for the distance from the borders in the regressions. As can be seen in the table, the OLS coefficients are positive and range between 0.03 and 0.06, but only one of them is statistically significant at acceptable levels. Importantly, the OLS estimates do not take into account the fact that individuals' hours worked may affect their earnings, or that other factors may affect individual's hours worked and also their earnings (i.e., the endogeneity problem).

The 2SLS analysis addresses this concern and reveals that higher income increases men's hours worked as indicated by the statistically significant 2SLS coefficients. Specifically, the 2SLS coefficients range between 0.23 and 0.64, suggesting that a 1% increase in earnings leads to a 0.23%-0.64% increase in hours worked. In addition, that the coefficients are similar across estimates reinforces the validity of using the borders of Biblical Israel during the Sabbath year as an instrument variable for earnings. Moreover, the robustness of the results to the use of different distance ranges shows that our main findings are not due to the control group that was used. (Importantly, although not shown, similar results were obtained when other distance ranges from the borders of Biblical Israel were used, including ranges that are smaller than the 280 km range.)

One may argue that since hours worked decrease with age, we should not expect to find an impact of income on hours worked among localities with a considerable elderly population share. Therefore, we divide the sample into two subcategories. Panel A of Table 4 shows that in localities where the percentage of men aged 18 to 64 is higher than the first quartile, the 2SLS estimate is statistically significant and its sign and magnitude are large. By contrast, as can be seen in Panel B of Table 4, in localities where the percentage of men aged 18 to 64 is lower than the first quartile the 2SLS estimate is statistically insignificant and negative, suggesting that income does not impact men's hours worked among relatively old populations. These findings reveal that income positively affects hours worked among relatively large working age populations. As expected, labor supply does not respond when we restrict the sample to localities where income plays a smaller role in changing hours worked. These results reinforce our previous findings that the Sabbath year affects hours worked through the income increase rather than a spurious difference in overall hours worked.

It is possible that the effect of the transitory income increase on hours worked would be more prominent among the less wealthy individuals. Since we lack data on financial assets, we use the proportion of people who own a home as a proxy for locality's wealth. Panel C of Table 4 reveals that the 2SLS estimate is statistically significant and its sign and magnitude are large in localities where the proportion of people who own a home is lower than the first quartile. By contrast, as can be found in Panel D of Table 4, the 2SLS coefficient for wealthy localities is statistically insignificant, indicating that the transitory income increase does not affect hours worked of relatively wealthy men. As we would expect, these results suggest that the transitory income increase is more likely to impact men whose paid work plays a substantial part of their earnings.

As previously explained, throughout estimations we control for the linear distance term (KM), which represents distance from the border of Biblical Israel. However, following Gelman and Imbens (2014), one may argue that we should control for second order polynomials as well. Panel E of Table 4 presents the estimated effects of Equation (1) when adding a quadratic term for the distance variable. As can be seen, the 2SLS results remain the same, i.e., there is a positive effect of

an income increase on hours worked. The robustness of the results to the inclusion of high order polynomials indicates that our main findings are not due to the chosen econometric specification.

One may raise the concern that the structure of the labor market differs between localities and that this in turn may bias our results. To alleviate this concern, we examine whether the results remain the same when controlling for the proportion of people who work in the industry sector. Panel A of Table B.1 reveals that the 2SLS estimates remain the same when controlling for labor market characteristics. These results suggest that our findings do not stem from differences in labor market conditions.

Alternative Identification Strategy: Difference-in-Differences. Our previous analysis and findings rest on the assumption that, after controlling for the distance from the borders of Biblical Israel, localities outside and inside Biblical Israel are very similar to one another. However, if this assumption does not hold, our previous findings are spurious.

Therefore, we employ a difference-in-differences identification strategy, in which we compare labor supply behavior (at the intensive and extensive margin) between men who reside inside and outside the HaArava district. As previously mentioned, during the Sabbath year, the HaArava district experiences a wage increase relative to all other districts because HaArava farmers are not prohibited from selling their products to ultra-religious consumers. Since 81% of the agriculture labor market in Israel is composed by men (see Footnote 16), we expect that men who reside outside Biblical Israel change their working behavior during the Sabbath year relative to men inside the Biblical land (because their income is relatively higher). In this specification, men who reside in the HaArava served as the "after treated", while men who reside outside the HaArava as the "before treated". By contrast, women are only 19% of the people who work in the agriculture sector and are also less likely to be self-employed;[21] therefore, women who reside outside and inside Biblical Israel should not be affected by the Sabbath year and are thus served as the control

[21]Only 30% of the self-employed are women, which in turn makes them less likely to change their labor supply in response to an income shock. For more information, please see: http://adva.org/wp-content/uploads/2015/02/%D7%A2%D7%A6%D7%9E%D7%90%D7%99%D7%9D-%D7%90%D7%A0%D7%92%D7%9C%D7%99%D7%AA-11.pdf.

group.

In other words, using women as a control group would capture any difference in labor market conditions and habits between localities inside and outside the Biblical Israel (e.g., labor market regulations, working conditions, etc.). This identification strategy would be valid only if men and women who reside outside the Biblical land are very similar to men and women who live inside the Biblical land (respectively) along various non-income related dimensions. Panel A of Table 5 demonstrates that this is indeed the case. The various socio-economic control variables (the proportion of men and women who hold an academic degree, men and women median age, etc.) are very similar for men who reside inside and outside Biblical Israel. Similar results hold for women. Thus, Panel A of Table 5 indicates that we can compare between men (women) who reside inside the HaArava to men (women) who reside outside the HaArava.

Specifically, the goal in this part of the analysis is to compare the difference between hours worked of men who reside outside and inside Biblical Israel with the corresponding difference in hours worked of a control group that is less likely to be affected by the Sabbath year (e.g., women). Thus, we employ a difference-in-differences identification strategy as follows:

$$LS_{j,m} = \alpha_1 + men_m + HaArava_j + \alpha_2 DiD_{j,m} + \alpha_3 X_{j,m} + v_{j,m}, \tag{3}$$

Where $LS_{j,m}$ measures the labor supply for men or women in locality j (hours worked or participation rates); $HaArava_j$ is an indicator variable for whether locality j is in the HaArava district, i.e., this variable accounts for the differences between localities inside and outside the HaArava district; and $DiD_{j,m}$ is an indicator variable for whether group m are men who reside in the HaArava district. Throughout estimations we control for men fixed effects (men_m) which accounts for the differences between men and women. The $X_{j,m}$ captures locality-specific characteristics such as: the proportion of people between aged 18 and 64, the proportion of people who hold an academic degree and establishment year (presented in Table 1). The $v_{j,m}$ represents the error term. Our main interest is in the α_2 coefficient which captures the causal effect of a transitory income increase on labor supply as a result of the Sabbath year.

Panel B of Table 5 displays the difference-in-differences results using Equation (3). As previously explained, the difference-in-differences analysis compares the difference between hours worked of men who reside outside and inside Biblical Israel and the corresponding difference for a control group that is less likely to be affected by the Sabbath year (i.e., women in all the localities). According to the difference-in-differences estimates, the difference between hours worked of men who reside outside and inside Biblical Israel with the corresponding difference in women's hours worked is significantly positive during the Sabbath year. I.e., the Sabbath year generates a significant increase in hours worked of men residing outside Biblical Israel relative to all other men and women. The results remain the same when we add different control variables and limit the range from the border of the Biblical Israel. The robustness of the results to the use of different distance ranges and to the inclusion of several control variables shows that our main findings are not due to the treatment variable being correlated with other factors that affect working behavior.

5.3 Extensive Margin

We now turn to estimating the effect of a transitory income increase on labor force participation rates using our baseline 2SLS identification approach and the difference-in-differences identification strategy.

OLS versus 2SLS Results. To estimate the effect of a transitory income increase on labor force participation rates, we use Equation (1) above and replace the hours worked outcome variable with labor force participation rates from the 2008 Israeli Census. As can be seen in columns (2) and (4) of Table 6, the 2SLS coefficients are statistically significant and positive suggesting that participation rates are positively associated with an income increase. However, using smaller distance ranges from Biblical Israel (as can be seen in Columns (6) and (8) of Table 6) results in the 2SLS coefficients sharply decreasing and becoming statistically insignificant, suggesting that a transitory income increase does not affect labor supply on the extensive margin. By and large, it is apparent that the results from Table 6 are not conclusively consistent with the hypothesis that a

transitory income increase affects participation rates.

Difference-in-Differences. We conduct a similar analysis to that applied to hours worked but we use instead labor force participation rates as our outcome variable. As previously explained, we compare participation rates between men who reside outside and inside Biblical Israel, against a control group that is less likely to be affected by the Sabbath year (e.g., women in all the localities). Panel C of Table 5 presents the difference-in-differences estimates and reveals that the Sabbath year does not affect labor force participation, as indicated by the statistically insignificant difference-in-differences coefficients. I.e., a transitory income increase does not affect labor supply on the extensive margin.

The results remain the same when we use different distance ranges from the border of Biblical Israel and control for different confounding factors throughout estimations, reinforcing our findings that there is no substantial impact of an income change on participation rates among men. Overall, taken together, the results from the 2SLS and difference-in-differences analysis are consistent with the hypothesis that a transitory income increase does not affect labor force participation rates.

5.4 Robustness Checks

Placebo Tests. Up to now, we have assumed that there were no additional factors that affected the treated group's (the HaArava district) labor supply in 2008 other than the income change. However, one may wonder whether the increase in men's workweek stems from the effect of the Sabbath year income change, or from differences in unobservable characteristics between localities inside and outside the Biblical land. In order to address this concern, we estimate the effect of an income change on women's labor supply (i.e., hours worked and participation rates) using the borders of Biblical Israel as an instrument for income. The assumption underlying this estimation is that the Sabbath year income change would not affect women's labor supply since women are less likely to work in the agriculture sector.

Table 7 shows that this is indeed the case, as indicated by the statistically insignificant 2SLS coefficients. Using different distance ranges from the border of Biblical Israel, women's labor supply (both at the extensive and the intensive margin) does not respond to the transitory income increase caused by the Sabbath year, reinforcing our previous finding that the Sabbath year was the true force behind the results rather than spurious differences between localities. Notably, the insignificant impact of the transitory income change on women's labor supply supports the 2SLS identification assumption that there were no other discrete changes at the border of Biblical Israel (at the cutoff) rather than the income change.

Anticipation Effects. One may also argue that since the Sabbath year is observed every seventh year, individuals would anticipate the upcoming income increase and reside outside the border of Biblical Israel. Therefore, we examine whether the proportion of people who lived within the locality five years ago has increased in the treated group relative to the control groups (localities inside Biblical Israel, within different distance ranges from the Biblical border). I.e., we estimate the following model:

$$Lived\_within\_Locality_j = \rho_0 + \rho_1 Distance_s + \rho_2 HaArava_j + \varrho_j, \tag{4}$$

where $Lived\_within\_Locality_j$ is the proportion of people who lived in locality j five years ago; $Distance_s$ measures the distance of district s from the borders of Biblical Israel; and $HaArava_j$ is an indicator variable that receives the value 1 if locality j is located outside Biblical Israel and zero otherwise. Our main coefficient of interest is ρ_2 which measures the effect of being outside Biblical Israel on the proportion of people who lived in locality j five years ago.

Column (1) of Table 8 reveals that the proportion of people who lived within the locality five years ago is similar in both the treated and the control groups. Similar analysis was conducted using as the outcome variable the proportion of people who lived outside the locality five years ago. As can be seen in column 2 of Table 8, similar proportions of people who lived outside the locality five years ago were found among the treated and the control groups as indicated by the

insignificant results of Equation (4). These findings suggest that individuals did not systematically opt to reside in localities outside Biblical Israel in anticipation of the income increase there.

In our instrumental variable design, the identifying assumption is that there are no other discrete changes that occur at the cutoff (at the border of the Biblical land), other than the income change. We provide further support to this claim by estimating the effect of being outside the Biblical land on education levels using Equation (4) above. Column 3 of Table 8 shows that there are no differences in education levels between the treated and the control groups. As can be seen in panels A to D, similar results were obtained when using localities within different distance ranges from the Biblical border. Moreover, Figure 3 contrasts the percentage who hold an academic degree in localities inside and outside the Biblical land. As can be seen in the figure, both the treated and the control districts had similar education levels in 2008. These findings demonstrate that there were no other discrete changes that occur at the cutoff other than the income change, which reinforce our previous conclusions that the Sabbath year affected hours worked only through the transitory income increase.

We also estimate the effect of living outside the Biblical land on the proportion of *men* who hold an academic degree using Equation (4) above. This is a similar estimation exercise to that used in the third column of Table 8 only that it focuses only on men's education, disregarding women's education. This additional estimation exercise is potentially important given this paper's focus on men's labor supply. As can be seen in Panel B of Table B.1, there are no differences in the proportions of men who hold an academic degree between localities inside and outside the Biblical land indicating a similarity between the treated and the controlled localities along this important dimension.

We now put forward an important argument which can ameliorate the general concern that anticipation of the Sabbath year may lead some people to change their behavior (e.g., postpone retirement) prior to the Sabbath year. The argument goes as follows: Although the Sabbath year timing is perfectly predicted, its financial impact is completely uncertain. Therefore, individuals are less likely to change their working behavior prior to the Sabbath year. E.g., in past Sabbatical

years, Israel consumed products from the Gaza strip. However, since the Hamas terror organization took over the Gaza strip in 2007, Israel decreased its imports from the Gaza strip. Thus, the financial impact of the Sabbatical year is not fully anticipated in advance.[22]

Pre- and Post-Treatment Differences. Throughout the analysis, we argue that the Sabbath year increased earnings of the treated district (HaArava). However, if the income of the affected district in the years preceding or following the Sabbath year is significantly different from the control districts, our identification strategies will yield invalid estimates. Panels A and B of Table 9 show that there are no significant differences in incomes between the HaArava district and all other districts in the years before (2002-2007) and after (2009-2013) the Sabbath year of 2008, indicating that workers inside and outside Biblical Israel earned almost the same in the years before and after the Sabbath year of 2008. Moreover, we expect that during the Sabbath year the affected district would experience a larger income increase relative to other districts and to other years. Therefore, we estimate the following equation:

$$Income_{s,t} = \phi_0 + \phi_1 KM_s + \phi_2 Year_t + \phi_3 DiD_{s,t}, \tag{5}$$

where $Income_{s,t}$ is the average income in district s at time t;[23] KM_s measures the distance of district s from the borders of Biblical Israel; $Year_t$ are year fixed effects; and $DiD_{s,t}$ is an indicator variable that receives the value 1 if district s is located outside Biblical Israel in the year of 2008 and zero otherwise. Our main coefficient of interest is ϕ_3 which measures the effect of being outside Biblical Israel in 2008 on income. (In other words, we use a difference-in-differences approach.)

Panel C of Table 9 shows that the $DiD_{s,t}$ coefficient is positive and statistically significant, indicating that during the Sabbath year the affected district experienced a sharp increase in its earnings relative to other districts and to other years. Figure 4 contrasts the average income of the treated district with those of all other districts in the years before (2002-2007), during (2008) and

[22]See, e.g.: http://www.jpost.com/Israel/IDF-to-import-Gaza-produce-on-shmita.

[23]We converted incomes into 2011 terms using the following formula: prices in 2011 terms = prices in current year$\times$(CPI in 2011)/(CPI in current year).

after (2009-2013) the Sabbath year. Again, the figure reveals a sharp difference in average income between the treated and the control districts in 2008 (the difference is statistically significant). In contrast, there were no statistical significant differences in income between the treated and the control districts in the years before or after the Sabbath year. These findings indicate that the increase in income occurs only in 2008, and that there were no differences in incomes between the HaArava and other districts before or after the Sabbath year, demonstrating that the Sabbath year of 2008 was the true force behind the results rather than locality-specific differences in income.

Unfortunately, we do not have district/locality-level data on hours worked in the years before and after 2008 and are thus unable to estimate a similar specification to Equation (5) for men's hours worked. Notwithstanding this limitation, we find it unlikely that our results are driven by generic, non-income related differences between men's hours worked inside and outside the HaArava for the following two reasons. First, the difference between men's hours worked inside and outside the HaArava is found to be significantly positive also in comparison to the corresponding difference for women's hours worked. This lends credence to the view that our main results are not driven by potential non-income related differences between labor supply in localities within and outside Biblical Israel. Second, income seems to be the only considered demographic variable to vary between the treatment and control groups in the Sabbath year. This second result compliments the first in enhancing our confidence in the interpretation of our results as being driven mainly by income differences only during the Sabbath year between HaArava and non-HaArava based localities.

6 Conclusion

This paper has shown that temporary wage increases lead to a rise in men's hours of work while having an insignificant effect on labor force participation rates. While the former result is consistent with the neoclassical theory of labor supply rather than the reference-dependent preferences based theory of labor supply, the latter result emphasizes the need to construct models that are

capable of producing implications consistent with both results. To obtain these results, we employed two different identification strategies, instrumental variable and difference-in-differences, and exploited a unique research design based on the Sabbath year which dictates that every seventh year consumption of agricultural products produced in Biblical Israel is prohibited. We have shown that during the Sabbath year, income among localities outside Biblical Israel was significantly higher relative to localities inside it, and that there were no income differences between localities during the years before or after the Sabbath year.

Throughout the analysis we reinforce the causal interpretation of our main findings by showing that anticipation did not lead individuals to reside outside the borders of Biblical Israel nor to change their behavior prior to the treatment. Moreover, we did not find any differences in women's hours worked (as well as other, additional demographic variables commonly focused upon by the literature) between the treated and the control localities, suggesting that there were no other discrete changes at the cutoff (at the border of Biblical Israel) during the Sabbath year apart from the income change.

The debate in the literature regarding the casual effect of income on labor supply still exists. This study sheds some light on this relationship and shows that income affects labor supply only on the intensive margin. Finding the determinants of the mixed results and why various workers studied in the literature respond differently to an income increase, however, is left for future work.

The policy implications of our results are potentially valuable. They suggest that putting together wage-increasing policy initiatives (e.g., through tax reforms) can be effective in terms of raising labor supply. But, importantly, their benefits are likely to derive from the response of hours worked rather than labor force participation rates. However, our analysis does carry with it an important caveat which applies to many labor supply studies: caution need be taken when attempting to generalize this paper's results. The external validity of our empirical analysis is likely limited given our particular focus on farmers' labor supply behavior. (And our focus on farmers has naturally led to our focusing only on men's hours worked, preventing us from also studying the labor supply behavior of women.) Notwithstanding this caveat, we are still confident that our

results contribute to our understanding of labor supply behavior.

Appendix A Data

A.1 Variables Definitions.

Average hours worked. Locality-level weekly average of hours worked from the 2008 Israeli Census.

Labor Force Participation Rates. Locality-level share of population (those aged 15 and over, not including single residents in institutions) who worked during 2008, in any type of work, or did not work at all but actively sought work. The source of this data is the 2008 Israeli Census.

Income. District-level income was calculated by multiplying the average employee pay and the average self-employment pay by their relative sizes (by the number of employees and self-employed people, respectively). The source of this data is district-level administrative information on income and other socio-economic and demographic characteristics taken from the Central Bureau of Statistics (CBS) Local Authorities in Israel dataset.

Distance (KM). Distance in kilometers for each locality from the Tzofar locality in the center of the HaArava district.[24]

Wealth. The wealth variable is defined as the proportion of people who own a home as a proxy for locality's wealth. The source of this data is the 2008 Israeli Census.

Other Controls. Education level: the proportion of people who hold an academic degree; Working-age population: the proportion of people between aged 18 and 64; Establishment year: the year the locality was founded. The source of these data series is the 2008 Israeli Census.

[24] We calculate the distance using this website: http://www.tremp.co.il/distance/distance.php.

Appendix B Additional Robustness Checks

Table B.1: Men's Education as Outcome Variable and Controlling in the Baseline Regression for the Proportion of People who Work in the Industry Sector.

Panel A: Mens Log Weekly hours worked				
	(1)	(2)	(3)	(4)
	Entire Sample	320 km	300 km	280 km
Log Income	0.800**	0.340***	0.377***	0.608***
	(0.392)	(0.0614)	(0.0795)	(0.125)
Observations	587	478	455	383
Panel B: Dependent Variable - Percentage of Men with an Academic Degree				
	(1)	(2)	(3)	(4)
	Entire Sample	320 km	300 km	280 km
Indicator for being Outside Biblical Israel	-4.409	0.576	-3.383	-4.251
	(3.544)	(3.803)	(3.758)	(4.046)
Observations	819	682	654	558

Notes: Panel A of this table presents OLS and 2SLS results for each sample. All the regressions include the distance in kilometers from the HaArava district and other control variables, which are: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; year of establishment; and the proportion of people who work in the industry sector. Robust standard errors are in parentheses. Panel B of this table presents the effect of being outside Biblical Israel on men's education for different distances (entire sample, within 320 km, 300 km, and 280 km) from the HaArava district. All the regressions include the distance in kilometers from the HaArava district. * indicates significance at the 10% level; ** indicates significance at the 5% level; and *** indicates significance at the 1% level.

References

Altonji, J. G.: 1986, Intertemporal Substitution in Labor Supply: Evidence from Micro Data, *Journal of Political Economy* **94**(3), 176–215.

Blundell, R., Meghir, C. and Neves, P.: 1993, Labour supply and intertemporal substitution, *Journal of Econometrics* **59**(1), 137 – 160.

Blundell, R., Pistaferri, L. and Saporta-Eksten, I.: 2016, Consumption inequality and family labor supply, *American Economic Review* **106**(2), 387–435.

Camerer, C., Babcock, L., Loewenstein, G. and Thaler, R.: 1997, Labor supply of new york city cabdrivers: One day at a time, *The Quarterly Journal of Economics* **112**(2), 407–441.

Chetty, R., Guren, A., Manoli, D. and Weber, A.: 2011, Are micro and macro labor supply elasticities consistent? a review of evidence on the intensive and extensive margins, *American Economic Review* **101**(3), 471–75.

Chou, Y. K.: 2002, Testing alternative models of labour supply: Evidence from taxi drivers in singapore, *The Singapore Economic Review* **47**(01), 17–47.

Crawford, V. P. and Meng, J.: 2011, New york city cab drivers' labor supply revisited: Reference-dependent preferences with rational-expectations targets for hours and income, *American Economic Review* **101**(5), 1912–32.

Doran, K.: 2014, Are long-term wage elasticities of labor supply more negative than short-term ones?, *Economics Letters* **122**(2), 208 – 210.

Ebenstein, A., Hazan, M. and Simhon, A.: 2015, Changing the cost of children and fertility: Evidence from the israeli kibbutz, *The Economic Journal* .

Farber, H. S.: 2005, Is tomorrow another day? the labor supply of new york city cabdrivers, *Journal of Political Economy* **113**(1), 46–82.

Farber, H. S.: 2008, Reference-dependent preferences and labor supply: The case of new york city taxi drivers, *American Economic Review* **98**(3), 1069–82.

Farber, H. S.: 2015, Why you cant find a taxi in the rain and other labor supply lessons from cab drivers, *The Quarterly Journal of Economics* **130**(4), 1975–2026.

Fehr, E. and Goette, L.: 2007, Do workers work more if wages are high? evidence from a randomized field experiment, *American Economic Review* **97**(1), 298–317.

French, E.: 2005, The effects of health, wealth, and wages on labour supply and retirement behaviour, *The Review of Economic Studies* **72**(2), 395–427.

Gelman, A. and Imbens, G.: 2014, Why high-order polynomials should not be used in regression discontinuity designs, *Working Paper 20405*, National Bureau of Economic Research.

Gin, X., Martinez-Bravo, M. and Vidal-Fernndez, M.: 2017, Are labor supply decisions consistent with neoclassical preferences? evidence from indian boat owners, *Journal of Economic Behavior & Organization* **142**(Supplement C), 331 – 347.

Goldberg, J.: 2016, Kwacha gonna do? experimental evidence about labor supply in rural malawi, *American Economic Journal: Applied Economics* **8**(1), 129–49.

Heckman, J. J. and MaCurdy, T.: 1982, Corrigendum on a life cycle model of female labour supply, *The Review of Economic Studies* **49**(4), 659–660.

Heckman, J. J. and Macurdy, T. E.: 1980, A life cycle model of female labour supply, *The Review of Economic Studies* **47**(1), 47–74.

Kahneman, D. and Tversky, A.: 1979, Prospect theory: An analysis of decision under risk, *Econometrica* **47**(2), 263–291.

Kimball, M. S. and Shapiro, M. D.: 2008, Labor supply: Are the income and substitution effects both large or both small?, *Working Paper 14208*, National Bureau of Economic Research.

Lee, D. S. and Lemieux, T.: 2010, Regression Discontinuity Designs in Economics, *Journal of Economic Literature* **48**(2), 281–355.

Oettinger, G. S.: 1999, An empirical analysis of the daily labor supply of stadium venors, *Journal of Political Economy* **107**(2), 360–392.

Ohanian, L., Raffo, A. and Rogerson, R.: 2008, Long-term changes in labor supply and taxes: Evidence from oecd countries, 1956–2004, *Journal of Monetary Economics* **55**(8), 1353–1362.

Prescott, E. C.: 2002, Prosperity and depression, *American Economic Review* **92**(2), 1–15.

Stafford, T. M.: 2015, What do fishermen tell us that taxi drivers do not? an empirical investigation of labor supply, *Journal of Labor Economics* **33**(3), 683–710.

Staiger, D. and Stock, J. H.: 1997, Instrumental variables regression with weak instruments, *Econometrica* **65**(3), 557–586.

Thakral, N. and Tô, L. T.: 2017, Daily labor supply and adaptive reference points, *Working paper*.

Ziliak, J. P. and Kniesner, T. J.: 2005, The effect of income taxation on consumption and labor supply, *Journal of Labor Economics* **23**(4), 769–796.

Table 1: Descriptive Statistics.

Panel A - Entire Sample					
	Mean	SD	Min	Max	Count
Distance	229.2052	73.07427	0	343.7	829
Percentage Aged 18 and 64	59.39107	8.066361	19.2	95.8	829
Income	7538.242	1322.182	4182.561	11086.62	829
Men's Weekly hours worked	46.45911	4.876871	22.4	67.4	829
Women's Weekly hours worked	35.10084	4.344163	7.3	51.8	829
Men's Labor Force Participation Rates	73.86719	11.5267	31.1	100	829
Women's Labor Force Participation Rates	68.27382	15.32451	1.3	100	829
Percentage who Hold an Academic Degree	25.97479	13.4897	1.5	68.9	829
Panel B - 320 km					
	Mean	SD	Min	Max	Count
Distance	208.1978	60.96126	0	317.9	692
Percentage Aged 18 and 64	58.78801	7.882589	19.2	95.8	692
Income	7760.304	1320.407	4182.561	11086.62	692
Men's Weekly hours worked	46.47168	4.789316	22.4	66.7	692
Women's Weekly hours worked	35.0854	4.309348	7.3	51.8	692
Men's Labor Force Participation Rates	74.0091	11.44104	31.1	100	692
Women's Labor Force Participation Rates	68.32645	15.23294	1.3	97.4	692
Percentage who Hold an Academic Degree	26.83223	13.78233	1.5	68.9	692
Panel C - 300 km					
	Mean	SD	Min	Max	Count
Distance	203.5718	57.82338	0	297.6	664
Percentage Aged 18 and 64	58.78283	7.946593	19.2	95.8	664
Income	7696.2	1309.731	4182.561	11086.62	664
Men's Weekly hours worked	46.45527	4.841269	22.4	66.7	664
Women's Weekly hours worked	35.09066	4.335908	7.3	51.8	664
Men's Labor Force Participation Rates	74.04849	11.43837	31.1	100	664
Women's Labor Force Participation Rates	68.31943	14.94758	6.8	97.4	664
Percentage who Hold an Academic Degree	26.23072	13.26946	2	65.9	664
Panel D - 280 km					
	Mean	SD	Min	Max	Count
Distance	188.9071	49.40015	0	279	567
Percentage Aged 18 and 64	58.51658	7.923274	19.2	86.4	567
Income	7646.755	1305.175	4881.104	11086.62	567
Men's Weekly hours worked	46.52205	4.901982	22.4	66.7	567
Women's Weekly hours worked	35.07284	4.417525	7.3	51.8	567
Men's Labor Force Participation Rates	74.15097	11.39835	31.1	100	567
Women's Labor Force Participation Rates	68.17196	14.87967	7.2	97.4	567
Percentage who Hold an Academic Degree	26.0843	13.49039	2.1	65.9	567

Notes: This table presents descriptive statistics for the variables used in the empirical analysis.

Table 2: First Stage Results.

	Dependent Variable - Log Income	
Panel A: Entire Sample		
	(1)	(2)
	Without Controls	With Controls
Instrument	0.110*** (0.0198)	0.186*** (0.0405)
Observations	832	810
R-square	0.0224	0.386
First Stage F- statistic	30.88	21.06
Panel B: 320 km		
	Without Controls	With Controls
Instrument	0.272*** (0.0228)	0.329*** (0.0425)
Observations	695	676
R-square	0.0448	0.416
First Stage F- statistic	141.69	59.76
Panel C: 300 km		
	Without Controls	With Controls
Instrument	0.233*** (0.0254)	0.300*** (0.0444)
Observations	667	651
R-square	0.0221	0.415
First Stage F- statistic	84.47	45.72
Panel D: 280 km		
	Without Controls	With Controls
Instrument	0.242*** (0.0311)	0.309*** (0.0483)
Observations	567	557
R-square	0.0241	0.438
First Stage F- statistic	60.77	40.79

Notes: This table presents the First Stage results. All the regressions include the distance in kilometers from the HaArava district. The other controls variables are: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; and year of establishment. Robust standard errors are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 3: OLS versus 2SLS Results.

Dependent Variable: Men's Log Weekly hours worked								
	Panel A: Entire Sample		Panel B: 320 km		Panel C: 300 km		Panel D: 280 km	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS	(7) OLS	(8) 2SLS
Log Income	0.0696*	0.645**	0.0551	0.316**	0.0496	0.235*	0.0306	0.464***
	(0.0366)	(0.306)	(0.0431)	(0.126)	(0.0443)	(0.132)	(0.0325)	(0.161)
Observations	810	810	676	676	651	651	557	557

Notes: This table presents OLS and 2SLS results for each sample. All the regressions include the distance in kilometers from the HaArava district and other control variables, which are: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; and year of establishment. Robust standard errors are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 4: OLS versus 2SLS Results: Sub-Samples Divided by First Quartiles of Wealth and Percentage of Elderly People; and Including Squared Distance.

Dependent Variable: Men's Log Weekly hours worked										
	Panel A: Percentage of People Aged 18-64 Above the First Quartile		Panel B: Percentage of People Aged 18-64 Below the First Quartile		Panel C: Non-Wealthy Municipalities		Panel D: Wealthy Municipalities		Panel E: Including Distance Squared	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS	(7) OLS	(8) 2SLS	(9) OLS	(10) 2SLS
Log Income	0.089**	0.59*	-0.35	-0.27	-0.25	2.83*	0.1**	0.31	0.0745*	0.242***
	(0.043)	(0.31)	(0.21)	(0.2)	(0.29)	(1.53)	(0.04)	(0.25)	(0.0397)	(0.0788)
Observations	585	585	223	223	172	172	638	638	810	810

Notes: This table presents OLS and 2SLS results from using as cutoffs the first quartile values of wealth and percentage of elderly people (Panel A-D), as well as results from inclusion of squared distance from the HaArava district (Panel E). All the regressions include the distance in kilometers from the HaArava district and other control variables, which are: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; and year of establishment. Robust standard errors are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 5: Difference-in-Differences.

Panel A: Differences between Means					
	HaArava	Outside HaArava	Diff.	Std. Error	
The Proportion of Men who Hold An Academic Degree	19.42 (3.37) [7]	22.66 (0.45) [841]	3.23	(5.05)	
The Proportion of women who Hold An Academic Degree	29.2 (3.37) [7]	29.56 (0.51) [851]	0.36	(5.72)	
Men Median Age	29.71 (1.56) [7]	28.41 (0.22) [886]	-1.29	(2.5)	
Women Median Age	28.71 (1.79) [7]	29.79 (0.24) [886]	1.08	(2.79)	
The Proportion of Men Aged 18 to 64	63.02 (2.94) [7]	59.35 (0.28) [886]	-3.67	(2.23)	
The Proportion of Women Aged 18 to 64	62.78 (2.86) [7]	59.35 (0.28) [886]	-3.43	(3.2)	
The Proportion of Men who are Married	60.68 (2.38) [7]	56.52 (0.33) [885]	-4.15	(3.75)	
The Proportion of Women who are Married	63.17 (2.62) [7]	57.46 (0.34) [885]	-5.7	(3.83)	
Panel B: hours worked					
	Entire Sample without Controls	Entire Sample with Controls	320 km	300 km	280 km
Difference-in-Differences Coefficient	5.478** (2.644)	5.537* (3.018)	5.531* (3.063)	5.548* (3.080)	5.473* (3.129)
Observations	1677	1632	1352	1302	1114
R-square	0.601	0.757	0.775	0.778	0.797
Panel C: Labor Force Participation Rates					
	Entire Sample without Controls	Entire Sample with Controls	320 km	300 km	280 km
Difference-in-Differences Coefficient	-3.185 (3.236)	-2.275 (3.687)	-2.220 (3.747)	-2.427 (3.769)	-2.711 (3.834)
Observations	1678	1632	1352	1302	1114
R-square	0.0458	0.529	0.558	0.566	0.600

Notes: Panel A presents t-test results for differences between means. Standard errors are in parentheses; numbers of observations are in brackets. Panels B and C present the difference-in-differences results of Equation (3) in the text. All the regressions include the following control variables: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; and year of establishment. Robust standard errors are clustered at the locality level and are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 6: OLS versus 2SLS Results: Men's Log Labor Force Participation Rates.

	Panel A: Entire Sample		Panel B: 320 km		Panel C: 300 km		Panel D: 280 km	
	(1) OLS	(2) 2SLS	(3) OLS	(4) 2SLS	(5) OLS	(6) 2SLS	(7) OLS	(8) 2SLS
Log Income	-0.00937	0.518**	0.0304	0.285**	0.0149	0.145	0.0421	0.144
	(0.0565)	(0.255)	(0.0622)	(0.118)	(0.0649)	(0.124)	(0.0734)	(0.119)
Observations	810	810	676	676	651	651	557	557

Notes: This table presents OLS and 2SLS results for men's log labor participation rates. All the regressions include the distance in kilometers from the HaArava district and other control variables, which are: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; and year of establishment. Robust standard errors are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 7: The Effect of the Sabbath Year on Women's Labor Supply: 2SLS Estimates .

	Women's Log Weekly hours worked	Women's Log Labor Force Participation Rates
Entire Sample		
Log Income	-0.22	0.13
	(0.4)	(0.32)
Observations	810	810
320km		
Log Income	-0.22	0.18
	(0.19)	(0.19)
Observations	676	676
300km		
Log Income	-0.31	0.17
	(0.21)	(0.22)
Observations	651	651
280km		
Log Income	-0.25	0.06
	(0.17)	(0.19)
Observations	557	557

Notes: This table presents the effect of the Sabbath year on women's hours worked and labor participation rates. All the regressions include the distance in kilometers from the HaArava district and other control variables, which are: the proportion of people aged 18 to 64; the proportion of people who hold academic degree; and year of establishment. Robust standard errors are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 8: The Effect of the Sabbath Year on Alternative Outcomes: Placebo Tests.

	(1) The Proportion of People Who Lived Within the Locality Five Years Age	(2) The Proportion of People Who Lived Outside the Locality Five Years Ago	(3) The Percentage who Hold an Academic Degree
Entire Sample			
Indicator for being Outside Biblical Israel	2.481	-3.821	-4.173
	(11.47)	(11.49)	(3.337)
Observations	829	820	830
R-square	0.0192	0.0217	0.00289
320 km			
Indicator for being Outside Biblical Israel	4.268	-6.307	0.307
	(11.52)	(11.56)	(3.605)
Observations	692	688	693
R-square	0.0243	0.0302	0.00391
300 km			
Indicator for being Outside Biblical Israel	4.641	-6.746	-3.405
	(11.55)	(11.59)	(3.571)
Observations	664	660	665
R-square	0.0240	0.0296	0.000926
280 km			
Indicator for being Outside Biblical Israel	5.812	-8.581	-5.080
	(11.64)	(11.71)	(3.847)
Observations	564	562	567
R-square	0.0222	0.0293	0.00314

Notes: This table presents the effect of being outside Biblical Israel on different outcomes for different distances (entire sample, within 320 km, 300 km, and 280 km) from the HaArava district. All the regressions include the distance in kilometers from the HaArava district. Robust standard errors are in parentheses. * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Table 9: Pre- and Post-Treatment Differences in Incomes and Difference-in-Differences Estimation for Income.

	Mean (HaArava)	Mean (Outside HaArava)	Difference	Std. Error	Obs.
Panel A: Real Income After 2008 (2009-2013)	9114.1869 (236.56) [5]	8437.8409 (109.791) [263]	-676.3461	798.2727	268
Panel B: Real Income Before 2008 (2002-2007)	8190.6281 (681.53) [6]	7491.1239 (100.231) [316]	-699.5042	733.5670	322

Panel C: Differences-in-Differences Estimates Using the Years 2002-2013 (Dependent Variable - Income in 2011 Terms)

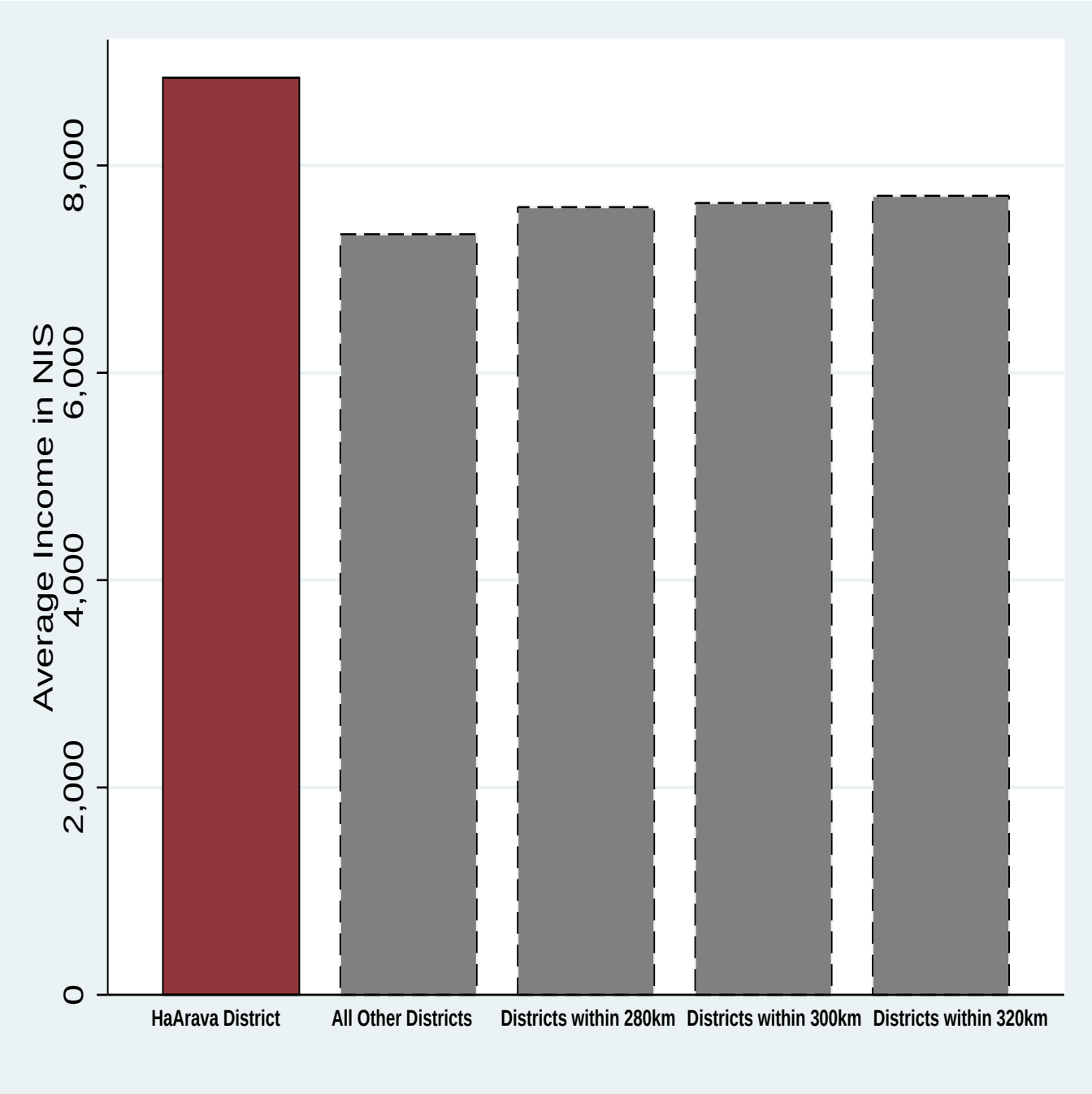
	(1) Entire Sample	(2) 320 km	(3) 300 km	(4) 280 km
Difference-in-Differences	973.2***	958.7***	952.6***	932.3***
	(336.6)	(336.2)	(335.8)	(335.4)
Observations	624	554	542	470
R-square	0.954	0.954	0.954	0.948

Notes: Panels A and B of this table present pre- and post-treatment differences between income means using the years 2002-2013. Standard errors are in parentheses; numbers of observations are in brackets. Panel C shows Difference-in-Differences estimation results for income. Throughout estimations we added year and distance dummies. Incomes are in 2011 terms according to the following formula: Income in 2011 terms = Income in current year (CPI in 2011)/(CPI in current year). * indicates significance at the 10% level; ** indicates significance at the 5% level; and * indicates significance at the 1% level.

Figure 1: **Mapping of Israel's Districts.**

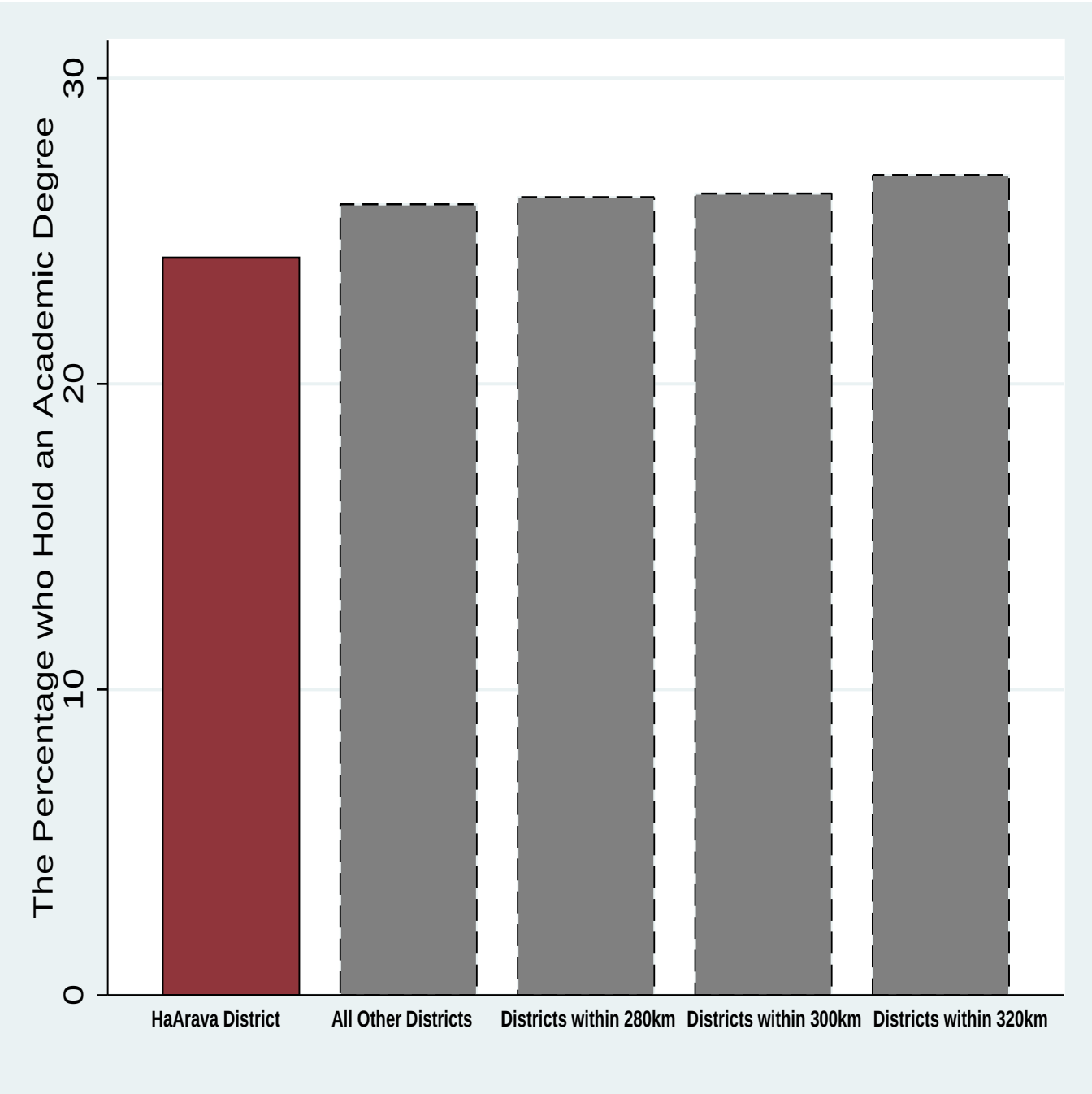
Notes: This figure presents a mapping of contemporary Israel based on its main districts. The HaArava district (in dark), which is below the Dead Sea, is defined as the area outside the Biblical land of Israel. All other districts are defined as the area inside the Biblical land. Source: Google images labeled for reuse with modification.

Figure 2: **Average Income in 2008: HaArava District versus Other Districts.**



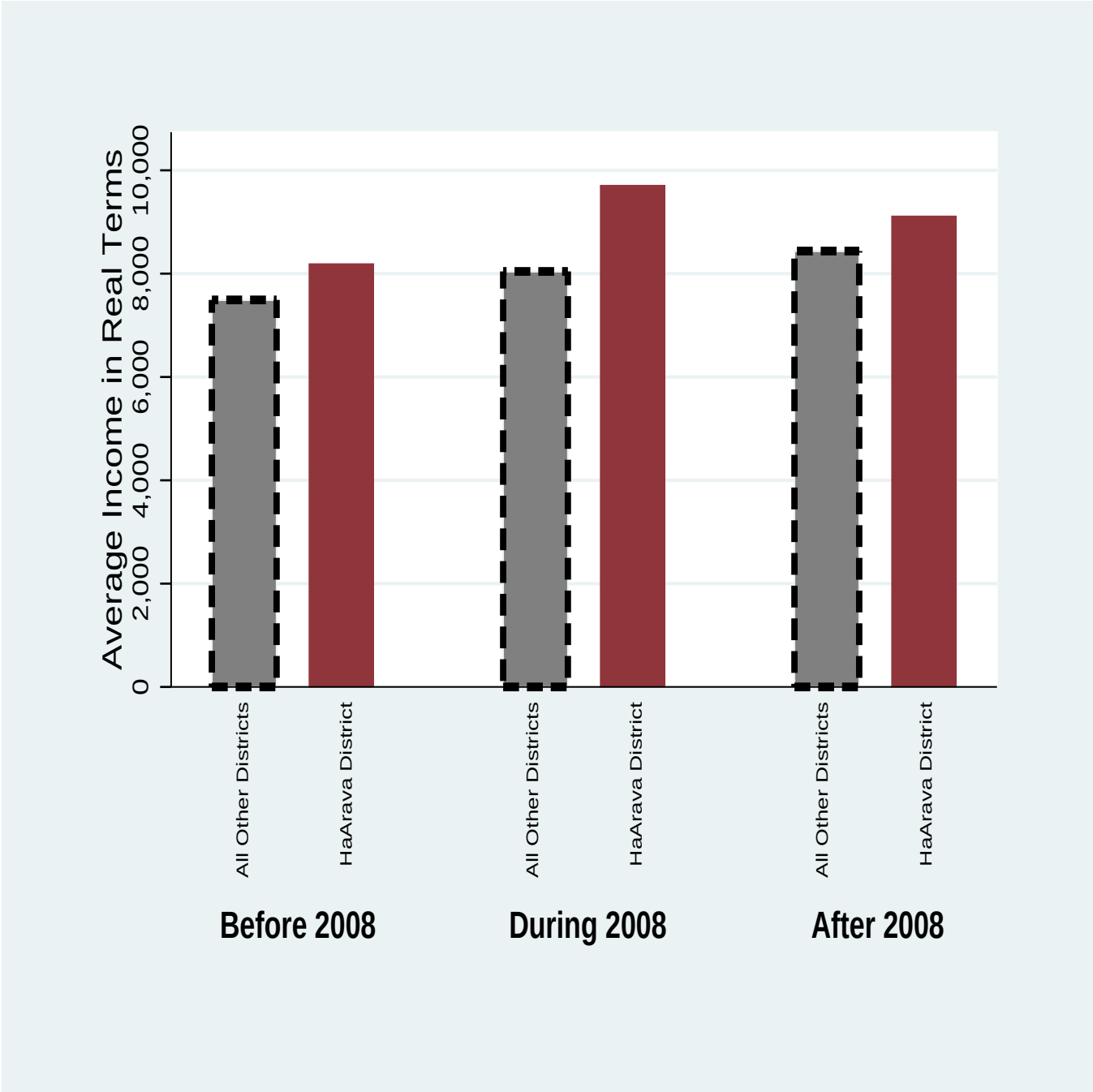
Notes: This figure presents incomes for localities within different distances (entire sample, within 320 km, 300 km, and 280 km) from the HaArava district and for localities within the HaArava district for 2008.

Figure 3: **The Percentage who Hold an Academic Degree: Treated versus Control Groups.**



Notes: This figure presents population percentages holding an academic degree in localities within different distances (entire sample, within 320 km, 300 km, and 280 km) from the HaArava district and for localities within the HaArava district for 2008.

Figure 4: **Average Real Income by District and Year.**



Notes: This figure presents income differences between localities inside and outside the HaArava district before, during, and after the 2008 Sabbath year.