Residential Location, Work Location, and Labor Market Outcomes of Immigrants In Israel*

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1 Introduction

Internal migration and immigration are two important mechanisms by which market economies adjust to changing economic conditions and achieve optimal allocation of resources. An influx of new workers to a particular region, be they new immigrants or internal migrants, can help equilibrate the labor market and improve the interregional allocation of resources. Perhaps due to frictions which prevent the free flow of labor, national policies aimed at facilitating the arrival of new workers to different regions of a country are now widespread. Governments often subsidize the relocation expenses of internal migrants, subsidize mortgages, and help in creating employment exchanges which advertise job openings nationally.

The purpose of this paper is to empirically examine the effect of national migration policy on the regional location choices and labor market outcomes of migrant workers. As a particular case study, we focus on measuring the consequences of the Israeli government's intervention in the housing market on the labor market outcomes of new immigrants from the former Soviet Union. New immigrants from the former Soviet Union, that started arriving in Israel towards the end of 1989 in large numbers, were allowed to freely choose their first locations of residence. Government housing policy presumably influenced these first location choices, as well as subsequent relocation choices, by substantially changing the regional housing cost structure.[1]

The Israeli government altered relative housing costs across regions of the country through both supply and demand interventions. On the housing demand side, the government provided direct grants to new immigrants to help cover rental costs and provided subsidized mortgages to encourage immigrants to purchase their own homes. The extent of benefits and subsidies depended on, among other things, the region of residence chosen by the immigrants. On the housing supply side, the government helped fund private firms that developed land for housing, and provided purchase guarantees. The government committed itself to purchasing new housing units that were built for new immigrants and that remained unsold. These guarantees substantially reduced the risk of building new housing units outside of the center of the country.

The government's intervention in the housing market, like many other types of migration policies, had the intention of improving upon the existing distribution of firms and workers across regions of the country. However, by altering the prior market balance between wages and housing costs, immigrants may have been attracted to regions in which their lifetime earnings were, in fact, lower. It is clear that artificially low housing prices may benefit immigrants. However, lower earnings suggest that the government intervention may have distorted the allocation of labor resources. These distortions are above and beyond the usual distortions created by the need to finance government activities. Of course, even if lifetime earnings were increased as a result of the government intervention, it is important to be able to assess the magnitude of the increase for the

[1] Most new immigrants to Israel that arrived before the late 1980s were not free to choose their initial locations of residence but were rather placed, by the government, in absorption centers around the country, and later on in specific towns where the housing units were built for them.

purpose of calculating the overall social profitability of the program.

In order to infer the impact of the housing market intervention on regional location choices and labor market outcomes, we estimate a dynamic discrete choice panel data model of employment and location outcomes, using longitudinal data on male Soviet engineers that arrived in Israel in the period from 1989 to 1995. The model assumes that the immigrants make optimal choices, upon arrival, and semi-annually thereafter, regarding: (a) the geographical region in which to live; (b) the geographical region in which to work; and (c) the employment status. The choice set contains seven broadly defined regions, which cover all of Israel, namely: Tel Aviv, Sharon, Shfela, Haifa, the Galilee, the Negev and Jerusalem. The employment options in each location are non-employment, blue-collar employment and white-collar employment.

The model of location choice developed here does not constrain work opportunities to be only in the regional labor market in which one resides. In fact, immigrants may choose to accept employment in one region while residing in another. However, when one resides in one location and works in another, a cost of commuting is incurred. The commuting cost is an additional key policy parameter, in addition to the cost of housing. Transportation policies that alter the cost of commuting provide alternative ways of affecting the distribution of workers over residential and employment locations. For example, the privatization of public transport can lead to decreased commuting costs in the long-run. Direct subsidies by the government can also affect the behavioral choices of the individuals.

The model accounts for several important factors that immigrants (and other workers) face in the labor market. First, the model takes into account the effects of regional amenities, differences in overall regional price levels and immigrant network effects. Second, the model incorporates stochastic job offers and job terminations. Third, the model allows the idiosyncratic shocks to wages, in each region, to be serially correlated. Finally, the model allows for the presence of permanent individual unobserved heterogeneity. The unobserved heterogeneity takes the form of discrete types, or nonparametric discrete individual random effects. That is, individuals are assumed to be of one of three possible types, where each type has, in general, a distinct set of behavioral parameters.

Due to the complexity of the model, and the computational difficulties that arise when allowing for serial correlation, we do not make explicit provisions for forward-looking behavior. The value functions associated with each of the joint location and occupational choices should, therefore, be considered as quasi-reduced form representations of the solution to an intertemporal optimization problem.

The rich error structure in the model also necessitates estimation by simulation. We use a simulated maximum likelihood algorithm that incorporates classification error rates for discrete outcomes and measurement error densities for continuous data. The estimation method builds on the method proposed in Keane and Sauer (2004) (see also Keane and Wolpin (2001)). The continuous data include accepted wages in the chosen work location and the housing costs in the chosen residential location. In the estimation we include the regional housing cost function, which depends on individual and family characteristics. We also incorporate regional occupation-specific wage functions. Adding these elements is one of the novel features of the paper. The tight parameterization of decision rules and the nonparametric random effects allow us to correct the estimates of these latter functions for potential biases due to self-selection.

The results of the study indicate that the regions vary considerably in many dimensions, creating different incentives for different types of workers and for individuals that came from different republics in the former USSR. Moreover, the human capital accumulated before arriving in Israel, in the form of experience, has no effect on the immigrants' wages. However, it does have an effect on the probability of obtaining a wage offer, especially in the white-color sector. For the actual wages of the immigrants, what matters is the labor history of the immigrants in Israel.

We examine four policies, whose versions were considered by policy makers in the past. These include: (a) wage subsidy to all workers in the Galilee and Negev of 32% of their wages; (b) transportation subsidy of 73% to all workers outside the major urban regions of Tel Aviv, Haifa, and Jerusalem; (c) rent subsidy of 100% to all workers residing in the Galilee and the Negev; and (d) lump-sum residential subsidy of 50,000 New Israeli Shekel (NIS) given to all individuals that move after arrival in Israel to either the Galilee or the Negev. All simulations are carried out so that the expenses associated with them are about the same, namely 23 million NIS in 1994 prices. Moreover, the policies are assumed to hold for the first ten years after the arrival of the immigrant in Israel. The usefulness of some of the policy measures are questionable. Nevertheless, some of the policies, in particular the policy in (d), have been found to be quite effective in creating the right incentives for the immigrants to fulfill the government goal, namely to move them to the Negev and Galilee regions.

The rest of the paper is organized as follows. The next section briefly reviews the relevant literature and puts the current paper into context. Section 3 describes the data. Section 4 presents the model, while Section 5 outlines the estimation procedure. Section 6 discusses the estimation results and model fit. In Section 7 we discuss the effects of the alternative policy measures discussed above on location choice and labor market outcomes. Section 8 summarizes and concludes.

2 Previous Literature

There is a vast literature on the internal migration of native workers in developing and developed countries (see the surveys by Lucas (1998) and Greenwood (1997)). However, there are very few studies that evaluate the effect of government policy on location choices. Kennan and Walker (2003) is a notable exception. There is also very little formal research that studies the connection between immigrant location decisions and subsequent labor market outcomes. This paper, therefore, contributes to the general literature on both internal migration and immigration.

Two relatively recent papers that our study builds on are Ihlanfeldt (1993) and Borjas (2000).[2] Ihlanfeldt (1993) examines the location and labor market outcomes of young Hispanic immigrants in the U.S. He finds that young Hispanic immigrants have a higher rate of unemployment than young whites. This is largely because a higher proportion of young Hispanic immigrants live in urban areas, while most low-skill jobs are located in non-urban areas. Specifically, he finds that there is a substantial mismatch between residential locations and job opportunities.

Borjas (2000) focuses on the role immigration plays in equilibrating labor markets across geographical locations. He argues that mobility among native workers may not be sufficient to eliminate wage differentials because native workers have relatively high migration costs that prevent them from moving quickly to areas that offer the best economic opportunities (see also Topel (1986) and Blanchard and Katz (1992)). Immigrants, on the other hand, do not incur substantial additional moving costs above and beyond the cost of immigrating to a new country. Therefore, it is easier for immigrants to initially locate in geographical areas that offer the highest wages. Using data from the Current Population Survey, Borjas finds that immigrants do, indeed, make different location decisions than natives and older immigrants. Hence, he finds, that the location decisions of new immigrants are relatively more responsive to interstate wage differentials.

Our study is also related to several papers that have analyzed different aspects of the recent mass immigration from the former Soviet Union to Israel. This more specific literature has generally not addressed the importance of geographical location on immigrant and native outcomes (see, e.g., Friedberg (2002), Weiss, Sauer and Gotlibovski (2003) and Eckstein and Cohen (2003)). An exception to this is Gotlibovski (1997) which finds that the granting of housing subsidies outside of the major urban areas of the country induces highly-skilled immigrants to move and leads to more unemployment and lower wages. We extend Gotlibovski's model in many ways. First Gotlibovski's model is static while our model is dynamic. Second, the data used in his study provide information only about the first residential choices of the new immigrants, while our data provide information about the sequential decision making of the immigrants. Finally, in Gotlibovski's model there is no distinction between the residential location and the work location, because the country was divided in that study to only two general areas.

In the spirit of Kennan and Walker (2003), our model builds on Gotlibovski's previous research by: (a) disaggregating the choice set into more than two regions; (b) taking into account the influence of unobserved regional amenities; (c) taking into account unobserved individual effects; and (d) allowing inter-regional commuting. The current study also incorporates data on individual housing costs and subsequent location choices.

[2] For other aspects regarding immigrants see also Borjas (2005 and 2006).

3 The Data

The data used in this study are drawn from the population of immigrants that declared, upon arrival at the airport in Israel, that they trained and worked as engineers in the former Soviet Union. According to this self-definition of the source country profession, close to one out of every five immigrants that arrived from the Soviet Union between October 1989 and December 1993 was an engineer. The total number of Soviet engineers that arrived during this time period is $57,400$. This is a large number, especially relative to the existing number of native engineers in Israel immediately prior to October 1989, which was $30,200$.

A survey of engineers in Israel from the former Soviet Union was conducted by the Brookdale Institute of Jerusalem between the months of June and December of 1995. The interviews were face-to-face and in Russian. A total of $1,432$ male and female immigrants were interviewed. We restrict the analysis here to male engineers between the ages of 25 and 55 at the time of arrival, yielding a sample of 697 immigrants. Female immigrant engineers are excluded to avoid further expanding the model to take into account joint labor supply and fertility decisions. The age restriction avoids having to model education and retirement decisions.

The survey of engineers is a retrospective survey. At the time of the survey the individuals supplied information about their occupational and educational background in the former Soviet Union, as well as a detailed history of their work experience in Israel since the time of arrival. The survey also supplies information on the immigrant's residential and work locations. Hence, a continuous history of the immigrant's residential location since the time of arrival can be constructed. One drawback of the survey is that information about work location is known only at the time of the survey for immigrants employed in Israel as engineers.

Table 1 displays selected descriptive statistics for the sample used in estimation. The mean monthly earnings at the time of the survey (excluding the non-employed) is $3,740$ NIS. All earnings observations are in 1995 at which time the exchange rate was approximately three NIS per U.S. dollar. The mean monthly housing costs at the time of the survey are $1,040$ NIS. About 60% of the individuals reported monthly housing costs on their privately owned homes.[3] The mean age of the immigrants upon arrival is about 42 and the mean years of education in the former Soviet Union is 16. Nearly 3/4 of the immigrants originate from the republics of Ukraine, Belarus and Russia. Note also that 40% of the immigrants in the sample came in 1990, so we have about 10 six-month periods (semesters) of data for them.

Table 2a displays the region of residence choice distribution over the first 11 six-month periods since arrival.[4] The figures show that in the first period in Israel, there is considerable regional

[3] The monthly housing costs were constructed as follows. For those who reported rent on their housing unit we take that rent as the housing costs. For all individuals that reported paying mortgage we take that payment to represent the housing costs. There were few individuals who reported both mortgage payment as well as rent. For these we take the rent to be the housing costs, because in most cases this happens when the individual bought a housing unit, but has not yet moved to that unit.

[4] The Sharon region contains Hertzeliya and Kfar Saba. Shfela region contains Ashdod and part of the Gaza strip.

dispersion. Half of the new immigrants are initially located in Tel Aviv and the adjacent regions Sharon and Shfela. The Shfela contains the largest proportion of new immigrants. The proportion of immigrants in Jerusalem is the smallest. The table indicates that there is a relatively sharp fall in the proportion of immigrants residing in Tel Aviv, in which housing costs are relatively large, over time. In contrast, there is a moderate increase in the proportion residing in Shfela (located south of Tel Aviv) and a more rapid increase in the proportion residing in the Galilee. The proportion in the other regions is roughly constant over time. By period 11, i.e., five and a half years since arrival in Israel, slightly more than half the sample resides outside of the three regions centered around Tel Aviv, i.e., Tel Aviv, Sharon, and Shfela.

Table 2b displays the employment status choice distribution over the first 11 periods since arrival.[5] Note that the non-employment rate drops sharply from 76.5% in the first period to 9% in period 11. Employment in blue-collar occupations rises from 21.1% in period 1 to 66.8% in period 3 and then declines steadily to 54% by period 11. The proportion employed in white-collar occupations increases monotonically from 2.4% in period 1 to 36.7% in period 11. The sharp decline in the non-employment rate, the non-monotonic proportion working in blue-collar occupations and the steady rise in the white-collar employment rate illustrate the main features of the labor market assimilation of the immigrants from the former USSR in Israel (for more details see also Weiss, Sauer and Gotlibovski (2003)). Occupational downgrading, relative to that in the former Soviet Union, is followed by a gradual absorption of immigrants back into their original source country profession. It is worthwhile noting that all immigrants in the sample worked in white-collar occupations in the former Soviet Union.

Table 2c displays the distribution of employment status by region of residence averaged over all periods as well as for some selected periods. The table shows that the non-employment rate is higher outside of the center of the country (Haifa, the Galilee, the Negev and Jerusalem), being the highest in Haifa. On the other hand, employment in white-collar occupations is most frequent in the Negev, primarily due to the presence of the Ben-Gurion University and the concentration of hi-tech plants in the desert region. This seems to create a trade-off between the quality of job one can get and the likelihood that he will lose his job. Also, the table indicates that the distributions of employment status vary dramatically across time. For example, the non-employment rate in Haifa was close to 36% in the second semester, but declined to about 9% by semester 11. The decline in Jerusalem and the Negev was not as sharp, although the non-employment rates in these two regions were cut by more than half.

The survey records employment location for all individuals that work in the white-collar oc-

The Galilee encompasses a large area stretching from Haifa to the northern border of Israel. The Negev includes Be'er Sheva, Dimona and Eilat. Jerusalem includes Bet Shemesh and the West Bank.

[5] Non-employment includes the unemployed, labor force dropouts and immigrants in training programs. White-collar employment includes immigrants employed as engineers or in other scientific/academic occupations, in addition to government officials. Blue-collar employment includes those employed as technical workers, teachers, nurses, artists and all others.

cupations.[6] Table 3 displays the extent of interregional commuting for these individuals. The information on commuting outcomes is provided conditional on employment status and job mobility. This introduces another layer of sample selection that our model takes into account. We do so by modeling the simultaneous decisions made by the individuals regarding the employment status, the region of residence, and the region of work in each period. Not surprisingly, Table 3 reveals that the propensity to commute decreases with increasing average distance between regions. For example, individuals who live in Sharon region are more likely to commute north to Haifa than are individuals that live in Tel Aviv or the Shfela region. In comparison, individuals who live in the Shfela region are more likely to commute to the Negev and Jerusalem. Immigrants that live in the major urban areas of Tel Aviv, Haifa, Jerusalem and the Negev (largely the city of Be'er Sheva) are less likely to commute out of their immediate region of residence.

Table 4 displays various aspects of the data on total monthly housing costs. The results of three simple ordinary least-squares (OLS) housing costs regressions are reported. The dependent variable in all regressions is the log of total monthly housing costs at the time of the survey. Column (1) of Table 4 indicates that married couples have 15.7% higher housing costs than unmarried individuals (the excluded group). Married couples with one child have 16.7% percent higher housing costs than unmarried individuals, while married couples with two children have 21% percent higher housing costs relative to the unmarried individuals. Renters, who account for about one-third of the sample, have significantly higher housing costs, by about 36.5%, than do immigrants in owner-occupied dwellings.

Column (2) of Table 4 adds other regressors to the basic specification of column (1). The added regressors are the immigrant's years of education in the former USSR, previous experience in the former USSR and its squared, and a dummy for being at least 40 years old upon arrival in Israel.[7] Notice that the coefficient on marital status substantially increases after adding other regressors. The reason is that in the previous specification the coefficient on marital status was picking up the negative effect of age on housing costs. In general, immigrants that are 40 or older upon arrival have lower housing costs. Also, older immigrants receive relatively generous housing subsidies. The coefficients on the family size and renter dummies are not substantially changed with the addition of other regressors. There are no significant effects of education and experience, which could be correlated with housing costs through income effects.

Column (3) of Table 4 adds the dummy variables for region of residence. The base region of residence is Tel Aviv. Note that the coefficients on the dummy variables for residing in Haifa, the Galilee and the Negev are all negative, and substantial in magnitude. The substantially lower housing costs in these regions could be due to amenity differences, greater distance from the cultural

[6] For the blue-collar workers it is commonly known that they largely work in the region in which they reside. The reason is mainly due to the fact that wages in the blue-collar sector are generally too low to permit the individuals to travel across regions.

[7] The added regressors whose coefficients are not reported, for the sake of brevity, include dummy variables for the length of time in the country (i.e., the number of semesters), dummy variables for the republic of origin (Ukraine, Belarus, Russia) and years of education of the spouse.

center of the country, and the greater extent of government intervention in the housing market in these regions.[8] Notice also that the coefficient on the renter dummy variable is substantially reduced. The reason is that most renters are located in Tel Aviv, where renting is a more common phenomenon than in any other region in Israel.

Table 5 displays the results of employment and monthly earnings regressions. The dependent variable in Columns (1), (2) and (3) is a dummy variable for being employed at the time of the survey (in either a blue-collar or white-collar occupation). The results in Column (1) indicate that employment probabilities are not correlated with education, are quadratic in previous experience and are lower for older immigrants. Nevertheless, while the coefficients on previous experience are precisely estimated, the coefficient on the age dummy is only marginally significant.

The regression whose results are reported in Column (2) adds the other regressors (as in Table 4) besides region of residence dummy variables. The addition of these regressors does not substantially change the results. Column (3) adds region of residence dummy variables. The results indicate that employment probabilities are generally lower outside of Tel Aviv. In particular, employment probabilities are lower in Jerusalem and the Galilee, but especially in Haifa and the Negev. The coefficients on the regressors not reported reveal that immigrants from the Ukraine have significantly lower employment probabilities. Surprisingly, the length of time in Israel does not seem to improve employment prospects.

Columns (4), (5) and (6) of Table 5 report the results of monthly log earnings regressions. The dependent variable in all three columns is the log of monthly earnings at the time of the survey. The results in Column (4) reveal that monthly earnings are not strongly correlated with education in the former USSR nor are they correlated with previous experience. This is a common finding in the literature on Soviet immigrants in Israel. Older immigrants, however, do have significantly lower monthly earnings (by about 11 percent). Column (5) adds the other regressors without substantially changing the results except that the earnings penalty for older immigrants is weakened somewhat. Column (6) adds the region of residence dummy variables. The results indicate that there are no significant regional wage differentials.

The coefficients on the regressors not reported in the table indicate that time in Israel is a strong and significant determinant of earnings. But, while the first 8 periods in Israel have no significant payoff, they are followed by a steep earnings profile thereafter. For example, immigrants in the country for 12 periods have 37% higher earnings than immigrants in the country for only one period, and those who reside in the country for 12 periods have 17% percent higher earnings than those in the country for 10 periods.[9]

The regression results for the housing costs, employment and earnings functions suggest that

[8] The Israeli government has always had incentive for people to migrate into the Galilee and the Negev. To achieve this the government subsidizes renting, and gives enormous tax incentives for potential employers to locate their businesses in these two regions.

[9] In general, the time in Israel dummy variables can be thought of as instruments for actual work experience since year of arrival in the first few years of the immigration wave is generally thought to be exogenous to potential employment and earnings outcomes in Israel.

region of residence is an important determinant of housing costs and employment probabilities. However, region of residence is not a good predictor of the level of earnings, at least not for those immigrants who are employed. Housing costs are substantially lower outside of the center of the country, but so are the employment prospects. Thus, there is evidence in the raw data of a non-trivial interaction between the housing location and labor market outcomes, namely earnings.[10]

Obviously the regression results reported above suffer from biases due to self-selection stemming from various sources, since housing costs, employment status, earnings, and region of residence are all determined simultaneously, and are subject to correlated shocks. The model presented below addresses these self-selection problems and corrects for the associated biases. The model also facilitates the evaluation of the effect of potential government interventions on optimal location and employment decisions.

4 The Model

4.1 Basic Structure

The model of location and employment decisions assumes that upon arrival in the host country and in each period (semester) after arrival, immigrants choose a region of residence, a region of employment and employment status, in order to maximize the expected discounted present value of remaining lifetime utility. The total number of regions in the country is denoted by R. The regions are defined broadly as: Tel Aviv ($r = 1$), Sharon ($r = 2$), Shfela ($r = 3$), Haifa ($r = 4$), the Galilee ($r = 5$), the Negev ($r = 6$), and Jerusalem ($r = 7$). The total number of employment options is denoted by K. Employment options are defined broadly as: non-employment ($k = 1$), white-collar employment ($k = 2$), and blue-collar employment ($k = 3$). The mutually exclusive choice set has dimension $R^2 \times K$ in each period t, that is, region of residence, region of employment, and employment status.

The model explicitly assumes that the residential locations are determined according to the employment opportunities of the male in the family. Nevertheless, the residential choices are also affected by non-pecuniary attributes, which, among other things, reflect the preferences of all family members.

In order to conrol for unobserved heterogeneity we assume that there are three discrete types of individuals, index by 0, 1, and 2. In general, we permit the parametrs for individuals of different type to differ from each other, except when specifically noted. The proportion of each type min the data are estimated along with the other parameters of the model.[11]

[10] Additional features of the raw data are related to transitions between states, i.e., geographical location of housing and work. The timing of transitions is considered in the discussion of the model fit below.

[11] Allowing for three types of individuals captures most of the variation due to unobserved heterogeneity. In fact, the first two types account for about 92% of the individuals in the sample.

Value of Non-Employment:

Remaining lifetime utility for individual i in the non-employment sector ($k = 1$) at time t, in region r in which the immigrant resides, is assumed to be

$$u^{j}_{i1rt} = b_{1r}\left(\varepsilon_{i1rt}\right) + \tau_{r}\left(x_{it}, \mu_{ir}\right) - hc_{rj}\left(x_{it}\right) - \gamma_{j} I\left(r_{t} \neq r_{t-1}\right), \tag{1}$$

for $j = 1, ..., J$, where J is the number of possibly different individual types.

The first term in (1), $b_{1r}\left(\varepsilon_{i1rt}\right)$, represents the per period consumption and leisure value of non-employment in region r. The consumption and leisure value of non-employment is allowed to vary with time since arrival in Israel and according to the realization of the random variable ε_{i1rt}. The value of non-employment could be relatively high soon after arrival in the host country as assets are drawn down and investments are made in language acquisition and re-training. Shocks to the consumption and leisure value of non-employment capture unobserved changes in asset levels and available leisure time.[12]

The second term in (1), $\tau_{r}\left(x_{it}, \mu_{ir}\right)$, represents the individual's per period preference for residing in region r. The individual's preference for residing in region r is allowed to be a function of a vector of observed individual characteristics, x_{it}, and a stochastic unobserved regional-specific characteristic, μ_{ir}. Among other things, x_{it} includes the immigrant's republic of residence in the former Soviet Union. Theoretically, the republic of origin could shift the taste for residing in a particular region in Israel if there is a concentration of immigrants from the same republic already living there. In other words, the republic of origin indirectly captures immigrant network effects.

The unobserved regional characteristic, μ_{ir}, captures the immigrant's valuation of regional amenities, e.g., proximity to a beach, landscape, climate, the size of housing per unit cost and the quantity and quality of local public services. It is assumed that each individual's initial realization from the distribution of μ_{ir} is fixed over time but that all immigrants draw from the same distribution of "match qualities". Moreover, the distribution of μ_{ir} is independent across regions, but is not necessarily identically distributed. A relatively small variance in a particular region implies that immigrants value the unobserved characteristics of that region in a similar way.

The third term in (1), $hc_{rj}\left(x_{it}\right)$, is the per period total cost of housing in region r. Note that the cost of housing is also a function of x_{it}. Among other characteristics, marital status and family size shift the cost of housing for immigrant i in region r. Being married with larger family increases the demand for larger, more expensive, housing units.

Finally the last term in (1), γ_{j}, is the individual type-specific cost of moving from one region to another. An individual incurs this cost only in the event that he changes his location of residence between two adjacent periods.

[12] Immigrant re-training courses in Israel are widely believed to be ineffective in significantly improving labor market outcomes (see Eckstein and Cohen (2003) for an explicit analysis). Therefore, we mostly ignore the role of training except for its effect on the duration of non-employment.

Value of Working in the Blue- and White-Collar Occupations:

Below we specify the utilities in blue-collar and white-collar employment in each region distinguishing between the sectors. However, an individual may live in one region and work in a different region only if he works in the white-collar sector. If an individual works in the blue-collar sector then he is assumed to reside in the same region where he works. The reason for imposing this restriction is that we do not have any information in the data set about the region in which the blue-collar workers are employed. While this may look like a major obstacle, it is well-known that very few blue-collar workers, if any, actually work out of their residential regions.

The utilities in the white-collar employment, i.e., $k = 2$, for a worker who works in region r' and resides in region r, is specified as

$$u_{i2rt} = 6 \cdot w_{kr't}(x_i, x_{ikt})e^{\varepsilon_{i2r't}} + \tau_r(x_{it}, \mu_{ir}) - hc_{rj}(x_i) - \gamma_j I\left(r_t \neq r_{t-1}\right) - tc(r', r), \qquad (2)$$

where the deterministic components of the wage offer function in region r', $w_{2r't}$, is assumed to be a function of the individual's time-invariant characteristics, x_i, and accumulated specific work experience, x_{ikt}. Accumulated work experience is distinguished by employment sector, but it is not distinguished by region. The law of motion of the sector-specific work experience is simply one in which an extra unit of experience (semester) is accumulated in each period the individual is employed in a particular sector. The initial condition is $x_{ikt} = 0$, that is, x_{ikt} measures only the ith individual accumulated work experience since arrival in Israel. Previous work experience in the source country is included separately in the vector x_i. The stochastic component of the wage offer function in region r', ε_{i2rt} is multiplicative, leading to standard Mincer-type wage functions. Note that the wage offer function is multiplied by 6, since the earnings are reported per month, while the period considered here consists of six months.

The next three terms in (2) are the same as the first three terms in (1), namely the valuation of the taste for residing in region r, the per period housing costs in region r, and the type-specific cost of moving from region r.

The fourth term, $tc(r', r)$, represents the commuting costs between the region of residence r, and the region of employment r'.[13] In any given period the immigrant can also decide to simultaneously move to a new residential region and a new region of employment. The commuting costs and moving costs change accordingly.

The utility in the blue-collar employment, $k = 3$, in region r, is specified in a similar fashion, only that a worker in the blue-collar sector is constrained to work in the same sector in which he resides. That is, it is specified as

$$u_{i3rt} = 6 \cdot w_{3rt}(x_i, x_{i3t})e^{\varepsilon_{i3rt}} + \tau_r(x_{it}, \mu_{ir}) - hc_{rj}(x_i) - \gamma_j I\left(r_t \neq r_{t-1}\right), \qquad (3)$$

[13]Note that an immigrant can choose to commute to the same work region from a different region of residence than in the previous period. In this case, a one-time moving cost, $\gamma_j I\left(r_t \neq r_{t-1}\right)$, is incurred and the commuting cost changes to say $tc(r', r'')$.

where the wage offer function $w_{3rt}(x_i, x_{i3t})$ is specified in a similar fashion to the wage offer function in the white-collar sector.

The Distribution of the Stochastic Terms:

The stochastic components ε_{ikrt}, for $k = 1, 2, 3$, are independent and identically distributed across regions and are independent across employment sectors within each region. However, we allow the ε_{ikrt}'s in the two employment sectors (i.e., $k = 2, 3$) to be serially correlated within the region of employment, that is, for $k = 2, 3$ we have

$$\varepsilon_{ikrt} = \rho_k \varepsilon_{ikrt-1} + \nu_{ikrt}, \tag{4}$$

conditional on sector k being chosen in period $t-1$, where the term ν_{ikrt} is white noise. The $AR(1)$ coefficient ρ_k is allowed to differ across employment sectors, but it is constrained to be identical across regions. For employment sectors that were not chosen in the previous period we simply have $\varepsilon_{ikrt} = \nu_{ikrt}$.

Although the model does not impose any restrictions on the choice of residential region, there are natural restrictions placed on the choice of employment sector and region of employment. That is, a job in a blue-collar, or white-collar occupation, in a particular region is in the individual's choice set only if an employment offer is received. An employment offer may be received in either sectors and in any of the seven regions of the country in each period. Thus, an individual may get up to $2R = 14$ offers in each period.

Job Offers and Job Termination:

The probability of receiving an offer in sector k, in region r at time t, given that the individual worked in the same occupation and same region in time $t-1$ is specified as

$$P_{krt} = 1 - \lambda_{kr}, \quad \text{for } k = 2, 3, \tag{5}$$

where λ_{kr} is a involuntary dismissal probability. If the individual is not dismissed from his job then he can always continue to work in that same occupation in the same region. The parameter λ_{kr} is assumed to be logistic so that dismissal probabilities lie in the unit interval. Moreover, it is assumed to depend on the sector and the individual's type, but does not depend on the region of employment. That is,

$$\lambda_{krj} = \lambda_{kj} = \frac{\exp\left\{\eta_{kj}\right\}}{1 + \exp\left\{\eta_{kj}\right\}}, \quad \text{for } k = 2, 3; \text{ and } j = 1, 2, 3.$$

An additional offer in sector k' in any region r' also arrives stochastically in each period. The probability of receiving an outside offer is

$$P_{k'rit} = \begin{cases} \psi_k \frac{\exp\{A_{k'rit}\}}{1+\exp\{A_{k'rit}\}} & \text{if } t = 1 \\ \frac{\exp\{A_{k'rit}\}}{1+\exp\{A_{k'rit}\}} & \text{otherwise,} \end{cases}$$

where

$$\begin{aligned} A_{k'rit} &= \lambda_{0k'r} + \lambda_{1k} I \left(\text{unemp. at } t-1\right) + \lambda_{2k}\text{educ}_i + \lambda_{3k}\text{age}_i + \lambda_{4k}\text{age}_i^2 \\ &\quad + \lambda_{5k}\text{time}_i + \lambda_{6k}\text{time}_i^2 + \lambda_{7k} TP_{1i} + \lambda_{8k} TP_{2i}, \end{aligned}$$

age_i denotes the age of the ith immigrant upon arrival, time_i denotes the time since arrival, $TP_{ji} = 1$ if the individual is of type j, and $TP_{ji} = 0$, otherwise, for $j = 1, 2$. (The excluded type is type 0.) Note that we impose no restrictions on the number of outside offers that may arrive from different regions and employment sectors in period t.

4.2 Additional Parameterization

In order to carry out the estimation one needs to introduce some additional parameterization for some of the functions introduced above. Below we describe this additional parameterization.

The per period consumption and leisure value of non-employment in region r is further parameterized to be

$$b_{1rt}\left(\varepsilon_{i1rt}\right) = \alpha_r I\left(t=1\right) + \exp\left(\varepsilon_{i1rt}\right), \quad \text{for } t = 1, ..., T, \tag{7}$$

where $I(\cdot)$ is the usual indicator. Note that the first period (six months) in the host country is assumed to have differential consumption and leisure value. The reason is that in the first period the immigrants need to learn about the new environment either in the absorption centers provide by the government or privately. Consequently, that value of non-employment increases (by the amount α_r).

The per period taste for residing in region r is parameterized to be a simple linear function of the republic of origin and the individual specific valuation of region r, μ_{ir},

$$\tau_r(x_{it}, \mu_{ri}) = \tau_{0r} + \tau_{1r}R_{1i} + \tau_{2r}R_{2i} + \tau_{3r}R_{3i} + \exp\left(\mu_{ir}\right), \tag{5}$$

where $R_{li} = 1$, $l = 1, 2, 3$, for each of the three republics of the Ukraine, Belarus and Russia, respectively, and $R_{li} = 0$, otherwise. The excluded category is all other republics in the former USSR.

The per period total cost of housing in region r is specified as a linear function of marital status, family size and the unobserved discrete type, that is,

$$hc_{rj}(x_{it}) = 6 * \exp\left\{\gamma_{0r} + \gamma_1 M_{it} + \gamma_2 NK_{it} + \gamma_3 TP_{1i} + \gamma_4 TP_{2i}\right\} \tag{6}$$

where $M_{it} = 1$ if the immigrant is married, and $M_{it} = 0$, otherwise, NK_{it} is the number of children under 18 in the family. As before, $TP_{ji} = 1$, for $j = 1, 2$, if the individual is type j, and $TP_{ji} = 0$, otherwise. The excluded type is type 0. The three unobserved discrete individual types are specified a-priori. The individual type probabilities are estimate as parameters along with the other parameters of the model. Including individual-specific effects in the housing cost functions helps control for unobserved assets that are also likely to be positively correlated with the immigrant's unobserved productivity.

The deterministic components of the wage offer functions in region r, w_{krt}, $k = 2, 3$, are specified as,

$$\begin{aligned} \ln w_{jkrit}(x_i, x_t) &= \beta_{0kr} + \beta_{1k} S_i + \beta_{2k} x_{0i} + \beta_{3k} x_{0i}^2 + \beta_{4k} x_{kt} + \beta_{5k} x_{kt}^2 \\ &\quad + \beta_{6k} I\left(\text{age}_i >= 40\right) + \beta_{7k} TP_{1i} + \beta_{8k} TP_{2i}, \end{aligned} \tag{7}$$

where S_i is the years of completed schooling in the former USSR. It is worth noting that the very low variation in S for the selected group of engineers makes it impossible to estimate its coefficient. The term x_{0i} denotes the years of previous experience before arriving in Israel, while x_{kt} denotes the number of sector-specific years of experience after arriving in Israel. The individual types are the same as in (6). Note that an unobserved type appears in the wage function in addition to the housing cost function, thereby accounting for possible correlation in the unobserved components of these two functions.

It is important to note that all of the observed variables in the vector x_i are measured at the time of arrival of the immigrant in Israel. These variables are widely believed to be exogenous to potential outcomes in Israel among immigrants that arrived in the first few years of the immigration wave. Consequently, there is no initial conditions problem in this dynamic discrete choice model.

5 Estimation

5.1 The General Algorithm

Given the relatively long histories for many individuals and the computational complexity that arises from having contemporaneously and serially correlated disturbances, the most computationally practical estimation technique is simulated maximum likelihood (SML). We also augment this method with another feature, allowing for classification errors in the discrete choices. A classification error implies that each simulated choice history is the individual's true choice history with some positive probability. That is, it allows for differences between the simulated choice history and the observed choice history. We follow here the method developed in Keane and Sauer (2004 and 2006) and in Keane and Wolpin (2001). Incorporating classification errors into the SML has two major advantages. First, it helps avoid the usual problem of zero probabilities that often arises in pure frequency simulation. Second, the choice probabilities are computed from unconditional simulations of the model, rather than conditional on past reported choices and realizations of the relevant random variables. In other words, the SML solves the problem of missing endogenous state variables in dynamic discrete choice models.

The estimation procedure is based on matching multiple simulated choice histories with the observed choice history of each individual in the data. Every simulated choice history generates a particular product of classification error rates, depending on the corresponding observed choice history. The likelihood contribution for each individual is then an average over the generated classification error rate products. Observed continuous data are incorporated into the likelihood function via measurement error densities. That is, the density of measurement error necessary to reconcile the history of simulated outcomes (here wages and housing costs) with observed outcomes.

For ease of exposition, suppose the data consist of $\{D_i^*, w_i^*, hc_i^*, x_i\}_{i=1}^N$, where $D_i^* = \{d_{it}^*\}_{t=1}^T$ is the history of reported choices (i.e., sector, residential location, work location), $w_i^* = \{w_{it}^*\}_{t=1}^T$ is the history of reported wages in the chosen option, $hc_i^* = \{hc_{it}^*\}_{t=1}^T$ is the history of reported housing costs in the chosen option, x_i is a vector of initial conditions for individual i, and N denotes the sample size.

Since there may be missing choices and accepted wages, we define three additional variables $I(d_{it}^*) \equiv I(d_{it}^* \text{ is observed})$, $I(w_{it}^*) \equiv I(w_{it}^* \text{ is observed})$, and $I(hc_{it}^*) \equiv I(hc_{it}^* \text{ is observed})$. These are simply indicator functions which equal one if the condition in brackets is true, and zero otherwise.

Estimation of the model proceeds as follows:

Step 1: Given x_i and a particular unobserved type j, draw M times from the distribution of wage offers and housing costs in every period t to form the sequences $\left\{\{w_{ijtm}\}_{t=1}^T\right\}_{m=1}^M$ and $\left\{\{hc_{ijtm}\}_{t=1}^T\right\}_{m=1}^M$.

Step 2: Given x_i, the individual's unobserved type, $\left\{\{w_{itm}\}_{t=1}^T\right\}_{m=1}^M$ and $\left\{\{hc_{ijtm}\}_{t=1}^T\right\}_{m=1}^M$, construct M simulated choice histories in every period t, to form the sequence $\left\{\{d_{tm}\}_{t=1}^T\right\}_{m=1}^M$ and a sequence.

Step 3: Compute classification error rates π_{jkt} which allow the probability of reporting a particular choice to differ from the true choice and which allow for persistence in mis-reporting. That is compute $\widehat{\pi}_{jlt} = \Pr(\text{reported } d_i = j | \text{actual } d_i = l)$, for $j, l = 0, 1$.

Step 4: Form the type-specific likelihood contribution for each individual i as:

$$\widehat{P}(D_i^*, w_i^*, x_i|\theta) = \frac{1}{M}\sum_{m=1}^M \prod_{t=1}^T \left(\sum_{j=0}^1 \sum_{l=0}^1 \widehat{\pi}_{jlt} I\left[d_{it}^m = j, d_{it}^* = l\right]\right)^{I(d_{it}^*)} f_W(u)^{I(w_{it}^*)} f_{HC}(v)^{I(hc_{it}^*)} \quad (13)$$

where θ is the vector containing all the model parameters, $f_W(u)$ is the measurement error density in reported wages and $f_{HC}(v)$ is the measurement error density in reported housing costs.

Step 5: Repeat steps (1) through (4) for each unobserved type in the population, in our case, that is, for $j = 0, 1, 2$.

Step 6: Average the type-specific likelihood contributions for each individual i using the unobserved type probabilities as weights.

Step 7: Use the unconditional (on type) likelihood contributions to build the log-likelihood function.

Step 8: Maximize the log-likelihood.

5.2 Computation of the Individual Likelihood

The estimation takes the sequential steps described below. Each step is repeated for each individual in the sample. For simplicity we omit the subscript i from all quantities below.

1. Let the current estimated probabilities for an offer in region r and sector k be denoted by $\widehat{p}_{rk}$, for $r = 1, ..., 7$, and $k = 2, 3$. Draw ζ_{rk}, for $r = 1, ..., 7$; $k = 2, 3$, from a uniform distribution $U(0, 1)$. If $\zeta_{rk} > \widehat{p}_{rk}$ then assume that the individual was offered a job in sector k at region r.

2. Each individual has $N_p = 7 \cdot 7 + 7 + 7 = 63$ potential choices, because of the residential and work location decision for white-collar workers, work location for blue-collar workers, and residential location for the non-employed. Compute the value function for all N_p alternative possibilities. Let, $V_1, ..., V_{N_p}$ denote these values and let $V_{\max} = \max\left\{V_1, ..., V_{N_p}\right\}$.

   Compute also
   $$V_l^d = V_l - V_{\max} \quad \text{and } e_l^d = \exp\left\{V_l^d/\tau\right\},$$
   for $l = 1, ..., N_p$, where τ is some constant (in our case $\tau = 10000$).

3. Compute the probabilities for all possible combinations as $\widetilde{p}_l^d = e_l^d \Big/ \sum_{m=1}^{N_p} e_m^d$, for $l = 1, ..., N_p$.

4. Repeat Step 1 through Step 4 for M simulations and form $\overline{p}_l = \sum_{j=1}^{M} \widetilde{p}_{lj}^d \Big/ M$, for $l = 1, ..., N_p$.

5. To take into account possible classification errors in the choice probabilities as follows:

   (a) If the probability p_l of a particular possible choice is also the observed choice in the data we let
   $$p_l = c + (1 - c)\,\overline{p}_l, \tag{8}$$
   for or some constant $0 < c < 1$.

(b) If this is not the case then we set

$$p_l = (1 - c)\,\overline{p}_l.$$

The constant c, which is a parameter to be estimated, indicates the degree of accurate classification for the smallest probabilities.

6. To take into account possible measurement errors in reported (log) wages and (log) housing costs we now form the density functions in reported wages and housing costs. We define here the density function for wages. The density function for housing costs is defined analogously.

(a) If the wage is observed for some choice made by the individual then

$$f_W\left(w^*_{it}, w_{itjm}; \sigma_w\right) = \phi\left(\log\left(w^*_{it}/w_{itjm}\right)/\sigma_w\right), \tag{9}$$

where $\phi(\cdot)$ denotes the density function of a standard normal variable and σ_w, a parameter to be estimated, is the standard error of the measurement error.

(b) If the wage is not observed then we set $f_W\left(w^*_{it}, w_{itjm}; \sigma_w\right) = 1$.

7. Repeat Step 1 through Step 6 as part of the maximization of the (log) likelihood with respect to the model's parameters until convergence is achieved.

6 Estimation Results

6.1 Parameter Estimates

The resulting parameters are provided in Tables 6 through Table 11. In Tables 6, 7, and 8 we present the parameter estimates associated with the three value functions of: (a) non-employment; (b) working in the white-collar sector; and (c) working in the blue-collar sector, respectively. In Tables 9 and 10 we present the parameter associated with the probabilities of job termination and the wage offer probability, respectively. Finally, in Table 11 we present estimates of additional common parameters of the model.[14]

Table 6 indicates that the consumption and leisure value of non-employment vary considerably across the different regions. In particular, the least valuable places of residence seems to be Jerusalem and the Sharon, while the Shfela is more desirable. The parameters α's are the value in the first period after arriving in Israel, and most of the immigrants do not work in the first period. The results support the idea that the immigrants self-select themselves into the region they are most comfortable with in the first period, although new work opportunity in later periods may lead them to change their place of residence.

[14] We present here only the final estimation results, after imposing some additional restrictions on the parameter estimates, incorporating the results from our initial analyses not reported here for brevity.

For the taste of residing in a region, the results indicate that, everything else held constant, immigrants prefer to live in the Shfela and Haifa regions (see τ_0 in lines 8-14), relative to the Tel Aviv, Sharon, Galilee, and Jerusalem, for which the constant terms were found to be statistically zero. Also, not surprisingly the results clearly indicate that immigrants prefer not to live in the Negev, a region that is much hotter than the rest of the country and has fewer residential establishments. The coefficients τ_1, τ_2, and τ_3, on the republic of origin dummy variables for Ukraine, Belarus, and Russia, respectively (the excluded category is all other states in the former USSR) indicate that individuals from different republics seem to have distinct preferences. Particularly, those who came from the Ukraine prefer to live in the in Haifa, the Galilee and in the Shfela region (south of Tel Aviv). In contrast, immigrants who came from Belarus, and especially immigrants who came from, Russia, prefer to live in the Sharon and Shfela.

The cost of housing results are presented at the bottom of Table 6. They indicate, as expected, that the cost of housing is the largest in Tel Aviv and the lowest in the Negev. Also, the cost of living tends to be higher in areas that are largely urban areas, such as the Shfela, Tel Aviv, Haifa, and Jerusalem. Note also that while being married has no effect on the cost of housing, the number of children in the household has a large positive (and highly significant) effect. It is also transparent that the cost of living does vary significantly across population of different types, that is, relative to type 0, type 1 and type 2 have lower housing costs by 15.3% and 39.5%, respectively.

Table 7 reports the results for the utility value of working in the white-collar occupation. Note that the remaining life-time utility has two components that have already been discussed, these are the taste for residing in a region and the housing costs. The key element of the utility is the wage earned in the white-collar sector. The results show clear wage differentials between regions. Clearly, the wages in Tel Aviv tend to be the largest, while the wages in the Sharon and Jerusalem are the lowest. Interestingly, we see that there are wage premiums for those in the white-collar occupation working in the southern region of the Negev, and even more so in the very north, i.e., the Galilee. As for the rest of the deterministic component of the wage function, we see that both schooling and experience in the home country have negative effect, though economically very small, on ones wages.[15] In comparison, the coefficient on the experience accumulated since arrival in Israel is relatively large, positive, and significant. Nevertheless, we find that is no curvature in the earning profile. This may be due to two facts. First, the sample is composed of relatively older individuals with an average age of over 42 years, much higher than the age in the population at large. Second, we observe the immigrants for a relatively short calendar time of only 13 semesters.

Contrary to the results of the reduced form estimation, here we see that there is quite a substantial premium for being over 40 years of age. A wage premium is also observed for the type 1 individuals, a group that accounts for approximately 26% of the population (see the results below in Table 11), but negative for type 2 individuals (a group that account for approximately 8% of

[15] This may stem merely from the fact that engineers with higher levels of education are more specialized in areas that are less tranportable from the USSR to Israel.

the population).

In Table 8 we report similar results for the wage function in the blue-collar sector. For limitation of data and based on preliminary estimation the coefficients on initial experience and the dummy variable for being over the age of 40 are constrained to be the same as those for the white collar occupation (see Table 7). We find that the coefficients on the region-specific dummy variables are generally smaller than those obtained for the white-collar sector. Note also that there is a substantial negative premium for working in either the Negev or Jerusalem, relative to the other regions. However, these coefficients are quite similar for all other regions. Overall, there is smaller variation in the region-specific coefficients across regions for the blue-collar workers than for the white-collar workers. This implies that the blue-collar workers are in a situation where they have to locate themselves outside of the major urban areas as is shown below.

A noticeable difference in the results for the wage functions between the two occupations is in the AR coefficient (see line 10 in Tables 7 and 8). While the AR coefficient in the white-collar sector is positive, large (.48), and highly significant, for the blue-collar sector is essentially zero. That is, while there is significant correlation in wage in the more developed sector, wages in the blue-collar sector are virtually uncorrelated over time. This stems from the fact that the white-collar workers are much more attached to their workplace than their blue-collar counterparts.

Finally, in the bottom part of Table 7 we report the estimates for the travelling costs (line 11). Recall that these costs are relevant only for the white-collar workers. The estimated costs represent the monetary value (in NIS) for the six-month period, which includes the direct costs, as well as the indirect non-pecuniary costs due to loss of time, being more tired, etc. In the data there are regions that are too far for any individual to be able to live in one and work in the other. For this reason we constrained all these coefficients to be equal to the greatest coefficients estimated from the other regions. Altogether we estimated three coefficients which are different from each other. The results indicate that the costs associated with travelling to a job are quite high, even for travelling between regions that are relatively close. An expense of about 8,400 NIS (that is tc_1) per period amounts to an expense that is equivalent to over 20% of the earnings of an average worker. An estimate of about 30,000 NIS (that is tc_3) implies that there will not be much travelling between regions, unless the wage offer is quite substantial, as is the case for some of the individuals in the sample.

Table 9 presents the results for the parameters associated with the probability of losing a job, by individual type. The results indicates that the probability of losing a job is rather small for most of the population, that is, for the individuals who are of type 0 or type 1. Nevertheless, there is a small part of the population, that is, the 8% of individuals of type 2, for whom the probability of losing their job is about 28% per semester.

In Table 10 we report the parameters associated with the probabilities of getting wage offers, by region, as well as by individual type. These probabilities apply to individuals who either worked outside of the specified region in the period preceding the current period, or for individuals who did not work at all. Several results stand out. First, note that while all the regional coefficients for the white-collar sector (i.e., $\lambda_{10}(r)$) are negative, those for the blue-collar sector (i.e., $\lambda_{20}(r)$) are all positive. This implies that it is a lot more likely to obtain a wage offer in the blue-collar sector than in the white-collar sector, regardless of the region. Moreover, the order of the implied probabilities for the blue- versus white-collar sectors are almost completely reversed. For example, holding everything else constant, the probability of obtaining a wage offer in the white-collar sector is more than four time larger in the Negev than in Tel Aviv. In contrast, the probability of obtaining a wage offer in the blue-collar sector is over 20% higher in Tel Aviv. That is, while there seem to be a greater demand for blue-collar workers in Tel Aviv, there is a clear shortage of white-collar workers in the Negev relative to the major urban areas in the country. The estimates also indicate that being non-employed in a given period lowers the probability of obtaining a wage offer in subsequent periods (see λ_2 in lines 8-9). Moreover, the older a person the more difficult it becomes to obtain a wage offer in either sectors (see λ_4 and λ_5 in lines 10-11), and more so for individuals over the age of 40 (see λ_3 in lines 8-9).

The last two estimates (i.e., for λ_6 and λ_7) indicate that it is a lot more likely for an individual of type 1 to obtain a job offer relative to individuals of type 0 (the excluded group), and even more so relative to individuals of type 2. This and the results discussed above regarding the probability of dismissal imply that not only individuals of type 2 are less likely to be offered a job, but they are also more likely to lose their job, conditional on having one.

Finally, Table 11 provides estimates of some additional parameters of the model. First, the table provides estimates of the probability of being of a particular type (see line 1). Note that the estimates imply that the population of immigrants is composed mostly of type 0 individuals (67%) and type 1 individuals (25%). Type 2 accounts for only 8% of the population. Recall that this is the type for whom most of the outcome variables are the worst.

The moving cost estimates for each of the types of individuals are presented in line 2 of Table 11. Note that the moving costs for type 0 individuals are about 63% larger than for type 1 individuals, and are seven times larger than those for type 2 individuals. In general, type 0 individuals are more likely to get a wage offer and they are more likely to earn a high wage. In turn, this allows them to incur larger moving costs.

The estimated parameters reported in lines 3 and 4 of Table 11 are for the standard errors of the common measurement error for the unconditional log wage and unconditional log housing costs, respectively.

Finally, the parameter estimate associated with the classification error rate simply implies that the base classification error for all discrete outcomes in the model, namely the sectorial , residential location, and work location choices is $c = .835$, where c, defined in (8). In other words it indicates that the degree accurate classification for the smallest probabilities of the model is almost 84%.

6.2 Model Fit

To examine the fitness of the model we compare some of the model's predictions with their observed counterparts. In Figures 1a–1c we report the density estimates for the observed and predicted monthly wages for the whole population, and then for the two sub-populations of white-collar and blue-collar worker, respectively. Table 12 provides key summary statistics of the actual and predicted distributions, corresponding to Figures 1a through 1c.

We can see that the predictions of the model are quite good, especially for the blue-collar occupation. However, in all cases the actual distributions are more skewed than their predicted counterparts. For the white-collar workers the predicted mean and median wages are 4,577 and 4,596 NIS, respectively, while the corresponding numbers in the observed data are 4,955 and 4,561 NIS. For the blue-collar sector we predicted the mean and median very accurately. The predicted mean and median are 3,328 and 3,107 NIS, while the mean and median of the observed data are 3,298 and 3,037 NIS. Note that in all cases, as one might expect, we underpredict the standard deviation and inter-quartile of the wage distributions.

In Table 13 through Table 17 we examine various aspects of the model's predictions. In Panel A we provide information on the observed data, while in Panel B we report the prediction of the basic model. In each table we have four additional panels Panel C through Panel F, in which we report the results from a set of policy simulations which are described below.

In Table 13 we report the predicted and actual distribution of employment status by semester. It is very clear that it is extremely hard to have the model fit the data for the first period. This is because the first period is an introduction period in a new country with a new language, new occupational requirements, etc. Nevertheless, even the prediction for the first period is no too far off. Overall, the model predicts faster transition from the non-employment state into the blue-collar and white-collar occupations. The model accurately predicts that most of the transition from the non-employment states will be into the blue-collar sector to begin with and then transition into the white-collar sector.

Table 14 reports the results for work location. Since the blue-collar workers do not report their work location we examine the prediction of the model for only the white-collar workers. Generally, the model accurately captures the overall distribution of workers across the various regions. Moreover, it accurately captures the transitions over time between regions. For example, it captures very well the increase in the percentage of individuals in the white-collar sector working in the Shfela and the decline in the fraction of white-collar workers in the Negev.

Table 15 reports the predictions for the place of residence for all workers. The overall predictions of the model are very good. There are some relatively small deviations of the model's predictions from the actual data, mostly for Tel Aviv and the Galilee. Nevertheless, the model captures the overall distribution of residential areas as well as the transition of the immigrants across regions over time.

Next we examine the simultaneous choices of work and residential locations. Again, because residential location is the same as work location for the blue-collar workers, we restrict attention to the white-collar workers. The results are presented in Tables 16a and 17. In Table 16a we report the full joint distribution of residential and work locations, while in Table 17 we report the conditional distribution of work location, conditional on the residential choice. Both tables are calculated for the whole period. For the most part, the model predicts the location-residential choice combinations extremely well. It correctly predicts that most people work in areas close to their residential area. Moreover, it accurately predicts the percentage of people who reside in one region while working in another.

The sum of the rows reported in the last column of Table 16a provides a summary of the residential location for white-collar workers over the entire sample period. Similarly, the sum of the columns reported in the last row of Table 16a provides a summary for the work location choices for that group of workers. In both cases we see a very good overall fit for all regions.

Table 17 provides a different angle of the distribution of work location. Here we present the conditional distribution conditional on the place of residence. Again, while some small deviations do exist, the overall predictions of the model are very accurate. The model does not do as good a job predicting the conditional work distribution, conditional on living in the Sharon region, but the overall number of individuals in this particular combination is relatively small. Also, the model correctly predicts that all individuals from Jerusalem will work in Jerusalem, and that most workers residing in the Negev will also work there.

7 Policy Implications

We consider here four alternative policy simulations. All policies we examine here have been proposed in one form or another by the relevant government agencies in Israel. Below we motivate and describe each policy simulation. This is followed by a close examination of the resulting changes in the key choice variables, namely work and residential location and the choice of employment status. All simulations are performed under the restriction that they cost the same amount. The cost of each policy is about 23 million NIS assuming that they are carried out by the government for the first ten years (i.e., 20 semesters) after the immigrant's arrival in Israel.[16]

One of the most important goals of all governments in Israel over the years was to enlarge the Jewish population in the Galilee and the Negev. These two regions, especially the Negev, were, according to policy makers "under populated". Some of the motivations for these policies are purely political and we offer no discussion regarding this aspect. Our goal is to merely examine the effects of the economic incentives on the individuals' choices. The results of the simulations are presented in Panels C through F of Tables 13 through 17. The results are compared with the predictions of

[16] The exact costs are: 23,364,717 NIS for the wage subsidy; 22,355,372 NIS for transportation subsidy; 22,688,103 NIS for rent subsidy; and 22,234,300 NIS lump-sum transfer subsidy.

the base model that are provided in Panel B of these tables.[17]

7.1 Wage Subsidy

One of the policies that the Israeli government has been contemplating is to provide direct wage subsidies for those working in the Negev and the Galilee. The subsidy comes as a percentage increase one's wage; 32% in the case considered here. Naturally this type of a policy is relatively hard to implement and it can lead to an incentive structure of potential employers that would undermine the intent of the policy. Nevertheless, it is important to examine such policy under the assumption that there will be no such effects, nor will there be any general equilibrium effects, because the results will provide us with an upper bounds on the possible effects. The wage increase considered here is for both the blue- and white-collar workers, and it is determined solely by the chosen place of work, which may not be the same as the place of residence.

The results from this simulation are reported in Panel C of Table 13 through Table 17. The results in Table 13 indicate that the policy lowers the fraction of people who are non-employed in the first two periods, increasing the number of workers in the blue-collar occupation by a significant percentage where it is a lot easier for the workers to obtain wage offers. Nevertheless, the impact of this policy is not sustained throughout the whole period. By period 11 the distribution of immigrants across employment statuses are almost the same as before (see Panel B of Table 13).

In Panel C of Table 14a we provide the results for the work location choices of the white-collar workers. It shows that initially there is a large increase of over 7 percentage points in the fraction of white-collar workers who choose to work in the Negev, while the initial effect in the Galilee is much smaller. Nevertheless, by period 11 the increase in the fraction of white-collar workers in the two regions is quite similar and stands at around 5 percentage points. The increase in these two regions comes from reduction in the percentage of individuals residing in all other regions, but more so in Haifa and the Shfela than in Tel Aviv. The work opportunity along with the relatively low cost of living in the Negev and the Galilee relative to the major urban areas draw workers into these two regions.

For the blue-collar workers there is somewhat larger increase in the fraction of workers choosing to work (and reside) in the Negev and especially the Galilee, as is apparent from the results reported in Panel C of Table 14b. By the end of the 11th period only the Galilee region is affected by the policy, leading to a 10 percentage points increase.

The overall effect of the wage policy on the residential location is seen in Panel C of Table 15 in comparison with Panel B. Interestingly we see that a substantial number of the individuals changed not only their working location, but also their residential location, because the commuting costs reported above are relatively large. Consequently there is an increase of 7 percentage points in the number of individuals choosing to also live in the Galilee. The effect in the Negev is much smaller

[17] The exception is Table 16b that provides the results for the blue-collar workers. Dues to the fact that the bllue-collar workers reside where they work, all the predictions can be given in only 5 lines.

and amounts to only 2 percentage points increase. These results clearly indicate, as some of the other results reported below, that what may work for the Galilee need not work for the Negev and that the government would be better off devising different policies for the two regions in order to achieve its goal.

Table 16a provides the results for the residential-work location choice of the white-collar workers. We see that there is an increase of more than 5 percentage points in the fraction of individuals residing and working in the Negev. The increase in the Galilee is only about 1 percentage point. The reason for this apparent difference is due to the transportation costs, which are much higher for those travelling to the Negev than for those travelling to the Galilee. That is, there is a significant fraction of individuals that reallocate their residential location to Haifa, while working in the Galilee. In contrast with the results for the white-collar workers, line 2 of Table 16b, for the blue-collar workers, indicate that there will be an increase of over 10 percentage points in the percentage of workers in the Galilee and only 1.5 percentage points in the Negev. The reason for that result is that the blue-collar workers have to reside where they work. Obtaining and keeping a job in the Galilee is an easier task than it is in the Negev. Note that the increases in the fraction of individuals residing and working in the Negev and the Galilee come largely from a significant reduction in the number of workers that work and reside in the Shfela and Haifa regions, which, not surprisingly, are adjacent to the Negev and the Galilee regions, respectively.

Finally, Table 17 provides the results for the conditional distribution of work locations, conditional on the region of residence. This is, again, relevant only for the white-collar workers. We see that there is hardly any change, except, as one should expect, for the Galilee and Haifa. There is a very large increase of over 20 percentage points in the number of workers who reside in Haifa and work in the Galilee. Moreover, the percentage of individuals who reside and work in the Galilee, rather than travel for work in Haifa, also increased by almost 20 percentage points.

Overall, we see that the 32%. wage subsidy does achieve the ultimate goal of shifting individuals to work more and reside in greater numbers in the two regions that were always targeted by the various governments. Nevertheless, as pointed above, the effects are rather mild, relative to the large costs and administrative difficulties that such a policy is likely to entail. This is especially important given that we have ignored here the general equilibrium effects and the employers strategical behavior, which would lower the magnitude of the observed effects.

7.2 Transportation Subsidy

Another primary goal of most governments in Israel's history was to shift employment from the urban areas of Tel Aviv, Haifa, and Jerusalem into the periphery. Here we consider a policy which is designed to achieve this goal. Under this policy an individual gets a subsidy of 73%. of his transportation costs if he commutes across regions, but not into the areas of Tel Aviv, Haifa, or Jerusalem.[18] This is quite a substantial incentive for individuals, although it does not provide

[18] Again, we chose this subsidy so that the costs will be similar to those of the other policy alternatives.

enough compensation for individuals to travel across regions that are geographically far apart. The results of this policy simulation are provided in Panel D of Tables 13 through 17.

As expected, giving a transportation subsidy has very little effect on the employment status of the immigrants (see Table 13). Even though, in principle, it opens up more opportunities to obtain a job in one place while residing in a different place.

This generous transportation subsidy seems to have the right effect, i.e., drawing people who work in the main urban areas to work in the periphery, particularly the Shfela and the Galilee. However, even for these regions the subsidy does not seem to have the effect the Israeli government traditionally hoped for, either for the white-collar workers (see Panel D of Tables 14a), or for the blue-collar workers (see Panel D of Table 14b).

The residential location is also only marginally affected by the transportation subsidy as can be see in Panel D of Table 15. Panel D of Table 16a indicates again that there is very little effect of the transportation subsidy on the work-residence location combinations of the white-collar workers. Similarly, the overall effect in this combination for the blue-collar workers is also rather negligible (see line 3 of Table 16b). Consequently, there are also very small changes in all the conditional distribution of work location, conditional on the choice of residential location (see Table 17).

7.3 Rent Subsidy

Here we consider a policy which would give free rent to all immigrants that reside in the Negev or the Galilee. The rent subsidy was determined according to the initial average rent that was paid in the two regions.[19] Versions of this policy have been considered in Israel in the past. It turns out that among all policies that have been considered in the past, this policy has the "right" effects, in terms of the government's stated goals. The results of this policy's simulations are provided in Panel E of Tables 13 through 17 (and in line 4 of Table 16b).

Panel E of Table 13 indicates that there is only a slight change in the employment status, largely due to the shift of some individuals from the white-collar to the blue-collar sector.

Panel E of Table 14a, for the white-collar workers, indicates a significant change in the choices of work location. In particular, we note a relatively large decrease of over 10 percentage points in the number of people working in the Shfela region. In contrast, we see a gradual increase in the number of people work in the Galilee, which reaches 12 percentage points by period 11. The effect on the number of people working in the Negev is much smaller and amounts to only 2 percentage points by the 11th period.

This policy also seems to be effective in drawing people to work outside of Tel Aviv, but at the same time it induces relatively large increases, between 3 and 8 percentage points, in the number of white-collar workers who choose to work in Haifa. The reason for this last result is that it is feasible to live in the Galilee, enjoying the rent subsidy, while working in Haifa, which, in general,

[19] We do so, because otherwise an individual will always have the incentive to rent the most expensive housing in the Galilee and the Negev, conditional on deciding that he wants to leave in either of these two areas.

is better for white-collar workers.

The effects for the blue-collar workers are even more pronounced, at least for some of the regions (see Panel E of Table 14b). Note that for this sector there is a huge increase of over 25 percentage points in the number of workers who choose to work (and live) in the Galilee, but there is almost no change in that figure in the Negev, largely because our results indicate (as discussed above) that it is harder for the new immigrants to find a job in the blue-collar sector in that region. The transition to the Galilee comes largely from the Shfela region, but also from all other regions. This creates an imbalance between the two sectorial groups and may introduce more inefficiencies in the system as well as some discrepancies in the labor market. The investigation of this issue is beyond the scope of this paper.

We can also see a huge impact on the place of residence (see Panel E of Table 15). This policy does contribute to a significant reduction in the percentage of immigrants living in the big cities of Tel Aviv and Haifa, but most of the reduction comes from the Shfela region. Almost all the immigrants relocate themselves into the Galilee and not to the Negev. This is largely because the shift into the Galilee is done by the blue-collar workers, who account for 2/3 of the immigrant population, while the shift into the Negev is done by the white-collar workers.

Panel E of Table 16a indicates that the rent subsidy also contributes to changes in the work-residence location combinations. The largest increases, between 8.5 and 10 percentage points, is in the Galilee. The white-collar workers who reside in that area work in either the Galilee or Haifa (two adjacent regions). For the Negev there is only a marginal increase, of about 1.6 percentage points in those who reside and work in the Negev. This is accompanied by a reduction of people who live in the central part of Israel, i.e., Tel Aviv, Sharon, and, most importantly, the Shfela.

The results presented in line 4 of Table 16b indicate more radical changes for the blue-collar workers. Specifically, there is a huge reduction in the percentage of individuals who reside and live in the Shfela (over 21 percentage points) and Haifa (about 4 percentage point). The increase in the fraction of blue-collar workers, of over 25 percentage points, is almost exclusively in the Galilee. Nevertheless, there are also some minor changes in the Negev. All these changes lead to minor changes in the conditional distributions as is indicated by the results reported in Panel E of Table 17. The changes are largely in the Galilee and the Shfela region, with no major change in any other region.

7.4 Residential Location Lump-Sum Subsidy

The Israeli government has tried over the years a number of policies of various housing subsidies. For the earlier immigration waves from the USSR during the early 1970s the government simply allocated housing units in certain geographical areas according to some criteria based on family size, etc. For recent immigration waves the government simply allocated a lump-sum of money which the immigrant could use as they deemed appropriate. Both policies raised a lot of objections and certainly have not achieved the goal of relocating the new immigrants to the Negev or the

Galilee.

Here we consider an alternative policy. Under this policy an individual gets, upon arrival in Israel, a lump-sum subsidy of 50,000 NIS, provided that he chooses to reside in either the Negev or the Galilee. If at some point the immigrant relocates himself to a different region of the country, within the first 10 years after arrival in Israel, then he has to return the amount of 50,000 NIS to the government without additional interest. This is one of the most direct policies one can imagine. It also turns out to be the most effective policy aimed at increasing the fraction of individuals choosing to live in the Galilee and the Negev. The results of this simulation are provided in Panel F of Tables 13 through 17.

First note from Panel F of Table 13 that this policy has some limited effect on the distribution of employment status across years. More individuals are drawn into the non-employment status shortly after their arrival in Israel. This is because the lump-sum subsidy makes it possible for them to wait longer until a job is offered since it raises the value on non-employment for individuals residing in either of these two regions. Nevertheless, by period 11 the distribution on employment status is virtually identical to that obtained for the base model.

Panel F in Tables 14a and 14b shows a dramatic effect on the work location in both sectors. For the white-collar workers there are huge increases in the percentage of people working both in the Negev and the Galilee; about 18 and 12 percentage points, respectively. For the blue-collar workers there are also large increases in the Negev and the Galilee. However, there is a much larger increase in the Galilee (about 30 percentage points) than in the Negev (about 13 percentage points). The reason for these phenomena is that the labor market is more attractive, in terms of wage offers and dismissal probabilities, for the blue-collar workers in the Galilee, while the reverse is true for the white-collar workers.

This policy is aimed at having people reside in the Negev and the Galilee. And, indeed, Panel F of Table 15 indicates that there is an increase of 14-15 percentage points in the number of immigrants residing in the Negev and about a 28 percentage point increase in the Galilee. Consequently, in all other regions the fraction of immigrants declines, most significantly in the Shfela region.

In Panel F of Table 16a we see the effect on the residential-work combinations for the white collar workers. Note that this policy raised the percentage of white-collar workers who live and reside in the Negev by almost 18 percentage points. Also, there are no white-collar workers who travel from the Negev elsewhere. In the Galilee there is an increase of over 11 percentage points, but there is also an additional increase of close to 11.5 percentage points of white-collar workers who reside in the Galilee and work in the adjacent region of Haifa.

Line 5 of Table 16b shows similar increases for the blue-collar workers. That is, an increase of over 30 percentage points in the Negev, and more than 27 percentage points in the Galilee. Finally, Panel F of Table 17, shows that the vast changes in the residential choices across regions have very little effect on the distribution of work location for workers in each of the seven regions.

8 Conclusions

In this study we develop a dynamic model and empirically examine the regional location choices and labor market outcomes of migrant workers. We focus here on the group of immigrants who came to Israel from the former USSR during the period 1989 to 1995. Specifically, we focus on measuring the consequences of the Israeli government intervention in the housing market on the labor market outcomes of these new immigrants. These immigrants were allowed to freely choose their first residential locations anywhere in the country. However, the government had established a number of policies in the housing market to influence these first location choices, and consequently all subsequent relocation choices.

The Israeli government altered building costs of housing, as well as the prices, across all regions of the country. The government did that by providing economic incentives for builders on one side and by offering differential mortgage subsidies across the different regions for potential buyers.

In order to examine the impact of the housing market intervention on regional location choices and labor market outcomes, we develop and estimate a dynamic discrete choice panel data model of employment and location choices, using longitudinal data on male engineer immigrants from the USSR that arrived in Israel between 1989 and 1995. The model developed addresses several important features that were found in a few other studies to be vital in understanding and explaining the migration behavior of these immigrants. We explicitly account for the housing costs, traveling costs from the region of residence to the region of employment, and the effect of changes in the underlying economic variable on the reallocation of these new immigrants. We include a number of new novel features. Specifically, we include the regional housing cost function, which depends on individual and family characteristics. We also specify region- and occupation-specific wage functions, for two general occupation categories: white- and blue-collar occupations.

The results shed new light on several issues regarding this group of immigrants, and more generally on the large immigration wave that came from the former USSR from 1989 to 1995. The results also shed light on several issues that have been debated among policy makers in Israel regarding the combination of work-residential location choices. We find that the job market experience accumulated by workers before coming to Israel has absolutely no effect on either the probability of obtaining a job, or on the wage function in either the white-collar or blue-collar sectors. We also find significant differences in the wage offer functions for the white-collar workers across the regions. For the blue-collar workers there are hardly any differences across the regions of the country.

We find that there are enormous traveling costs associated with commuting from one region to another for work. This is especially true for the most southern region of the Negev. Consequently almost all residents of the Negev also work in the region.

By and large, the model performs very well in terms of its predictions. For virtually all key variables the model's predictions are quite close to the observed data. This gives us the confidence about the usefulness of the policy simulations we conducted.

We examine a number of policies which are designed to give citizens, in general, and especially immigrants, incentives to reside and work outside of the main urban areas, and specifically the northern region of the Galilee and southern region of the Negev. The four simulations we conduct include: (a) wage subsidy to all workers in the Galilee and Negev of 32% of their wages; (b) transportation subsidy of 73% to all workers outside the regions of Tel Aviv, Haifa, and Jerusalem; (c) rent subsidy of 100% to all workers residing in the Galilee and the Negev; and (d) lump-sum residential subsidy of 50,000 NIS given to all individuals that choose to settle in either the Galilee or the Negev.

The usefulness of some of the policy measures is questionable, especially the transportation subsidy. However, the Lump-Sum subsidy was found to be very effective, drawing the new immigrants into the Negev and even more so into the Galilee. The other two subsidies, i.e., rent and wage subsidies provide mixed results. While they increase the fraction of immigrants in the Galilee the have very little effect, if at all, in the Negev. We also find that the various policies give different incentives to individuals who are employed in the two different sectors. In particular, the white-collar workers are drawn more into the Negev, while the blue-collar workers are drawn into the Galilee, creating a mismatch in terms of the labor mix needed in all the regions.

A key lesson that we learn from our study is that the policies can be effective only within a particular setup. It is therefore important to model in detail the different features—particularly wage, housing market, and local labor market conditions—in order to properly evaluate possible policy measures.

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Table 1: Descriptive Statistics

Variable	Mean	St. Dev.	Obs.
General Variables:			
Employed	.87	—	655
Monthly Earnings	3,740	(1,738)	571
Monthly Housing Costs	1000	(604)	677
Months In Israel	46.68	(16.45)	697
Age	42.01	(8.65)	697
Years of Education	16.45	(1.60)	697
Previous Experience	16.11	(8.54)	697
Married	.89	—	697
Children under 21 Living at Home	1.11	(.86)	
Years of Education of Spouse	14.98	(2.07)	624
From Ukraine	.31	—	697
From Belorussia	.11	—	697
From Russia	.32	—	697
Year of Arrival			697
1989	.01	—	
1990	.40	—	
1991	.19	—	
1992	.15	—	
1993	.16	—	
1994	.09	—	
Monthly Earnings:			
Semester 1	NA	NA	—
Semester 2	2,599	579	15
Semester 5	2,909	835	33
Semester 8	3,446	1,478	34
Semester 11	4,190	2,065	121
Monthly Housing Costs:			
Semester 1	NA	NA	—
Semester 2	1,398	1,459	18
Semester 5	1,058	421	46
Semester 8	940	409	40
Semester 11	918	433	141

Note: The first four variables, the monthly housing costs and the monthly eranings are measured at the time of the survey in 1995. The remaining variables are measured at the time of arrival.

Table 2a: Residential Locations, by Period (row percentage)

Semester	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Obs
1.	10.6	9.6	29.8	16.3	13.8	11.4	8.4	667
2.	10.9	10.0	29.6	15.3	13.8	12.5	8.1	682
3.	10.5	10.5	28.2	14.6	14.5	13.6	8.1	664
4.	10.6	10.1	28.8	14.5	14.3	13.5	8.2	635
5.	9.7	10.7	29.6	14.4	14.9	12.9	8.0	599
6.	8.8	10.1	29.6	14.4	16.0	13.5	7.6	555
7.	8.7	9.8	29.7	14.4	16.7	12.8	7.9	492
8.	8.4	8.9	30.3	14.0	17.3	14.0	7.2	429
9.	7.2	9.0	30.8	14.6	18.0	13.6	6.9	390
10.	6.7	8.9	31.4	16.5	16.5	12.4	7.6	315
11.	4.5	7.9	31.1	18.6	18.6	10.2	9.0	177

Table 2b: Distribution of Employment Status, by Period (row percentage)

Semester	Non-Empl.	White-Collar	Blue-Collar
1.	76.5	2.4	21.1
2.	27.8	12.3	59.8
3.	18.0	15.2	66.8
4.	16.3	18.5	65.2
5.	13.4	21.5	65.2
6.	12.2	24.2	63.7
7.	9.9	28.1	62.0
8.	11.1	30.2	58.7
9.	10.5	31.5	58.1
10.	10.5	33.3	56.2
11.	9.0	36.7	54.2

Table 2c: **Employment Status by Region of Residence (column percentage)**

	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.
Whole Sample:							
Non-employment	20.7	19.2	18.0	31.2	23.6	24.1	22.0
Blue Collar	66.3	61.8	57.4	50.8	56.8	50.6	62.9
White Collar	12.9	19.0	24.6	18.0	19.7	25.3	15.1
Obs. (total $= 5,640$)	526	552	1679	850	865	723	445
Semester 1:							
Non-employment	70.4	82.8	65.8	88.1	82.6	75.0	82.1
Blue Collar	28.2	15.6	31.7	11.0	16.3	17.1	14.3
White Collar	1.4	1.6	2.5	0.9	1.1	7.9	3.6
Obs. (total $= 667$)	71	64	199	109	92	76	56
Semester 2:							
Non-employment	29.7	25.0	23.3	35.6	26.6	29.4	30.9
Blue Collar	64.9	61.8	64.3	51.9	62.8	52.9	54.5
White Collar	5.4	13.2	12.4	12.5	10.6	17.7	14.6
Obs. (total $= 682$)	74	68	202	104	94	85	55
Semester 5:							
Non-employment	13.8	9.4	8.5	24.4	15.7	15.6	8.3
Blue Collar	74.1	70.3	66.1	57.0	67.4	53.2	72.9
White Collar	12.1	20.3	25.4	18.6	16.9	31.2	18.8
Obs. (total $= 599$)	58	64	177	86	89	77	48
Semester 8:							
Non-employment	2.8	10.5	8.5	16.6	10.8	16.7	9.7
Blue Collar	75.0	63.2	53.8	56.7	59.5	48.3	77.4
White Collar	22.2	26.3	37.7	26.7	29.7	35.0	12.9
Obs. (total $= 429$)	36	38	130	60	74	60	31
Semester 11:							
Non-employment	25.0	7.2	5.4	9.1	6.1	16.7	12.5
Blue Collar	50.0	71.4	47.3	57.6	51.5	50.0	68.7
White Collar	25.0	21.4	47.3	33.3	42.4	33.3	18.8
Obs. (total $= 177$)	8	14	55	33	33	18	16

Table 3: Percentage of Residential-Work Locations for White Collar Workers

Residential Location	Employment Location							
	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Obs
Tel Aviv	57.6	3.4	39.0	—	—	—	—	95
Sharon	47.5	30.3	14.1	8.1	—	—	—	123
Shfela	26.0	5.1	58.1	4.1	3.3	0.5	2.8	474
Haifa	—	—	—	90.6	9.4	—	—	166
Galilee	—	1.3	3.3	32.0	63.4	—	—	178
Negev	1.9	—	7.4	—	—	88.7	—	203
Jerusalem	—	—	—	—	—	—	100.0	83

Table 4: OLS Log Monthly Housing Costs Regressions

Variable	(1)	(2)	(3)
Married	.157	.537	.465
	(.086)	(.234)	(.221)
One Child	.166	.119	.110
	(.059)	(.058)	(.055)
Two Children	.208	.132	.142
	(.063)	(.068)	(.064)
More than 2 Kids	.056	-.045	-.059
	(.166)	(.173)	(.160)
Renting	.365	.374	.233
	(.053)	(.066)	(.066)
Education	—	.013	.010
		(.015)	(.014)
Previous Exp.	—	.021	.016
		(.014)	(.012)
Previous Exp. Sq.	—	-.0005	-.0004
		(.0003)	(.0003)
Age >= 40	—	-.141	-.139
		(.075)	(.071)
Northern Tel Aviv	—	—	-.026
			(.079)
Southern Tel Aviv	—	—	-.062
			(.059)
Haifa	—	—	-.304
			(.071)
Galilee	—	—	-.532
			(.085)
Negev	—	—	-.661
			(.108)
Jerusalem	—	—	-.048
			(.099)
Other Regressors	No	Yes	Yes
RMSE	.5924	.5887	.5406
R Sq.	.0873	.1221	.2667
N	677	674	674

Note: Other regressors include dummies for length of time in the country (six month periods), dummies for republic of origin (Ukraine, Belarus, Russia) and years of education of the spouse. Approximately one-third of the individuals in the sample are renting. Robust standard errors are in parentheses. Each column in the table represents a different regression with the same dependent variable, but different explanatory variables.

Table 5: OLS Employment and Log Monthly Earnings Regressions

	Employment			Log Monthly Earnings		
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Education	.0049	.0062	.0060	-.0130	-.0131	-.0133
	(.0091)	(.0092)	(.0090)	(.0097)	(.0096)	(.0097)
Previous Exp.	.0235	.0232	.0234	.0044	-.0022	-.0031
	(.0079)	(.0080)	(.0078)	(.0083)	(.0080)	(.0080)
Previous Exp. Sq.	-.0006	-.0006	-.0006	-0.0003	-0.0002	-0.0001
	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)	(.0002)
Age $\geq$ 40	-.0752	-.0852	-.0925	-.1130	-.0875	-.0835
	(.0422)	(.0435)	(.0426)	(.0581)	(.0545)	(.0552)
Northern Tel Aviv	—	—	.0127	—	—	.0297
			(.0476)			(.0700)
Southern Tel Aviv	—	—	-.0401	—	—	.1030
			(.0403)			(.0558)
Haifa	—	—	-.1756	—	—	.0762
			(.0583)			(.0737)
Galilee	—	—	-.0723	—	—	-.0709
			(.0474)			(.0635)
Negev	—	—	-.1585	—	—	.0406
			(.0527)			(.0644)
Jerusalem	—	—	-.0920	—	—	-.0278
			(.0619)			(.0742)
Other Regressors	No	Yes	Yes	No	Yes	Yes
RMSE	.3346	.3333	.3290	.3867	.3587	.3583
R^2	.0353	.0690	.1013	.1198	.2411	.2510
Observations	655	652	652	568	565	565

Note: See note in Table 4.

Table 6: Utility of Non-Employment

No.	Variable	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.
Value of Non-Employment, $b_{1rt}(\varepsilon_{i1rt})$:									
		α (for $t=1$)							
1.	Tel Aviv	15,443	75.1						
2.	Sharon	12,897	65.4						
3.	Shfela	18,760	19.3						
4.	Haifa	15,950	16.0						
5.	Galilee	15,709	18.5						
6.	Negev	15,314	17.3						
7.	Jerusalem	11,640	76.8						
Taste for Residential Location, $\tau_r(x_{it}, \mu_{ir})$:									
		τ_0		τ_1		τ_2		τ_3	
8.	Tel Aviv	0	—	0	—	0	—	0	—
9.	Sharon	-1,931	18,781	-20,473	28,961	1,690	382.3	7,049	614.2
10.	Shfela	3,986	42.2	11,356	125.9	4,302	90.0	9,111	614.9
11.	Haifa	2,118	276.0	10,429	128.5	2,074	274.9	-557	36,850
12.	Galilee	-2,127	408.3	8,445	67.2	359	18.2	2,312	1,168.4
13.	Negev	-2,115	1680.4	2,392	1,107.6	-1,6940	25,579	-7,094	826.5
14.	Jerusalem	0	—	0	—	0	—	0	—
Housing Cost, $hc_{rj}(x_{it})$:									
		γ_0							
15.	Tel Aviv	7.34	0.218						
16.	Sharon	6.91	0.065						
17.	Shfela	7.12	0.018						
18.	Haifa	7.07	0.026						
19.	Galilee	6.74	0.030						
20.	Negev	6.19	0.039						
21.	Jerusalem	7.03	0.083						
		γ_1		γ_2		γ_3		γ_4	
22.	All regions	-0.0009	0.062	0.023	0.008	-.153	0.082	-0.395	0.092
		$\sigma^2_{\varepsilon_1}$							
23.	All regions	3.475	0.017						

$$u_{i1rt} = b_{1rt}(\varepsilon_{i1rt}) + \tau_r(x_{it}, \mu_{ir}) - hc_{rj}(x_{it}) - \gamma_j I\left(r_t \neq r_{t-1}\right),$$
$$b_{1rt}\left(\varepsilon_{i1rt}\right) = \alpha_r I\left(t=1\right) + \exp\left(\varepsilon_{i1rt}\right),$$
$$\tau_r\left(x_{it}, \mu_{ir}\right) = \tau_r(x_i, \mu_{ri}) = \tau_{0r} + \tau_{1r}R_{1i} + \tau_{2r}R_{2i} + \tau_{3r}R_{3i} + \exp\left(\mu_{ir}\right),$$
$$hc_{rj}\left(x_{it}\right) = 6 * \exp\left\{\gamma_{0r} + \gamma_1 M_{it} + \gamma_2 NK_{it} + \gamma_3 TP_{1i} + \gamma_4 TP_{2i}\right\}$$

Table 7: Utility from Employment in White-Color Occupation

No.	Variable	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.
Log wage, $\ln w_{jkrit}(x_i, x_t)$:									
		β_{02r}							
1.	Tel Aviv	8.840	0.008						
2.	Sharon	8.204	0.017						
3.	Shfela	8.580	0.017						
4.	Haifa	8.594	0.015						
5.	Galilee	8.746	0.021						
6.	Negev	8.665	0.046						
7.	Jerusalem	8.380	0.079						
		β_{21}		β_{22}		β_{23}		β_{24}	
8.	All regions	-0.0341	0 .0006	-0.0054	0.0001	0	—	0.0542	0.0048
		β_{25}		β_{26}		β_{27}		β_{28}	
9.	All regions	-0.0006	0.0009	0.1152	0.0095	0.1426	0.0010	-0.1370	0.1676
Travelling Costs $tc(r, r')$:									
		tc_1		tc_2		tc_3			
10.	All regions	8,444	14.0	182,286	2,306	30,145	151.4		
Error Structure:									
		ρ_1		$\sigma^2_{\varepsilon_2}$					
11.	All regions	0.484	0.040	0.1503	0.0013				

$\tau_r(x_{it}, \mu_{ir})$: As in Table 6

$hc_{rj}(x_{it})$: As in Table 6

$$u_{ikrt} = 6 \cdot w_{krt}(x_i, x_{kt})e^{\varepsilon_{krt}} + \tau_r(x_i, \mu_{ir}) - hc_r(x_i) - \gamma_j I(r_t \neq r_{t-1}) - tc(r, r'), \quad k = 2$$

$$\ln w_{2rit}(x_i, x_t) = \beta_{02r} + \beta_{21}S_i + \beta_{22}x_{0i} + \beta_{23}x_{0i}^2 + \beta_{24}x_{kt} + \beta_{25}x_{kt}^2$$
$$+\beta_{26}I(\text{age}_i >= 40) + \beta_{27}TP_{1i} + \beta_{28}TP_{2i} + v_{2rit},$$

$$v_{2rit} = \rho_1 v_{2ri,t-1} + \omega_{rti}$$

$$tc_1 = tc_{1,2}, tc_{1,3}, tc_{4,5}$$

$$tc_2 = tc_{1,4}, tc_{1,5}, tc_{1,6}, tc_{1,7}, tc_{2,5}, tc_{2,6}, tc_{2,7}, tc_{3,5}tc_{3,6}tc_{3,7}, tc_{4,6}tc_{4,7}, tc_{5,6}, tc_{5,7}, tc_{6,7}$$

$$tc_3 = tc_{2,3}, tc_{2,4}, tc_{3,4}$$

Table 8: Utility from Employment in Blue-Color Occupation

No.	Variable	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.
Log Wage, $\ln w_{jkrit}(x_i, x_t)$:									
		β_{03r}							
1.	Tel Aviv	8.331	0.0413						
2.	Sharon	8.356	0.0370						
3.	Shfela	8.350	0.0137						
4.	Haifa	8.427	0.0183						
5.	Galilee	8.374	0.0154						
6.	Negev	8.148	0.0235						
7.	Jerusalem	8.114	0.0520						
8.	All regions	β_{31}		β_{32}		β_{33}		β_{34}	
		-0.0350	0.0002	-0.0054	0.0001	0	—	0.0555	0.0053
9.	All regions	β_{35}		β_{36}		β_{37}		β_{38}	
		-0.0014	0.0007	0.1152	0.0095	-0.3805	0.0081	-0.2491	0.1211
Error Structure:									
10.	All regions	ρ_2		$\sigma^2_{\varepsilon_3}$					
		0.241	0.313	0.1415	0.0022				

$hc_{rj}(x_{it})$: As in Table 6

$\tau_r(x_{it}, \mu_{ir})$: As in Table 6

$$\ln w_{3rit}(x_i, x_t) = \beta_{03r} + \beta_{31} S_i + \beta_{32} x_{0i} + \beta_{33} x_{0i}^2 + \beta_{34} x_{kt} + \beta_{35} x_{kt}^2 + \beta_{36} I\,(\text{age}_i >= 40) + \beta_{37} TP_{1i} + \beta_{38} TP_{2i} + v_{3rit},$$

$$v_{3rit} = \rho_2 v_{3ri,t-1} + \omega_{3rti}$$

Table 9: Probability of Losing Job, by Type, Λ_{kj}

No.	Occupation	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.
		η_k of Type 0		η_k of Type 1		η_k of Type 2	
1.	White color	-7.582	0.152	-7.891	5.571	-0.9589	0.080
	Implied prob.	0.0005		0.0004		0.277	
2.	Blue color	-5.723	0.030	Same as above		Same as above	
	Implied prob.	0.0033		Same as above		Same as above	

$$\Lambda_{kj} = \exp\left(\eta_{kj}\right) / \left(1 + \exp\left(\eta_{kj}\right)\right) \text{ for } k = 1, 2;\ j = 0, 1, 2.$$

Table 10: Probability of Job Arrival, by Type

No.	Variable	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.	Coeff. Est.	St. Err.
		White-Color, $\lambda_{10}(r)$		Blue-Color, $\lambda_{20}(r)$			
1.	Tel Aviv	-1.927	0.082	2.365	0.052		
2.	Sharon	-0.897	0.029	1.253	0.026		
3.	Shfela	-1.281	0.020	2.105	0.048		
4.	Haifa	-0.895	0.016	1.875	0.050		
5.	Galilee	-2.292	0.040	2.242	0.033		
6.	Negev	-0.478	0.010	1.679	0.043		
7.	Jerusalem	-0.766	0.413	1.718	0.106		
		λ_1		λ_2		λ_3	
8.	White color	-0.150	0.0010	-0.221	0.0062	-0.022	0.0003
9.	Blue color	Same as above		Same as above		Same as above	
		λ_4		λ_5		λ_6	
10.	White color	-0.0003	0.0375	0.0001	0.0125	3.293	0.0214
11.	Blue color	0.0646	0.0016	-0.0169	0.0005	-0.1912	0.0075
		λ_7					
12.	White color	-9.6013	0.2741				
13.	Blue color	-2.1217	0.0387				
		ψ					
10.	P_{krit} for $t=0$	0.9142	0.0021				

$$P_{krit} = \exp(A_{krit}) / (1+\exp(A_{krit})), \quad \text{if } t=1$$
$$= \psi \exp(A_{krit}) / (1+\exp(A_{krit})), \quad \text{otherwise,}$$
$$A_{k'rit} = \lambda_{0r} + \lambda_{k1} S + \lambda_{k2} I\,(\text{Occ. } 0 \text{ at } t-1) + \lambda_{k3} \cdot \text{age at arrival}$$
$$+\lambda_{k4} \cdot t + \lambda_{k5} \cdot t^2 + \lambda_{k6} TP_{1i} + \lambda_{k7} TP_{2i},$$

where t denotes time since arrival

Table 11: Other Parameters

	Coeff. Estimate	Standard Error	Coeff. Estimate	Standard Error	Coeff. Estimate	Standard Error
Type-specific parameter:						
	Type 0		Type 1		Type 2	
1. Prob. param, φ	—	—	-0.972	0.118	-2.066	0.144
Implied probabilities	0.665		0.251		0.084	
2. Moving costs	278,864	2,767	171,400	1,641	39,866	4,089
Standard deviation of measurement errors						
3. Wages	0.3526	0.0141				
4. Cost of housing (κ)	0.5834	0.0032				
Base classification error rate:						
5. Parameter, ϑ	1.654	0.026				
Implied probability	0.839					

$\pi_j = \Pr(\text{Type j}) = \exp(\varphi_j) / (1 + \exp(\varphi_1) + \exp(\varphi_2))\,,\ j = 1, 2.$

$\pi_0 = \Pr(\text{Type 0}) = 1 - \pi_1 - \pi_2.$

$c = \exp(\vartheta) / (1 + \exp(\vartheta)) = 0.839 = 1 - \text{Classification error}.$

$\text{St.error of housing costs} = \exp(\kappa)$

Table 12: Summary Statistics for Actual and Predicted Monthly Wage Distributions (in 1994 New Israeli Shekel)

Statistic	Actual			Predicted		
	All	White	Blue	All	White	Blue
Mean	3,756	4,955	3,298	3,492	4,577	3,328
Median	3,348	4,560	3,037	3,224	4,596	3,107
St. deviation	1,734	2,172	1,266	1,232	1,055	1,108
Inter-quartile range	1,671	2,353	1,319	1,425	1,420	1,241

Table 13: Employment Status, by Semester

a. Actual Data

Employment Status	Semester										
	1	2	3	4	5	6	7	8	9	10	11
Non-Employed	.765	.278	.180	.163	.134	.122	.099	.111	.105	.105	.090
White-collar	.024	.123	.152	.185	.215	.242	.281	.302	.315	.333	.367
Blue-collar	.211	.598	.668	.652	.652	.637	.620	.587	.581	.562	.542

b. Basic Model

Employment Status	Semester										
	1	2	3	4	5	6	7	8	9	10	11
Non-Employed	.822	.287	.122	.079	.067	.063	.063	.064	.066	.069	.072
White-collar	.028	.096	.150	.187	.214	.236	.252	.265	.276	.286	.295
Blue-collar	.150	.617	.728	.734	.719	.701	.685	.671	.658	.645	.633

c. Wage Subsidy Simulation

Employment Status	Semester										
	1	2	3	4	5	6	7	8	9	10	11
Non-Employed	.697	.262	.116	.077	.067	.064	.063	.064	.065	.069	.072
White-collar	.033	.095	.148	.184	.207	.228	.249	.261	.273	.284	.292
Blue-collar	.271	.644	.737	.739	.726	.708	.688	.676	.662	.648	.636

d. Transportation Subsidy Simulation

Employment Status	Semester										
	1	2	3	4	5	6	7	8	9	10	11
Non-Employed	.820	.286	.121	.078	.068	.064	.063	.064	.065	.069	.072
White-collar	.032	.109	.164	.199	.223	.243	.263	.274	.286	.296	.304
Blue-collar	.148	.605	.715	.722	.709	.692	.674	.663	.649	.635	.624

Table 13: (Continued)

e. Rent Subsidy Simulation

Employment Status	Semester 1	2	3	4	5	6	7	8	9	10	11
Non-Employed	.839	.293	.122	.079	.068	.064	.062	.064	.065	.069	.072
White-collar	.029	.091	.144	.179	.203	.224	.244	.257	.269	.280	.287
Blue-collar	.133	.616	.734	.743	.730	.712	.694	.680	.666	.651	.641

f. Living Location Subsidy Simulation

Employment Status	Semester 1	2	3	4	5	6	7	8	9	10	11
Non-Employed	.867	.298	.124	.079	.066	.063	.062	.064	.065	.068	.072
White-collar	.022	.092	.145	.183	.210	.232	.250	.265	.277	.289	.298
Blue-collar	.111	.610	.730	.738	.724	.705	.688	.672	.658	.643	.630

Table 14a: Actual and Predicted Work Location, by Semester for White-Collar Workers

a. Actual Data

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.214	.224	.208	.209	.192	.189	.168	.170	.171	.144	.070
Sharon	.000	.066	.073	.046	.050	.047	.031	.051	.054	.056	.053
Shfela	.143	.158	.208	.255	.267	.268	.298	.280	.279	.322	.351
Haifa	.071	.211	.188	.164	.167	.173	.191	.195	.189	.189	.246
Galilee	.071	.105	.094	.109	.108	.118	.107	.119	.126	.144	.175
Negev	.357	.145	.135	.136	.142	.142	.145	.144	.135	.111	.070
Jerusalem	.143	.092	.094	.082	.075	.063	.061	.042	.045	.033	.035

b. Basic Model

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.138	.175	.191	.200	.209	.217	.224	.231	.238	.245	.251
Sharon	.052	.082	.069	.062	.056	.050	.046	.043	.039	.036	.033
Shfela	.186	.242	.259	.264	.264	.262	.258	.256	.251	.245	.242
Haifa	.189	.171	.165	.161	.157	.156	.154	.152	.151	.150	.149
Galilee	.080	.058	.057	.057	.058	.060	.063	.064	.065	.068	.069
Negev	.273	.185	.169	.163	.160	.159	.159	.159	.159	.161	.161
Jerusalem	.081	.087	.091	.094	.095	.096	.097	.096	.097	.096	.097

c. Wage Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.122	.163	.171	.183	.197	.208	.208	.212	.225	.225	.230
Sharon	.045	.079	.069	.060	.056	.052	.045	.042	.040	.037	.033
Shfela	.160	.209	.226	.230	.234	.240	.223	.221	.228	.213	.209
Haifa	.161	.141	.132	.124	.118	.112	.111	.106	.102	.100	.100
Galilee	.094	.071	.074	.080	.082	.086	.101	.104	.106	.116	.119
Negev	.348	.257	.240	.229	.218	.209	.214	.217	.202	.214	.213
Jerusalem	.071	.080	.089	.095	.096	.093	.098	.097	.097	.095	.097

Table 14a: (Continued)

d. Transportation Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.131	.154	.168	.181	.196	.207	.209	.214	.224	.226	.232
Sharon	.052	.152	.105	.079	.067	.057	.046	.042	.038	.034	.029
Shfela	.219	.266	.293	.297	.297	.302	.289	.288	.290	.280	.276
Haifa	.178	.142	.139	.135	.133	.126	.130	.124	.122	.121	.121
Galilee	.084	.055	.059	.065	.067	.070	.080	.083	.082	.090	.090
Negev	.259	.160	.154	.155	.149	.150	.152	.155	.149	.156	.157
Jerusalem	.077	.072	.082	.089	.091	.089	.094	.095	.094	.093	.095

e. Rent Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.134	.131	.134	.142	.150	.162	.163	.165	.176	.178	.182
Sharon	.047	.080	.069	.059	.056	.052	.044	.041	.040	.036	.033
Shfela	.171	.146	.144	.146	.141	.145	.129	.129	.134	.121	.115
Haifa	.167	.254	.255	.246	.243	.228	.229	.220	.211	.205	.207
Galilee	.097	.101	.116	.126	.139	.145	.164	.168	.175	.186	.186
Negev	.312	.209	.196	.188	.177	.175	.175	.181	.169	.179	.182
Jerusalem	.073	.080	.087	.094	.095	.092	.096	.096	.096	.094	.096

f. Living Location Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.067	.074	.082	.088	.094	.100	.103	.107	.112	.116	.118
Sharon	.036	.061	.052	.046	.042	.038	.034	.032	.029	.026	.024
Shfela	.044	.067	.071	.072	.070	.068	.066	.064	.062	.059	.059
Haifa	.115	.254	.253	.244	.235	.225	.213	.203	.196	.184	.178
Galilee	.142	.119	.134	.148	.161	.172	.181	.188	.196	.196	.195
Negev	.539	.364	.345	.334	.329	.328	.332	.336	.335	.350	.358
Jerusalem	.058	.062	.065	.068	.070	.070	.071	.070	.070	.069	.069

Table 14b: Predicted Work Location, by Semester
for Blue-Collar Workers

b. Basic Model

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.066	.113	.110	.108	.107	.107	.107	.107	.107	.106	.107
Sharon	.213	.100	.101	.104	.107	.109	.109	.110	.111	.111	.113
Shfela	.283	.360	.356	.352	.349	.346	.343	.343	.343	.340	.340
Haifa	.212	.139	.136	.136	.137	.138	.141	.141	.142	.145	.144
Galilee	.121	.108	.105	.105	.106	.106	.107	.107	.108	.109	.107
Negev	.024	.097	.105	.107	.107	.106	.106	.104	.103	.102	.101
Jerusalem	.081	.084	.088	.088	.088	.088	.088	.088	.088	.088	.088

c. Wage Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.035	.107	.108	.106	.105	.105	.105	.105	.105	.104	.104
Sharon	.106	.089	.094	.100	.102	.106	.105	.105	.108	.104	.107
Shfela	.118	.272	.275	.268	.279	.274	.250	.257	.268	.254	.252
Haifa	.092	.116	.121	.120	.116	.115	.121	.122	.117	.126	.124
Galilee	.424	.210	.191	.200	.195	.199	.216	.211	.209	.218	.218
Negev	.183	.127	.126	.120	.116	.113	.117	.114	.108	.110	.110
Jerusalem	.044	.080	.086	.086	.087	.087	.086	.086	.086	.085	.086

d. Transportation Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.066	.110	.104	.102	.100	.101	.101	.101	.102	.102	.102
Sharon	.213	.099	.098	.104	.106	.111	.111	.110	.113	.108	.112
Shfela	.283	.367	.362	.355	.363	.361	.341	.348	.354	.341	.342
Haifa	.212	.134	.134	.132	.127	.126	.138	.138	.132	.145	.143
Galilee	.121	.106	.103	.107	.105	.105	.110	.107	.109	.112	.109
Negev	.024	.099	.109	.109	.109	.106	.109	.106	.102	.104	.103
Jerusalem	.081	.086	.090	.090	.090	.090	.089	.090	.088	.089	.089

Table 14b: (Continued)

e. Rent Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.070	.110	.106	.103	.102	.102	.101	.102	.102	.101	.101
Sharon	.187	.086	.088	.093	.094	.097	.097	.097	.099	.097	.099
Shfela	.142	.140	.136	.132	.132	.133	.125	.126	.130	.126	.126
Haifa	.128	.103	.105	.102	.101	.101	.102	.104	.101	.105	.105
Galilee	.353	.376	.365	.375	.374	.375	.382	.378	.382	.382	.379
Negev	.034	.105	.116	.112	.112	.108	.111	.109	.104	.107	.107
Jerusalem	.087	.081	.084	.084	.085	.085	.083	.084	.083	.083	.083

f. Living Location Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.062	.083	.080	.078	.078	.078	.078	.078	.078	.078	.078
Sharon	.155	.065	.066	.069	.070	.072	.073	.074	.074	.075	.077
Shfela	.067	.071	.069	.069	.068	.068	.068	.068	.068	.069	.069
Haifa	.099	.076	.076	.076	.076	.076	.076	.076	.076	.077	.077
Galilee	.460	.422	.411	.413	.413	.412	.408	.406	.408	.396	.390
Negev	.079	.221	.233	.231	.230	.230	.232	.233	.230	.240	.243
Jerusalem	.079	.063	.065	.065	.065	.066	.065	.066	.066	.066	.066

Table 15: Actual and Predicted Place of Residence, by Semester

a. Actual Data

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.106	.109	.105	.106	.097	.088	.087	.084	.072	.067	.045
Sharon	.096	.100	.105	.101	.107	.101	.098	.089	.090	.089	.079
Shfela	.298	.296	.282	.288	.296	.296	.297	.303	.3077	.314	.311
Haifa	.163	.153	.146	.145	.144	.144	.144	.140	.146	.165	.186
Galilee	.138	.138	.145	.143	.149	.160	.167	.173	.180	.165	.186
Negev	.114	.125	.136	.135	.129	.135	.128	.140	.136	.124	.102
Jerusalem	.084	.081	.081	.082	.080	.076	.079	.072	.069	.076	.090

b. Basic Model

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.104	.104	.104	.104	.104	.104	.104	.104	.104	.105	.105
Sharon	.107	.107	.107	.107	.107	.107	.106	.106	.106	.105	.106
Shfela	.347	.347	.346	.346	.345	.344	.341	.342	.342	.339	.340
Haifa	.136	.136	.136	.136	.136	.137	.139	.139	.140	.142	.141
Galilee	.096	.096	.097	.097	.097	.098	.098	.098	.098	.098	.097
Negev	.121	.121	.121	.121	.121	.121	.121	.121	.121	.122	.122
Jerusalem	.090	.090	.090	.090	.090	.090	.090	.090	.090	.090	.091

c. Wage Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.103	.103	.104	.103	.103	.103	.103	.103	.102	.103	.103
Sharon	.103	.103	.102	.103	.104	.106	.103	.103	.104	.101	.101
Shfela	.277	.284	.279	.274	.285	.285	.263	.270	.283	.268	.267
Haifa	.124	.124	.125	.124	.120	.119	.126	.126	.122	.129	.128
Galilee	.165	.157	.158	.166	.160	.162	.173	.168	.165	.170	.169
Negev	.140	.141	.144	.142	.139	.137	.143	.142	.135	.141	.142
Jerusalem	.088	.089	.089	.089	.089	.088	.089	.089	.089	.088	.089

Table 15: (Continued)

d. Transportation Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.104	.105	.105	.105	.104	.104	.105	.105	.104	.105	.105
Sharon	.107	.107	.105	.108	.108	.110	.107	.106	.108	.104	.105
Shfela	.347	.350	.348	.344	.353	.354	.336	.342	.350	.338	.337
Haifa	.136	.134	.137	.136	.130	.129	.139	.138	.134	.143	.143
Galilee	.096	.092	.093	.096	.095	.095	.099	.096	.097	.099	.097
Negev	.121	.122	.122	.122	.120	.119	.123	.122	.118	.122	.122
Jerusalem	.090	.090	.090	.090	.090	.090	.091	.091	.090	.090	.091

e. Rent Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.100	.101	.101	.101	.100	.100	.100	.101	.100	.101	.101
Sharon	.097	.097	.097	.098	.098	.099	.097	.097	.098	.096	.096
Shfela	.142	.146	.145	.141	.143	.147	.135	.139	.146	.139	.139
Haifa	.108	.109	.110	.108	.106	.105	.108	.109	.106	.109	.110
Galilee	.338	.329	.327	.337	.338	.337	.345	.338	.339	.339	.335
Negev	.129	.132	.134	.129	.128	.125	.129	.130	.124	.130	.132
Jerusalem	.086	.087	.087	.087	.087	.086	.087	.087	.087	.086	.087

f. Living Location Subsidy Simulation

	Semester										
Region	1	2	3	4	5	6	7	8	9	10	11
Tel Aviv	.075	.075	.075	.075	.076	.076	.076	.076	.076	.076	.076
Sharon	.073	.073	.073	.073	.073	.073	.073	.073	.073	.074	.074
Shfela	.068	.069	.069	.069	.069	.069	.069	.069	.069	.069	.069
Haifa	.078	.078	.078	.078	.078	.078	.078	.078	.079	.079	.079
Galilee	.377	.377	.379	.384	.384	.383	.378	.374	.375	.362	.355
Negev	.263	.263	.260	.255	.254	.255	.259	.263	.262	.274	.281
Jerusalem	.066	.066	.066	.066	.066	.067	.067	.067	.067	.067	.067

Table 16a: Actual and Predicted Residence-Work Locations for White-Collar Workers

a. Actual Data

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	3.23	0.19	2.18	0.00	0.00	0.00	0.00	5.60
Sharon	4.46	2.85	1.33	0.76	0.00	0.00	0.00	9.40
Shfela	9.59	1.90	21.46	1.52	1.23	0.19	1.04	36.94
Haifa	0.00	0.00	0.00	11.87	1.23	0.00	0.00	13.11
Galilee	0.00	0.19	0.47	4.65	9.21	0.00	0.00	14.53
Negev	0.28	0.00	1.42	0.00	0.00	13.49	0.00	15.19
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	5.22	5.22
Sum of rows	17.57	5.13	26.88	18.80	11.68	13.68	6.27	100.00

b. Basic Model

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	6.36	0.36	2.82	0.00	0.00	0.00	0.00	9.54
Sharon	4.66	4.77	0.00	0.00	0.00	0.00	0.00	9.43
Shfela	10.62	0.00	22.64	0.01	0.00	0.00	0.00	33.27
Haifa	0.00	0.00	0.00	12.19	1.61	0.00	0.00	13.8
Galilee	0.00	0.00	0.00	3.48	4.58	0.00	0.00	8.06
Negev	0.00	0.00	0.00	0.00	0.00	16.45	0.00	16.45
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	9.45	9.45
Sum of rows	21.64	5.13	25.46	15.68	6.19	16.45	9.45	100.00

c. Wage Subsidy Simulation

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	6.57	0.30	2.67	0.00	0.00	0.00	0.00	9.54
Sharon	4.92	4.31	0.00	0.00	0.00	0.00	0.00	9.24
Shfela	9.51	0.00	19.53	0.01	0.00	0.00	0.00	29.05
Haifa	0.00	0.00	0.00	9.04	4.29	0.00	0.00	13.33
Galilee	0.00	0.00	0.00	1.96	5.68	0.00	0.00	7.65
Negev	0.00	0.00	0.00	0.00	0.00	21.71	0.00	21.71
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	9.48	9.48
Sum of rows	21.00	4.61	22.20	11.01	9.97	21.71	9.48	100.00

Table 16a: (Continued)

d. Transportation Subsidy Simulation

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	6.04	1.18	3.97	0.00	0.00	0.00	0.00	11.19
Sharon	4.39	3.21	2.15	0.00	0.00	0.00	0.00	9.75
Shfela	10.49	0.78	21.50	0.01	0.00	0.00	0.00	32.78
Haifa	0.00	0.14	1.13	9.52	3.50	0.00	0.00	14.29
Galilee	0.00	0.00	0.00	3.19	4.29	0.00	0.00	7.48
Negev	0.00	0.00	0.00	0.00	0.00	15.41	0.00	15.41
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	9.10	9.10
Sum of rows	20.92	5.31	28.75	12.72	7.79	15.41	9.10	100.00

e. Rent Subsidy Simulation

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	6.55	0.30	2.67	0.00	0.00	0.00	0.00	9.52
Sharon	4.91	4.28	0.00	0.00	0.00	0.00	0.00	9.2
Shfela	5.00	0.00	10.50	0.01	0.00	0.00	0.00	15.51
Haifa	0.00	0.00	0.00	10.36	1.43	0.00	0.00	11.8
Galilee	0.00	0.00	0.00	11.92	14.62	0.00	0.00	26.54
Negev	0.00	0.00	0.00	0.00	0.00	18.08	0.00	18.08
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	9.35	9.35
Sum of rows	16.46	4.58	13.17	22.29	16.05	18.08	9.35	100.00

f. Living Location Subsidy Simulation

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	4.21	0.26	2.09	0.00	0.00	0.00	0.00	6.56
Sharon	3.50	3.53	0.00	0.00	0.00	0.00	0.00	7.03
Shfela	2.18	0.00	4.48	0.00	0.00	0.00	0.00	6.66
Haifa	0.00	0.00	0.00	6.84	1.04	0.00	0.00	7.89
Galilee	0.00	0.00	0.00	14.93	15.94	0.00	0.00	30.87
Negev	0.00	0.00	0.00	0.00	0.00	34.14	0.00	34.14
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	6.86	6.86
Sum of rows	9.89	3.79	6.57	21.77	16.98	34.14	6.86	100.00

Table 16b: Predicted Residence-Work Locations for Blue-Collar Workers

Simulation	Work and Residence Location						
	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.
Basic Model	10.69	10.92	34.69	14.09	10.69	10.18	8.74
Wage Subsidy	10.39	10.24	26.17	11.94	21.09	11.69	8.47
Transportation Subsidy	10.19	10.86	35.22	13.60	10.74	10.47	8.91
Rent Subsidy	10.23	9.59	13.05	10.31	37.64	10.83	8.35
Living Location Subsidy	7.83	7.21	6.87	7.65	41.14	22.75	6.55

Table 17: Distribution of Work Location by Place of Residence for White-Collar Workers

a. Actual Data

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	57.63	3.39	38.98	0.00	0.00	0.00	0.00	100.00
Sharon	47.47	30.30	14.14	8.08	0.00	0.00	0.00	100.00
Shfela	25.96	5.14	58.10	4.11	3.34	0.51	2.83	100.00
Haifa	0.00	0.00	0.00	90.58	9.42	0.00	0.00	100.00
Galilee	0.00	1.31	3.27	32.03	63.40	0.00	0.00	100.00
Negev	1.88	0.00	9.38	0.00	0.00	88.75	0.00	100.00
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

b. Basic Model

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	66.65	3.77	29.58	0.00	0.00	0.00	0.00	100.00
Sharon	49.41	50.55	0.01	0.03	0.00	0.00	0.00	100.00
Shfela	31.92	0.00	68.05	0.03	0.00	0.00	0.00	100.00
Haifa	0.00	0.00	0.01	88.30	11.69	0.00	0.00	100.00
Galilee	0.00	0.00	0.00	43.22	56.78	0.00	0.00	100.00
Negev	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

c. Wage Subsidy Simulation

Place of Residence	Work Location: Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	Sum of columns
Tel Aviv	68.86	3.12	28.02	0.00	0.00	0.00	0.00	100.00
Sharon	53.26	46.66	0.02	0.06	0.00	0.00	0.00	100.00
Shfela	32.73	0.00	67.24	0.03	0.00	0.00	0.00	100.00
Haifa	0.00	0.00	0.01	67.79	32.20	0.00	0.00	100.00
Galilee	0.00	0.00	0.00	25.65	74.35	0.00	0.00	100.00
Negev	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

Table 17: (Continued)

d. Transportation Subsidy Simulation

Place of	Work Location							Sum of
Residence	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	columns
Tel Aviv	53.98	10.58	35.44	0.00	0.00	0.00	0.00	100.00
Sharon	44.98	32.94	22.04	0.04	0.00	0.00	0.00	100.00
Shfela	32.02	2.37	65.59	0.02	0.00	0.00	0.00	100.00
Haifa	0.00	0.97	7.92	66.60	24.51	0.00	0.00	100.00
Galilee	0.00	0.00	0.00	42.62	57.38	0.00	0.00	100.00
Negev	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

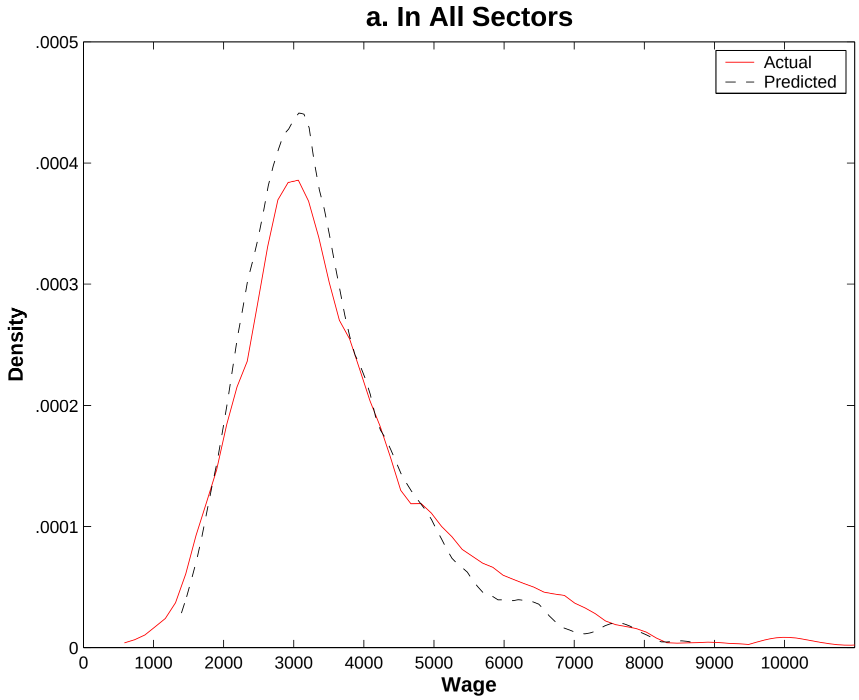
e. Rent Subsidy Simulation

Place of	Work Location							Sum of
Residence	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	columns
Tel Aviv	68.82	3.11	28.07	0.00	0.00	0.00	0.00	100.00
Sharon	53.41	46.51	0.02	0.06	0.00	0.00	0.00	100.00
Shfela	32.26	0.00	67.70	0.04	0.00	0.00	0.00	100.00
Haifa	0.00	0.00	0.01	87.84	12.15	0.00	0.00	100.00
Galilee	0.00	0.00	0.00	44.93	55.07	0.00	0.00	100.00
Negev	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

f. Living Location Subsidy Simulation

Place of	Work Location							Sum of
Residence	Tel Aviv	Sharon	Shfela	Haifa	Galilee	Negev	Jerus.	columns
Tel Aviv	64.12	4.03	31.85	0.00	0.00	0.00	0.00	100.00
Sharon	49.77	50.18	0.01	0.04	0.00	0.00	0.00	100.00
Shfela	32.76	0.00	67.21	0.03	0.00	0.00	0.00	100.00
Haifa	0.00	0.00	0.01	86.78	13.21	0.00	0.00	100.00
Galilee	0.00	0.00	0.00	48.37	51.63	0.00	0.00	100.00
Negev	0.00	0.00	0.00	0.00	0.00	100.00	0.00	100.00
Jerusalem	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00

Figure 1: Density of Actual and Predicted Wages



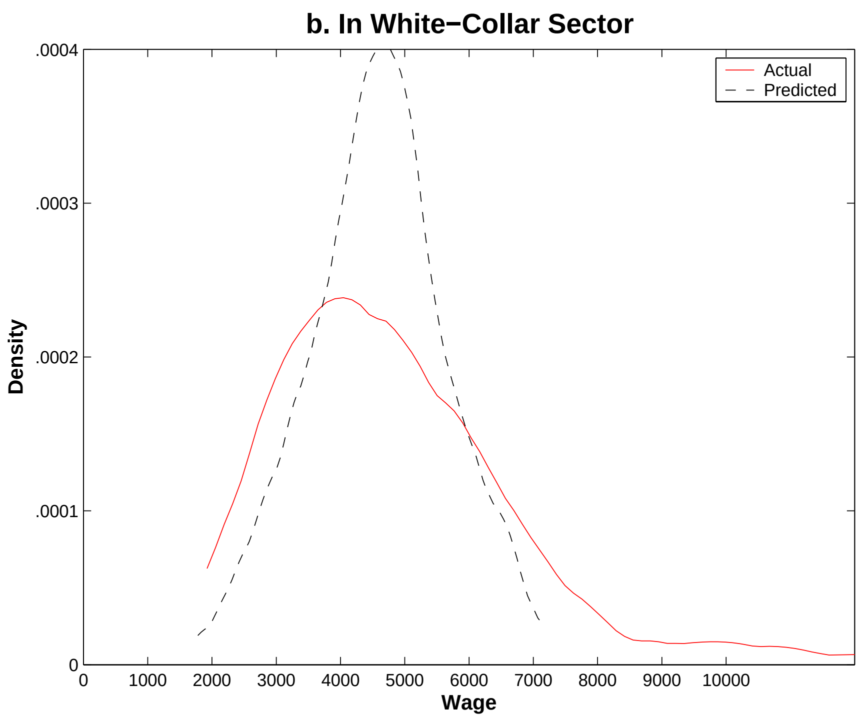


Figure 1: (Continued)