The Dynamic Impact of Immigration on Natives' Labor Market Outcomes: Evidence from Israel*

Sarit Cohen-Goldner
Bar-Ilan University
cohens1@mail.biu.ac.il

M. Daniele Paserman
Hebrew University, IZA and CEPR
dpaserma@shum.huji.ac.il

December 2006

Abstract

This paper studies the dynamic impact of highly skilled immigrants from the Former Soviet Union to Israel on natives' labor market outcomes. Specifically, we attempt to distinguish between the short-run and long-run effects of immigrants on natives' wages and employment. The transition of immigrants into a new labor market is a gradual process: the dynamics of this process come from immigrants' occupational mobility and from adjustments by local factors of production. Natives may therefore face changing labor market conditions, even years after the arrival of the immigrants.

If immigrants are relatively good substitutes for native workers, we expect that the impact of immigration will be largest immediately upon the immigrants' arrival, and may become smaller as the labor market adjusts to the supply shock. Conversely, if immigrants upon arrival are poor substitutes for natives due to of their lack of local human capital, the initial effect of immigration is small, and increases over time as immigrants acquire local labor market skills and compete with native workers. We empirically examine these alternative hypotheses using data from Israel's Labor Force and Income Surveys from 1989 to 1999.

We find that wages of both men and women are negatively correlated with the fraction of immigrants with little local experience in a given labor market segment. A 10 percent increase in the share of immigrants lowers natives' wages in the short run by 1 to 3 percent, but this effect dissolves after 4 to 7 years. This result is robust to a variety of different segmentations of the labor market, to the inclusion of cohort effects, and to different dynamic structures in the residual term of the wage equation. On the other hand, we do not find any effect of immigration on employment, neither in the short nor in the long run.

* We thank Jennifer Hunt, Magnus Lofstrom, Saul Lach and seminar participants at the European University Institute, Bar-Ilan University, Ben Gurion University, the University of Haifa, Tel Aviv University, Uppsala University and at the IZA Annual Migration Meeting in Bonn (June 2004) for helpful comments. We acknowledge generous financial support from the Maurice Falk Institute for Economic Research in Israel. Stas Krasinski and Royi Ben-Ivri provided excellent research assistance. All errors are our own.

The Dynamic Impact of Immigration on Natives' Labor Market Outcomes: Evidence from Israel

Abstract

This paper studies the dynamic impact of highly skilled immigrants from the Former Soviet Union to Israel on natives' labor market outcomes. Specifically, we attempt to distinguish between the short-run and long-run effects of immigrants on natives' wages and employment. The transition of immigrants into a new labor market is a gradual process: the dynamics of this process come from immigrants' occupational mobility and from adjustments by local factors of production. Natives may therefore face changing labor market conditions, even years after the arrival of the immigrants.

If immigrants are relatively good substitutes for native workers, we expect that the impact of immigration will be largest immediately upon the immigrants' arrival, and may become smaller as the labor market adjusts to the supply shock. Conversely, if immigrants upon arrival are poor substitutes for natives due to their lack of local human capital, the initial effect of immigration is small, and increases over time as immigrants acquire local labor market skills and compete with native workers. We empirically examine these alternative hypotheses using data from Israel's Labor Force and Income Surveys from 1989 to 1999.

We find that wages of both men and women are negatively correlated with the fraction of immigrants with little local experience in a given labor market segment. A 10 percent increase in the share of immigrants lowers natives' wages in the short run by 1 to 3 percent, but this effect dissolves after 4 to 7 years. This result is robust to a variety of different segmentations of the labor market, to the inclusion of cohort effects, and to different dynamic structures in the residual term of the wage equation. On the other hand, we do not find any effect of immigration on employment, neither in the short nor in the long run.

1. Introduction

As immigration continues to rise throughout the Western world, the question of the economic impact of immigration on the host country labor market is moving to the center of the public debate. The concern that competition from immigrants may hurt the wages and employment prospects of low skilled natives is among the factors that drive negative attitudes toward immigrants in Europe and the USA.[1] Despite this widespread sentiment, the economic literature has failed to find conclusive evidence for an adverse effect of immigration on natives' labor market outcomes. In this paper, we try to shed additional light on this issue by studying the impact of the mass migration to Israel of the 1990s. From 1989 to 2000 more than 1 million Jews migrated from the former Soviet-Union (FSU) to Israel, increasing its population and labor force by extraordinary magnitude.

The main novel feature of our work is the attempt to distinguish between the short and long run effects of immigration on the labor market. Much of the existing literature has assumed that the effect of a given immigration wave is uniform over time. However, there are reasons to believe that this is not the case. For example, if immigrants are relatively close substitutes to natives when they land in the host country, we would expect to see an immediate impact on wages and employment, as the stock of capital and other factors of production are fixed in the short run. However, as time goes by, capital and labor adjust, so that the medium and long run response will be smaller, and potentially even zero. An alternative possibility is that upon arrival, immigrants are poor substitutes for native workers, since their imported human capital is not transferable to the host economy (Friedberg, 2000; Eckstein and Weiss, 2003). Therefore, the immediate impact of immigration on natives' labor market outcomes is close to zero; nevertheless, as immigrants acquire local labor market skills, they compete with native workers, so that the medium and long run effects on natives' outcomes might be substantial.

[1] Bauer, Lofstrom and Zimmermann (2000).

To tease out these alternative hypotheses, we set up an econometric framework that allows immigrants with different levels of local labor market experience to have different effects on natives' labor market outcomes. The transition of immigrants into a new labor market is a gradual process: the dynamics of this process come from immigrants' occupational mobility and from adjustments by local factors of production. Therefore, natives may face changing labor market conditions, even years after the arrival of the immigrants. While most previous studies implicitly assume that the effect of immigration is homogeneous over time (regardless of whether the time frame of analysis is two or ten years after the arrival of immigrants), we adopt a more flexible approach that nests this conventional assumption. In addition, while most studies usually looked for the impact of low skilled immigrants on native outcomes, our case study provides a unique opportunity to study the impact of highly skilled immigrants, as most of the immigrants from the FSU to Israel have college education and have worked in the FSU in white collar occupations. An additional novel feature of our study is that we study the effects of immigration on the labor market outcomes of women as well as men.

We use micro data from Israel's Labor Force and Income Surveys from 1989 to 1999 to estimate the impact of the percentage of immigrants with different tenure in Israel in a well-defined labor market segment on natives' wages and employment. The analysis is feasible given the availability of detailed information on dates of immigration in the Israeli data, and the sheer size of the immigration wave, that allows us to observe a sufficiently large amount of immigrants with different amounts of tenure in each labor market segment. We consider different segmentations of the labor market such that moving across labor market segments always involves substantial adjustment costs for natives (education, retraining, moving, commuting, etc.).

Recognizing that immigrants do not allocate themselves randomly across different labor market segments, we use a number of different specifications to control for the potential correlation between immigrants' concentration and unobserved labor market conditions. Specifically, we experiment with different dynamic structures of the error term, including segment-specific fixed effects, a segment-specific linear time trend, and higher-level fixed effects interacted with a full set of time dummies. Thus, identification of the key parameter in the model comes from deviations in wages, employment, and the proportion of immigrants from segment specific means, segment specific trends, or deviations from period-specific means in broad groupings of segments.

Our results indicate that immigration has an adverse short run impact on wages of both men and women, though this effect dissolves in the medium and long run. This result is robust to a variety of different segmentations of the labor market and to alternative structures of the error term. Our preferred estimates suggest that a 10 percent increase in the share of immigrants lowers natives' wages in the short run by 1 to 3 percent. On the other hand, we do not find any effect of immigration on employment, neither in the short nor in the long run. Finally, we find that the short-run effect of immigration on native wages is concentrated primarily in blue-collar occupations, suggesting that either in the short run it is easier for immigrants to compete with low-skill natives, or that there may be more scope for complementarities between natives and immigrants within high-skill occupations.

Our paper is related to the large literature on immigrants' impact on natives' outcomes. It is natural to expect that a large migration wave would have an adverse effect on employment rates and wages of native workers. However, various studies, both in Israel and elsewhere, typically find little or no such effect. Friedberg (2001) studied the impact of FSU immigrants in Israel on the 1989-1994 changes in natives' wages. Taking an instrumental variable approach to control for the occupational selectivity of the immigrants, she shows that the mass migration had no effect on the wages of veteran Israelis. Friedberg's instrumental variable strategy can not be implemented in our setting, because the variable she uses (the occupational distribution of immigrants in the former Soviet Union) can only act as an instrument for immigrant concentration in a cell at a single point in time. In contrast, our goal is to explore the dynamics that arise from immigrants' mobility across segments and over time, and therefore we must take a different approach to control for the selectivity of the immigrants.

Friedberg's results are consistent with much of the international evidence accumulated on the (lack of) impact of immigration on host country wages and employment. A number of studies exploit variation in immigrant rates across United States cities and over time to measure the impact of immigration on local labor market outcomes (Altonji and Card, 1991; Goldin, 1994). These studies typically conclude that immigration had little or no adverse impact on natives' wages and employment. Pischke and Velling (1997) obtain similar results when looking at variation in immigrant rates across German counties. LaLonde and Topel (1991) exploit variation in the timing of immigration across localities to analyze the dynamic substitution patterns between new and older cohorts of immigrants. They find that older immigrants' wages are negatively affected by immigration, whereas natives' wages are not. Other studies, which focused on natural experiments of immigration episodes generated by political factors in the origin country (Card, 1990; Hunt, 1992; Carrington and de Lima, 1996), also found surprisingly little effects of migration.

The cross-market approach has recently been criticized by Borjas, Freeeman and Katz (1996). They argue that that an increase in labor supply in a certain city due to immigration can be diffused across the economy by intercity trade, movements of capital or by outflows of natives. Acknowledging this problem, a recent paper by Card (2001) assumes that immigrants and natives are perfect substitutes within occupations and cities. Under this assumption, he does find that occupation-specific wages and employment rates are systematically lower in cities with higher relative supplies of workers in a given occupation. Similarly, Borjas (2003) uses only variation in the human capital mix (determined by schooling and experience) of immigrants to study the effect of immigration on different groups of natives; he finds that, within groups, immigrants did have an adverse effect on wages and employment opportunities of natives. Angrist and Kugler (2005) focus on the correlation between institutions (such as employment protection, wage rigidities etc.) and the displacement effects of immigration across European countries. In contrast to previous studies, they do find that reduced flexibility may lead to a larger adverse effect of immigrants on natives' employment. Our paper supports this recent trend and suggests that the effects of immigration in the short run may be larger than what previously believed, while in the long-run, the effect is indeed negligible. The lack of distinction between the short and the long run may lead to the mixed results reported in the literature.

The remainder of the paper is organized as follows: the next section gives a brief account of the absorption of FSU immigrants in the Israeli labor market, and presents some preliminary evidence on the short and long run responses of wages and employment of natives. In Section 3 we describe and motivate the different labor market segmentations, and present our methodology for estimating the dynamic impact of immigration on native wages and employment. In this context, we also discuss the various structures of error terms that enable to identify the parameters of interest. In section 4 we present the basic estimation results, and perform a series of robustness tests. Section 5 concludes.

2. Background

Migration to Israel

Israel has been a country of immigrants and experienced several massive migration episodes from different countries before and after it was established in 1948. Immigration flows reached their peak in the first few years after the establishment of the State, but they started to decrease substantially after the 1973 war, so that by the end of the 1980s the immigration flow had settled around a fairly low number of about 1000 immigrants per month (see Friedberg (2001) Figure 1).[2] However, starting in October 1989, with the collapse of the former Soviet Union (FSU) and the change in emigration restrictions on Russian Jewish citizens, Israel experienced one of its largest immigration inflows, which continued throughout all of the 1990s.

From late 1989 until 2001, over a million of immigrants from the FSU arrived in Israel, increasing its population and labor force by extraordinary rates. At the peak of this wave during 1990 and 1991, over 330 thousand FSU Jews immigrated to Israel, increasing Israel's potential labor force by 8 percent and its population by 15 percent (see Figures 1a, 1b[3, 4]). Throughout the paper, we use the term "natives" to describe the population resident in Israel prior to January 1989 and "immigrants" to describe FSU immigrants who arrived after 1989. The native population includes both Israeli-born and foreign-born individuals. The share of foreign-born among natives is more than 40 percent. Since immigration to Israel was at its lowest during the 1980s, more than 90 percent of these foreign-born individuals have been in Israel for more than 10 years.[5]

The most notable characteristic of the FSU immigrants is their high level of education. Table 1 presents the educational distribution of male and female natives and immigrants by year of arrival. Over 69 percent of all FSU male and female immigrants had at least some college education and over 40 percent were college graduates. The share of college-educated natives during the same period, on the other hand, is only about 35 percent, and only 22 percent of natives are college graduates. Table 1 also reveals that immigrants who arrived in the early wave were, on the average, more educated than those who arrived in the later wave.

In Table 2 we present the one-digit occupational distribution of natives and immigrants in two sub-periods, 1989-1993 and 1994-1999. The table shows that male

---

[2] The only exception is 1984 where a wave of Ethiopian refugees arrived in Israel in a special operation known as Exodus Operation.

[3] The data for our analysis is taken from Israel's Labor Force (LFS) and Income Surveys (IS) from 1989 to 1999. The LFS is a rotating panel, where each household is interviewed for two consecutive quarters, followed by a break of two quarters, and is interviewed again for two consecutive quarters. In the fourth interview, a sub-sample of the respondents is asked questions about their income, and this information makes up the Income Survey (see Appendix A for a more detailed data description).

[4] The figures present the flow (1a) and the stock (1b) of immigrants at the ages of 25-64 as a percentage of the total Israeli population in this age group (Jews and non-Jews).

[5] In all of our analysis, we always control for foreign-born status and years since immigration.

immigrants are more concentrated than natives at both ends of the occupational ladder, while female immigrants are especially concentrated at the bottom. The distribution of natives has almost not changed between the two periods. At a first glance, there is no evidence that immigrants substantially affected the occupational distribution of natives. This is important for our empirical analysis because it lends credibility to our assumption that natives' ability to move between segments of the labor market defined by occupation is limited.[6] Therefore, our results are not likely to be contaminated by native flows across skill groups. As for the distribution of immigrants, it is worthwhile to note that in the early period (1989-1993) they were more likely to be employed in unskilled occupations, probably reflecting that (a) the size of the initial wave was so large that for many immigrants it was difficult to find a job suitable to their imported high skills; and (b) Israeli employers were uncertain about the quality of imported human capital (i.e., education), and it took them some time to learn it.

This last observation is reinforced by Table 3, which presents the occupational distribution of immigrants and natives, by schooling and time since migration. The table shows that the occupational distribution of recently arrived immigrants resembles the occupational distribution of relatively uneducated natives, regardless of the actual level of education attained by the immigrants. For example, 41 percent of recently arrived male immigrants with some college were employed as skilled industry workers, and 11 percent were employed as unskilled workers; the corresponding numbers for native males with some college are 11 percent and 0.5 percent. Similarly, 42.5 of recently arrived immigrant females with some college are employed as service workers, compared to only 5 percent among native females with the same level of education. As immigrants spend more time in Israel, their occupational distribution begins to match their educational attainment, though it does

[6] In previous work (Cohen-Goldner and Paserman, 2006), we did not find any evidence that higher immigrant concentration in a given occupation affected the occupational choices of young native workers.

not converge fully to that of natives.[7] The table highlights the important distinction between the true level of imported education and its effective value in the Israeli labor market. In calculating immigrant concentrations by schooling levels, we will therefore need to adjust immigrants' schooling in a way that reflects the groups of native workers with which immigrants are effectively competing.

<u>*Natives' Labor Market Outcomes*</u>

We now turn to the analysis of Israeli natives' labor market outcomes during the 1990s. Figure 2 shows the evolution of native male and female real hourly wages between 1987 and 1999, where the scale is 100 in 1987 for each gender. We see that for both native males and females real wages fell substantially at the time the migration wave began. Female real wages returned to their 1989 level only in 1994, and after dipping in 1995, they continued to grow more or less steadily throughout the second part of the decade. On the other hand, male wages were slower to recover, and only in 1996 did they return to their 1989 level for more than two consecutive years.

In Figure 3 we present the evolution of native male and female employment rates (again the scale is 100 for each gender in 1987). Here it seems more difficult to disentangle any potential effect due to immigration from cyclical and secular trends. The employment rate among males was relatively stable throughout the first half of the decade, apart from cyclical movements, and has been falling steadily since 1995. On the other hand, the employment rate among females is characterized by a secular upward trend.

The above mentioned time-series give some preliminary sense that wages did initially react to the migration wave, and recovered later in the decade, while the picture for employment is less clear. We now turn to analyze whether there is a cross-sectional correlation between the concentration of immigrants in a sector and the change in wages or employment in the short and long run. For each two-digit

[7] This finding mirrors the results of Weiss, Sauer and Gotlibowski (2001), who found that immigrants'

occupation cell, we calculate the average log hourly wage of natives in every year, and the ratio of immigrants who arrived between 1989-1991 in the cell to the size of the cell in 1989. Holding constant the size of the cell in 1989 ensures that we pick up only the variation in the number of immigrants in a cell (the numerator), not contaminated by native flows across labor market segments.

Figures 4 and 5 plot the change in log hourly wages against the fraction of 1989-1991 immigrants in two-digit occupation cells for males and females, respectively. The left-hand panel in the figures presents changes between 1989 and 1994 (the short-run change), while the right-hand panel presents changes between 1989 and 1999 (the long-run change). The overlaid regression line is obtained by weighted least squares, where each cell's weight is its average size. Note that the regression coefficient represents the percentage change in wages associated with a 100 percent change (i.e., a doubling) in the fraction of immigrants, and can therefore be interpreted as elasticity. For both males and females, we find that the short run change in log hourly wages exhibits a strongly negative and statistically significant correlation with immigrant penetration at the two-digit occupation level. The regression coefficient places the unadjusted short-run factor price elasticity at around -0.55, a substantially larger number than what had been previously found in the literature. On the other hand, the long run elasticity is between 0.18 and -0.44, and insignificantly different from zero for both males and females.[8]

Figures 6 and 7 plot the change in employment rates, in the short run and the long run, against the fraction of 1989-1991 immigrants in two-digit occupation cells. For males, there seems to be a very tenuous relationship between the two variables, independently of the time horizon. For females, the pattern is more similar to that

wages do not converge fully to those of natives in the long run.

[8] The actual value of the elasticity should be taken with some caution. If immigrants who arrived after 1992 tend to concentrate in the same occupations as immigrants who arrived between 1989 and 1991, and they have a short run negative impact on wages, this may lead to finding a stronger negative correlation between native wages and the fraction of 1989-1991 immigrants.

found for wages: employment is negatively correlated with immigrant concentration in the short run, but the long run correlation is essentially zero.

While these are very raw estimates, they illustrate clearly the importance of distinguishing between the short and long run effects of immigration, and they provide some preliminary support that in our case study of highly skilled immigrants, any adverse effects of immigration are more likely to manifest themselves in the short run, before the labor market has had time to adjust, and before these immigrants who arrived from a significantly different economy than the Israeli economy adjusted their skills to the local labor market.

In the next sections, we investigate further whether the contrast between the short and long run effects of immigration is robust to the use of individual level data, to the inclusion of additional controls for macroeconomic conditions and individual characteristics, to different segmentations of the labor market, and to alternative structures of the error term.

3. Methodology

We begin by specifying a conventional model for the impact of immigration on native labor market outcomes. Our estimating equation is

$$y_{ijt} = \beta_0 + \beta_1 IMM_{jt} + \beta_2 Z_{jt} + \beta_3 X_{ijt} + \alpha_j + \delta_t + \eta_{jt} + u_{ijt}, \qquad (1)$$

where y_{ijt} is the outcome variable of interest for individual i in labor market segment (or "cell") j observed in calendar quarter t. In the wage regressions y_{ijt} is the log hourly wage, while in the employment regressions it is a dummy indicator for whether the individual is employed. IMM_{jt} is the ratio of immigrants (both men and women) in segment j at time t to the size of cell j in 1989, Z_{jt} and X_{ijt} are vectors of observable macro and individual characteristics, α_j is a segment specific fixed effect, δ_t is a calendar quarter fixed effect, η_{jt} is a segment-calendar quarter specific effect, whose exact specification will be presented later, and u_{ijt} is the error term. All regressions adjust standard errors for clustering at the cell-calendar quarter level. The underlying assumption in equation (1) is that all immigrants have the same effect on the dependent variable, regardless of their time of arrival in Israel. Note that the all the time-series variation in the immigrant ratio in a given cell comes from the number of immigrants, since the denominator (the number of natives) is fixed.

Definition of the Labor Market Cells

The variable IMM_{jt} is a key variable in our analysis. Using the LFS, we calculate the share of immigrants in a given labor market cell in each calendar quarter, from the third quarter of 1989 to the fourth quarter of 1999. Following the recent criticisms of the local labor market approach (Borjas, Freeman and Katz, 1996; Borjas 2003), we take particular care to define the segments in such a way that they can be viewed as isolated markets with limited possibilities for native workers to move between them. We adopt four different segmentations of the labor market. In each of these segmentations, moving across labor market segments involves substantial adjustment costs (education, retraining, moving, commuting, etc.).

As in Friedberg (2001), we start by defining a closed labor market segment as a two-digit occupation cell. We next construct cells defined by one-digit occupation interacted with district of residence. The third segmentation is based on one digit occupation interacted with one digit industry, and, following Borjas (2003), the fourth segmentation is defined by the interaction of schooling and experience. In constructing the schooling-experience cells, however, it is important that we take into account the fact that human capital acquired abroad is not immediately transferable to the host economy, especially since the education system in the FSU significantly differs from the Israeli one. In addition, as highlighted in Table 3, many of the highly educated immigrants have difficulties in quickly finding employment that is suitable to their skills. Therefore, we construct two alternative segmentations: one based on the actual level of schooling and experience, and one based on the *effective* schooling and experience embodied in immigrant workers.

To calculate effective experience, we follow Borjas (2003) and estimate a conventional wage regression for immigrants and natives, where for immigrants we separate between years of experience acquired abroad and years of experience in Israel. The effective value of experience in Israel (abroad) is then simply calculated as the ratio of the marginal value of an additional year of experience in Israel (abroad) to the marginal value of a year of experience for natives. See Appendix B for details.

To calculate effective schooling, we follow a different approach, which we briefly summarize here (for the full details, see Appendix C). We first construct a matrix of the one-digit occupational distribution of immigrants (with different levels of experience in Israel) and natives by schooling category (we consider four schooling categories: less than high school, high school, some college, and college or more). We then look for a set of weights $\pi_{jj'}$ $(0 \leq \pi_{jj'} \leq 1, \sum_{j'} \pi_{jj'} = 1, \quad j, j' = 1,2,3,4)$ that minimize the distance between the occupational distribution of immigrants and natives. These weights then represent the effective schooling of immigrants: an immigrant in actual schooling category j is equivalent to π_{j1} natives in schooling category 1, π_{j2} natives in schooling category 2, and so on. This approach captures the slow transferability of human capital acquired abroad, and reflects more accurately the schooling of natives with which immigrants are effectively competing.

Table 4 presents the number of distinct cells in each segmentation, the average number of observations used to calculate the immigrant share, and the overall average in the fraction of immigrants according to the five different labor market segmentations.[9]

<u>*Other Variables*</u>

The vector Z_{jt} represents a set of controls primarily for labor demand shocks for workers in segment j at time t. In particular, Z_{jt} includes the total number of

[9] The proportion of immigrants in each labor market segmentation is calculated using the sampling weights in the LFS.

workers in cell j at time t, and an index for labor demand for workers in the cell. Specifically, the labor demand index for segment j in year s,[10] LD_{js} is constructed as follows:

$$LD_{js} = \sum_{k} p_{jk} Y_{ks},$$

where Y_{ks} is the real level of industrial production in (one-digit) industry k in year s, and p_{jk} is the 1989-1999 proportion of workers in segment j who are employed in industry k. In other words, the labor demand index for cell j is a weighted average of industrial production in year s, where the weights are given by the industry shares of employment of cell j workers. To illustrate, if a large share of engineers is employed in manufacturing, and the GDP share of manufacturing decreases, this will lower the demand for engineers.

The vector X_{ijt} represents a set of individual demographic characteristics of worker i in cell j at time t, and it includes years of schooling, potential experience (age – years of schooling – 6), and potential experience squared; a marital status dummy (1 if married, zero otherwise) and the number of children aged 0-4, 5-14, and 15-17; a dummy for whether the individual is foreign born (1 for Israeli born) and the number of years since immigration; a set of ethnic origin variables – Jews of European/American origin (Ashkenazi), Jews of Asian/African origin (Sephardi), and non-Jews;[11] and a dummy for whether the individual is employed in the public sector. In all regressions we include a full set of calendar quarter dummies, to capture unobserved macroeconomic conditions.

Dynamic Model

---

[10] The labor demand index varies only by year and labor market segment, since data on 1-digit industry production is available only at the yearly level. Clearly, this same index will be assigned to all observations within a calendar year.

[11] Ethnic origin is determined by the country of birth of the respondent, or, if the respondent was born in Israel, by country of birth of the respondent's father. The omitted category is third-generation Israeli Jews.

We extend now equation (1) to allow for immigrants with different levels of tenure in Israel to have a different impact on native outcomes. Specifically, let IMM_{jst} be the ratio of immigrants with s years of tenure Israel in cell j at time t to the size of cell j in 1989. Then the estimating equation becomes

$$\begin{aligned} y_{ijt} &= \beta_0 + \gamma_0 IMM_{j0t} + \gamma_1 IMM_{j1t} + \ldots + \gamma_{10} IMM_{j,10,t} \\ &\quad + \beta_2 Z_{jt} + \beta_3 X_{ijt} + \alpha_j + \delta_t + \eta_{jt} + u_{ijt}. \end{aligned} \tag{2}$$

We are particularly interested in the pattern of the γ coefficients. This pattern depends on the degree of substitutability between immigrants and natives in the short run, and on the speed of adjustment of local factors of production to the migration wave.

A high degree of substitutability between immigrants and natives implies that the initial impact of migration on native outcomes should be substantial, as the stock of capital is fixed in the short run. If capital and labor are non-rival in production, the initial migration wave will raise the marginal productivity of capital, so that in the medium and long run the demand for capital increases. The rightward shift in the demand for capital raises in turn the marginal productivity of labor, and therefore labor demand increases as well. As a result, the initial adverse impact of migration on native wages and employment will be mitigated in the long run.[12] If this is the case, we expect the short-run γ's to be significant and negative, while the long run γ's to be smaller.

An alternative possibility is that in the short run immigrants are relatively poor substitutes for natives, but the degree of substitutability increases over time as immigrants gradually acquire local labor market skills. Depending on the speed of adjustment of capital, we could have a scenario in which the initial impact of immigration is negligible (or maybe even positive if immigrants and natives are complements, and immigration pushes up the marginal productivity of Israeli

[12] In a two sector open economy, if the total supply of capital is fixed, an increase in the amount of one factor of production will only cause a reallocation of production factors across sectors, depending on the factor intensities of each sector, and will not affect factor prices in the long run. This is the

workers), but the effect becomes more negative over time. In this case, the short run γ's are zero or maybe even positive, while the adverse impact of immigration manifests itself in the long-run γ's.

Since we have only eleven years of data, it might be difficult to estimate precisely the coefficients on the long-run γ's. For example, γ_{10} is identified only from the 1999 wave of the LFS, and there might not be enough observations in each cell to obtain a satisfactory estimate of this parameter. Therefore, we adopt a linear functional form for the dynamic pattern of the γ's. Specifically, we assume that

$$\gamma_s = \lambda_0 + \lambda_1 s.$$

Substituting for γ_s in equation (2), we obtain:

$$\begin{aligned} y_{ijt} &= \beta_0 + \lambda_0 \sum_s IMM_{jst} + \lambda_1 \sum_s s \times IMM_{jst} + \beta_1 Z_{jt} + \beta_2 X_{ijt} + \alpha_j + \delta_t + \varepsilon_{ijt} \\ &= \beta_0 + \lambda_0 IMM_{jt} + \lambda_1 I\tilde{M}M_{jt} + \beta_1 Z_{jt} + \beta_2 X_{ijt} + \alpha_j + \delta_t + \eta_{jt} + u_{ijt}, \end{aligned} \quad (3)$$

where IMM_{jt} is the ratio of total stock of immigrants in cell j at time t to the size of the cell in 1989 (defined exactly as in equation (1) in the static model), and $I\tilde{M}M_{jt}$ is the weighted sum of ratios of immigrant-years in cell j at time t to the size of the cell in 1989. In this specification, the parameters λ_0 and λ_1 have a very straightforward interpretation: λ_0 , which is equivalent to γ_0 in (2), measures the immediate impact of immigration on labor market outcomes. If immigrants upon arrival are close substitutes to natives, we expect λ_0 to be negative, while it should be zero or even positive if the degree of substitutability is low. The second coefficient, λ_1, measures how the impact of immigration changes over time. We expect λ_1 to be positive if the adverse impact of immigration becomes smaller over time, whereas it should be negative if the native labor market is negatively affected only some years after the

Rybczinsky theorem from international trade theory. See Gandal, Hanson and Slaughter (2004) for an empirical analysis of the Israeli case.

initial arrival of immigrants. A simple hypothesis test for the null of λ_1 equal to zero essentially tests whether the impact of immigration is homogeneous over time.

Identification Issues

If all the segment specific effects (the α_j's and the η_{jt}'s) were uncorrelated with the proportion of immigrants in a segment, we could exploit the variation in the fraction of immigrants both across cells and over time, and estimate equations (1) and (3) by simple OLS, adjusting the standard errors for within segment correlations in the error term.

It is important, however, to make sure that the effect we identify in the dynamic model is not simply due to the selection of immigrants across labor market segments. To illustrate the problem, consider the following simple two period example: the labor market consists of two segments, a low wage and a high wage segment. The wage in each segment is fixed and is not affected by immigration. In each period, a wave of immigrants arrives and is employed in the low wage segment. After one period in the host country, all immigrants move to the high wage segment of the labor market. Therefore, all recent immigrants are concentrated in the low wage segment, and all veteran immigrants are concentrated in the high wage segment. As a result, wages are negatively correlated with the concentration of recent immigrants, and positively correlated with the concentration of veteran immigrants. Despite the fact that immigration has no effect on wages, we could erroneously conclude that the initial effect is negative, and then disappears in the long run. In this simplified example, controlling for segment specific effects would prevent us from reaching the wrong conclusion. The key identifying assumption here is that the fraction of immigrants is potentially correlated with the unobserved overall level of wages or employment in a segment, but we rule out the possibility that it is correlated with unobserved *changes* in wages or employment.

Controlling for segment specific fixed effects is not enough if the segment specific wages are not fixed. Assume for example that wage growth in the high wage segment is faster than in the low wage segment. Then the deviation in wages from the segment mean is positively correlated with deviation in the fraction of veteran immigrants from the segment mean, while it is negatively correlated with the deviation in the fraction of recent immigrants from the segment mean. Hence, even controlling for fixed effects would yield a spurious conclusion that the impact of immigration changes over time. To alleviate this concern, we test the robustness of the estimates to the inclusion of more complex dynamic structures of the segment specific effect. In particular, we control for segment specific time trends, and higher level fixed effects (e.g., one-digit occupation fixed effects when segments are defined by two-digit occupation cells) interacted with a full set of time dummies. In these two specifications, identification is achieved from the deviation in wages and immigrant concentration from their segment specific trends, or from the higher-level mean in a specific year.

4. Results

From this point on we will focus exclusively on native outcomes. The sample of "native" workers, (which includes both Israeli born and veteran immigrants), is taken from the 1989-1999 Labor Force Surveys and Income Surveys. Summary statistics for this sample are presented in Table 5.[13]

Wages

The first two columns of Table 6 present the estimation results for the effect of immigration on natives' log hourly wage, assuming that the effect of immigration is homogeneous over time. We present results for both males and females, with and without cell fixed effects, and for all the possible segmentations of the labor market.[14]

[13] The Income Survey excludes households in small localities, hence sample sizes for the income variables are smaller.
[14] The regressions are run separately for men and women, but the key explanatory variable is calculated as the ratio of *total* immigrants (both men and women) to native employment in a labor market cell in 1989.

We first examine the specification without fixed effects in the first column of the table. The results here are sensitive to the choice of labor market segmentation. When the segmentation is based on occupational category, we generally find a strong negative correlation between immigrant concentration and native wages. On the other hand, the fraction of immigrants in a schooling-experience cell is *positively* correlated with native wages. The correlation is very strong in the segmentation based on actual schooling and experience, and substantially weaker when we use adjusted schooling and experience. There is a simple explanation for this finding. Immigrants from the FSU are substantially more educated than natives (see Table 1); however, upon arrival, they cluster in low skill jobs that pay low wages (Eckstein and Weiss, 2002; Weiss, Sauer and Gotlibovski, 2003). Therefore, at the cross-sectional level, we expect to find a strong negative correlation between the fraction of immigrants and natives' wages at the occupational level, but a positive correlation between immigrants and natives' wages when we segment the labor market by schooling and experience.

Part of the correlation that we estimate may rise from the selectivity of immigrants across labor market cells. Hence, we should not attach any causal interpretation to the estimates in the no-fixed effects specification; however, we believe that it is important to report them in order to better understand the nature of the selection of immigrants across labor market segments.

The fixed effects estimates in the second column of the table reinforce the above interpretation. In nearly all specifications, we find that the coefficient estimate in the fixed effect specification is substantially smaller (in absolute value) than the coefficient estimate when fixed effects are not included. For males, the coefficient is negative and statistically significant when we segment the labor market by district of residence and occupation, it is essentially zero in the other occupation-based segmentations and in the adjusted schooling-experience segmentation, and it is still positive and significant in the actual schooling-experience segmentation. For females, the coefficient is negative and statistically significant in all the occupation-based segmentations and in the adjusted schooling-experience segmentation, and it is positive and statistically significant in the actual schooling-experience segmentation. The results based on the actual schooling-experience segmentation are not entirely unexpected: they reinforce the belief that human capital accumulated abroad is not entirely transferable to the host economy (Friedberg, 1999; Eckstein and Weiss, 2004; Kugler and Sauer, 2005), especially in the short run, and hence the segmentation based on actual schooling and experience does not accurately reflect the competition from immigrants faced by native workers.

The estimates of the dynamic model are presented in specifications 3 and 4. Once again, to illustrate the nature of the selection process, we present results from specifications without segment fixed effects (specification 3) and with segment fixed effects (specification 4). When fixed effects are omitted, we find a pattern similar to that of the static model: in the occupation-based segmentations and in the segmentation based on adjusted schooling and experience there is a very strong short run negative correlation between immigration and native wages, with the sign of the effect reverting in the long run. The pattern of signs is reversed in the actual schooling-experience segmentation. As discussed above, this is likely to be due to the selection of immigrants upon arrival in low wage segments, and their subsequent move up the occupational ladder. In fact, when segment fixed effects are included, the estimate for both λ_0 and λ_1 fall substantially. However, with the exception of the segmentation based on actual schooling and experience, we find that that λ_0, the estimate for the immediate effect of immigration on wages, is negative and nearly always statistically significant. The estimate of λ_1 is always positive and is statistically significant in five of the eight segmentations: in the two-digit occupation segmentation it is statistically significant for both males and females, and of similar magnitude.

The pattern of signs in the actual schooling-experience segmentation is reversed, even though the estimates are not statistically different from zero at conventional significance levels. Again, this suggests that immigrants with a given level of schooling and experience are not necessarily substitutes to natives with the same objective attributes. In fact, the positive short-run and negative long-run coefficients are not entirely surprising in this specification, since it is exactly when we segment the labor market by schooling and experience that we expect the degree of substitutability between immigrants and natives to increase over time.

It is worthwhile to compare these results to those of the static model: assuming that the effect of immigration is constant over time and using the two-digit occupation segmentation, we would have concluded that the elasticity of native male wages with respect to immigration is zero, and that of females is –0.12. However, when we allow the effect to differ depending on immigrants' tenure in Israel, our conclusion is dramatically altered. The short run elasticity of wages is –0.20 for males and –0.28 for females, and it takes between 5 and 7 years for occupation-level wages to return to their pre-immigration level.

<u>Employment</u>

The first two columns of Table 7 present the estimates of the static model for employment rates. For males, the pattern is similar to that found for wages. There is a negative cross-sectional correlation between employment and immigrant penetration, but this relationship disappears once we control for segment specific effects. Interestingly, we do not find any evidence of a positive correlation in the actual schooling-experience segmentation. For females, we observe a negative cross-sectional correlation in the occupation-based segmentations, and a positive correlation in the actual schooling-experience segmentation, while the correlation is zero in the adjusted schooling-experience segmentation. All of the correlations switch signs when we include fixed effects, although only the coefficient in the 2-digit occupation segmentation is statistically significant.

In the remaining columns of Table 7 we present the estimates of the dynamic model for employment rates. In the specification without fixed effects, we find the familiar pattern of coefficients, driven by selection. The fixed effects estimates, on the other hand, yield mixed results: we find a short-run negative correlation for males, which diminishes over time, in the actual schooling-experience segmentation; and a positive short-run correlation for females in the two-digit occupation segmentation. All the other coefficients are statistically insignificant, and it is difficult to detect any consistent pattern in the signs of the estimates. Overall, it seems difficult to draw any definite conclusions on the effect of immigration on natives' employment rates. This could be due to several factors. First, our sample is based only on workers in the labor force: it is possible that immigration operates mainly on the labor force status margin. Second, there seem to be important secular trends in both male and female labor supply (see Figure 3), which may make it difficult to identify any effects due to immigration. Finally, if the labor supply curve is inelastic, we would indeed not expect immigration to have any effect on natives' employment.

Robustness Checks

Since there appears to be essentially no effect of immigration on employment, neither in short nor in the long run, we report robustness checks for the effect of immigration on native wages alone.[15] Moreover, we exclude from the analysis the actual schooling-experience segmentation, since these variables were not completely transferable and utilizable in the Israeli labor market and therefore should be adjusted as explained above. The results are presented in Table 8.

The first two columns of the table adjust standard errors for potential serial correlation in the error term. The standard errors reported in Table 6 are correct if there is no serial correlation between the residuals in a particular labor market cell (formally, u_{ijt} and u_{ijs} in equation (3) must be uncorrelated for any two periods s and t). As shown by Bertrand, Duflo and Mullainathan (2004), serial correlation within clusters in differences in differences analysis can lead to serious biases in estimated standard errors, especially so if the explanatory variable of interest is highly persistent. To address this concern, Bertrand et al. suggest estimating the equation with clustering at the cell level, rather than at the cell-time unit level. Column (1) in Tables 8 replicates column (4) in Table 6, but presents autocorrelation-robust standard errors. For males, the precision of the estimates is slightly lower in the district of residence-occupation and in the industry-occupation segmentations, but the coefficient for the immediate impact remains significant. By contrast, the estimate of λ_0 in the adjusted schooling-experience segmentation becomes statistically significant at the 10 percent level. For females, the largest increase in standard errors occurs in the two-digit occupation segmentation, but the coefficients remain significant.

We next test whether our results are driven by the fact that different cohorts of immigrants affect the labor market differently. If the impact of immigration is indeed the same, regardless of immigrant tenure in Israel, but different cohorts of immigrants affect native outcomes differently, we would face an identification problem similar to the one that arises in the estimation of the immigrant wage-tenure profile (Borjas, 1985). In a single cross-section, it is impossible to identify separately tenure effects from cohort effects. With repeated cross-sections, as in our data, identification becomes possible, but one must impose additional restrictions.[16] Therefore, we distinguish between two cohorts of immigrants: those who arrived in the initial wave between 1989 and 1992 (these immigrants essentially fled the Soviet Union in haste, fearing that the country would fall into chaos, and can be described as "refugees"); and those that arrived in 1993 and later, which share more of the features of economic migrants. The identifying assumption is that the impact of the first cohort is zero, and we test whether adding cohort effects changes our estimates from Table 6. The results

[15] Similar robustness checks for employment regressions yielded essentially the same results as in Table 7.

[16] To see this, let IMM_{jst} be the fraction of immigrants with s years of tenure in Israel, and let IMM_{jct} be the fraction of immigrants who arrived in cohort (year) c. A general model would allow a different effect for immigrants of any possible combination of cohort and tenure. However, this model is clearly not identified since in a given cell, the sum of the number immigrants with different tenure in Israel is identical to the sum of the number of immigrants from different cohorts. Mathematically, $\sum_s IMM_{jst} = \sum_c IMM_{jct}$. Therefore, we have a perfect multicollinearity problem. The same identification problem arises even if we impose a linear structure on the pattern of coefficients.

of this exercise are presented in column (2) of Table 8. It turns out that the inclusion of a cohort of immigration dummy has little effect on either the magnitude or the significance level of the coefficients.

In specification (3) we test for robustness of our estimates to a more flexible specification of the error term structure. Specifically, we allow the segment effects to be time-varying, but we restrict the dynamics to follow a linear trend.[17] The regression equation is estimated with a full set of segment-specific fixed effects, and a full set of segment-specific effects interacted with a linear time trend. In other words, we attempt to identify any effects of immigration from the deviations in wages and immigrant concentration from their segment specific trends. For both males and females we find that the short-run effect of immigration is smaller in absolute value once we control for a segment specific trend. For males, two of the three significant coefficients in the benchmark case remain statistically significant. The short-run coefficient in the two-digit occupation segmentation is halved in size and becomes insignificant. For females, all the coefficients become insignificant at the 5 percent level, although the pattern of signs is preserved, and all the t-statistics are above one. We should not be too surprised by the loss in precision of our estimates, since the inclusion of so many segment specific effects may swamp out much of the useful variation that can aid us in identification.

In specification (4) we go one step further, and relax the linear trend assumption for the dynamics of the unobserved effect. Instead, we assume that the segment specific effect can vary freely over time, but the dynamics are constant within broad groupings of segments. Specifically, suppose that the index $j_{g_1 g_2}$ denotes that segment j belongs to broad groupings g_1 and g_2. For example, if the segmentation is based on district of residence and one-digit occupational category, then the labor market segment for professional workers in the Tel Aviv district belongs to the aggregate grouping of all professional workers (g_1), and to the aggregate grouping of

[17] Formally, in equation (3) we substitute η_{jt} with $\zeta_j \times t$.

all Tel Aviv residents (g_2). Then, the individual effect for segment $j_{g_1 g_2}$ at time t is $\eta_{j_{g_1 g_2} t} = \theta_{g_1}\delta_t + \theta_{g_2}\delta_t$. In our example, this means adding to regression (4) in Table 5 a full set of district of residence dummies interacted with a full set of year dummies, and a full set of one-digit occupation dummies interacted with a full set of year dummies. In this specification, identification is achieved off the deviations in segment-specific immigrant concentration and wages from their overall mean in the sample period (because of the inclusion of the cell fixed effects) and from the period t mean in broad groupings of segments.

For males we find that the short-run effect of immigration disappears in the residence-occupation segmentation, but is unaffected in the other three segmentations. For females, the effect maintains its sign and significance level only in the two-digit occupation segmentation. It is difficult to interpret these results: on one hand, it's possible that part of the estimated coefficient in the fixed effects specification was capturing the concentration of newly arrived immigrants in sectors with temporarily low wages; on the other hand, it could be that the more complex dynamic structure of the unobserved component swamps out much of the useful variation that is necessary to estimate the effect precisely.[18]

In Table 9 we check whether the results are robust to a more flexible specification of the dynamic impact of immigration on native wages. In particular, we specify a piecewise-constant function for the γ's in equation (2):

$$\gamma_s = \mu_0 \cdot 1(s=0) + \mu_1 \cdot 1(1 \le s \le 3) + \mu_2 \cdot 1(4 \le s \le 6) + \mu_3 \cdot 1(7 \le s \le 10).$$

The estimating equation then becomes

$$\begin{aligned} y_{ijt} = \beta_0 + \mu_0 IMM_{j0t} + \mu_1 \sum_{s=1}^{3} IMM_{jst} + \mu_2 \sum_{s=4}^{6} IMM_{jst} + \mu_3 \sum_{s=7}^{10} IMM_{jst} + \\ + \beta_1 Z_{jt} + \beta_2 X_{ijt} + \alpha_j + \delta_t + \varepsilon_{ijt}. \end{aligned} \tag{4}$$

[18] We have also estimated all the models on the data grouped at the segment-calendar quarter level, using weighted least squares. All the results are essentially unchanged, and can be obtained by the authors upon request.

This specification allows us to identify more accurately the dynamic structure of the immigration impact. We estimate equation (4) both with only cell fixed effects, and with a full set of cell effects interacted with a linear trend. In both specifications, we find that the adverse impact of immigration on native wages is concentrated one to three years after the immigrants' arrival. This effect is present for both males and females, and is statistically significant in nearly all segmentations. Controlling for a more complex dynamic structure of the error term has little effect on the estimates for males, while it reduces by about half those for females. The estimates imply that a 10 percent increase in the fraction of immigrants with one to three years of tenure in Israel reduces native wages by 0.9 to 3.2 percent for males, and by 0.4 to 5.1 percent for females. At all other time spans, the effect is essentially zero in all specifications. The fact that the effect is concentrated in the short run (though not in the very short run, at zero years of tenure), is consistent with the hypothesis that immigrants are substitutes for native workers, and that other factors of production adjust within one to three years after the immigrants' arrival, so that in the medium and long run the effect of immigration on native wages is essentially zero.

Differences between low-skill and high skill sectors

The empirical analysis so far may have been too restrictive, as it imposed the same immediate and long-term effects on workers in different skill groups. However, it is possible that upon arrival immigrants compete with relatively low-skilled natives and as they acquire local human capital they are able to upgrade their occupation and compete with high-skilled natives. In addition, in low skill jobs that require little training and local skills, immigrants and natives are more likely to be substitutes with one another, while in the high-skill sectors there may be more scope for complementarities. Therefore, we allow the effect to differ between two broad categories of workers: white-collar (high skill) and blue-collar (low skill) workers.[19]

Table 10 presents the results from the dynamic model with fixed effects and with fixed effects interacted with a linear trend, separately for blue-collar and white-collar workers. There is a noticeable difference in the sign of the initial effect and in its significance between blue-collar and white-collar workers. Specifically, in blue-collar occupations we find the same broad pattern that was present in the overall sample: the initial effect tends to be negative and significant, and as immigrants spend time in Israel this effect diminishes. However, the initial effect for white-collar workers has an inconsistent sign and is insignificant.

Based on the results from the separate regressions for different skill groups we conclude that the source of our previous findings (Tables 6, 8, and 9) comes from the dynamic effect of immigrants on low-skilled blue-collar native workers and that white-collar native workers are not significantly affected by immigration neither in the short run nor in the long run. Overall, the results provide support for our general conclusion that the impact of immigration is largest upon the immigrants' arrival, and then diminishes over time.

5. Conclusion

This paper studies the dynamic impact of the mass migration from the former Soviet Union on native Israelis' labor market outcomes. The key feature of our paper is allowing the impact of immigration to vary over time. Our results indicate that immigration did have a short-run adverse impact on wages, with the effect dying out after 5 to 7 years. However, we do not find any immediate nor delayed impact on employment. Despite that most of the immigrants had high level of imported human capital, the effect on natives' wage comes from the effect of immigrants on low-skills

[19] White-collar workers are defined as those in occupations 0-299 in the CBS 1994 occupational classification (scientific and academic professionals, other free professionals and technicians,

blue-collar natives, while the wage of white-collar native workers is not affected from immigration neither in the short-run nor in the long-run. Interestingly, we find that the effect of immigration is quite similar for both men and women. This suggests that there is no reason to neglect the impact of immigration on native females.

Our preferred estimates suggest that a 10 percent increase in the share of immigrants lowers natives' wages in the short run by 1.2 to 5.7 percent. These findings are consistent with the notion that within occupation-oriented segments, immigrants are close substitutes to natives in the short run and depress natives' wages; however, as the labor market adjusts to the migration wave through offsetting flows of capital and other factors of production, the adverse effect is diffused in the medium and long run. These results are robust to the inclusion of cohort effects and to the selection of immigrants into low wage or low wage growth segments in the labor market.

We should be aware of the idiosyncratic characteristics of the Israeli case study, which may make our results difficult to extend to other countries. The Soviet migration wave represented a sudden large deviation of the immigration rate from its long-run steady-state level. In this setting, it is not surprising that the short-run impact of immigration was substantial, as other factors of production did not have time to adjust due to the unexpected nature of the shock. The dynamic response of the labor market to small fluctuations in the immigration rate from its steady-state, or to gradual increases in the immigration rate, should not necessarily resemble that found in our paper. Nevertheless, we view our methodological contribution as potentially important for understanding the economic impact of immigration in other contexts as well. We leave the investigation of this matter for future research.

---

managers); blue-collar workers are defined as those in occupations 300-999 (clerical workers, sales workers, service workers, farm workers, skilled workers in industry, and unskilled workers).

References

Altonji, Joseph G., and Card, David. "The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives." In *Immigration, Trade and Labor,* edited by John M. Abowd, and Richard B. Freeman. Chicago: University of Chicago Press, 1991.

Angrist, Joshua D., and Kugler, Adriana D. "Protective or Counter-Productive? Labour Market Institutions and the Effect of Immigration on EU Natives." *Economic Journal*, June 2003, 113(488), pp. F302-31

Bauer, Thomas; Lofstrom, Magnus and Zimmermann, Klaus F. "Immigration Policy, Assimilation of Immigrants, and Natives' Sentiments Towards Immigrants: Evidence from 12 OECD Countries." *Swedish Economic Policy Review,* 7(2), Fall 2000, pp. 11-53.

Bertrand, Marianne; Duflo, Esther, and Mullainathan, Sendhil. "How Muchs Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*, 119(1)*,* February 2004, pages 249-275.

Borjas, George J., Freeman, Richard B, and Katz, Lawrence. "Searching for the Effect of Immigration on the Labor Market", *American Economic Review*, 86(2), May 1996, pp. 246-251.

Borjas, George J. (1985). "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants." *Journal of Labor Economics*, 3(4), 463-489.

Borjas, George J. "The Labor Demand Curve *Is* Downward Sloping: Reexamining the Impact of Immigration on the Labor Market." *Quarterly Journal of Economics,* 118(3), November 2003, pp. 1335-1374.

Card, David. "The Impact of the Mariel Boatlift on the Miami Labor Market." *Industrial and Labor Relations Review*, 43(1), January 1990, pp. 245-257.

Card, David. "Immigrant Inflows, Native Outflows, and the Local Labor Market Impacts of Higher Immigration." *Journal of Labor Economics*, 19(1), January 2001, pp. 22-64.

Carrington, William J. and de Lima, Pedro J.F. "The Impact of 1970s Repatriates from Africa on the Portuguese Labor Market." *Industrial and Labor Relations Review*, 49(2), January 1996, pp. 330-347.

Cohen-Goldner, Sarit and Paserman, M. Daniele. "Mass Migration to Israel and Natives' Employment Transitions ." *Industrial and Labor Relations Review*, 59(4), July 2006, pp. 630-652.

Eckstein, Zvi and Weiss, Yoram., "'The Integration of Immigrants from the Former Soviet Union in the Israeli Labor Market," in *The Israeli Economy, 1985-1998: From Government Intervention to Market Economics, Essays in Memory of Prof. Michael Bruno*, edited by Ben-Bassat, Avi. Cambridge: MIT Press, 2002.

Eckstein, Zvi and Weiss, Yoram., "On the Wage Growth of Immigrants: Israel 1990-2000," *Journal of the European Economic Association*, 2(4), June 2004, pp. 665-695.

Friedberg, Rachel M. "You Can't Take It with You? Immigrant Assimilation and the Portability of Human Capital." *Journal of Labor Economics*, 18(2), April 2000, pp. 221-251.

Friedberg, Rachel M. "The Impact of Mass Migration on the Israeli Labor Market." *Quarterly Journal of Economics*, 116(4), November 2001, pp. 1373-1408.

Gandal, Neil; Hanson, Gordon H. and Slaughter, Matthew J. "Technology, Trade and Adjustment to Immigration in Israel." *European Economic Review*, April 2004, 48(2), pp. 403-428.

Goldin, Claudia. "The Political Economy of Immigration Restriction in the United States, 1890-1921." In *The Regulated Economy: A Historical Approach to*

Political Economy, edited by Claudia Goldin and G. Libecap. Chicago: University of Chicago Press, 1994.

Hunt, Jennifer. "The Impact of the 1962 Repatriates from Algeria on the French Labor Market." *Industrial and Labor Relations Review,* 45(3), April 1992, pp. 556-572.

Kugler, Adriana D., and Sauer, Robert M. "Doctors Without Borders? Relicensing Requirements and Negative Selection in the Market for Physicians." *Journal of Labor Economics*, 23(3), July 2005, pp.437-465.

LaLonde, Robert and Topel, Robert. "Labor Market Adjustments to Increased Immigration." In *Immigration, Trade and Labor,* edited by John M. Abowd, and Richard B. Freeman. Chicago: University of Chicago Press, 1991.

Pischke, Jorn-Steffen and Velling, Johannes. "Employment Effects of Immigration to Germany: An Analysis Based on Local Labor Markets." *Review of Economics and Statistics,* 79(4), November 1997, pp. 594-604.

Weiss, Yoram; Sauer, Robert M.; and Gotlibovski, Menachem. "Immigration, Search, and Loss of Skill." *Journal of Labor Economics*, 21(3), July 2003, pp.557-591.

Appendix A: Data

We use micro data from the Israeli *Labor Force Survey* (LFS) and the *Income Survey* (IS) of 1989-1999. The LFS is a rotating panel, where each household is interviewed for two consecutive quarters, followed by a break of two quarters, and is interviewed again for two consecutive quarters. In the fourth interview, a sub-sample of the respondents is asked questions about their income, and this information makes up the Income Survey. The Income survey excludes households in kibbutzim, collective moshavim, and other localities with a population below 10,000. The native male sample includes men between 25 and 65, the native female sample includes women between 25 and 60.[20] We do include non-Jews in our sample, but we exclude ultra-orthodox Jews since most of them dedicate their time to Torah study and are permanently out of the labor force. We also exclude people who reported more than 30 years of schooling. Since most of our segmentations are based on workers' occupational category, we also drop from the sample workers who did not report a previous occupation. This excludes from the sample workers who are unemployed for more than a year and individuals out of the labor force who did not work in the calendar year prior to the survey date.

Appendix B: Calculation of Effective Experience

To calculate effective experience, we follow Borjas (2003). We estimate the following wage equation, jointly for natives and immigrants, using all the available Income Surveys between 1989 and 1999:

$$\begin{aligned}\log w = {} & \alpha^{N}{}' N \cdot Ethnic + \beta^{N} N \cdot SCH + \gamma_1^{N} N \cdot EXP + \gamma_2^{N} N_i EXP^2 + \\ & \alpha^{I} I + \beta^{I} I \cdot SCH + \gamma_1^{F} I \cdot EXPFOR + \gamma_2^{F} I \cdot EXPFOR^2 + \\ & \gamma_1^{I} I \cdot EXPISR + \gamma_2^{F} I \cdot EXPISR^2 + \delta Y + \lambda C + v,\end{aligned}$$

[20] We omit younger workers because in some of the years the CBS masks the actual age of individuals between 18 and 24. Moreover, all young Jews serve in the military for a compulsory period of between 20 months (women) and 36 months (men), hence they are not members of the labor force. The upper limit represents the mandatory retirement ages for men and women during the sample period.

where N and I are dummies for "natives" (Israeli born and veteran immigrants) and post 1989 immigrants respectively, SCH denotes years of schooling, EXP is years of potential experience for natives, $EXPFOR$ is years of potential experience abroad for immigrants, $EXPISR$ is years of experience in Israel, Y are year dummies, and C are cohort of immigration dummies. The effective value of a year of experience abroad is the ratio of the returns to experience abroad to the returns to experience for natives (evaluated at the average value of experience abroad for immigrants), and the effective value of experience in Israel is calculated analogously. Appendix Table B1 presents the details of the calculation of the effective value of experience for immigrants

Appendix C: Calculation of Effective Schooling

Let M be a 10×4 matrix whose representative element m_{ij} is the proportion of immigrants in schooling category j (less than high school, high school, some college, and college or more) who are employed in one-digit occupation i (occupation category 10 represents workers who are not employed or have a missing occupation). Let N be the analogous matrix for natives. Let M_j be the j^{th} column of the matrix M. Our goal is to find, for every schooling category j, the vector $\pi_j = \left(\pi_{j1}, \pi_{j2}, \pi_{j3}, \pi_{j4}\right)'$ that minimizes the distance between N and M_j. Formally,

$$\hat{\pi}_j = \arg\min_{\pi} \left(N\pi - M_j\right)' W^{-1} \left(N\pi - M_j\right)$$
$$s.t.: \sum_{j'=1}^{4} \pi_{jj'} = 1,$$
$$0 \le \pi_{jj'} \le 1, \qquad j' = 1,2,3,4.$$

For simplicity, we use the identity matrix as the weighting matrix. The resulting coefficients $\pi_{jj'}$ represent the probability of an immigrant with actual schooling j to be equivalent to a native with schooling j'. We estimate a different set of π's for men and women, and for immigrants with 0-2, 3-5, and 6-10 years of experience in Israel. The resulting matrices are presented in Appendix Table C1.

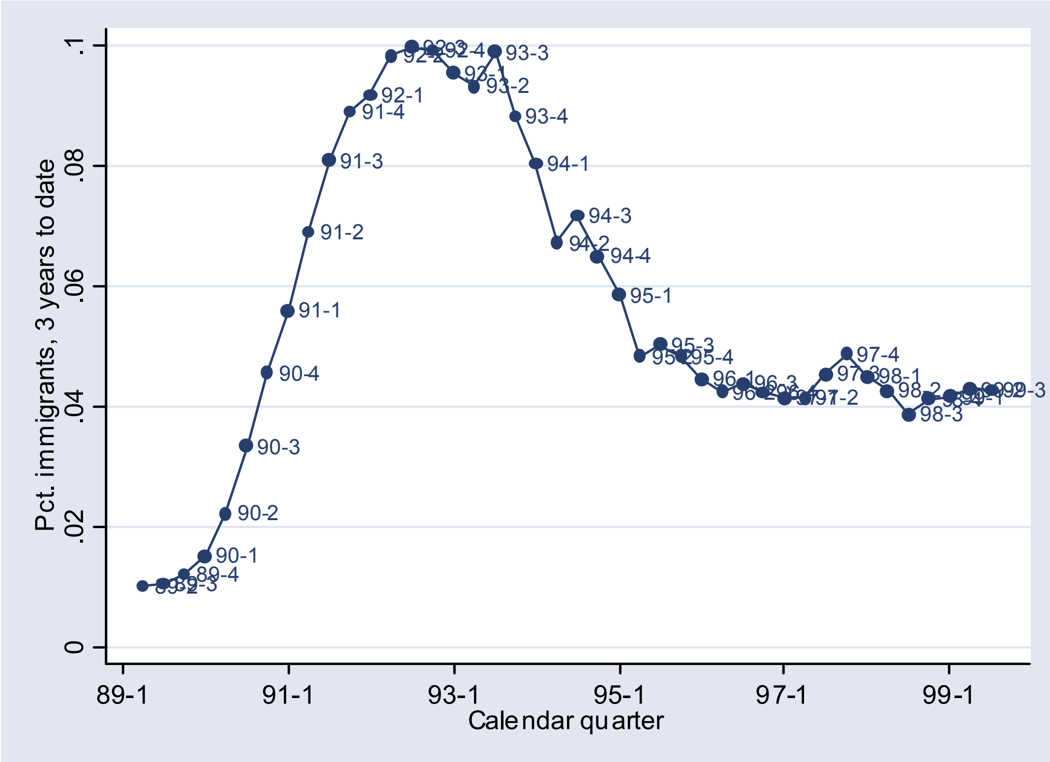

Figure 1a: Immigrant Flow, 1989-1999

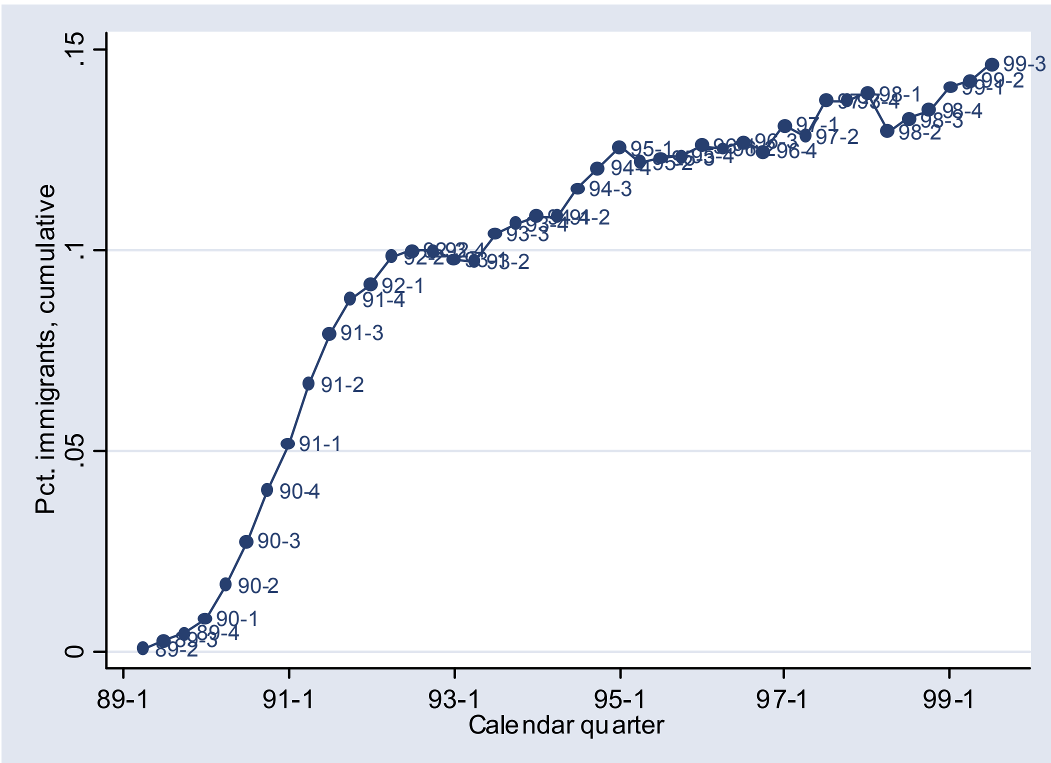

Figure 1b: Immigrant Stock, 1989-1999

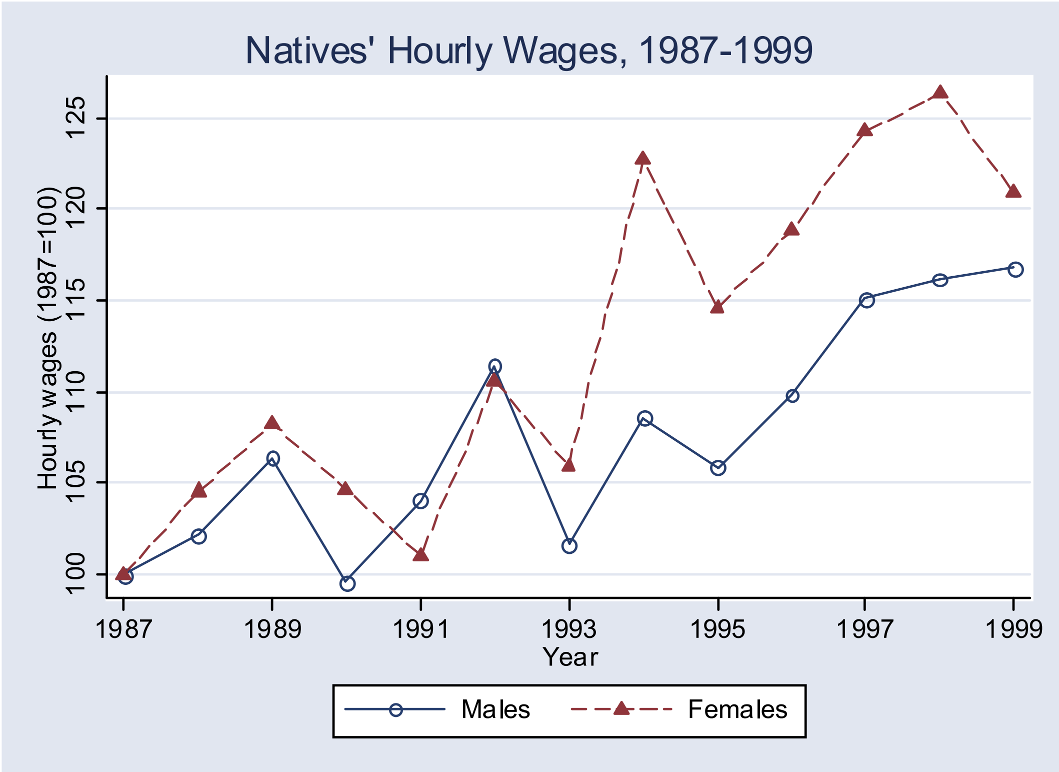

Figure 2: Natives' Hourly Wages, 1989-1999

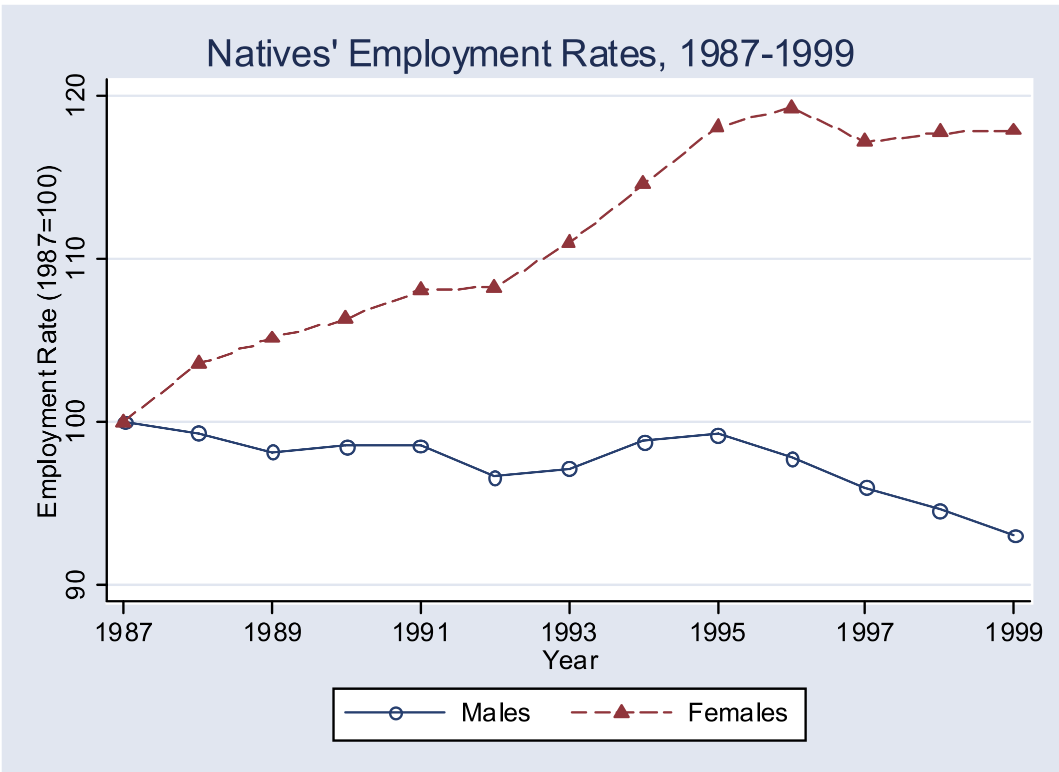

Figure 3: Natives' Employment Rate, 1989-1999

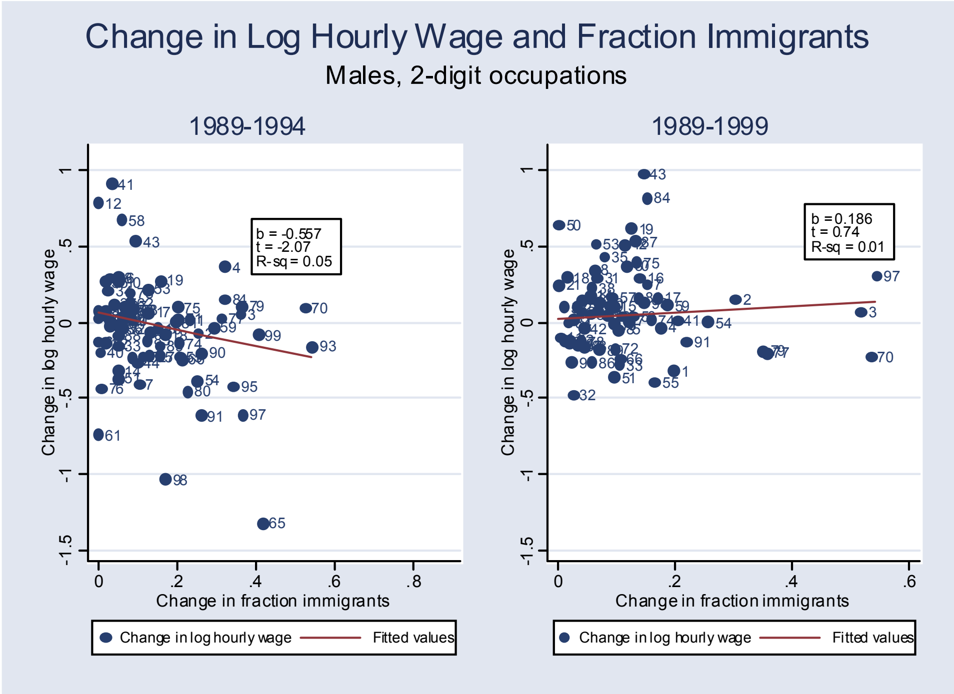

Figure 4: Change in Log Hourly Wages and Fraction of 1989-1991 Immigrants Males, 2-digit occupations

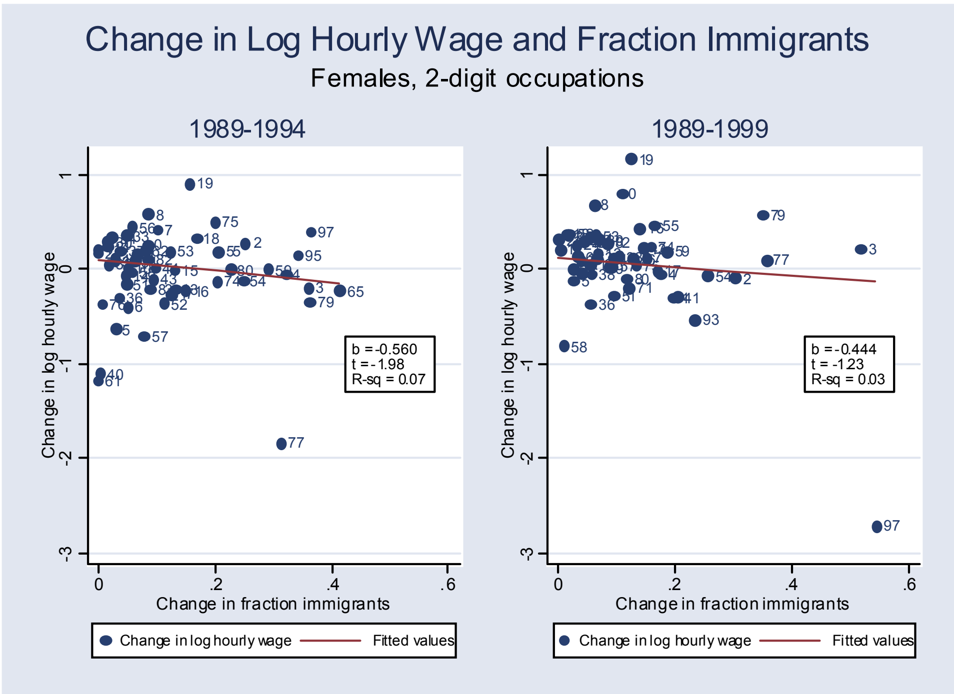

Figure 5: Change in Log Hourly Wages and Fraction of 1989-1991 Immigrants Females, 2-digit occupations

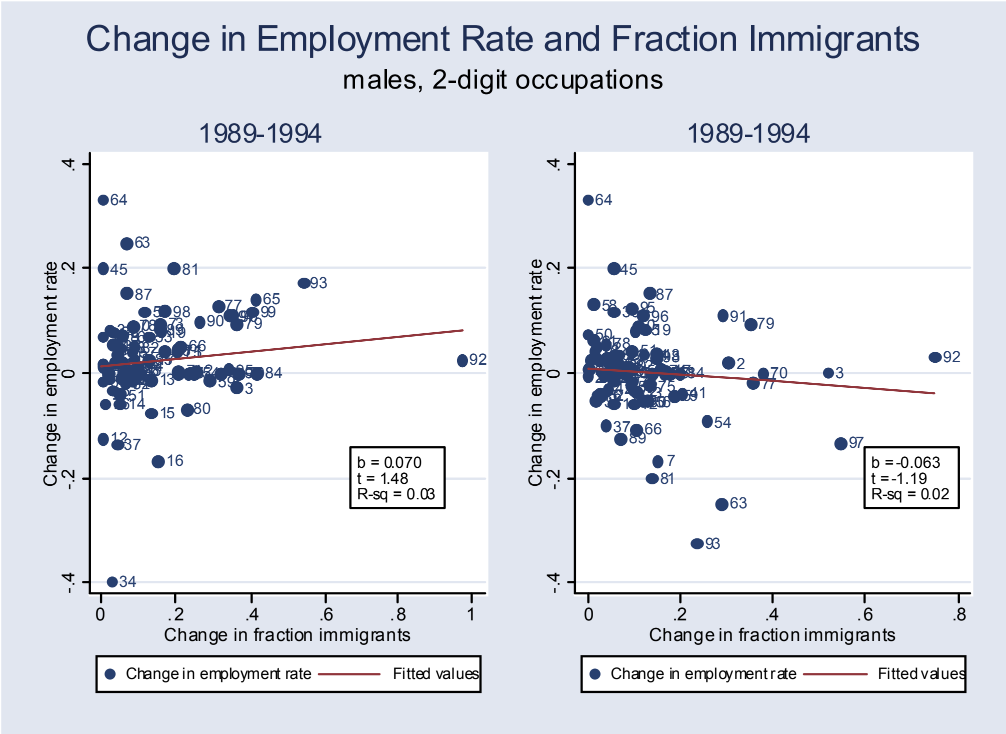

Figure 6: Change in Employment Rates and Fraction of 1989-1991 Immigrants Males, 2-digit occupations

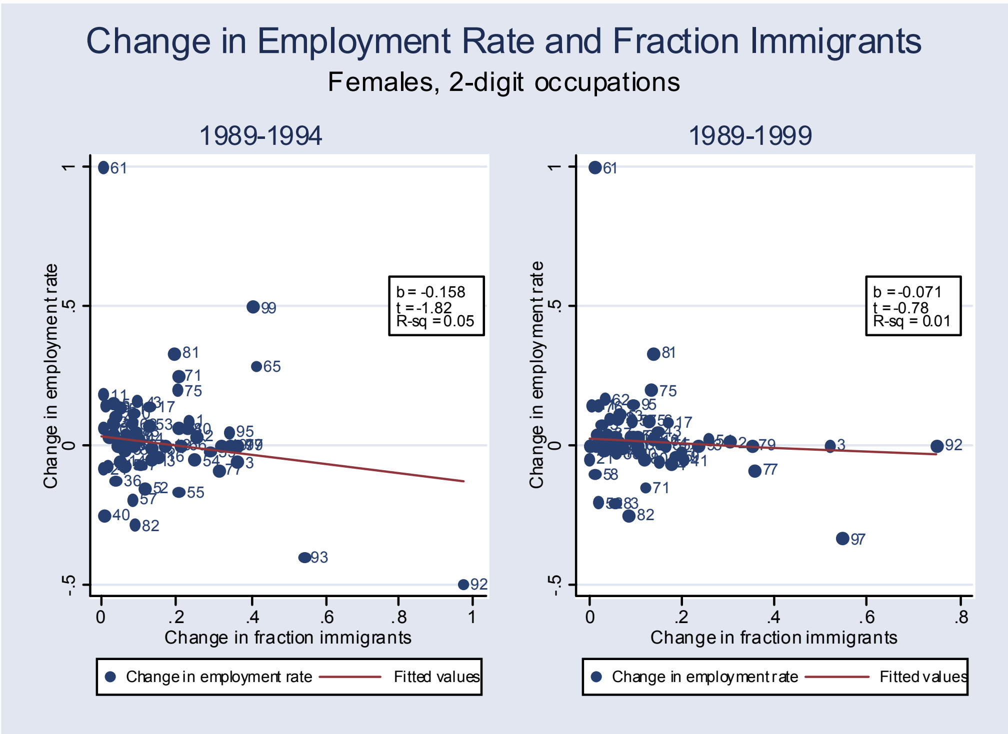

Figure 7: Change in Employment Rates and Fraction of 1989-1991 Immigrants Females, 2-digit occupations

Table 1: Educational Distribution of Immigrants and Natives

Panel A: Males

	All immigrants 1989-1999	Immigrated in 1989-1993	Immigrated in 1994-1999	Natives
Less than High School	9.54	8.33	11.18	32.40
High School or Equivalent	20.93	18.57	24.89	28.87
Some College	25.15	24.26	26.37	15.72
College or more	44.39	48.84	37.55	23.00

Panel B: Females

	All immigrants 1989-1999	Immigrated in 1989-1993	Immigrated in 1994-1999	Natives
Less than High School	8.43	7.77	8.81	29.26
High School or Equivalent	18.13	16.21	21.31	29.95
Some College	29.66	27.58	32.73	18.95
College or more	43.78	48.44	37.14	21.84

Source: Authors' calculations from the Israeli Labor Force Survey, 1989-1999.

Table 2: Occupational Distribution of Immigrants and Natives

Panel A: Males

	1989-1993		1994-1999	
	All immigrants	Natives	All immigrants	Natives
Academic and Scient. Professionals	12.02	9.41	12.94	10.16
Other Professionals and Technicians	8.26	10.92	10.02	11.87
Managers	0.40	8.61	1.74	9.60
Clerical Workers	1.56	9.14	3.34	9.19
Sales Workers	2.34	9.75	3.45	9.68
Service Workers	14.17	8.16	13.52	9.48
Skilled Agricultural Workers	3.47	4.60	5.03	4.20
Skilled Industry Workers	44.12	36.03	41.88	33.46
Unskilled Workers	13.66	3.39	8.09	2.34

Panel B: Females

	1989-1993		1994-1999	
	All immigrants	Natives	All immigrants	Natives
Academic and Scient. Professionals	9.03	9.49	10.39	10.04
Other Professionals and Technicians	14.40	26.51	13.79	25.68
Managers	0.42	2.49	0.70	3.59
Clerical Workers	7.82	27.62	9.90	30.09
Sales Workers	4.99	7.71	6.37	7.47
Service Workers	36.75	18.17	36.30	17.48
Skilled Agricultural Workers	2.24	1.27	3.79	1.21
Skilled Industry Workers	15.37	5.42	13.83	3.74
Unskilled Workers	8.97	1.32	4.94	0.70

Source: Authors' calculations from the Israeli Labor Force Survey

Table 3: Occupational Distribution of Immigrants and Natives, by Level of Schooling and Years in Israel

	Immigrants, less than 2 years in Israel		Immigrants, 3-5 years in Israel		Immigrants, 6-10 years in Israel		Natives	
	High school or less	More than high school	High school or less	More than high school	High school or less	More than high school	High school or less	More than high school
Panel A: Males								
Academic and Scient. Professionals	0.0	13.5	0.5	18.5	0.5	22.8	0.3	27.2
Other Professionals and Technicians	3.2	9.7	1.8	14.1	3.0	16.7	4.8	23.1
Managers	0.5	1.0	0.4	1.7	0.8	3.3	6.2	15.6
Clerical Workers	0.9	2.4	2.2	3.3	3.3	4.3	9.6	8.7
Sales Workers	2.3	2.5	4.3	3.2	5.0	3.9	10.9	7.2
Service Workers	17.3	14.2	16.5	12.7	13.4	10.2	11.0	4.3
Skilled Agric. Workers	5.9	4.3	7.0	2.9	8.1	2.4	5.9	2.4
Skilled Industry Workers	53.5	41.3	55.0	37.2	55.9	31.5	47.1	11.1
Unskilled Workers	16.4	11.1	12.4	6.6	10.1	4.9	4.2	0.5
Panel A: Females								
Academic and Scient. Professionals	0.0	8.7	0.3	12.6	0.0	15.6	0.3	19.8
Other Professionals and Technicians	2.2	13.3	7.0	17.5	5.9	23.1	7.5	45.4
Managers	0.0	0.6	0.0	0.4	0.7	0.8	1.6	4.5
Clerical Workers	4.1	7.4	5.2	11.4	9.2	16.9	38.3	18.5
Sales Workers	2.5	5.0	7.0	6.8	9.5	6.8	10.2	4.4
Service Workers	59.5	42.5	44.1	30.1	42.8	21.8	30.2	5.1
Skilled Agric. Workers	5.1	2.8	6.2	3.1	5.9	2.5	2.0	0.7
Skilled Industry Workers	17.7	12.7	21.4	13.3	19.7	10.0	8.1	1.5
Unskilled Workers	8.9	7.0	9.0	4.8	6.3	2.6	1.8	0.3

Source: Authors' calculations from the Israeli Labor Force Survey

Table 4: Immigrant Ratio by Labor Market Segmentation

Segmentation	Number of distinct cells	Average number of observations per cell	Mean	Std.dev.	Minimum value	Maximum value
Two Digit Occupation	85	113	0.1439	0.2715	0	4.4117
District of Residence × Occupation	63	151	0.1247	0.1440	0	1.0997
Industry × Occupation	80	122	0.1413	0.4136	0	10.7266
Schooling × Experience	38	342	0.1593	0.2201	0	1.9092
Adjusted Schooling × Experience	40	321	0.0888	0.2670	0	34.6249

Immigrants' share in cell j at time t is defined as the number of immigrants in cell j at time t divided by total employment in cell j in 1989. The number of immigrants and total employment in the cell are calculated using sampling weights.
The summary statistics in all segmentations are calculated across all cells and all periods, and are weighted by the number of natives employed in the segment.

Table 5: Summary Statistics of the Natives Sample

	Males	Females
Employed (% of the population)	80.24	57.30
Education	11.87	11.59
Experience	24.51	23.03
Percentage married	82.45	80.30
Number of children aged 0-4	0.437	0.447
Number of children aged 5-14	0.896	0.995
Number of children aged 15-17	0.275	0.296
Percentage of Non-Jews	13.89	13.73
Origin Asia-Africa*	44.57	44.14
Origin Europe-America*	32.85	33.11
Percentage foreign born	37.82	36.08
Years in Israel (foreign born)	33.67	31.72
Employed in public sector (%)	17.83	46.95
Total number of natives in LFS sample	58,485	59,263
Hourly wage (2000 NIS)**	44.99	36.44
Log hourly wage (2000 NIS)**	3.55	3.36
Total Number of natives in Income Survey sample	40,372	42,437
Total Number of natives in Income Survey sample with non missing wage data	25,190	20,007

Source: Authors' calculations from the Israeli Labor Force and Income surveys, 1989-1999.
* Origin of respondent or respondent's father.
** In 2000, 1 US$ = 4.07 NIS.

Table 6: The Effect of Immigration on Native Wages: Constant and Dynamic Effects

	Constant Effect		Dynamic Effect			
	(1)	(2)	(3)		(4)	
			λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time
Panel A: Males						
Two Digit Occupation	-0.0103	0.0959	-0.3088	0.0679	-0.2031	0.0393
	[-0.69]	[-0.10]	[-4.98]	[5.05]	[-2.90]	[3.89]
District of Residence × Occupation	-0.4426	-0.1844	-0.8766	0.1087	-0.2741	0.0205
	[-11.21]	[-3.46]	[-9.13]	[4.56]	[-2.56]	[0.95]
Industry × Occupation	-0.0542	-0.0151	-0.3236	0.0631	-0.1616	0.0309
	[-4.73]	[-0.67]	[-4.75]	[4.41]	[-3.47]	[3.34]
Schooling × Experience	0.4081	0.0843	0.6282	-0.0442	0.1226	-0.0065
	[13.39]	[2.05]	[8.35]	[-3.10]	[1.28]	[-0.43]
Adjusted Schooling × Experience	0.0646	-0.0313	-0.1574	0.0543	-0.0930	0.0127
	[2.70]	[-1.04]	[-3.72]	[5.56]	[-1.39]	[1.09]
Cell Fixed Effects	No	Yes	No		Yes	

	Constant Effect		Dynamic Effect			
	(1)	(2)	(3)		(4)	
			λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time
Panel B: Females						
Two Digit Occupation	-0.2334	-0.1152	-0.7152	0.1131	-0.2836	0.0352
	[-7.61]	[-2.61]	[-5.80]	[4.69]	[-3.61]	[2.40]
District of Residence × Occupation	-0.6074	-0.2771	-1.5501	0.2347	-0.5669	0.0651
	[-10.72]	[-4.10]	[-11.78]	[7.49]	[-3.94]	[2.45]
Industry × Occupation	-0.0742	-0.0676	-0.3223	0.0594	-0.1249	0.0118
	[-5.14]	[-2.68]	[-3.93]	[3.33]	[-2.06]	[1.07]
Schooling × Experience	0.5046	0.1152	0.9198	-0.0792	0.1598	-0.0068
	[14.74]	[2.61]	[10.84]	[-5.35]	[1.52]	[-0.44]
Adjusted Schooling × Experience	0.0416	-0.0948	-0.3292	0.0870	-0.2344	0.0266
	[1.36]	[-2.68]	[-6.21]	[7.98]	[-3.04]	[1.98]
Cell Fixed Effects	No	Yes	No		Yes	

Dependent variable: log hourly wages. Entries in the table represent the parameter estimate and t-statistics (in brackets) for the coefficient on the fraction immigrants in a labor market segment from separate regressions. Standard errors are robust to general heteroskedasticity and clustering at the segment-calendar quarter level. Sample sizes: around 24,200 for males; around 19,300 for females.

The sample is an extract from the 1989-1999 Israeli Income Survey, and includes all natives and pre-1989 immigrants for whom data on occupation is non-missing. The male sample is restricted to ages 25 to 65, the female sample is restricted to ages 25 to 60. All regressions include the following variables: total employment in the segment, an index of labor demand for workers in the segment (see text for details, education, experience, experience squared; a dummy for married; dummies for the number of children between 0 and 4, between 5 and 14, and between 15 and 17; a dummy for non-Jews; dummies for ethnic origin Asia-Africa and ethnic origin Europe-America-Oceania (third generation Israelis are the omitted category); a dummy for foreign born status and years since immigration (zero for natives); a full set of calendar quarter dummies. Observations with missing data were deleted.

Table 7: The Effect of Immigration on Native Employment: Constant and Dynamic Effects

	Constant Effect		Dynamic Effect			
	(1)	(2)	(3)		(4)	
			λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time
Panel A: Males						
Two Digit Occupation	-0.0114 [-2.50]	0.0098 [0.95]	-0.0602 [-3.83]	0.0112 [3.42]	0.0230 [1.11]	-0.0027 [-0.83]
District of Residence × Occupation	-0.0514 [-5.67]	-0.0056 [-0.37]	-0.1070 [-4.22]	0.0138 [2.56]	-0.0366 [-1.20]	0.0069 [1.19]
Industry Occupation	-0.0053 [-1.78]	0.0093 [0.90]	-0.0418 [-2.48]	0.0084 [2.28]	0.0169 [0.88]	-0.0016 [-0.52]
Schooling × Experience	-0.0072 [-1.07]	-0.0037 [-0.36]	-0.0561 [-3.27]	0.0097 [3.21]	-0.0628 [-2.91]	0.0100 [3.09]
Adjusted Schooling × Experience	0.0037 [0.74]	0.0073 [1.09]	0.0143 [1.19]	-0.0024 [-1.09]	0.0168 [0.99]	-0.0020 [-0.68]
Cell fixed effects	No	Yes	No		Yes	

	Constant Effect		Dynamic Effect			
	(1)	(2)	(3)		(4)	
			λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time
Panel B: Females						
Two Digit Occupation	-0.0382 [-4.25]	0.0666 [3.76]	-0.1123 [-3.55]	0.0174 [2.49]	0.0869 [2.07]	-0.0044 [-0.56]
District of Residence × Occupation	-0.0736 [-4.60]	0.0331 [1.24]	-0.2042 [-5.34]	0.0318 [3.90]	0.0739 [1.43]	-0.0090 [-0.97]
Industry × Occupation	-0.0053 [-1.11]	0.0268 [1.79]	-0.0649 [-2.53]	0.0136 [2.52]	0.0255 [1.05]	0.0003 [0.06]
Schooling × Experience	0.0185 [1.93]	-0.0159 [-1.11]	0.0455 [1.72]	-0.0051 [-1.11]	-0.0452 [-1.29]	0.0047 [0.93]
Adjusted Schooling × Experience	-0.0041 [-0.38]	0.0144 [0.95]	-0.0218 [-0.99]	0.0040 [1.15]	0.0369 [0.94]	-0.0043 [-0.75]
Cell fixed effects	No	Yes	No		Yes	

Dependent variable: 1 if employed, 0 otherwise. Entries in the table represent the parameter estimate and t-statistics (in brackets) for the coefficient on the fraction immigrants in a labor market segment from separate linear probability models. Standard errors are robust to general heteroskedasticity and clustering at the segment-calendar quarter level. Sample sizes: around 47,000 for males; around 35,500 for females.

The sample is an extract from the 1989-1999 Israeli Labor Force Survey, and includes all natives and pre-1989 immigrants in their first LFS interview for whom data on occupation is non-missing. The male sample is restricted to ages 25 to 65, the female sample is restricted to ages 25 to 60. All regressions include the following variables: total employment in the segment, an index of labor demand for workers in the segment (see text for details, education, experience, experience squared; a dummy for married; dummies for the number of children between 0 and 4, between 5 and 14, and between 15 and 17; a dummy for non-Jews; dummies for ethnic origin Asia-Africa and ethnic origin Europe-America-Oceania (third generation Israelis are the omitted category); a dummy for foreign born status and years since immigration (zero for natives); a full set of calendar quarter dummies. Observations with missing data were deleted.

Table 8: Immigrants' Short-Run and Long-Run Effects on Natives' Wage: Robustness Checks

	(1) Autocorrelation Robust Standard Errors		(2) Adding Cohort Dummies		(3) Cell Fixed Effects Interacted with Linear Time Trend		(4) Cell Fixed Effects and One-digit Interactions with a Full Set of Year Dummies	
	λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time
Panel A: Males								
Two Digit Occupation	-0.2031 [-2.92]	0.0393 [4.25]	-0.1910 [-2.69]	0.0407 [3.88]	-0.1068 [-1.14]	0.0138 [0.64]	-0.1024 [-1.39]	0.0301 [2.86]
District of Residence × Occupation	-0.2741 [-1.90]	0.0205 [0.89]	-0.3217 [-2.88]	0.0152 [0.69]	-0.2555 [-2.30]	0.0230 [0.80]	0.0243 [0.16]	-0.0134 [-0.40]
Industry × Occupation	-0.1616 [-1.95]	0.0309 [2.31]	-0.1438 [-2.84]	0.0354 [3.58]	-0.1234 [-2.59]	0.0265 [2.25]	-0.1579 [-3.14]	0.0391 [3.64]
Adjusted Schooling × Experience	-0.0930 [-1.75]	0.0127 [1.39]	-0.1078 [-1.62]	0.0147 [1.26]	-0.1063 [-1.39]	0.0141 [0.96]	-0.1216 [-1.55]	0.0195 [1.34]
Panel B: Females								
Two Digit Occupation	-0.2836 [-2.22]	0.0352 [1.49]	-0.2146 [-2.42]	0.0426 [2.79]	-0.1234 [-1.56]	0.0303 [1.44]	-0.2515 [-2.48]	0.0528 [2.88]
District of Residence × Occupation	-0.5669 [-3.76]	0.0651 [2.12]	-0.4832 [-3.20]	0.0690 [2.55]	-0.3060 [-1.84]	0.0453 [1.37]	-0.1539 [-0.73]	0.0055 [0.13]
Industry × Occupation	-0.1249 [-2.23]	0.0118 [1.63]	-0.0898 [-1.37]	0.0191 [1.40]	-0.0680 [-1.25]	0.0075 [0.46]	0.1029 [1.14]	-0.0208 [-1.12]
Adjusted Schooling × Experience	-0.2344 [-4.10]	0.0266 [2.88]	-0.2363 [-2.86]	0.0268 [1.91]	-0.1413 [-1.45]	-0.0034 [-0.19]	-0.0313 [-0.31]	0.0088 [0.47]

Dependent variable: log hourly wages. Entries in the table represent the parameter estimate and t-statistics (in brackets) for the coefficient on the fraction immigrants in a labor market segment from separate regressions. Standard errors are robust to general heteroskedasticity and clustering at the segment-calendar quarter level. Sample sizes: around 24,200 for males; around 19,300 for females. For sample selection rules and the full set of explanatory variables, see notes to Table 6.

Table 9: Piecewise Constant Effects of Immigration on Native Wages

	(1) Cell Fixed Effects				(2) Cell Fixed Effects Interacted with Linear Trend			
	Effect at 0 years	Effect at 1-3 years	Effect at 4-6 years	Effect at 7-10 years	Effect at 0 years	Effect at 1-3 years	Effect at 4-6 years	Effects at 7-10 years
Panel A: Males								
Two Digit Occupation	-0.2861 [-1.33]	-0.1791 [-2.67]	0.0471 [0.82]	0.1086 [2.12]	-0.2612 [-1.10]	-0.1296 [-2.00]	0.0099 [0.17]	-0.0221 [-0.19]
District of Residence × Occupation	0.1477 [0.44]	-0.3157 [-3.32]	-0.1257 [-1.29]	-0.1015 [-0.87]	0.0218 [0.06]	-0.3153 [-3.08]	-0.0140 [-0.11]	-0.0417 [-0.22]
Industry × Occupation	-0.7284 [-2.987	-0.1400 [-2.94]	0.0479 [1.49]	0.0976 [2.31]	-0.6876 [-2.87]	-0.1077 [-2.21]	0.0428 [1.28]	0.0270 [0.41]
Adjusted Schooling × Experience	-0.0929 [-0.32]	-0.0875 [-1.62]	0.0163 [0.30]	0.0022 [0.04]	0.2640 [0.73]	-0.0904 [-1.70]	0.0085 [0.14]	0.0097 [0.01]
Panel B: Females								
Two Digit Occupation	-0.2322 [-0.71]	-0.3105 [-3.49]	-0.0046 [-0.06]	-0.0164 [-0.21]	-0.1627 [-0.48]	-0.1712 [-1.78]	0.1374 [1.18]	0.0947 [0.59]
District of Residence × Occupation	-0.0316 [-0.05]	-0.5051 [-4.22]	-0.2382 [-2.02]	-0.0066 [-0.05]	-0.1611 [-0.28]	-0.2896 [-2.01]	0.0041 [0.02]	0.0562 [0.20]
Industry × Occupation	0.6562 [1.41]	-0.1022 [-1.35]	-0.0935 [-1.42]	-0.0189 [-0.46]	0.5756 [1.19]	-0.0398 [-0.43]	-0.0358 [-0.42]	0.0476 [0.40]
Adjusted Schooling × Experience	0.1242 [0.48]	-0.1659 [-2.43]	-0.1488 [-1.96]	0.0052 0.90]	0.1623 [0.59]	-0.1747 [-2.26]	-0.1479 [-1.65]	-0.1545 [-1.85]

Dependent variable: log hourly wages. Entries in the table represent the parameter estimate and t-statistics (in brackets) for the coefficient on the fraction immigrants in a labor market segment from separate regressions. Standard errors are robust to general heteroskedasticity and clustering at the segment-calendar quarter level. Sample sizes: around 24,200 for males; around 19,300 for females. For sample selection rules and the full set of explanatory variables, see notes to Table 6.

Table 10: The Dynamic Effect of Immigration on Native Wages: Blue-Collar versus White-Collar Occupations

	(1) Cell Fixed Effects				(2) Cell Fixed Effects Interacted with Linear Trend			
	Blue-collar		White Collar		Blue collar		White Collar	
	λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time	λ_0: Initial Effect	λ_1: Change over time
Panel A: Males								
Two Digit Occupation	-0.1689 [-2.28]	0.0332 [3.22]	0.0180 [0.08]	0.0193 [0.55]	-0.1242 [-1.23]	0.0166 [0.71]	0.1337 [0.54]	0.0105 [0.24]
Residence × Occupation	-0.2036 [-1.70]	0.0246 [0.95]	0.1086 [0.30]	-0.0190 [-0.37]	-0.3324 [-2.74]	0.0400 [1.16]	0.0548 [0.15]	-0.0153 [-0.26]
Industry × Occupation	-0.1217 [-2.70]	0.0245 [2.61]	-0.1858 [-1.07]	0.0603 [2.54]	-0.1273 [-2.39]	0.0276 [2.13]	-0.0869 [-0.51]	0.0293 [0.78]
Adjusted Schooling × Experience	-0.0084 [-0.09]	-0.0142 [-0.74]	0.0801 [0.43]	-0.0018 [-0.07]	-0.1011 [-1.07]	0.0094 [0.42]	0.1499 [0.75]	-0.0114 [-0.44]
Panel B: Females								
Two Digit Occupation	-0.1982 [-2.51]	0.0191 [1.24]	-0.1504 [-0.45]	0.0503 [1.03]	-0.1246 [-1.55]	0.0194 [0.84]	-0.0986 [-0.29]	0.0395 [0.66]
Residence × Occupation	-0.3940 [-2.45]	0.0338 [1.07]	0.0152 [0.04]	0.0018 [0.03]	-0.4095 [-2.26]	0.0555 [1.39]	0.0236 [0.06]	-0.0122 [-0.19]
Industry × Occupation	-0.0611 [-1.04]	0.0018 [0.16]	-0.4753 [-1.30]	0.0564 [0.89]	-0.0516 [-0.93]	0.0089 [0.51]	-0.4672 [-1.18]	0.0288 [0.35]
Adjusted Schooling × Experience	-0.2295 [-1.91]	0.0239 [0.85]	-0.2681 [-1.85]	0.0249 [1.14]	-0.0626 [-0.38]	-0.0139 [-0.38]	-0.2822 [-1.97]	0.0072 [0.32]

Dependent variable: log hourly wage. Entries in the table represent the parameter estimate and t-statistics (in brackets) for the coefficient on the fraction immigrants in a labor market segment from separate linear regressions. Standard errors are robust to general heteroskedasticity and clustering at the segment-calendar quarter level. Sample sizes: blue-collar males, 16300; white-collar males, 7900; blue-collar females, 12100; white-collar females, 7200. For sample selection rules and the full set of explanatory variables, see notes to Table 6.

Appendix Table B1: Calculating Effective Years of Experience for Immigrants

	Males		Females	
	Natives	Immigrants	Natives	Immigrants
Regression coefficients:				
FSU experience	-	0.00732	-	0.00511
FSU experience squared	-	-0.00038	-	-0.00053
Experience in Israel	0.0633	0.1129	0.03343	0.09888
Experience in Israel squared	-0.00093	-0.00352	-0.00049	-0.00245
Mean value of :				
FSU experience	-	17.91	-	15.79
Israel experience	23.02	3.94	20.83	4.29
Marginal value of an additional year of experience for immigrants				
FSU experience	-	-0.00615	-	-0.01153
Israel experience	-	0.08519	-	0.07789
Marginal value of an additional year of experience for natives (evaluated at mean of immigrant experience)	0.02270	-	0.01385	-
Effective value of experience for immigrants				
FSU experience	-	-0.27115	-	-0.83280
Israel experience	-	3.75382	-	5.62363

Authors' calculations based on Israeli Income Survey data. See Appendix B for details of the calculations.

Appendix Table C1: Calculating the Effective Schooling of immigrants

Panel A: Males

		Immigrants with 0-2 years in Israel				Immigrants with 3-5 years in Israel				Immigrants with 6-10 years in Israel			
		Immigrants in schooling category:				Immigrants in schooling category:				Immigrants in schooling category:			
		High school dropout	High school	Some college	College or more	High school dropout	High school	Some college	College or more	High school dropout	High school	Some college	College or more
Probability of being equivalent to native in schooling category:	Less than high school	0.9655	1	0.9702	0.6972	0.9870	0.9999	0.8295	0.5429	0.9056	0.9999	0.7711	0.3428
	High school	0	0	0	0	0	0.0001	0.0003	0	0	0.0001	0.1276	0
	Some college	0	0	0.0001	0	0	0	0.1702	0	0	0	0.1014	0
	College or more	0.0345	0	0.0298	0.3027	0.0130	0	0	0.457	0.0944	0	0	0.6571

Panel B: Females

		Immigrants with 0-2 years in Israel				Immigrants with 3-5 years in Israel				Immigrants with 6-10 years in Israel			
		Immigrants in schooling category:				Immigrants in schooling category:				Immigrants in schooling category:			
		High school dropout	High school	Some college	College or more	High school dropout	High school	Some college	College or more	High school dropout	High school	Some college	College or more
Probability of being equivalent to native in schooling category:	Less than high school	1	1	0.8945	0.8472	1	0.7310	0.4754	0.2908	1	0.4353	0.3276	0.0453
	High school	0	0	0	0	0	0.0231	0.1160	0.1704	0	0.2931	0.1042	0.2860
	Some college	0	0	0.0125	0	0	0.0275	0.1912	0	0	0.0185	0.3768	0
	College or more	0	0	0.0929	0.1528	0	0.2184	0.2174	0.5388	0	0.2531	0.1814	0.6687

Authors' calculation from Israeli Income Survey and Labor Force Survey data. See Appendix C for details.