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**THE EFFECTS OF MASS IMMIGRATION
ON THE EMPLOYMENT OF NATIVES**

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Abstract

This paper studies the effects of mass immigration - a wave of immigration that arrived in Israel from the former U.S.S.R., with 700,000 immigrants arriving in 6 years - on the employment of natives. We present and estimate a model which emphasizes the point that immigration absorption into employment is gradual and therefore its effect on native-born employment occurs with a lag. It incorporates the empirically observed phenomenon whereby the immigrants initially worked in jobs that require lower skills and only later found jobs at higher skill levels. The model caters for substitution and complementarity among the various skill groups and takes into account effects from the goods market.

The empirical findings point to two main conclusions:

(i) Contrary to many existing studies which found little or no effect of immigrants on native-born employment, the effect of the immigrants on the natives' employment is for the most part positive. This is explained by aggregate demand effects.

(ii) The effect of the immigrants is different for different natives skill groups, explained by the differential entry of immigrants into occupations according to skill level.

The Effects of Mass Immigration on the Employment of Natives¹

1 Introduction

This paper studies the effects of mass immigration on the employment of natives: almost 700,000 immigrants arrived in Israel from the former U.S.S.R within 6 years (1990-1995), representing a 16% increase in base population. This experience offers a unique opportunity - a sort of "natural experiment" - to examine the labor market performance of immigrants and its effects on the native-born.

While possible negative effects of immigration on the employment of native-born feature prominently in public debates, the evidence in the literature often points to surprisingly small effects. This literature is reviewed and discussed by Borjas (1994, see in particular pp. 1695-1700)² who points to two major conclusions: immigration has a weak effect on the employment of natives even when the immigrant flows are large; this finding may possibly be explained by outflows of the native-born from the localities or industries affected by immigration to other parts of the economy. The latter implies that the adjustment mechanisms in local labor markets are rapid. This implication is in contrast to other studies which point to gradual adjustments. Particularly striking are the findings of the influential study by Card (1990) concerning the Cuban Mariel boatlift to Miami in 1980. Though Miami's labor force had grown by an unexpected 7% almost overnight, the effects on the trend in wages and employment opportunities of locals were very small. Zimmerman (1995, in particular pp. 53-54) points to similar conclusions for Europe. Borjas, Freeman and Katz (1996) argue

¹We are indebted to Beni Feferman for several discussions, to Galit Cohen and Michal Rechany for able research assistance, and to the Ministry of Labor and Welfare and the Sapir Center for Development at Tel-Aviv University for financial support. All errors are our own.

²Beyond the cited survey, immigration issues are discussed and summarized in Borjas (1990) and in the papers contained in Abowd and Freeman (1991) and Borjas and Freeman (1992).

that area studies which contrast the level of (or changes in) immigration by area with the level of (or changes in) the outcomes of non-immigrant workers yield unstable results which cast doubt on their validity. A better approach would be a factor proportions methodology which treats immigrants as affecting the national supplies of labor of different skills. For example an inflow of unskilled immigrants would operate to lower the wage of the unskilled relative to the skilled by increasing the relative supply of unskilled labor.

In this paper we take up the latter approach and study the national labor market, differentiating between skill levels. We emphasize that beyond the substitution effect through labor supply, there are additional effects of immigrants on labor demand. These come from the effects of immigration on the goods market and through complementarity effects across skill levels. A key issue in this context is the empirically observed phenomenon whereby the immigrants initially worked in jobs that require lower skills and only later found jobs at higher skill levels. These work patterns evolved through time. In the empirical work we capture the time-varying employment effects of this job acceptance behavior by differentiating between skill levels and through an elaborate lag structure.

We proceed as follows: Section 2 presents the stylized facts of the Israeli immigration experience and the immigrants' labor market performance citing the observations of previous studies on this topic. Section 3 presents a model of the labor and goods markets which serves as the basis for estimation. Section 4 discusses the data and the econometric methodology. Section 5 presents and interprets the results of estimation. Section 6 concludes.

2 The Israeli Immigration Experience

Beginning in late 1989 immigrants began to flow to Israel from the USSR. As seen in Figure 1, after modest numbers in 1989, monthly immigration flows jumped to about 16,000 in 1990-1991 with a short decline in early 1991 due to the Gulf War. Beginning in early 1992 the monthly flow declined to about 6,000 on average in the years 1992-1995:

Figure 1

An important aspect of this immigration experience is that on the whole it may be considered exogenous: the Jewish immigrants responded to worsening political and economic conditions in the former USSR ; due to changes in U.S. immigration laws and the existence of tough European laws in this context, Israel seemed to be their only option.

The following key features summarize the labor market performance of the immigrants:³

- (i) The rate of labor force participation is relatively high at around 55%.
- (ii) Figure 2 shows employment rates out of working age population for native and immigrant groups. The figure is divided into three panels according to the workers' education levels - high (post secondary education, including academic studies), medium (secondary education, mostly high school) and low (secondary education dropouts):

Figure 2

Two features stand out: first, the immigrants' employment rates gradually increased converging to the levels of the native-born; second, native-born employment rates went up slightly in this period. The exception to the latter is low-skill employment rates which initially declined. This second feature is also expressed by the noteworthy fact whereby natives' unemployment stood at 9% of the natives labor force at the beginning of the immigration

³These stylized facts are drawn from the monthly bulletins of the Central Bureau of Statistics, from the data sets described below and from four special surveys conducted by the Central Bureau of Statistics. The surveys related to immigrants who arrived in the fourth quarter of 1990 (three surveys) and in the fourth quarter of 1993 (the fourth survey). The former sampled 3300 immigrants out of the 63,900 (15 years and older) who arrived in that period. The latter sampled 2100 immigrants out of 13,600 (15 years and older) who arrived in 93:4 [see Central Bureau of Statistics (1995,1996)].

Figure1

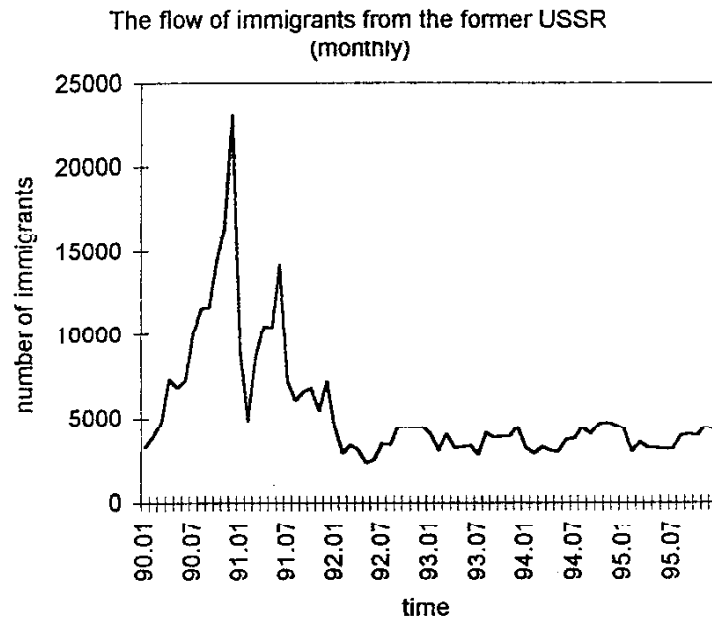


Figure 2a

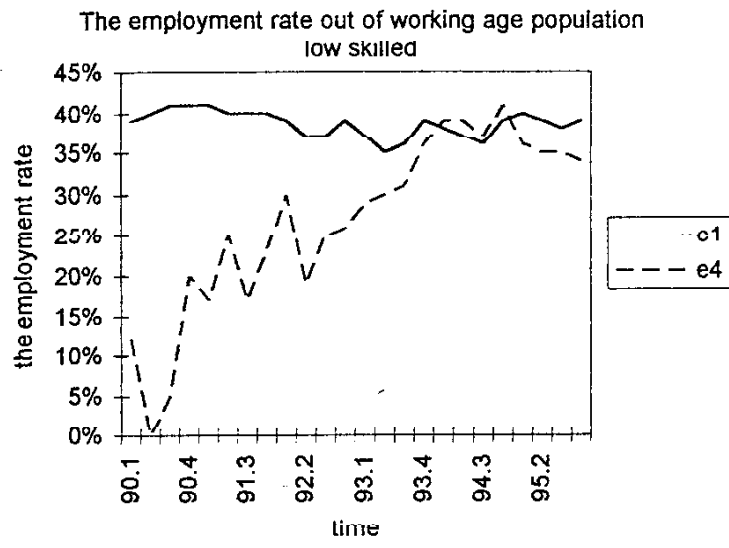


Figure 2b

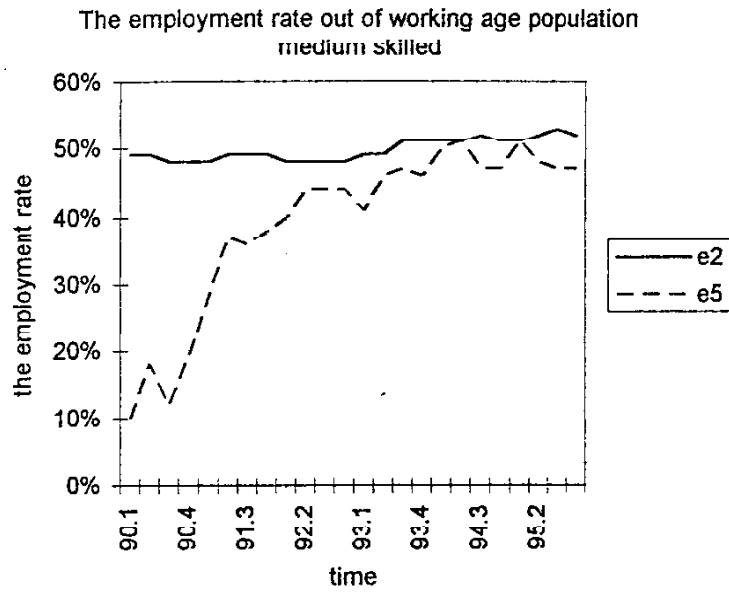
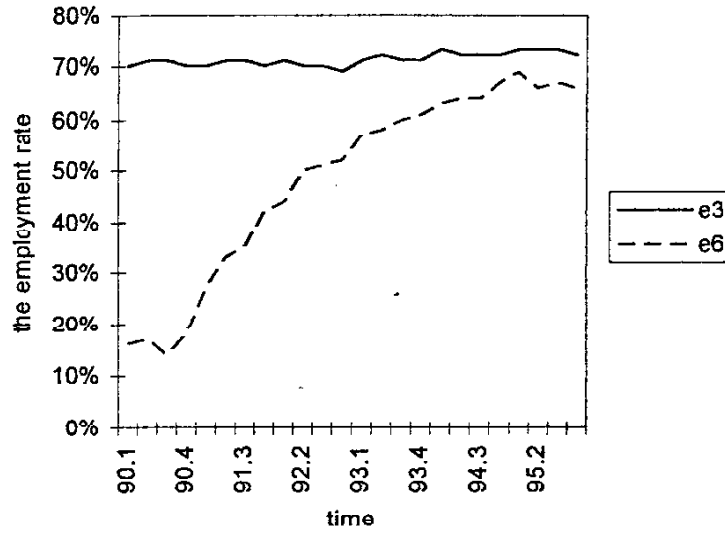


Figure 2c

The employment rate out of working age population
high skilled



wave, climbed to almost 11% in 1992 and declined to under 6% by the end of 1995. These features are key to the interpretation of the results below.

(iii) The immigrants are highly skilled: out of the working-age population over 60% had post-secondary education, compared to about 30% for the native-born population. Out of those employed in the source countries 15% were engineers and architects, 7% were physicians, 18% were technicians and other professionals and 8% were managers.

(iv) There is evidence for substantial, though declining, skill mismatch for highly skilled workers. Taking immigrants who were employed prior to immigration and looking at their labor market status two and three years after immigration, the following picture emerges [based on Central Bureau of Statistics (1995) p. 78]: for scientific and academic occupations 18% were employed in their original occupation two years after immigration; the rest were working in other occupations (40%), unemployed (16%) or out of the labor force (26%). Three years after immigration 24% were employed in their original occupation, 45% were working in other occupations, 16% were unemployed and 22% were out of the labor force. For technicians and other professionals the data are similar and for managers the mismatch is worse (only 2% were employed as managers after three years and 73% were working in other occupations).

(v) The mismatch experience is different across skill levels: three years after immigration 47% of professional workers in manufacturing were working in their original occupations compared to the afore-cited 24% for high skilled workers. It is also somewhat different across cohorts, with the earlier cohorts, which had a larger share of high-skilled workers, displaying a faster decline in mismatch.

Several authors have looked at the labor market experience of this immigration wave. In the context of this paper two previous studies are noteworthy: Weiss and Gotlibovksy (1995) studied the loss of human capital as a result of the afore-cited skill mismatch. Using a 1992 survey of 452 immigrant males, they structurally estimate a search model whereby immigrant workers accept jobs that require less schooling than they have and continue to search on the job for better paying jobs. They find that the expected loss of years of schooling

The ratio $\frac{P_M}{P_Y}$, the real exchange rate, has a negative effect on labor demand as an increase in the relative price of the imported input lowers the demand for other factors of production due to complementarity.

Labor is supplied by six types of workers: native-born (N) and immigrants (I) who are of each one of the three skill levels. The working age population of each type is exogenous, and it is denoted by $P^{j,i}$, where $j = N, I$, $i = 1, 2, 3$, and $P = \sum_i \sum_j P^{j,i}$. Employment of each type is endogenous, and denoted accordingly as $L^{j,i}$, with $L = \sum_i \sum_j L^{j,i}$.

Native-born of each type are either employed in their own skill category, or unemployed. Employment of native born at each skill level satisfies $L^{N,i} = e^{N,i} \times P^{N,i}$, $i = 1, 2, 3$, where $0 \leq e^{N,i} \leq 1$ is the employment rate out of the working-age population. The e^i fractions are thus the product of the conventional participation rate (labor force divided by the working age population) and the conventional employment rate (employment divided by the labor force).

Immigrants, in contrast, are assumed to be more flexible. They may be employed in their own category, a lower one, or unemployed. The presumption is that, over time, an increasing fraction of immigrants behaves as native-born. The exogenous flow of immigrants at each skill level is $P_t^{I,i} - P_{t-1}^{I,i}$. An immigration flow h periods ago has an employment rate of $e_t^{I,i,h}$ and those employed are distributed between the skill levels lower or equal to i according to the fractions $\alpha_t^{1,1} = 1$, for immigrants at the lower skill level, $\alpha_t^{2,1}$ and $\alpha_t^{2,2}$ for the intermediate skill level ($\alpha_t^{2,1} + \alpha_t^{2,2} = 1$), and $\alpha_t^{3,1}$, $\alpha_t^{3,2}$ and $\alpha_t^{3,3}$ for the high skill level ($\alpha_t^{3,1} + \alpha_t^{3,2} + \alpha_t^{3,3} = 1$).

Given the exogenously evolving population of native-born and immigration flows, the (inverted) labor supply functions are described by:

$$w^i = w(L^i, D^N, D^I, P^{N,1}, P^{N,2}, P^{N,3}, \Delta P^{I,1}, \Delta P_{-1}^{I,1}, \dots, \Delta P^{I,2}, \Delta P_{-1}^{I,2}, \dots, \Delta P^{I,3}, \Delta P_{-1}^{I,3}, \dots), \quad (3)$$

$i = 1, 2, 3$, where D^N, D^I are vectors of demographic characteristics of the natives and

is 1.9 years, which constitutes 13% of the immigrants' 14.7 average years of formal schooling. Friedberg (1996) studied the effects of the immigrant flows on wage growth of natives across occupations, using microdata from the Income Survey and the Labor Force Survey of the CBS. Using OLS estimation a significant negative effect is found; using an instrumental variable approach with the pre-immigration occupational distribution serving to instrument their post-immigration distribution yields insignificant coefficients in the same regressions.

3 The Model

The framework is a standard model of a small-open economy with two goods, one produced domestically, Y , and the other imported, M , serving as an intermediate good in producing the domestic good. The economy faces a perfectly elastic supply of M from abroad and a constant real interest rate, r , determined in the world capital market. There are three types of workers: low-skilled (type 1), medium-skilled (2) and high-skilled (3). The aggregate production function of domestic goods is:

$$Y = F(L^1, L^2, L^3, K, M, A) \quad (1)$$

where K is the stock of capital, and A is the state of technology. We assume all factors of production are complements.

Correspondingly, labor demand is determined by the following three equations:

$$\frac{\partial Y}{\partial L^i}(L^1, L^2, L^3, K, A, \frac{P_M}{P_Y}) = w^i = \left(\frac{W^i}{P_Y} \right), \quad i = 1, 2, 3, \quad (2)$$

where

W^i is the nominal wage,

P_M is the price of the imported good,

P_Y is the price of the domestic good, and the sign under an argument represents the sign of the first derivative w.r.t. that argument.

immigrants respectively.

Labor market equilibrium obtains by equating each of the three equations in (2) to the corresponding one from (3). Note that the exogenous population variables are the corresponding stocks for the native-born, and the entire vector of flows for immigrants. This distinction follows from the assumption that native born work only at the corresponding skill level, but immigrants may change the skill-level of their jobs at some point in time.

The employment at each skill level in equilibrium can be then be written as

$$L^i = L^i(X, K, \frac{P_Y}{P_M}), \quad i = 1, 2, 3, \quad (4)$$

where $X = \{A, D^N, D^I, P^{N,1}, P^{N,2}, P^{N,3}, \Delta P^{I,1}, \Delta P_{-1}^{I,1}, \dots, \Delta P^{I,2}, \Delta P_{-1}^{I,2}, \dots, \Delta P^{I,3}, \Delta P_{-1}^{I,3}, \dots\}$ is the vector of exogenous variables in the system. Employment levels of native born and immigrants are accordingly:

$$L^{N,i} = L^{N,i}(X, K, \frac{P_Y}{P_M}), \quad i = 1, 2, 3, \quad (5)$$

$$L^{I,i} = L^{I,i}(X, K, \frac{P_Y}{P_M}), \quad i = 1, 2, 3.$$

Note that the labor market system includes the endogenous capital stock, K , and the relative price, $\frac{P_Y}{P_M}$.

The capital stock is determined by

$$\frac{\partial Y}{\partial K}(L^1, L^2, L^3, K, A, \frac{P_Y}{P_M}) = r, \quad (6)$$

where the real interest rate, r , is by assumption exogenous and constant. Substituting the employment levels from (4) into (6) the capital stock can be written as

$$K = K(X, \frac{P_Y}{P_M}), \quad (7)$$

where r is omitted since it is constant. To close the system we need the equilibrium condition in the goods market. Aggregate supply is obtained by substituting the employment levels in (4) and the capital stock in (7) into the production function (1):

$$Y^s = Y^s(X, \frac{P_Y}{P_M}). \quad (8)$$

Aggregate demand for the domestic good can be specified accordingly as

$$Y^d = Y^d(X, \frac{P_Y}{P_M}). \quad (9)$$

Note that this is the demand for the domestic good, which includes demand from abroad (exports), assumed here to be constant. The negative effect of the relative price reflects the usual property of demand functions.

Equating (8) and (9) solves for the relative price and closes the system

$$\frac{P_Y}{P_M} = \frac{P_Y}{P_M}(X). \quad (10)$$

Substituting (10) into (7), and then both into (5) yields the reduced form of native-born employment as a function the exogenous variables:

$$L^{N,i} = \tilde{L}^{N,i}(X), \quad i = 1, 2, 3, \quad (11)$$

which is the basis of the empirical investigation reported in Section 5.

The main exogenous variables of interest are the immigration flows $\Delta P^{I,1}, \Delta P_{-1}^{I,1}, \dots, \Delta P^{I,2}, \Delta P_{-1}^{I,2}, \dots, \Delta P^{I,3}, \Delta P_{-1}^{I,3}, \dots$

To illustrate how this framework works, consider the effects of an immigration influx on the native-born, with equal representation for the three skill levels. The influx will have direct negative effects on employment levels of native born by increasing the total supply of labor of each type – equations (5). Which labor markets will be most affected depends on the α 's. Although we assumed that the influx is divided equally among skill levels,

type 1 and 2 will tend to be more affected than 3. Additionally, however, there are indirect effects working via the demands for labor. First, assuming for the sake of the example complementarity between all skill levels in the production function, increasing employment of one type will tend to increase the demand for the other skill types. The other indirect effect of immigration on labor demands works through the domestic goods market and the relative price. Increasing Y^d in (9) raises $\frac{P_Y}{P_M}$, having a positive effects on labor demand and hence on native-born employment. Immigration also influences the supply of goods, but in the short term the demand effect may be stronger due to the gradual entry of immigrants into employment. Overall, the effects on native born employment are uncertain. In the short-run, however, types 1 and 2 are more likely to be more negatively affected than 3, but over time, as immigrants tend to return to their original types of employment, this effect will tend to dissipate.

As a further illustration of this analysis consider the following figure that, for simplicity, refers to one skill level.

Figure 3

The increase in the working age population from P_0 to P_1 is reflected in the goods market (panel a) and in the labor market (panel b) as a shift of the two supply curves: Y^S and L^S both shift rightward. The demand for goods, Y^d , is also affected and hence moves to the right. Panel a presents the possibility that the effect of immigration on the demand for goods is stronger (as in the first stage the entry of immigrants into the labor market is partial) and hence the relative price in the goods market goes up from $(\frac{P_Y}{P_M})_0$ to $(\frac{P_Y}{P_M})_1$. This rise in the relative price of the domestic good encourages the demand for labor and shifts the L^d curve to the right in panel b. The result is that total employment goes up from L_0 before immigration to \bar{L}_1 ; the natives' employment rises from L_0 to L_1 . The latter rise stems from the increase in the demand for labor generated by the increase in demand for the domestic

good. If it were not to the demand effect, panel b shows that natives' employment would have declined to L_0^* , the level that would be generated by a shift of L^S alone.

4 The Data and Econometric Methodology

The data we use comes from two main sources: Central Bureau of Statistics (CBS) data on immigrant flows and labor market data from the Labor Force Survey (LFS) of the CBS.

For immigrant flows we use the CBS records on immigrants upon their arrival in Israel. Out of these data we use the monthly inflow of working age (15-64) immigrants from the former USSR. This data set does not permit division into skill groups.⁴

For labor force variables of natives we use the Labor Force Survey; the latter samples 11,400 households covering 22,500 people 15 years and older (0.6% of the relevant population). We use data on natives' employment out of the labor force, sub-divided into three categories of education - primary, secondary (high-school) and post-secondary (universities, colleges etc.)⁵. We also use three demographic variables: average age, percentage of females and percentage of married persons within each of these categories. These data are available quarterly; we transform them into the monthly frequency by placing the variables (which are stocks) at the middle month of the quarter and assuming linear monthly growth in terms of logs between consecutive quarters.

Using these data we construct three regressions. Note that the reduced form of natives employment (11) has the following set of exogenous variables:

$$X = \{A, D^N, D^I, P^{N,1}, P^{N,2}, P^{N,3}, \Delta P^{I,1}, \Delta P_{-1}^{I,1}, \dots, \Delta P^{I,2}, \Delta P_{-1}^{I,2}, \dots, \Delta P^{I,3}, \Delta P_{-1}^{I,3}, \dots\} \quad (12)$$

⁴We hope to obtain data on the skill composition of immigrant flows for future work.

⁵This division is obtained by using the responses to the question in the LFS with respect to the last school attended.

The level of technology A and the native population stocks $P^{N,1}, P^{N,2}, P^{N,3}$ evolve slowly and are captured by a linear-quadratic time trend. Given that we could not divide the immigrants into skill levels we use total immigrant flows $\Delta P^I, \Delta P^I_1, \dots$. The estimating equations are obtained by dividing the latter as well as the stocks of natives employment ($L^{N,i}$) by the working age population $P^{N,i}$:

$$e_t^{N,i} = \alpha_0 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 D_t^{N,i} + \alpha_4 \frac{\Delta P_{t-3}^I}{P_t^{N,i}} + \alpha_5 \frac{\Delta P_{t-4}^I}{P_t^{N,i}} + \dots + \varepsilon_t^i \quad (13)$$

$$i = 1, 2, 3$$

where $e_t^{N,i} = \frac{L_t^{N,i}}{P_t^{N,i}}$, $D_t^{N,i}$ are the demographic variables for group i —average age $AGE^{N,i}$, percentage of females $FEM^{N,i}$, and percentage of married persons $MAR^{N,i}$. These variables are included in order to capture the major demographic factors and in order to reduce the standard error of the regressions and thus improve the efficiency of the estimators. We include lags of immigrants flows from 3 to 18 months, as we assume that the immigrants do not enter the labor market in the three months following their day of arrival. We use 50 monthly observations in the period 1991:10-1995:11, the sample being shorter than the maximum sample length by the lag length chosen.

5 Estimation Results

The results of the three regressions are reported in Table 1.

Table 1

Let us start by analyzing the main variables of interest - the $\frac{\Delta P^I}{P^{N,i}}$ flows. The vector of coefficients for the three groups are plotted in Figures 4 a,b,c. We construct 95% confidence interval bands by adding and subtracting twice the standard error of each coefficient.

Table 1a

Dependent variable: the employment rate out of working age population- e^1

Variable	(1)			(2)		
	Coefficient	std. Error	t-Statistic	Coefficient	std. Error	t-Statistic
c	0.01	0.15	0.08	0.32	0.01	28.53
time	0.00	0.00	6.44	0.00	0.00	6.24
age	0.01	0.00	2.21	-	-	-
fem	0.00	0.00	-0.08	-	-	-
mar	0.00	0.00	-0.71	-	-	-
ΔP_{-1}^i	-0.23	0.48	-0.48	0.15	0.45	0.34
ΔP_{-2}^i	-0.43	0.55	-0.78	-0.56	0.55	-1.01
ΔP_{-3}^i	-0.55	0.60	-0.92	-0.94	0.57	-1.65
ΔP_{-4}^i	0.45	0.44	1.01	0.46	0.43	1.08
ΔP_{-5}^i	0.59	0.21	2.82	0.54	0.20	2.65
ΔP_{-6}^i	0.70	0.23	3.03	0.06	0.21	2.86
ΔP_{-7}^i	0.79	0.30	2.64	0.52	0.28	1.89
ΔP_{-8}^i	0.64	0.39	1.64	0.56	0.37	1.50
ΔP_{-9}^i	0.69	0.33	2.09	0.85	0.30	2.82
ΔP_{-10}^i	0.08	0.28	0.30	0.01	0.27	0.04
ΔP_{-11}^i	0.08	0.14	0.61	0.09	0.14	0.64
ΔP_{-12}^i	0.01	0.15	0.10	0.02	0.15	0.13
ΔP_{-13}^i	-0.04	0.14	-0.26	0.01	0.14	0.08
ΔP_{-14}^i	0.00	0.17	0.00	0.02	0.17	0.10
ΔP_{-15}^i	-0.09	0.12	-0.75	-0.09	0.12	-0.73
ΔP_{-16}^i	0.08	0.11	0.69	0.10	0.11	0.94
ar(1)	1.15	0.05	21.13	1.17	0.04	26.71
ar(3)	-0.53	0.05	-9.89	-0.53	0.04	-12.11

$R^2 = 0.97$

D.W. = 1.75

$R^2 = 0.98$

D.W. = 1.7

remarks:

age- the average age.

fem- female percentage.

mar- married percentage

ΔP_{-i}^i - the flow of immigrants from the former USSR in month t-i.

sample range: 1990:01-1995:11

adjusted sample (due to lags):(1) 1991:10-1995:11

(2) 1991:10-1995:11

Table 1b

Dependent variable: the employment rate out of working age population- e^2

Variable	(1)			(2)		
	Coefficient	std. Error	t-Statistic	Coefficient	std. Error	t-Statistic
c	1.48	0.24	6.23	0.36	0.03	10.39
time	0.01	0.00	7.70	0.00	0.00	3.97
time ²	0.00	0.00	-6.96	0.00	0.00	-3.28
age	-0.05	0.01	-4.90	-	-	-
fem	-0.01	0.00	-4.16	-	-	-
mar	0.01	0.00	5.82	-	-	-
ΔP_{-3}^i	0.96	0.57	1.68	0.21	0.79	0.26
ΔP_{-4}^i	1.13	0.68	1.66	0.43	0.95	0.46
ΔP_{-5}^i	1.11	0.63	1.76	0.90	0.94	0.96
ΔP_{-6}^i	0.12	0.81	0.15	-0.61	0.72	-0.85
ΔP_{-7}^i	0.12	0.68	0.18	0.75	0.38	1.98
ΔP_{-8}^i	-0.02	0.68	-0.04	1.01	0.38	2.67
ΔP_{-9}^i	0.50	0.64	0.78	0.48	0.48	1.00
ΔP_{-10}^i	1.20	0.43	2.78	0.92	0.62	1.48
ΔP_{-11}^i	1.39	0.41	3.35	0.33	0.49	0.68
ΔP_{-12}^i	1.44	0.33	4.43	1.22	0.43	2.8
ΔP_{-13}^i	0.58	0.33	1.75	0.13	0.25	0.54
ΔP_{-14}^i	0.05	0.34	0.14	-0.28	0.27	-1.04
ΔP_{-15}^i	-0.40	0.23	-1.71	-0.09	0.28	-0.33
ΔP_{-16}^i	-0.50	0.18	-2.75	-0.37	0.30	-1.23
ΔP_{-17}^i	-0.33	0.19	-1.69	-0.17	0.22	-0.76
ΔP_{-18}^i	-0.17	0.18	-0.99	-0.38	0.19	-2.00
ar(1)	1.04	0.12	8.78	1.13	0.08	14.5
ar(2)	-0.70	0.10	-7.04	-	-	-
ar(3)	-	-	-	-0.50	0.08	-6.57

$R^2 = 0.99$

D.W. = 1.71

$R^2 = 0.99$

D.W. = 1.93

remarks:

time² - time square.

age- the average age.

fem- female percentage.

mar- married percentage.

ΔP_{-i}^i - the flow of immigrants from the former USSR in month t-i.

sample range: 1990:01-1995:11

adjusted sample (due to lags):(1) 1991:09-1995:11

(2) 1991:10-1995:11

Table 1c

Dependent variable: the employment rate out of working age population- e^3

Variable	(1)			(2)		
	Coefficient	std. Error	t-Statistic	Coefficient	std. Error	t-Statistic
c	1.31	0.16	8.04	0.68	0.01	70.82
time	0.00	0.00	7.62	0.00	0.00	5.85
age	-0.02	0.00	-5.74	-	-	-
fem	-0.01	0.00	-2.41	-	-	-
mar	0.01	0.00	6.24	-	-	-
ΔP_{-3}^i	-0.68	0.33	-2.07	0.00	0.00	5.86
ΔP_{-4}^i	0.66	0.39	1.67	-0.92	0.41	-2.23
ΔP_{-5}^i	1.74	0.41	4.27	0.23	0.57	0.40
ΔP_{-6}^i	1.68	0.30	5.57	1.04	0.54	1.93
ΔP_{-7}^i	1.24	0.29	4.28	1.11	0.40	2.73
ΔP_{-8}^i	0.97	0.26	3.81	0.57	0.34	1.66
ΔP_{-9}^i	1.13	0.26	4.26	0.48	0.27	1.76
ΔP_{-10}^i	0.37	0.24	1.52	0.67	0.35	1.91
ΔP_{-11}^i	-0.16	0.25	-0.64	-0.05	0.38	-0.14
ΔP_{-12}^i	-0.26	0.22	-1.21	-0.65	0.33	-2.00
ΔP_{-13}^i	-0.11	0.22	-0.50	-0.67	0.29	-2.35
ΔP_{-14}^i	0.01	0.17	0.07	-0.36	0.22	-1.59
ΔP_{-15}^i	-0.04	0.16	-0.25	-0.06	0.20	-0.31
ΔP_{-16}^i	0.14	0.13	1.06	-0.06	0.20	-0.30
ΔP_{-17}^i	0.06	0.09	0.67	0.13	0.20	0.69
ΔP_{-18}^i	0.11	0.08	1.50	0.00	0.15	0.02
ar(1)	0.83	0.14	6.00	0.07	0.11	0.62
ar(2)	-	-	-	1.41	0.14	9.97
ma(1)	0.35	0.2	1.76	-	-	-

$R^2 = 0.98$

D.W. = 2.03

$R^2 = 0.99$

D.W. = 1.85

remarks:

age- the average age.

fem- female percentage.

mar- married percentage.

ΔP_{-i}^i - the flow of immigrants from the former USSR in month t-i.

sample range: 1990:01-1995:11

adjusted sample (due to lags):(1) 1991:08-1995:11

(2) 1991:09-1995:11

Therefore, when the entire width of the band is above or below zero for particular lags, the relevant coefficients are significantly different from zero at the 5% confidence level.

Figure 4 a,b,c

From the three graphs emerges an important and surprising result: the effects of immigration on native-born employment rates are in general *positive*, although temporary. In other words, the aggregate demand effects of immigration are stronger than labor substitution generated by additional labor supply. For the high skill group (3), the significant positive effects start after 4 months and last until 10 months, while for the low skill group (1) these effects start later, after 6 months, and last until the 12th. The effects on the intermediate group (2) are less smooth: the effects are positive to lag 13, but at the intermediate lags the effect is very weak. At higher lags, the coefficients for this group turn significantly negative, but for a short period. Overall, these results suggest a strong effect of immigration on the demand for domestic goods, that has increased the relative price $\frac{P_Y}{P_M}$ (equation (10)), which in turn increased the demand for the three types of labor (equations (5)).

There are, however, important differences between the effects on the three skill groups. To stress these differences, Figure 5 plots the three coefficient patterns juxtaposed, based on the point estimates of these coefficients.

Figure 5

There are two main phenomena emerging from Figure 5: the first is that the impact effect following immigrants' entrance into the labor market (lags 4 to 7) differs significantly among skill levels. The strongest positive impact is on the high-skill level; the effect is much weaker on the intermediate skill level; and it is the lowest on the low-skill group - an effect which is negative in part. These differences can be interpreted as follows: most

Figure 4a

Coefficients on immigrant flows
in employment rate regression e1
confidence interval

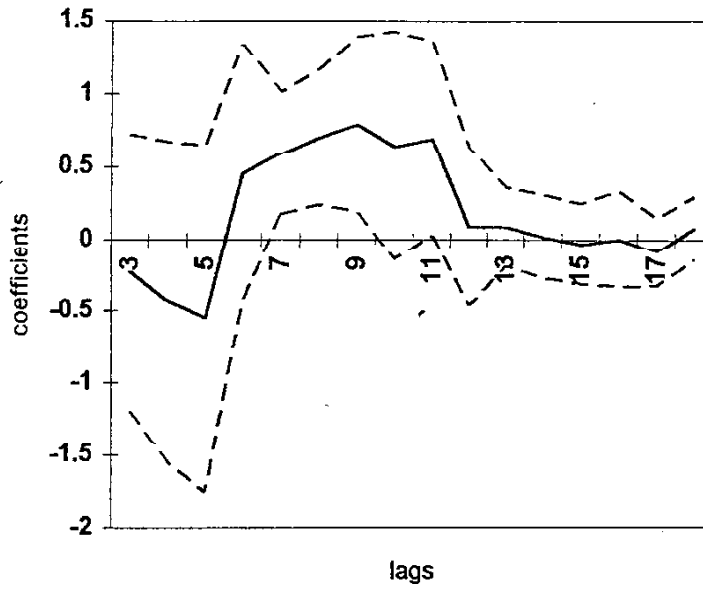


Figure 4b

Coefficients on immigrant flows
in employment rate regression e2
confidence interval

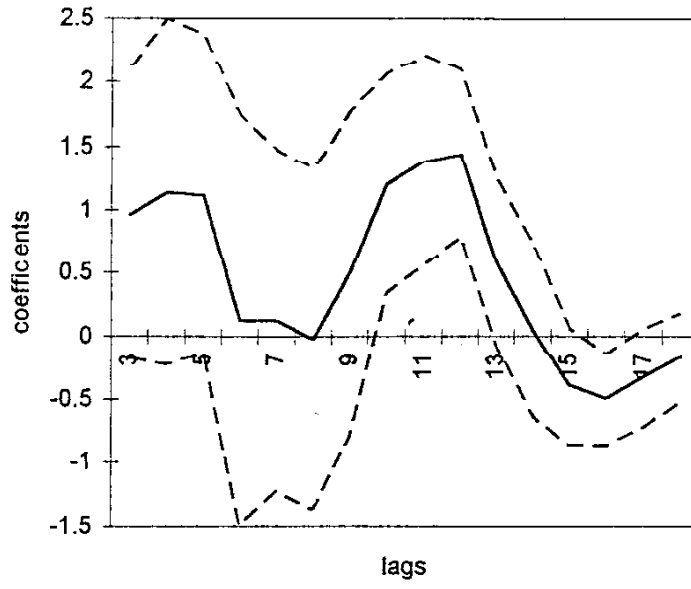


Figure 4c

Coefficients on immigrant rates
in employment rate regression e3
confidence interval

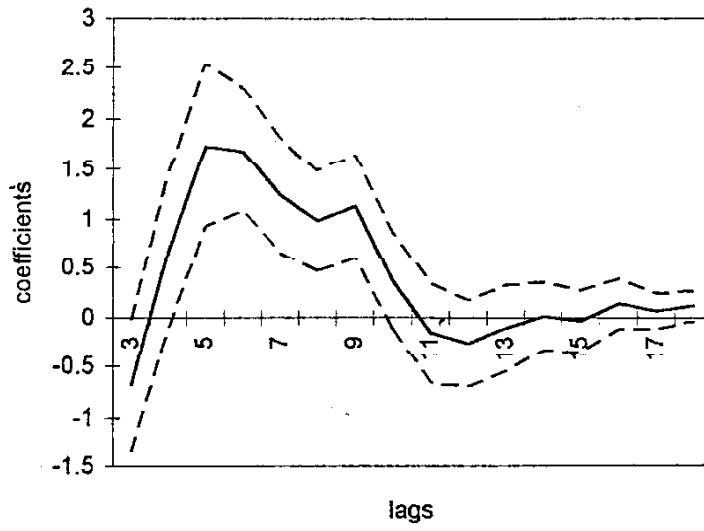
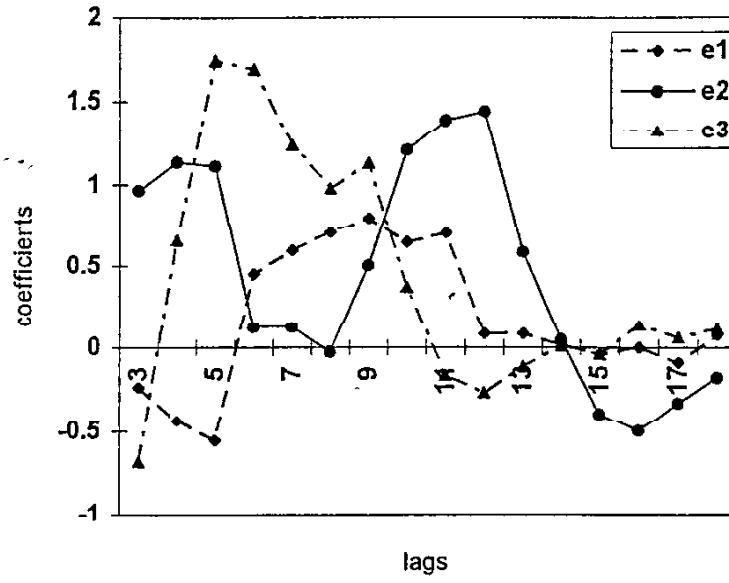


Figure 5

Comparison of the coefficients



of the immigrants (about 60% during the entire sample) highly-skilled. It is well known that a large proportion of these immigrants initially obtained low-skill jobs, i.e., joined group 1. Accordingly, the aggregate demand effect on native-born high-skill employment is not offset after immigrants arrival by higher labor supply at this level. At the low-skill level, accordingly, labor supply does increase by immigrants of type 3 (and maybe also of type 2) offsetting the aggregate demand effect on native-born group 1. Hence the marked differences between the impact effects on groups 3 and 1. Immigrants of the intermediate skill level (about 30% of total immigration, and fairly constant over the sample) may have entered mostly their own job level, and hence the aggregate demand effect of group 2 was also offset by higher labor supply. The second phenomenon seen in Figure 5 is that the effects on the three groups converge over time. In particular the positive effect on group 1 declines, and that on groups 1 increases. This pattern may be due to a gradual shift of high-skill immigrants to employment at their own skill level, which substitutes high-skilled native-born, and simultaneously reduces the substitution of low-skilled native-born.

Note that both the impact and the convergence effects discussed above are reinforced if there is complementarity between the three types of labor – as for example in the case of a Cobb-Douglas production function. This works as follows: consider first the impact effect of type 3 immigrants joining the type 1 labor market, which reduces type 1 wages. In consequence, total employment at this level increases. Given complementarity, higher employment at the low-skill level raises the *demand* for the other types, and in particular for high-skill labor. This reinforces the higher demand for high-skill labor generated by goods demand, and hence the employment of native-born of type 3. Similar effects are at work during the convergence phase. Type 3 immigrants shift to type 3 employment, thereby increasing total employment at the high-skill level. Because of complementarity, this generates higher demand for low-skill labor, precisely at the time that type 3 immigrants are moving away from the low-skill market. The consequence is higher employment of native-born at the low-skill level.

Figures 4 and 5 show an additional phenomenon. The effect of immigration on

intermediate-skill native-born employment becomes eventually negative (after more than one year, and for a period of a few months). This negative effect, which is statistically significant (see Table 1b), can be explained by a movement of high-skill immigrants to intermediate-skill jobs—engineers taking jobs of technicians, for example. This may constitute a permanent downgrading of their skills, which may be offset after a while by other factors, such as aggregate demand or capital accumulation.

Let us turn to the demographic factors. Age has a positive effect on the low-skill group, and negative effects on the higher skill-levels. This difference may be due to the link between skilled-labor, education and age. Younger workers are probably more up-to-date on new technologies, and hence their chance of employment increases. The percentage of women and of married individuals in the population have negative effects on the intermediate and high-skill groups, and they are insignificant in the low-skill regression. The negative coefficients of *MAR* can probably be explained by the fact that types 2 and 3 enjoy higher income per worker than group 1, and hence families at the higher skill-levels can afford to be one-job families. Technically, it seems to indicate that leisure, or home activities, are a normal good. Regarding *FEM*, the explanation can be similar to that of *MAR*, given that in one-job families, it is likely that it will be the woman who will engage in home activities.

Finally, the time trend has different effects on the three groups. First, the quadratic term was significant only in the intermediate skill-level. Employment rates of groups 1 and 3 increase over time, but the coefficient in the high-skill case is about twice as big as the coefficient in the low-skill case. This result is consistent with skill-biased technological change, which favors employment at the high skill level. The effect on the employment rates cannot be, however, a long run phenomenon, although the sample period seems to have been one of adjustment to this type of technological change. The impact of time on group 2 declines over time, given the negative quadratic coefficient. The combined effect is very high in the earlier part of the sample, and is reduced to about zero towards the end of the sample period.

6 Conclusions

The paper has examined the effect of mass immigration on the employment rates of the native born in a dynamic context. It proposed a theoretical model dealing with several aspects of this process and has tested it empirically. The model emphasizes the point that immigration absorption into employment is gradual and therefore its effect on native-born employment occurs with a lag. It incorporates the empirically observed phenomenon whereby the immigrants initially worked in jobs that require lower skills and only later found jobs at higher skill levels. The model caters for substitution and complementarity among the various skill groups and takes into account effects from the goods market.

The empirical findings point to two main conclusions:

(i) Contrary to many existing studies which found little or no effect of immigrants' on native-born employment, the effect of the immigrants on the natives' employment is for the most part positive. This is explained by aggregate demand effects.

(ii) The effect of the immigrants is different for different natives skill groups, explained by the differential entry of immigrants into occupations according to skill level.

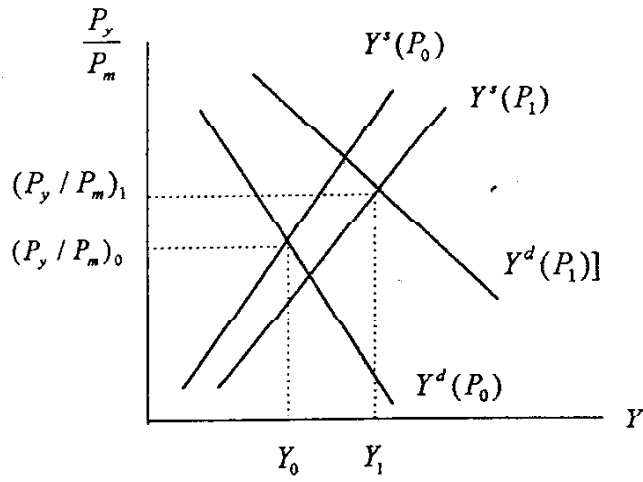
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Figure 3

panel a



panel b

