High skill immigration: some lessons from Israel

Yoram Weiss [*]

Summary

■ This paper draws some lessons from recent mass immigration of highly skilled immigrants from the USSR to Israel. One important lesson is that the adjustment process for highly skilled immigrants can be quite long and extend throughout their lifetime. This implies a substantial loss of skills, in present value terms. The expected present value of the difference between actual earnings and potential earnings is approximately 250,000 US Dollars, which constitutes about 57 per cent of the present value of potential earnings over the remaining working life (about 25 years). Another important lesson is that even a large wave of immigrants can be absorbed in the labour market without a marked effect on wages or employment of natives. This is a consequence of two related trends, entry of additional capital and gradual entry into high skill occupations, that together kept the aggregate capital labour ratio constant, if labour is correctly measured. ●

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High skill immigration: some lessons from Israel

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Following the disintegration of the USSR, Israel has experienced a sudden and large inflow of highly skilled immigrants. This mass immigration, which started towards the end of 1989, amounted to a total of about 711 thousand immigrants between 1990 and the end of 1997 (see Table 1). The Israeli population at the end of 1989 was 4.56 millions and the impact of the initial wave in 1990-91 was to increase the population almost instantly by 7.6 per cent. The accumulated flow of immigrants from the former Soviet Union, during the period 1990-1997, constitutes about 16 per cent of the labour force of the pre-migration population of Israel. Compared with the immigration to the US and other receiving countries, this wave is exceptional in its magnitude.

An important characteristic of this wave of immigration is the markedly high level of education and the prior work experience in academic jobs (see Table 1). Those who arrived before the end of 1993 possessed an average of 14.5 years of schooling, and half of them had held academic and managerial positions before immigrating. Of those, 57,400 defined themselves as engineers and 12,200 as medical doctors, compared with 30,200 engineers and 15,600 doctors in Israel in 1989. On average, these immigrants are older than Israeli workers by four years and bring with them about 15 years of work experience. This is in contrast to most immigrations, where immigrants tend to be relatively young. This feature reflects the exogenous relaxation of emigration from the USSR and the free entry to Israel of Diaspora Jews. Thus, this immigration wave is less governed by self-selection.

Table 1. Total immigrants and immigrants from former USSR by year of immigration and occupation abroad (total immigrants in parentheses)

	1990		1991		1992		1993		1994		1995		1996		1997		Total 90-97	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Total Arrivals	185,227 (199,516)		147,839 (176,456)		65,093 (77,057)		66,145 (76,805)		68,079 (79,844)		64,847 (76,361)		59,049 (70,919)		54,591 (66,000)		710,870 (822,958)	
Aged 15+	142,944 (153,395)		117,395 (133,987)		52,037 (60,451)		52,569 (60,607)		54,706 (63,615)		52,382 (61,031)		47,960 (56,852)		44,536 (53,124)		564,529 (643,062)	
Worked Abroad	(100,720)	(100)	79,743 (84,694)	100 (100)	33,696 (36,948)	100 (100)	33,141 (36,128)	100 (100)	35,145 (39,232)	100 (100)	36,338 (41,230)	100 (100)	32,009 (36,943)	100.0 (100.0)	31,026 (35,877)	100 (100)	281,098* (411,772)	100 (100)
Occupa- tion. a) *Abroad*																		
1	(43,315)	(43.0)	31,693 (33,078)	39.7 (39.1)	12,242 (13,179)	36.3 (35.7)	10,214 (11,219)	30.8 (31.1)	11,563 (13,086)	32.9 (33.4)	11,089 (12,514)	30.5 (30.4)	10,771 (12,277)	33.6 (33.2)	9,926 (11,589)	32.0 (32.3)	97,498* (150,257)	34.7 (36.5)
2	(34,443)	(34.2)	26,021 (27,321)	32.6 (32.3)	10,872 (11,631)	32.3 (31.5)	10,736 (11,658)	32.4 (32.3)	11,748 (13,179)	33.4 (33.6)	11,272 (12,593)	31.0 (30.5)	10,220 (11,680)	31.9 (31.6)	9,856 (11,181)	31.8 (31.2)	90,725* (133,687)	32.4 (32.7)
3	(22,962)	(22.8)	22,029 (24,294)	27.6 (28.7)	10,582 (12,138)	31.4 (32.9)	12,191 (13,251)	36.8 (36.7)	11,834 (12,967)	33.7 (33.1)	13,977 (16,123)	38.5 (39.1)	11,018 (12,986)	34.4 (35.2)	11,244 (13,107)	36.2 (36.5)	92,875* (127,828)	33.0 (31.0)

Notes: a) Occupation 1: Academic professionals and managers. Occupation 2: Associate professionals and technicians. Occupation 3: other skilled and unskilled workers.

Source: Israeli Central Bureau of Statistics, Statistical Abstracts, 1990-1995; Israeli Central Bureau of Statistics, Annual Statistics, 1997-1998.

The large entry rates of highly skilled immigrants, generated substantial excess supply in some high skill occupations. This has led to a *gradual* adjustment process, whereby immigrants first work at low skill occupations and then climb up the occupational ladder as they become more familiar with the Israeli labour market and find jobs that match their skills.

This paper attempts to draw a number of general conclusions based on this unique experiment. We begin with a brief outline of the special problems related to high skill immigrants. The main issue is whether the immigrants can successfully transfer their skills to the new country. The point of departure is that, for imported skills to be used efficiently, immigrants must be sorted out and matched with local jobs that can exploit their skills. Because of frictions and limited information among immigrants and among local employers, this process takes time. The speed of the process depends on local market conditions and on the investment and search decisions of the immigrants. We note that search externalities, imperfect capital markets and uncertainty about job prospects may call for some government intervention in the process. We then describe the Israeli experience in some detail, noting the main features of the process of integration for high skill immigrants. The general pattern is an initial low wage, compared with Israelis of similar skills, followed by a sharp increase in wages with time spent in Israel. The growth in average wages is accompanied by increased wage variability among immigrants. Initially, all immigrants receive similar wages, irrespective of their imported skills. As the local rewards for imported skills rise, immigrants become more differentiated and their wages become less equal.

One important lesson is that the adjustment process for highly skilled immigrants can be quite long and extend throughout their lifetime. This implies a substantial loss of skills, in present value terms. The loss of human capital can be defined as the difference between the expected actual lifetime earnings and the expected potential lifetime earnings that the immigrant would have obtained had he access to the same job offer distribution and wages on these jobs as comparable Israelis, with the same schooling and work experience. The expected present value of the difference between actual earnings and potential earnings is approximately 250,000 US Dollars, which constitutes about 57 per cent of the present value of potential earnings over the remaining working life (about 25 years).

Another important lesson is that even a large wave of immigration can be absorbed in the labour market without marked effects on wages or employment of natives. This is a consequence of two related trends, entry of additional capital and gradual entry into high skill occupations, that together kept the aggregate capital labour ratio constant, assuming that labour is correctly measured. Specifically, the estimated individual wage profiles of natives and immigrants can be used to create a quality adjusted labour aggregate, that takes into account the different productivity of immigrants and natives and the changes in this gap as the immigrants are gradually matched. If one uses this quality adjusted number of workers, the capital labour ratio has remained roughly constant.

1. General considerations

1.1. Matching

Immigrants arrive with different skills and face many job alternatives in the host country. They cannot immediately find the job that best fits their skills. Initially, they work at jobs which require no particular skills, then they gradually climb up the occupational scale. This process depends on the rate at which workers meet employers and on their respective willingness to match, rather than continue the search.

To simplify the exposition, let immigrants vary in their schooling endowments and jobs vary in their **minimal** schooling requirements. The output achieved by employing a particular worker on a particular job depends on the match between the worker and the job. Specifically, a worker with less schooling than the required minimum cannot perform the job. A worker with more than the required level of schooling produces the same amount as one who has just the minimal requirement for the job. Associated with each job is a unique wage that each qualified applicant will receive. Different jobs, with different schooling requirements, pay different wages but any qualified worker who is employed on a given job receives the same wage, irrespective of his actual level of schooling (see Figure 1).

Figure 1. Output and wages as functions of schooling in different jobs
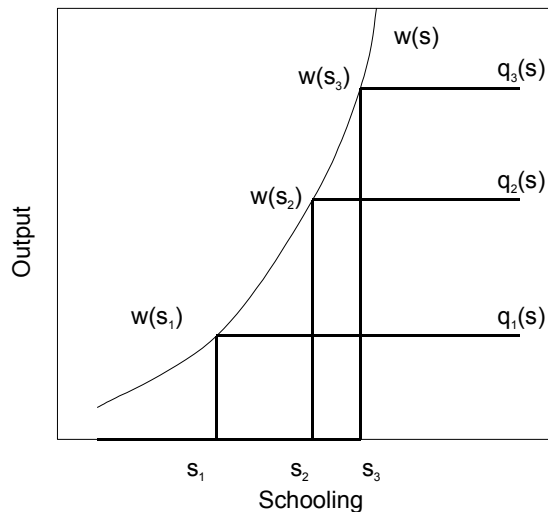
The matching process involves frictions and search by workers and firms. Frictions are captured by the assumption that a worker meets, with some probability, at most one firm each period. Upon meeting, the firm announces its job offer, consisting of a minimal schooling requirement, s, and an associated wage. Firms in different occupations may offer a different wage for a given s, depending on the technology and the demand conditions. In addition, each occupation has a different distribution of job offers, whereby high skill occupations have a higher proportion of jobs with high schooling requirements. Firms make offers only to workers that can perform the job. Local employers are uncertain about the quality of immigrants. A local employer who meets an immigrant with s_0 years of schooling acquired abroad, ascribes to him a "true" schooling endowment of s^* and accepts him if and only if $s^* \geq s$ If the worker is acceptable to the firm, he may choose whether or not to accept the job offer.

In deciding whether or not to accept a job offer, the worker compares its value to the value of other feasible alternatives which include unemployment and the current job, unless terminated. Thus, the acceptance decision depends on whether or not the worker is employed and on the current and future wages in each state, taking into account the option to quit for better jobs, should the opportunity arise. The

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value of future wages plus non-monetary returns is not known at time t, so that the worker faces a problem of decision under uncertainty. Based on his current state, the worker has a reservation rule that determines which offers to accept. Researchers do not observe all the attributes of the current job and can only predict the probability of a job change based on the observed state.

The process of transitions from the initial state of unemployment to subsequent jobs, implied by the dynamic optimisation problem, has several salient features. The first feature is that transitions generally involve an improvement in income. This is an outcome of the fact that the worker can usually maintain his current state, unless it is terminated (an event with a positive but small probability). However, it is possible for a worker to accept a job with a lower wage, if he is compensated in terms of non-monetary rewards. The other feature is that in choosing jobs, workers examine not only current income, but also future income prospects which depend on wage growth and alternative job offers and layoff probabilities. Finally, because of the frictions embedded in the model, a worker will usually not wait until he gets the best job for which he is qualified, but will accept jobs for which he is overqualified. Thus, the model naturally captures the phenomenon of occupational downgrading and loss of skill, but in a dynamic context, allowing for a gradual climb up the occupational ladder (see Weiss et al., 2000).

1.2. **Investment**

Improved job matching and rising rewards to imported skills is only one source of wage growth. An additional source is wage growth associated with the accumulation of local human capital via schooling, on the job training and learning by doing in the host country. These investment options typically require some sacrifice of current earnings to generate wage growth.

We can classify skills, based upon their origin. We denote by $L(t)$ the local skills of the worker at time t and by $K(t)$ his imported skills. By definition, only immigrants have imported skills. The earning capacity of a worker in the local market $Y(t)$ rises as a result of both of these types of human capital. We further assume that the two skills are *complements* in the production of local earnings.

Any worker can accumulate local human capital by investing in schooling and training. Although the imported skills of immigrants are fixed in quantity, their local value rises with time, as they are

gradually put into better uses. Abstracting for a moment from the stochastic features involved in job matching, assume that $K(t)$ increases deterministically with time and consider the accumulation of local skills. Augmenting local human capital requires some withdrawal of work time, and thus current earnings. So that actual earnings are

$$y(t) = Y(t)h(\frac{\dot{K}}{L}),$$

where $\dot{K}/L$ is the growth rate in local human capital and the function $h(\dot{K}/L)$ describes the (negative) relationship between the effective hours of work, and the creation of local human capital. Because of the exogenous growth in $K(t)$, when the investment is done in time t, $Y(t)$ is low, relative to $Y(t + h)$, where $t + h$ is the future time when the returns for the investment are obtained. Therefore, the higher is the growth rate in $K(t)$, the stronger are the incentives to invest now. Another important determinant of investment is the worker's age. The older he is, the shorter is the period over which human capital is used and the incentive for investment diminishes.

An important implication of these observations is that, because of the expected increase in the returns for imported skills, immigrants have a higher incentive than natives to invest in local human capital, and, consequently, their wage growth is higher at any given age. The basic difference between natives and immigrants is that immigrants bring with them skills which are not immediately applicable to the local market conditions. As time passes, the imported skills become more valuable as immigrants adapt to local market conditions. After sufficient time in the host country, immigrants are as well matched as natives and the earning growth rates of immigrants and natives will eventually converge. However, the convergence of growth rates does not necessarily imply convergence in levels. Earnings of immigrants can *overtake* the earnings of natives, because of the faster accumulation of local human capital (see Figure 2). Of course, if imported skills are of inherently lower quality, then earnings of immigrants may never catch up with those of natives.

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Figure 2. Earning power and actual earnings of immigrants and natives as functions of age (time)
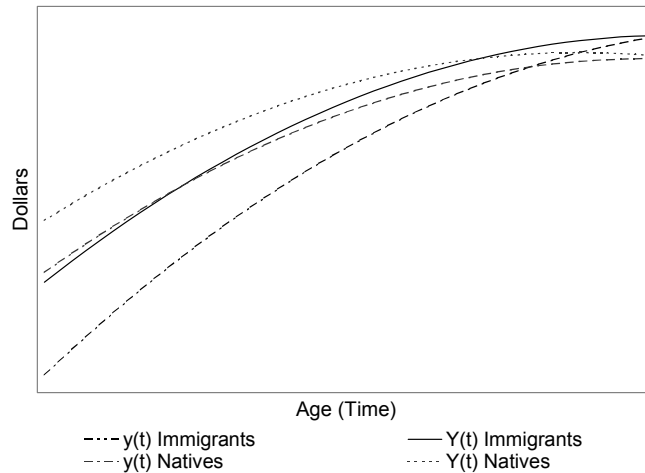
The positive interaction between rising prices for imported skills and the incentive to invest in local human capital provides a simple answer to a query raised by Borjas (1994, p. 1672) "why would immigrants accumulate more human capital than natives?" within the context of standard human capital theory. There is no need to rely on heterogeneity or self selection to explain overtaking. Immigrants may "try harder", simply because they have stronger market incentives to invest in human capital.

We should qualify this observation by noting the uncertainty involved in the matching process. Although the immigrant expects to get higher rewards for his imported skills, there is substantial individual uncertainty about the outcome. This added uncertainty may reduce the incentives of immigrants to invest.

A more general remark is that matching, investments and wage growth are jointly determined. Upon arrival, immigrants face a choice between waiting in unemployment for a high quality job, or accepting a job offer in a low skill occupation. Their decision depends on the options to search and train on the job. Although some training is provided out of the labour force through language and retraining programs, these options are limited and most of the training must be

purchased on the job. Jobs that closely match the worker's imported skills are better sources of training and may also provide better opportunities to search on the job. However, the probability of getting such jobs is relatively low and immigrants also accept low quality jobs, expecting a further climb up the occupational ladder (see Eckstein and Weiss, 1998).

1.3. **Market conditions and policy issues**

The rate at which firms and workers meet, and decide to form a match, depends on market conditions. The larger the aggregate inflow of immigrants of a particular skill, the lower is the probability to get a job offer from an occupation that matches this skill in any period. Such immigrants will experience a longer spell of unemployment or low skill occupations and the rise in the local value of their skills will be relatively slow. Some of these immigrants will never be matched with a local job that matches their skills. This can happen if immigrants become discouraged and stop searching or if the demand for their skill in the host country is too low. For several reasons, the market adjustment may be too long, leading to a substantial loss of skill both from the point of view of the immigrants and from the point of view of the receiving country. Imperfect capital markets and uncertainty about future prospects may lead immigrants to compromise and accept low quality lobs. Employers may be uncertain about the quality of the immigrants and reject too many of them. Government intervention in the form of minimum wage or unemployment benefits, may also reduce the speed of the adjustment as workers are less likely to accept, or unable to obtain, jobs with high training content and low wages. In addition, the matching process itself suffers from a variety of externalities. The decision of each immigrant to enter does not take into account the difficulties that he imposes on other immigrants with similar skills. Similarly, for those who have entered, there may be excessive search for the "good" jobs.

On balance, these considerations may justify government intervention aimed at facilitating the matching process and the accumulation of local human capital. Among the policy options, one may mention training subsidies to employers, subsidised credit to immigrants and some form of wage insurance. A simple scheme that combines all these features is to provide immigrants with employment *vouchers* denominated in wage units and valid for few years. A local employer who agrees to employ an immigrant for a certain period can obtain a

refund from the tax authorities. The advantage of the vouchers is that immigrants can observe, better than the authorities, whether or not they receive training, and therefore allocate the subsidy more efficiently among employers

2. The Israeli experience

2.1. Background

This section describes the *process* of entry of immigrants from the former USSR into the Israeli labour force. The data include, the whole immigrant population from the 1995 Census, repeated cross sections from the Income Surveys for the years 1991-1995 and two panels, including mainly Engineers, collected by the Brookdale Institute (a detailed description of these data appears in Eckstein and Weiss, 1999, and Weiss et al., 2000). Most of the observations are on immigrants from the recent wave and provide information on the short term adjustments. There are some observations on immigrants from previous cohorts that can be used to form some long term predictions. We describe the matching process, as reflected in the occupational upgrading, and examine the wage growth within and across occupations. To describe this process, it is useful to aggregate occupations, based on their schooling requirements. Occupation 1 includes academic professionals, such as engineers and physicians. Occupation 2 includes other professionals, such as teachers, nurses and technicians. Occupation 3 includes other workers, such as service workers and blue collar workers. We use this classification to describe the immigrants' occupation in the former USSR and in Israel.

Immigrants from the former USSR have rapidly entered the Israeli labour force, willing to accept any available job. The occupational distribution of first jobs among immigrants is similar to the distribution of jobs in the Israeli economy, implying a substantial occupational downgrading. Following this initial phase, there is a second phase in which the highly educated immigrants gradually upgrade their positions by finding better jobs within the low-ranked occupations or move to jobs within high-ranked occupations. Associated with the occupational upgrading, there is an increase in the average wage of immigrants. In addition, there is wage growth within occupations. Together, these factors account for an a sharp growth in real wages of about 6 per cent a year. Initially, all immigrants are paid the same

wages, irrespective of their imported skills. Then, wages grow differentially, whereby immigrants with more education and experience have a higher growth rate. Consequently, as immigrants spend more time in Israel, the variability in wages across schooling and experience groups rises, suggesting improved matching of workers to positions and rising returns for skills acquired abroad. There is also an increase in wage variability within experience and schooling groups that indicates a sorting of immigrants based on unobserved characteristics (see Eckstein and Weiss, 1998). This process has occurred without much effect on the employment and wages of natives (see Freidberg, 1996; and Eckstein and Weiss, 1999), because of inflow of capital and increased exports.[1] In some professions, such as medicine, collective wage bargaining yielded substantial wage rises for natives, despite the sharp increase in supply (see Sussman and Zakai, 1998).

2.2. The short run

The main features of the short term adjustments, during their first five years in Israel, can be summarised as follows.

Figure 3. Occupational distribution of immigrants in Israel
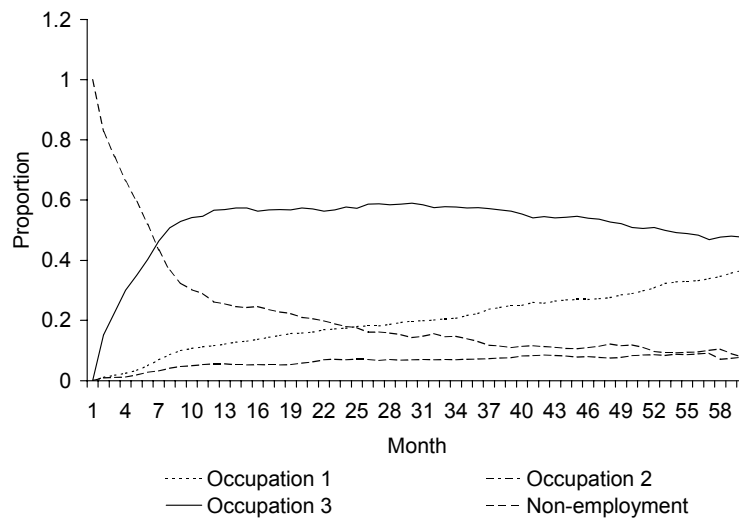
2.2.1. Rapid entry into the labour force

Male and young immigrants found jobs relatively quickly (see Table 2 and Figure 3). However, their first jobs were mainly in low skill occupations, such as cleaning, gas stations and plant floors. Less than 20 per cent of the high skill immigrants found a *first* job in high skill occupation. Women and older workers experienced slower entry into the labour force.

Table 2. Occupational distribution in Israel and occupational distribution in the former USSR males age 25-55 on arrival (per cent)

	Occ. 1	Occ. 2	Occ. 3	No job	Obs.
Occupation in USSR:	84.3	4.6	11.0	0.0	1086
Occupation in Israel:					
Month 12	11.6	5.6	56.6	26.2	1058
Month 24	17.4	6.9	57.7	17.9	929
Month 36	22.3	7.2	57.5	13.0	793
Month 48	27.6	7.5	52.7	12.2	583
Month 60	36.7	7.8	47.7	7.8	218

Source: Brookdale's Surveys.

2.2.2. Move up the occupational scale

High skill immigrants who start at low skill occupations, gradually move up the occupational scale and after five years in the Israel, about 40 per cent find jobs at occupations that require high skills (see Table 2 and Figure 3). Initially, the proportion of immigrants in low skill occupation keeps rising, because of entry from unemployment. However, after 3 years in Israel, the proportion of immigrants in low skill occupations starts to decline, as they move to better occupations.

Table 3. Average monthly reported wages of immigrants by occupation and years since arrival, ales age 25-55 on arrival (1995 Israeli Shekels=.33 US Dollars)

Occupation in Israel

Year	Occ. 1		Occ. 2		Occ. 3		All Occ.	
	Obs.	Wage	Obs.	Wage	Obs.	Wage	Obs.	Wage
1	6	3856	1	2764	7	2322	78	2445
2	26	3422	32	2764	189	2416	247	2567
3	38	3623	11	3288	155	2732	199	2911
4	41	4562	14	3337	163	2861	218	3211
5	92	5047	29	3575	202	3413	323	3893
6	57	5340	10	4263	83	3688	150	4354

Source: Brookdale's Surveys.

Table 4. Monthly wages of immigrants by schooling, years since arrival and sex (1995 Israeli Shekels = .33 US dollars)

Men

Year	School ≤ 12			School = 13-15			School ≥ 16		
	Obs.	Wage	Std.	Obs.	Wage	Std.	Obs.	Wage	Std.
1	535	2661	915	381	2798	950	217	2707	1058
2	524	2775	1018	381	3188	1618	247	3426	2083
3	458	2901	1126	485	2798	1692	394	3654	1839
4	983	3029	1304	1121	3188	1816	942	4079	2311
5	1155	3264	1390	1558	3528	2129	1454	4621	2729

Women

Year	School ≤ 12			School = 13-15			School ≥ 16		
	Obs.	Wage	Std.	Obs.	Wage	Std.	Obs.	Wage	Std.
1	410	1517	641	359	1657	769	173	2686	883
2	448	1746	1236	406	1837	993	242	1847	1071
3	373	1892	1003	549	2033	1141	344	2188	1330
4	858	1858	1238	1394	2239	1473	952	2643	2006
5	996	2023	1132	1903	2577	1758	1489	3095	2295

2.2.3. Rapid increase in average wages

Initially, immigrants receive an average wage that is about half the average wage of comparable Israelis (with the same schooling and local work experience). But wage *growth* is substantially higher for immigrants. The average annual growth rate in real wages among immigrants was about 6 per cent. Immigrants with a higher level of school-

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ing enjoyed a higher wage growth (see Tables 3 and 4). Wages also grew within occupations in Israel.[2]

2.2.4. No impact on natives

Despite the large relative change in the size and composition of the labour force, the impact on natives was very small. This is mainly a reflection of increased investments and rise in the capital stock.[3]

Following the beginning of the mass immigration in 1990, there is an initial small decrease in average wages, followed by a subsequent increase. The temporary reduction in wages occurred mainly in the business sector, while public sector wages continued to grow (see Eckstein and Weiss, 1999). The decline in average wages probably reflects the entry of immigrants into low paying jobs, and does not imply that natives suffered a wage loss. In fact, starting in 1991, we can separate wages of immigrants from those of natives, and these data show that the real wage of *both* groups tend to *rise* during the period, with higher proportional wage growth among immigrants. This holds for all schooling levels and both sexes. (See Figure 4, for the patterns among the highly skilled workers.)

The aggregate employment data misrepresents the time changes in the aggregate labour input and, consequently, in the aggregate capital labour ratio, because immigrants are treated as perfect substitutes for natives. In fact, immigrants adapt *gradually* to the Israeli labour market and become closer substitutes to comparable Israeli workers, with similar schooling and work experience, as they spend more time in Israel. This process is reflected in the initially low wages of immigrants, about half of the wages of comparable natives, followed by a sharp increase in wages with time spent in Israel. If we weigh immi-

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[2] A sharp increase of wages among immigrants is a common finding, although the reasons are not always clear. See the surveys by LaLonde and Topel (1997) and Borjas (1994, 1999).

[3] Ben-Porath, 1986, provides a detailed description of the growth of population and output in Israel from 1922 to 1982 and notes the positive correlation between immigration and growth. Eckstein and Weiss, 1999, show that this pattern continued in the 1990s, despite the lower growth rates in later years. In particular, consumption per capita rises during periods of mass immigration. This was made possible through investments that were triggered by the immigration shocks. Generally, the capital stock keeps up with the increase in employment, after some delay. This is true for both productive capital and residential capital. There is also some evidence that the rate of capital utilisation has increased at the initial period after the mass immigration started.

grants and natives according to their relative wages, we see that the aggregate capital labour ratio remained roughly constant during the period of mass immigration (see Eckstein and Weiss, 1999). Another mechanism that prevented the reduction in wages, is the substantial growth in exports, especially of high-tech products that absorbed many of the immigrants (see Gendal et al., 1999).

Figure 4. Real wage by sex and education (schooling 16+)

Males

Females
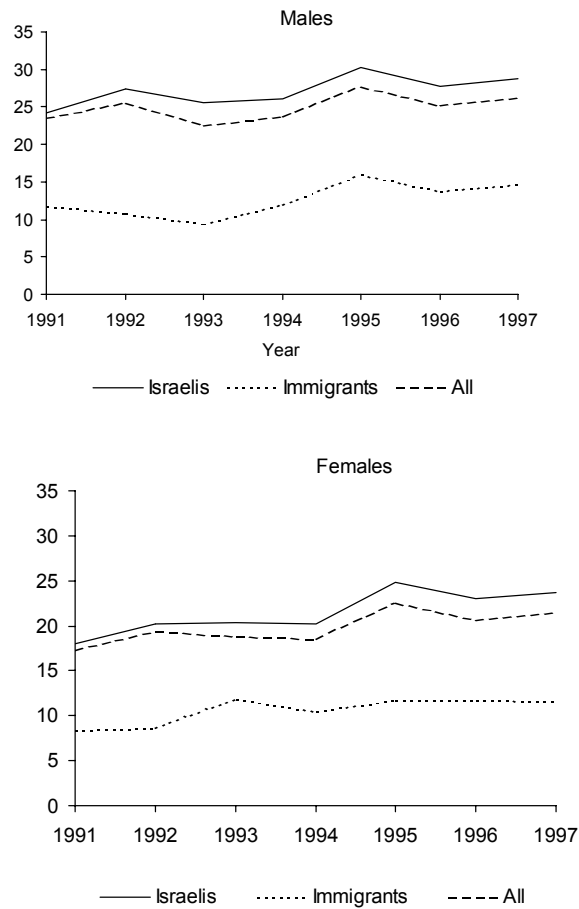
2.3. The long run

Based on the long term experience of previous cohorts of immigrants from the USSR and the short term experience of the recent cohorts, we can make some predictions on the long term prospects of the recent cohort.

2.3.1. Convergence in occupation.

Table 5 shows the occupational distribution of immigrants, by years in Israel, for two age groups; those who arrived at age 26-40 and those who arrived at age 41-55. The figures show an increase in the proportion employed in academic jobs, especially among immigrants who arrived at a young age.

As seen in Figure 5, the proportion of Israeli workers, with 16+ years of schooling, who actually work in occupation 1, rises from about 50 per cent at age 30 to about 60 per cent at age 50. Over the same age (time) interval, the proportion of immigrants who work in occupation 1, from the recent wave who entered Israel at age 30 with 16+ years of schooling, rises from about 25 per cent to about 55 per cent.

These figures mainly reflect the outcomes for immigrants who arrived in earlier cohorts. Estimates based on the short run experience of experience of the recent cohorts, also indicate a high expected entry unto high skill occupations (see Table 6 and Figure 5).

Figure 5. Predicted proportion employed in occupation 1 for workers with 16+ years of schooling
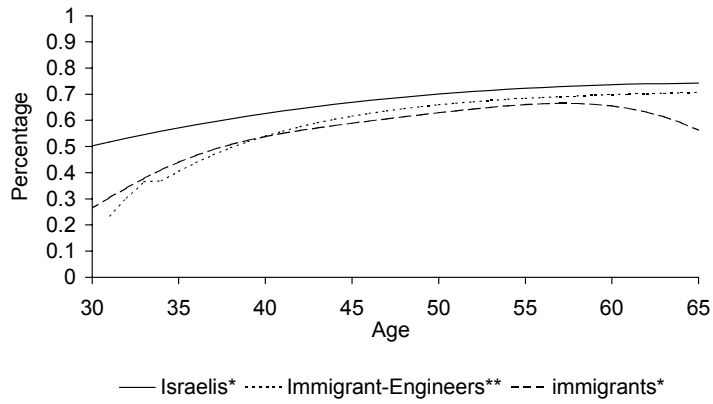
Notes: Israelis and immigrants with age at immigration 25-40. * Based on Logit estimation for Israelis (CBS, Labour Force Surveys 1991-95). * Based on Logit estimation for immigrants, with age of arrival 25-40 (Labour Force Surveys 1991-95). ** Based on the transition matrix in Brookdale's Engineers sample.

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Table 5. Occupational distribution of male immigrants (per cent)

Occupation	After 1 year		After 2 years		After 3 years		After 4 years		After 5-15 years		After 15+ years	
	All	Sch 16+	All	Sch 16+	All	Sch 16+	All	Sch 16+	All	Sch 16+	All	Sch 16+
Age at arrival 26-40												
1	6.94	20.77	12.05	24.79	16.35	34.65	17.06	36.50	21.05	54.26	23.79	58.40
2	6.20	10.38	8.18	8.97	9.31	10.09	11.57	13.50	11.18	13.45	11.37	12.18
3	65.93	45.36	67.73	51.71	67.30	45.61	65.58	46.00	63.29	28.70	58.30	26.05
Not Working	20.93	23.50	12.05	14.53	7.04	9.65	5.79	4.00	4.47	3.59	6.54	3.36
Total observations	951	183	880	234	795	228	674	200	760	223	765	238
Age at arrival 41-55												
1	6.82	19.16	9.41	18.91	11.03	21.46	14.00	28.22	18.81	37.42	25.75	75.00
2	3.48	3.27	5.26	6.30	6.21	8.68	8.32	10.40	8.26	6.75	7.78	2.50
3	66.48	47.20	68.74	54.20	72.76	58.90	69.78	50.99	67.20	49.69	60.48	12.50
Not working	23.23	30.37	16.59	20.59	10.00	10.96	7.91	10.40	5.73	6.13	5.99	10.00
Total observations	719	214	627	238	580	219	493	202	436	163	167	40

Source: CBS Labour Force Surveys, 1991- 1995.

Table 6. Simulated occupational distribution immigrants from occupation 1 in USSR by age at arrival

Year	Younger than 40				Older than 40			
	Oct. 1	Oct. 2	Oct. 3	No job	Oct. 1	Oct. 2	Oct. 3	No job
1	.175	.069	.483	.273	.123	.039	.560	.277
2	.246	.087	.522	.145	.159	.043	.647	.150
3	.289	.092	.514	.105	.177	.042	.668	.113
4	.320	.090	.506	.084	.187	.040	.678	.094
5	.342	.086	.498	.073	.195	.038	.682	.085
6	.347	.085	.495	.073	.197	.038	.680	.085
7	.397	.087	.435	.081	.239	.048	.635	.078
8	.418	.088	.417	.076	.261	.052	.619	.069
9	.437	.089	.400	.073	.280	.055	.601	.064
10	.455	.088	.385	.071	.305	.058	.577	.061
11	.472	.087	.371	.070				
12	.487	.086	.359	.068				
13	.501	.084	.349	.066				
14	.514	.082	.339	.064				
15	.526	.081	.331	.063				
16	.536	.079	.324	.061				
17	.546	.077	.317	.060				
18	.554	.076	.311	.058				
19	.563	.074	.306	.057				
20	.570	.073	.302	.056				
21	.576	.071	.298	.055				
22	.582	.070	.295	.053				
23	.588	.068	.291	.053				
24	.593	.067	.289	.052				
25	.596	.066	.287	.051				

*Source:* Simulations are derived form Weiss et al. (2000) using data from Brookdale's Surveys.

2.3.2. Slow convergence in wages

We can form some predictions regarding long term wage prospects of the recent waves, based on the observed short term pattern among the recent cohorts of immigrants and the experience of previous cohorts.

Figure 6 presents wage-age profiles, averaged over occupations, for an immigrant with 16 years of schooling, who arrived to Israel at age 30 and a comparable Israeli. As seen in these figures, the immigrant's wage-age profile are generally below those of the native Israelis. For instance, the average hourly wage of an highly skilled immigrant who arrived in the cohort 1990-91 at the age of 30 is predicted to be 60 per cent of the wage of an equivalent Israeli. The estimated regression equation predicts that this immigrant will reach at

the age of 55, a wage that is about 84 per cent of the equivalent Is-
raeli.

**Figure 6. Simulated wage-age profiles, averaged over occupa-
tions, for an Israeli worker and an immigrant, with and with-
out cohort effects, schooling=16, age at immigration=30***
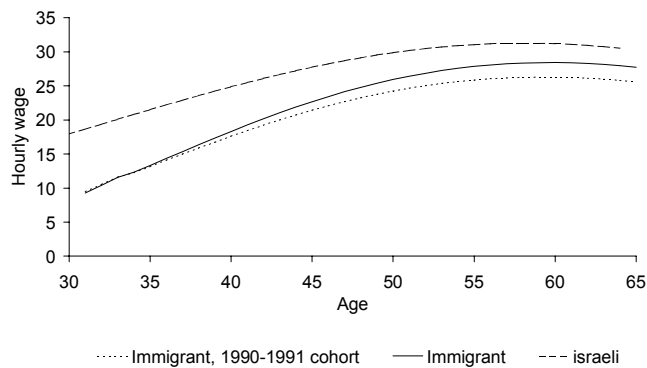

Notes: * Wage per hour in 1991 NIS. Predictions are based on regressions, using the
CBS Income Surveys 1991-95.

Figure 7 breaks the earnings growth of young immigrant (40 years
or less, who worked in occupation 1 in the USSR) into two compo-
nents: growth associated with improved matching, as jobs change,
and growth associated with wage growth within jobs. As seen, the
average annual earnings of immigrants (including zeros when the im-
migrant is out of the labour force) in their first year in Israel are less
than half of the earnings that would have been received, had they
faced the same job offer distribution as Israelis, and less than a quar-
ter of the earnings that would have been received, had they faced the
same job offer distribution and had their skills commanded the same
rewards, in each job, as comparable Israelis. After 25 years in Israel,
the earnings of immigrants still fall short of the earnings of compara-
ble Israelis by about 30 per cent, where half of the difference is at-
tributed to occupational mismatch and the remaining half to lower
wages for immigrants when employed on the same job as Israelis. The
wage growth in early years, that is mainly within occupations, can be
ascribed to the rise in the returns for imported skills, and the induced

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investments in local skills. The growth in later years is mainly due to occupational switches, reflected in the narrowing of the occupational differences between immigrants and native Israelis. However, convergence is not attained, because of an incomplete convergence in the occupational structure and the lack of convergence within occupations (see Eckstein and Weiss, 1998, and Weiss et al., 2000).

Figure 7. Simulated actual and potential annual earnings of immigrants from occupation 1 in the USSR younger than 40 on arrival (1995 Israeli shekels=.33 US dollars)
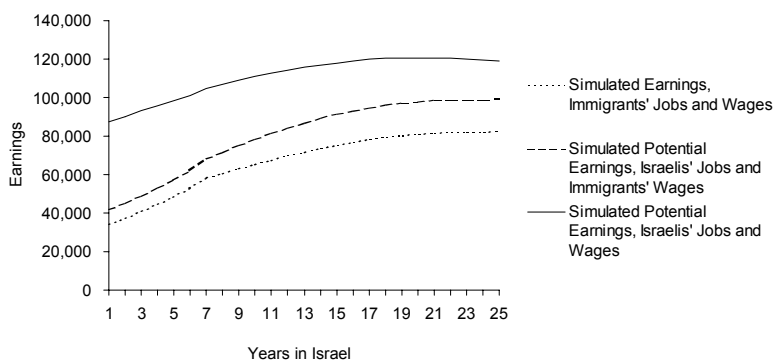

2.3.3. Family effects

Immigrants of the recent wave from the former USSR, especially female immigrants, are more likely to be single than native Israelis.[4] Data from the 1995 Census suggests that married immigrants do better than single immigrants. This is reflected in the higher participation rates and the higher wage level and wage growth for married immigrants of both sexes during the early years in Israel, relative to comparable single immigrants. The initial growth rate in wages for single male immigrants is 8.1 per cent a year, while married male immigrants enjoy an initial growth rate which is 10.7 per cent. There is a positive and significant initial marriage premium of 8.1 per cent for males and 11.5 per cent for females. This gap between married and singles rises

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[4] In the age range 25-65, the proportions of single men are 9 per cent for Israelis and 12 per cent for immigrants. The proportions of single women are 13 per cent for Israelis and 24 per cent for immigrants.

during the first 15 years in Israel and then narrows down (see Figure 8). For female immigrants, the difference in the initial growth rate between married and single is also positive (15.5 vs. 13 per cent, respectively) and the pattern over time is very similar to that of male immigrants.[5]

Figure 8. Simulated wages and participation of married and single immigrants*
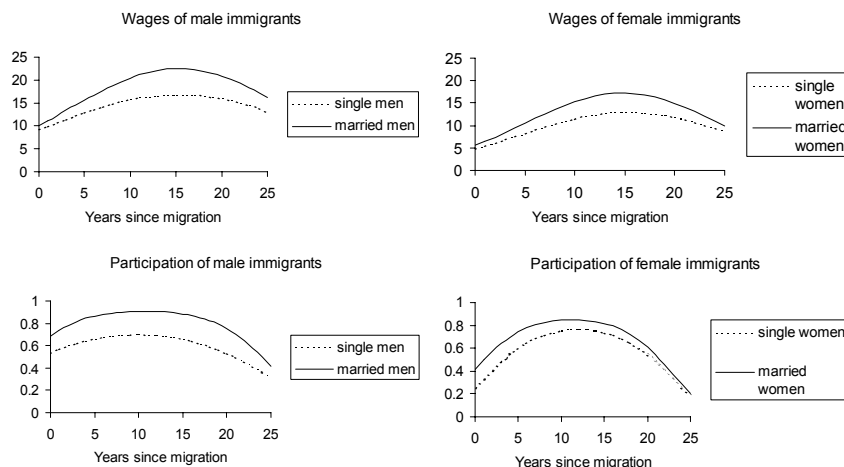
Notes: * Based on regressions from the 1995 Census.

In contrast to the positive marriage gap among immigrants, the marriage premium among Israeli men is very small, taking account of measured attributes and differences in participation. Comparing immigrants who have been in Israel for 10 years with Israelis who had 10 years of market experience, we see that married immigrant males obtain a large (15 to 20 per cent) marriage premium for both males and females, while for Israelis, the corresponding premia are essentially zero. This large "difference in differences" suggests the presence

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[5] Recent studies (Baker and Benjamin, 1997, and Duleep et al., 1999) have addressed the question whether wives support investment activities by their husbands via increased participation at reduced wages, at the early stage after migration. The data on immigrants from the USSR to Israel is consistent with a more symmetric view, suggesting that being married helps *both* husbands and wives.

of complementarities in the growth of wages of married immigrants. For instance, one spouse can work in unskilled work, while the other searches for high skill job or invests in training.

The higher participation and wage growth among married immigrants can be either an outcome of different behaviour, e.g. coordination of work activities, or different attributes of married couples. It is very difficult to separate these effects from a single cross section. Let us note, however, that the husband-wife interactions in schooling and age follow the same pattern as among married Israelis, suggesting that selection by attributes operates in a similar way for the two groups and the difference in wage growth between married and single is probably due to co-ordination. One indication for co-ordination is that the wage differences between married and single immigrants tend to vanish after a long stay in Israel (see Eckstein and Weiss, 1999).

2.4. Loss of skill

Immigration entails the transfer of human capital from one labour market to another. Human capital is to some extent country-specific. Skills acquired abroad are valued differently from skills acquired locally, both because immigrants have limited information on local market conditions and the location of jobs, and because employers are uncertain about the attributes of the newcomers. As a consequence, immigrants do not immediately find the jobs for which they are most suitable, nor do they immediately receive the same wage as Israelis on the same job. Instead, there is a gradual process of adjustment, whereby immigrants start at low wage jobs, and at the lower part of the occupational scale, and then climb up the occupational scale and obtain higher wages. The speed of the adjustment depends on market conditions, especially the number of jobs in relation to the number of workers looking for them, which affects the rate at which immigrants meet local employers. It also depends on the choices that immigrants make, especially which job offers to accept and the length of time that they have to wait for a suitable job.

An attempt to assess the magnitude of the costs of immigration associated with frictions and imperfect transferability of skills is performed by Weiss et al. (2000). They compare the simulated earnings of each immigrant, based on the estimated parameters of an optimisation model, to two *hypothetical* values. The first hypothetical value is the potential earnings of immigrants provided that they were given

access to the same distribution of jobs as comparable Israelis, but still receive immigrant wages on these jobs. The second hypothetical value is the potential earnings of immigrants where in addition to access to the same distribution of jobs as comparable Israelis, they would also receive the same wages for these jobs as comparable Israelis. One may define the difference between the potential and actual wage of the immigrant as a loss. These calculations aim to estimate the social loss of output to the receiving country associated with shifting human capital across labour markets. For this reason, the loss calculations do not include the benefits that immigrants receive when unemployed nor the monetary value of non-monetary benefits when employed and use the wages of Israelis as a benchmark. The estimated loss is probably an upper bound on the loss associated with frictions, because it is based on a presumption of fixed market conditions.

Because of the sharp changes in earnings loss over time in Israel and the endogeneity of wages, whereby low wages are currently traded for future high wages, the appropriate summary statistic of the loss is provided by the expected *present value* of discounted earnings over the immigrants remaining work-life in Israel, from the time of immigration until the age of 65. Weiss et al. (2000), estimate a substantial loss of 253,000 US Dollars. This loss constitutes 57 per cent of the life-time earnings that these immigrants would have obtained, had they been treated exactly like Israelis with the same measured attributes. Thus, although immigrants almost converge with Israelis in terms of occupation and earnings, the lifetime loss is very substantial.

Most of this loss, can be attributed to the fact that immigrants are paid lower wages, for the *same* job, than comparable Israelis, during the first years following immigration. This loss constitutes about 43 per cent of the lifetime earnings that these immigrants would have obtained had they been treated exactly like Israelis with the same measured attributes. The lifetime loss of earnings due to frictions in the labour market constitutes 14 per cent of the earnings they would have obtained if they had been treated exactly like Israelis with the same measured attributes.

We ascribe this loss to a lack of information by employers on the quality of newly arrived immigrants, and by immigrants of their opportunities in the new labour market, that together with the need for immigrants to invest in complementary local human capital (such as language skills) imply a gradual process of adjustment and adaptation. Clearly, any attempt to evaluate the importance of these considera-

tions is subject to many difficulties, resulting from the fact that we cannot observe the full adjustment process and we can judge the true quality of the immigrants' skills only ex-post, based on their experience in Israel. It is even more difficult to judge whether, and to what extent, there are market failures in this process and whether there is some policy that could have reduced the social loss. It is likely that limited borrowing capacity and uncertainty prevents immigrants from making the required local investment in on the job training, which should be the main vehicle for the acquisition of local *general* human capital. But there is no simple way to ascertain the quantitative importance of these factors.

3. Conclusion

Most developed countries can attract a large inflow of unskilled labour, should they decide to open up immigration. The large windfall of human capital that Israel received is somewhat rare. Yet, it is an option for other developed countries to receive more skilled workers from abroad, mainly from less developed countries, who have invested heavily in human capital. Inevitably, the receiving countries must use eligibility criteria, based on formal schooling achievements in the source countries, and the issues of transferability and potential loss of skills are an important input.

The two main conclusions from the Israeli experience are that the absorption of high skilled immigrants takes a long time and involves a substantial loss of their skills. However, natives do not suffer a loss even when immigration is large.

Limiting entry was not a policy option in Israel, although the government intervened actively in several ways in the absorption process. Upon arrival, each immigrant received free language classes. Subsidised training programs were also provided. While the language programs were quite effective, training programs had only limited success (See Cohen and Eckstein, 2000). The government paid some training subsidies to academic institutions and for hiring immigrants, but in relatively few cases. The main bottle neck appears to be in the provision of on the job training by private firms that, based on the experience of other countries, is expected to be the most efficient form of training (see Heckman, 1998). Vouchers for training have been discussed but not implemented. Entry into the labour market was facilitated by allowing immigrants to locate anywhere and still receive

housing subsidies, in contrast to publicly provided housing in selected area, as was done in the past.

It is important to note that it is quite possible that skilled natives would also have lost had the Israeli government been more successful in speeding up the entry of immigrants into high skilled occupations. In general, policy evaluations cannot only be made by looking at the impact on immigrants. The impact on natives must also be taken into consideration.

Important issues upon which we did not touch are the second generation effects and emigration. There is a lot of evidence which suggests that parents human capital influence their children (see Heckman, 1998). Accordingly we should extend the measurements of gains and losses further into the future. In fact, children of immigrants seem to invest more than natives in higher education, suggesting that the process of intergenerational transmission has began. There has been very little emigration from Israel back to the USSR, but one can expect some chain migration to other western countries. These topics must be left for further research.

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