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The Case of Israel -1995 to 2000**

Gottlieb, Daniel

Bank of Israel

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The Effect of Migrant Workers on Employment, Real Wages and Inequality  
The Case of Israel - 1995 to 2000

by

Daniel Gottlieb\*

Abstract

Key words: Migrants, Foreign workers, Israel, Income inequality, Employment

In this paper we consider the impact of migrant workers on the Israeli wage structure, on the chances of being unemployed or out of the labor force and on inequality in gross earnings from work.

One of the manifestations of globalization is the movement of migrant workers from low-income to richer countries. The recent increase in living standards in Israel has created significant wage differentials for workers from low-income countries. Paradoxically, an important trigger for this process was also the worsening of Israel's security situation in 1993, following the Oslo accord between Israel and the Palestinians. Israel responded to the deterioration by closures, which sharply reduced the number of Palestinian workers in Israel, substituting them with migrant workers, mainly from Eastern Europe, South and Central America and the Far East.

The rapid inflow of migrant workers, especially since 1995, makes Israel an interesting case study for studying its effects on labor force participation, unemployment, the wage structure and gross earnings inequality. Given the bias in the government's permit policy in favor of unskilled workers, the paper emphasizes the effects on Israelis with weak economic endowments.

The research is based on a pooled micro data set, combined with data on the number of non-Israeli workers by economic branch. The micro-data is based on the Israeli income survey, including a host of personal characteristics, such as the individual's education level, labor market status and a model-based calculation of welfare benefits. The research also focuses on government policy issues, such as the effect of the replacement ratio on the rate of labor force participation. For individuals not in the labor force the replacement ratio is defined as the income support payment divided by the potential wage. The inflow of migrant workers affects the potential wage negatively and together with a relatively easy access to income support payments, this policy variable is found to contribute significantly to the explanation of the exclusion from the labor force and the worsening of gross earnings distribution in a statistically significant way. The effect of these variables on unemployment is less clear and the effects on the wage structure are varied, distinguishing between substitutive and complementary effects, depending on the individual's occupational and educational characteristics as well as on the time perspective.

The study also shows that the highly branch-specific migrant permit policy did not prevent the effects on wages from spreading throughout the economy, thus emphasizing the general-equilibrium nature of these effects.

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## 1. Introduction

This study analyses the effect of the massive inflow of low skilled migrant workers<sup>1</sup> into the Israeli labor market in the second half of the 1990s on the Israeli labor market. The migrant workers' presence in the labor market grew rapidly since 1993 and by 2001, non-Israeli workers<sup>2</sup> reached about 12 percent of the Israeli labor force – a proportion more than twice as high as the OECD average.<sup>3</sup>

This research studies the effect of the supply of non-Israeli workers on the Israeli labor market, emphasizing the effect on the low skilled and poorly educated among the working age population. We also study the relationship between the government's policy on migrant workers and on income support for people in the working age. The former affects the alternative wage of domestic low skilled workers and the latter affects their reservation wage. Therefore the combined effect is expected to have an important effect on the replacement ratio (reservation wage/alternative wage). The present study aims at understanding the influence of migration both on the participation rate and the rate of unemployment.

There is a vast literature on economic effects of migrant workers on the labor markets in the host countries and in the countries of emigration. One of the basic questions in many such studies is to what extent the migrant labor constitutes a substitute or a complement to domestic labor. A substitutive relationship is present when the increase in the supply of migrant workers reduces the price of the domestic production factor (*ceteris paribus*); a complementary relationship implies a rise in the price of domestic production factor. De New and Zimmermann (1994) have found a general and predominant drop in domestic wages, particularly for blue collar workers, and a slight increase in the salary of white collar employees. The empirical literature on the American economy is less clear. For domestic workers the relationship was mainly complementary (data for the 1970s).<sup>4</sup> The effect on working women has been

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<sup>1</sup> These are not to be confounded with the large wave of Jewish immigration mainly from the former Soviet Union and Ethiopia in the early 1990s, who are entitled to citizenship. However these “new immigrants” have strongly affected the Israeli labor market. Therefore they are included here as explanatory variables.

<sup>2</sup> Non-Israeli workers include migrant (i.e. foreign) workers and Palestinian workers, who reside in the territories occupied by Israel.

<sup>3</sup> The Annual Report, 2001, on “Trends in International Migration: Continuous reporting system on migration” reports on an average ratio of migrant workers of 5.3% for the OECD.

<sup>4</sup> See Borjas (1983), Baldwin and Grossman (1982), Gang and Rivera-Batiz (1994)

observed to be mainly substitutive.<sup>5</sup> Borjas emphasizes the effect of migration on the second and third generation.

The intensity of the relationship between the foreign and domestic production factors depends crucially on government policy. The US government for example, encourages, at least formally, highly skilled immigrants<sup>6</sup>, whereas the Israeli government accepts only low skilled migrant workers.<sup>7</sup>

In this paper we study the effects of the inflow of migrant workers on four issues:

- 1) the wage structure of Israeli workers (direct and indirect effects),
- 2) the probability of Israeli workers to be out of the labor force,
- 3) the probability to be employed (versus unemployed),
- 4) the effect on the distribution of gross earnings from work.

These effects are shown to depend (among other things) on the extent of the migration relatively to the working age population in the host economy, and - in the short run - on the distribution of the permits among economic sectors. Effects on unemployment and on the participation rate tend to be of permanent nature, particularly in the presence of hysteresis in the rate of unemployment. An interesting question in this respect is whether there exists a critical share of migrant workers that operates as a threshold for domestic workers to abandon that sector.

The basic conjecture is that the presence of non-Israeli workers is concentrated mainly in low wage industries, such as construction, agriculture or personal services. Inadequate implementation of labor laws, especially the minimum wage law, with respect to migrant workers, puts pressure on the wage rate in the sectors with a high ratio of migrant workers. Israelis with similar skills, who have to compete for workplaces in the low skill range, face low wages, whereas those, for whom migrant workers constitute a complementary production factor, experience an improvement in labor market outcomes. The relevant reservation wage in the short run is given by the level of unemployment benefits or income support payments.

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<sup>5</sup> See Bean et al. (1988) or Taylor et al. (1988).

<sup>6</sup> See Borjas (1992, p. 21).

<sup>7</sup> This was the case when, during the Hi tech boom of 1999/2000, Israeli Hi tech firms tried to convince the government without success to open the Israeli labor market to Indian computer specialists, who were ready to work at significantly lower wages than their Israeli counterparts. Of course, this does not

In general, the government's control over illegal immigration will be more difficult to achieve, the higher the wage differential between the source economies of migrant workers and the host economy, and the more open the host economy is toward the global economy and the weaker the enforcement efforts of labor laws, particularly concerning minimum wage and social benefits. A large proportion of illegal immigration tends to be accompanied by negative externalities, such as xenophobia<sup>8</sup>.

Israel's economy has been part of the general process of globalization, which gained impetus in the second half of the 1990s. The rapid convergence of the Israeli standard of living with that in Western countries has provided an important "pull factor", attracting migrant workers, similarly to the situation in the labor markets of Western economies. Poverty stricken countries all over the world have for long been a major source of migration. Furthermore, the collapse of labor markets in the Soviet bloc, reflected by high unemployment and insufficient social protection, has since 1989 created a powerful "push factor" for worker migration from Eastern Europe and Russia, mainly to Western Europe. Some of these population movements have also reached the Israeli labor market.

In the next section the relatively scarce data on non-Israeli workers is presented.<sup>9</sup> The methodology used is discussed in section 3. Section 4 presents the database. The results are reported in section 5. Conclusions are drawn at the end.

## **2. The Non-Israeli Workers**

The trigger for the immigration of foreign workers into the Israeli labor market was supplied by the worsening of Israel's security situation in 1993 after a wave of stabbing attacks by Palestinians, who opposed the Oslo peace efforts, that had just begun. Israel responded to this deterioration by closures, which eventually reduced the number of Palestinian workers in Israel after about 25 years of high and growing employment. Shortly thereafter the Israeli government yielded to heavy pressure by

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apply to the "new immigrants", many of whom are highly qualified. However, as mentioned above, they are not considered migrant workers, since they have an automatic right to Israeli citizenship.

<sup>8</sup> See for example Castles and Miller (1993) and Layton-Henry (1992). An illuminating counter-example of potential cultural benefits is provided in a lecture given by the Swiss author Max Frisch in his article "Ueberfremdung 1, Ueberfremdung 2" (1966), in which this emblem of Swiss culture reveals himself as a distant offspring of a foreign worker.

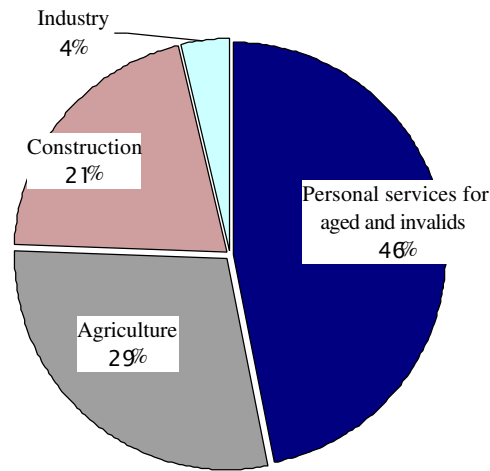
<sup>9</sup> See also Bar-Tsuri (1999).

lobbyists in the agricultural and construction sectors and allowed for the substitution of the locked out Palestinian workers by migrant workers, mainly from Eastern Europe, South America and the Far East. At first the permits were allocated to entrepreneurs in construction and farming by the official labor exchange. Later on, the labor exchange allowed the contractors' association and the farmers' association ("Tnu'at Hamoshavim") to intervene in the allocation process. This eventually increased the lobbying groups' influence on the decision about the number of permits.<sup>10</sup> In the last 4 years the government has also opened to migrant workers the occupation of personal care for the aged and invalids. Workers in this occupation are mainly recruited from the Philippines. These workers, while officially sanctioned, are being limited only by demand criteria for those services, and not by any government quota. Accordingly, this loophole constitutes an easy way to enter Israel with a work permit, only to move on to other jobs. This, of course, jeopardizes the concept of permit quotas. Unsurprisingly, in early 2002 this sector accounted for the highest share of permits (46 percent, see chart 1). Furthermore, a rapidly increasing number of illegal workers initially found their way into the labor market as tourists, becoming illegal workers, once the tourist visa expired.

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<sup>10</sup> See Bouhris commission (2001).

Chart 1: Distribution of Permits  
monthly average January to April 2002



total permits in April 2002 78819

Source: Official Labor exchange

**Table 1: Basic data about Non-Israeli workers**

Years	Work permits monthly averages	Employed Foreign workers	Foreign workers without permit	Foreign workers without permit/total workers	Employed Palestinians	Employed non-Israelis	Foreign workers/non-Israeli workers	Non-Israeli workers/Israelis in working age with 0-12 years of schooling
	thousands	thousands	thousands	percent	thousands	thousands	percent	percent
1990	n/a	3	n/a	n/a	108	110	2	6
1991	n/a	9	n/a	n/a	98	107	8	5
1992	n/a	17	n/a	n/a	116	132	13	6
1993	n/a	30	2	7	84	114	26	5
1994	n/a	52	11	21	70	122	42	6
1995	70	92	22	24	60	152	61	7
1996	95	137	43	31	58	196	70	9
1997	92	159	67	42	75	234	68	11
1998	80	164	84	51	107	270	61	12
1999	73	184	110	60	116	299	61	13
2000	72	214	142	67	98	312	69	14
2001	97	246	149	61	12	258	95	n/a

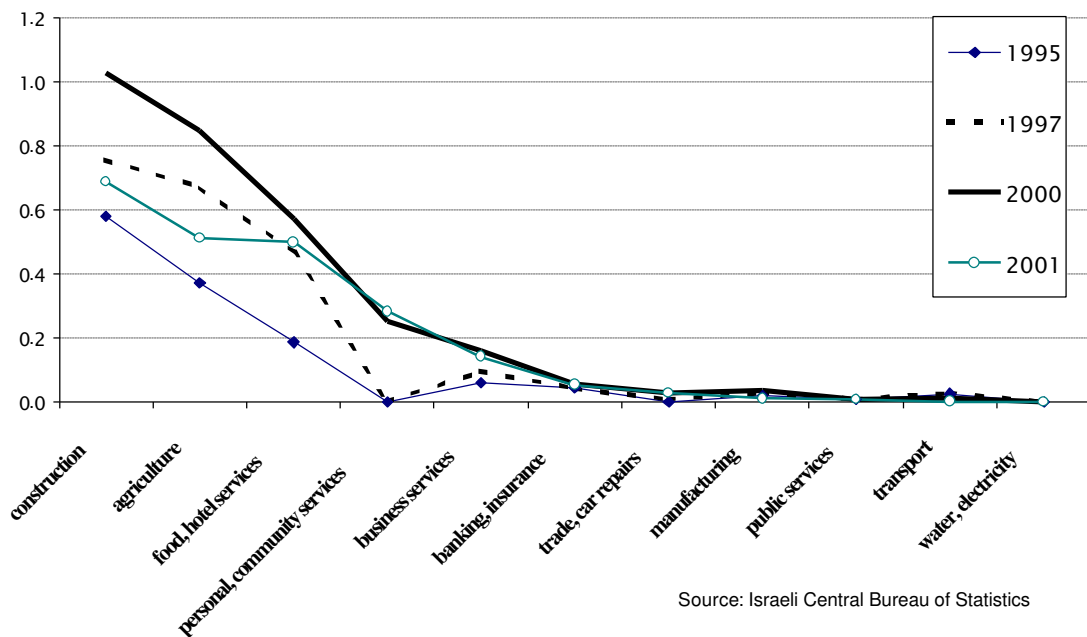
1 Sources: Labor exchange and Israeli Central Bureau of Statistics

2 The definition of unskilled workers has changed in 1995 thus rendering comparisons with earlier years difficult

The number of non-Israeli workers grew rapidly during the 1990s and peaked at more than 300,000 in the year 2000. The fall in 2001 was due to the Intifada, which caused a sharp drop in the number of Palestinians working in Israel. The share of foreigners among non-Israeli workers grew from 26 percent in 1993 to 95 percent in 2001 (see table 1).

The largest share of non-Israeli workers (henceforth “migrant-ratio”) can be found in construction (see chart 2). In the year 2000 their number slightly exceeded the employment of Israelis. In agriculture the number of non-Israelis was more than 80 percent of Israeli workers. In food and tourism services as well as in community and personal services (mainly in personal care for the aged and invalids) migrant-ratio began to increase after 1997. In all other economic branches their share has been negligible throughout the observation period.

**Chart 2: Share of Employed Non-Israelis to Israelis: 1995 to 2001**



The authorities lack a systematic knowledge on non-Israeli workers, such as personal characteristics, wages, hours of work etc. Their number and distribution among economic branches is estimated by the Israeli Central Bureau of Statistics (ICBS).

In this study we combine data from the ICBS annual income survey on Israelis both inside and outside the labor force with data on non-Israeli workers by economic branches. The distribution by branches is based on information from employers' insurance payments to the National Insurance Institute (NII). The ICBS then estimates the likelihood of a foreign entrant to Israel being a migrant worker by use of a model



based on (1) the entry date of persons who have not exited the country after the visa has expired and (2) their country of origin.<sup>11</sup>

An indirect and partial evidence on the extent of wage differentials between migrant domestic workers can be derived from internal statistics of the enforcement unit in the Ministry of Labor and Welfare.<sup>12</sup>

The enforcement unit audits a sample of varying size, reflecting about 0.2 to 2.4 percent of all non-Israeli workers.<sup>13</sup> In the years 1996 to 2000 audited employers, who were found to have paid wages below the minimum wage had to add about 7 percent to their wage payments to migrant workers in order to fulfill the minimum wage requirement. The shortfall was significantly higher than for all other population groups. The fact that the probability of migrant workers being underpaid grew from 24 percent of audits in 1996 to 80 percent in 2000 reflects a low and deteriorating compliance, mainly due to the neglect of penalties as a means of deterring employers. The lack of enforcement lowers the employer's wage cost of migrant workers and thus affects the comparable Israeli worker's competitiveness negatively.

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<sup>11</sup> The information about the trends in the distribution of tourists by country of origin, is used to calculate deviations from these trends. These deviations indicate an increase in migrant workers.

<sup>12</sup> For a detailed analysis of these statistics see Gottlieb (2000).

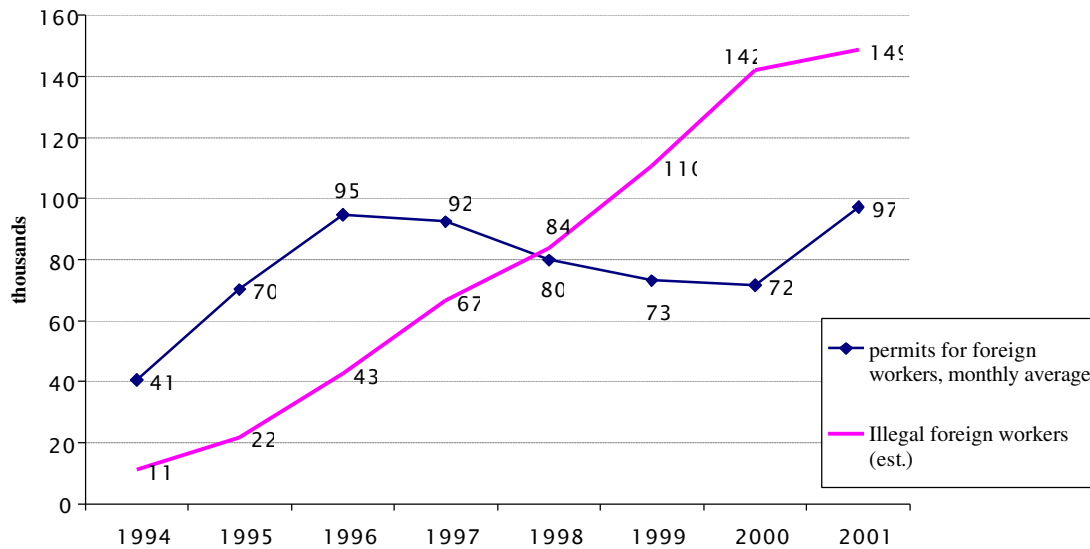
<sup>13</sup> The sampling procedure is based on investigation requests from the public and unsystematic initiatives by the Ministry, thus causing samples not to be sufficiently representative. A major flaw in the audit policy is that the enforcement unit does not report on any audited employers of Palestinian workers, since they are supposed to be paid through the official labor exchange.

**Table 2: The Enforcement of the Minimum Wage**

	1996	1997	1998	1999	2000	average 1996-2000
Payments due to shortfall below the minimum wage						
Migrants (men)	10.4%	9.6%	5.8%	8.8%	2.0%	7.3%
Israeli Arabs (men)	11.9%	1.0%	5.1%	1.6%	1.7%	4.3%
Jews (men)	1.0%	0.6%	10.8%	1.2%	1.8%	3.1%
Migrants (women)	0.0%	0.0%	0.0%	11.2%	3.6%	3.0%
Israeli Arabs (women)	0.7%	0.9%	5.7%	2.7%	5.2%	3.0%
Jews (women)	0.9%	0.8%	1.8%	1.7%	3.1%	1.6%
probability of getting less than minimum wage (assuming that the actual sample is representative)						
Migrants (men)	24.2%	54.6%	63.5%	57.4%	80.2%	56.0%
Israeli Arabs (men)	20.9%	1.8%	20.2%	17.2%	11.8%	14.4%
Jews (men)	6.1%	3.1%	5.9%	2.9%	10.4%	5.7%
Migrants (women)	13.0%	45.6%	0.0%	0.0%	0.0%	
Israeli Arabs (women)	27.5%	12.8%	36.9%	37.2%	41.1%	31.1%
Jews (women)	8.9%	6.4%	3.9%	12.0%	43.4%	14.9%

Source: Enforcement reports for the years 1996-2000. The Unit for the enforcement of labor laws, Ministry of Labor and Welfare, Israel.  
Calculations: Daniel Gottlieb, Bank of Israel

The number of illegal foreign workers has been growing rapidly during the observation period. In 1995 about 25 percent of foreigners were illegally employed; by 1998 the number of legal and illegal workers was about equal and by the year 2000 illegal workers were twice as many as legal workers (see chart 3).

**Chart 3: Legal and Illegal Migrant Workers**

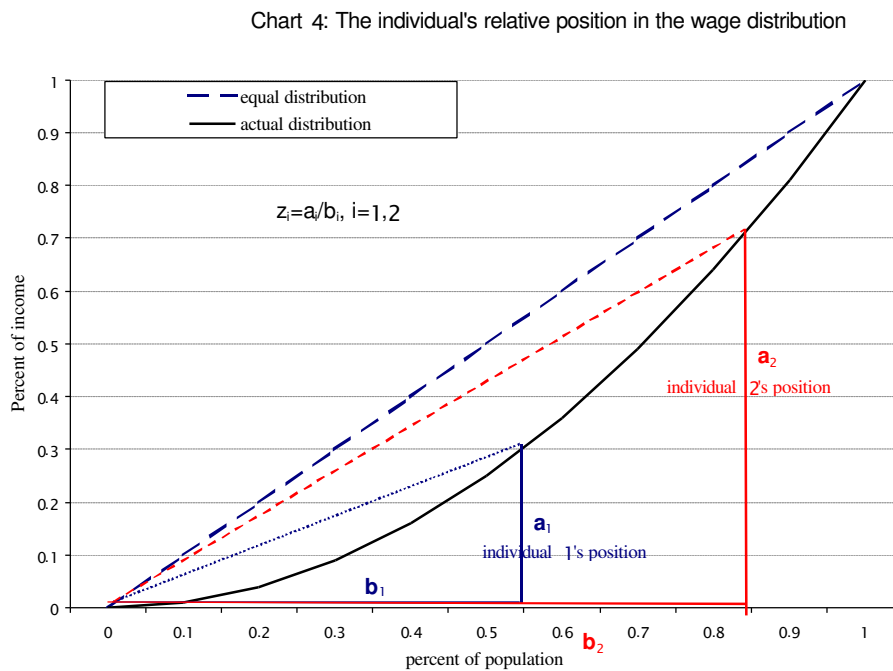
### 3. Methodology

(i) The effect of the inflow of migrant workers on the Israeli wage structure is approached in two ways:

One avenue is to examine what variables determine individual  $i$ 's position ( $z_i$ ) on a Lorenz curve of wage inequality, where

$$z_i = S\% \text{ of income (up to individual } i) / S\% \text{ of wage-earners (up to individual } i) \quad (1)$$

The position  $z_i$  is unique for every individual  $i=1\dots n$ . It is given by the average slope  $a_i/b_i$  and rises monotonically in a given year.<sup>14</sup>



Typically the individual's position in the wage structure depends on personal characteristics, such as gender, age, the amount and quality of schooling, work experience; his or her occupation, the economic branch of employment, and so forth. The question of interest here is to what extent the individual's exposure to competition from non-Israeli workers affects his relative position in the wage structure:

$$z_{i,t,b,o,r} = z(x_{i,t,b,o}, u_t, D_t, f_{t,b}) \quad i=0\dots n, \quad (2)$$

where  $i=1\dots n$  individuals,  $t$  is the time (year, quarter) of the survey response,  $b$  is the economic branch in which the individual is occupied and  $o$  is the person's occupation.  $x$

<sup>14</sup> For this to be true for all observations in a given year, one needs to assume strict convexity of the Lorenz curve. However, increasing inequality makes the distribution more convex.

denotes a vector of individual characteristics, such as age, gender, religion, schooling, marital status and work experience,  $u_t$  is the unemployment rate at the time (quarter, year),  $j$  denotes the lag in years (0,1) from the survey response,  $D_t$  is an aggregate demand variable,  $f_{t,b}$  is the ratio of non-Israeli workers to Israeli workers in the economic branch (migrant ratio), in which the individual works, in the year of the survey response. The sign in parentheses above the equation indicates the expected direction of the effect. An increase in the migrant-ratio has a negative effect if the individual's position in the wage distribution deteriorates and a positive one otherwise. Another avenue is to investigate the partial effect of the inflow of non-Israeli workers on real wages. Here the log of the real wage is regressed on the whole sample and various sub-samples, separately for the main industries and occupations:

$$\log(w_{i,t,b,o}) = w(x_{i,t,b,o}, D_t, u_{t-j}, w_t, f_t, f_{t,b}), \quad (3)$$

where the suffix  $j$  denotes the lag in years (0,1) from the survey response,  $w$  is the average wage rate, indicating a general productivity increase, and the other variables and suffices are as indicated above. The effect of migrant workers' ratio depends of course on whether the migrants' effect is of substitutive or complementary. This question will be addressed empirically.<sup>15</sup>

(ii) The probability of Israeli workers to drop out of (or remain outside) the labor force is tackled by a typical probability function of the type:

$$p_{i,t,o,r} = p(x_{i,t,o}, u_t, D_t, f_t, is_{i,t}/w^*_{i,t,o}, ch_{i,t}), \quad i=0\dots n, \quad (4)$$

where  $p$  is the probability to be outside the labor force,  $is_{i,t}/w^*_{i,t,o}$  denotes the replacement ratio with the income support ( $is$ ) in the numerator and the alternative wage rate ( $w^*$ ) in the denominator.

The income support variable is calculated by use of a statutory model, based on the National Insurance law, combined with the relevant personal characteristics, of course including the gross earnings from work, known from the income survey.<sup>16</sup>

<sup>15</sup> Furthermore there might be a case of simultaneity, since a high domestic wage rate tends to increase the incentive for migration.

<sup>16</sup> For example, the income support differs between married and unmarried, couples with or without children, by age of the recipients etc.

The alternative wage rate is calculated as the potential wage rate, an individual would earn if he or she were employed, or the actual wage rate in case the person is working:

$$w_{i,t,b,o}^* = w_{i,t,b,o} - dH \quad (5)$$

If the person is outside the labor force,  $w$  is a calculated forecast using those parameters from the basic wage regression on wage earners, which correspond to the individual's characteristics. A certain discount ( $dH$ ) is deducted in order to account for the depreciation of this individual's human capital due to absence from the labor force or unemployment.<sup>17</sup>

$ch_{i,t}$  indicates the number of children in the household and the signs in brackets are as indicated above.

The direction of the effect, indicated in parentheses above each variable, corresponds to the directions given in Bowen and Finegan (1969).<sup>18</sup> Like in the previous equations, the effect of migrant workers' ratio depends of course on whether the migrants' effect is of substitutive ("losers") or complementary ("winners").

(iii) The probability to be employed (versus unemployed) is of similar nature as equation (4), except that here the sample consists only of those in the labor force. This data set includes also the economic branch (suffix  $b$ ), in which the individual is employed, or in which he or she was employed before becoming unemployed.

(iv) Migrant workers influence also inequality in market earnings from work. In this section it is important to include also the unemployed and the people outside the labor force, since, as discussed above, unemployment and the exit out of the labor force may well be directly caused by migration. Accordingly, people, who are not working, have an (imputed) labor income of zero. The market earnings of interest here are of course only wages and earnings from self-employment. The earnings from capital and other incomes are excluded, since they are unlikely to be influenced by migration.<sup>19</sup>

Migration has direct and indirect effects on the distribution of market incomes: The direct effect works through the substitution or complementarity effect, as mentioned

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<sup>17</sup> Given the ignorance concerning the duration of the individual's absence from the labor force or unemployment, an arbitrary rate  $d$  of 5 and 15 percent respectively is assumed here.

<sup>18</sup> They divide the variables into the following groups: tastes, substitution effects of market earnings and non-market earnings, the latter including mainly unemployment benefits and income support; see op. cit. p. 20-21.

above. The indirect effect works through the replacement ratio: If migration is relatively homogenous with respect to the migrants' skill level, this creates pressure on the alternative wage of domestic workers with similar skill levels in the migration-intensive economic branches. The statutory linkage of welfare benefits to average wage increases but not decreases in Israel further raises the replacement ratio, thereby lowering the incentive to remain in (or join) employment. However, there may also be an employment-enhancing effect: Increased profits, due to low wage costs (and high productivity) of migrant workers create investment opportunities and jobs, particularly for those with complementary skills to those of the migrants.

Equations 2 and 3 are estimated by ordinary least squares and for equation 4 the logistic regression model is used. In the regression on labor force participation, the value for non-participation is 1 with probability  $p$ , and "0" otherwise.

$$P[y=1|x] = p(\mathbf{x}) \quad (6)$$

The Logit is given by equation

$$g(\mathbf{x}) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n, \quad (7)$$

Then the probability of event "1" can be written as

$$p(\mathbf{x}) = \frac{\exp[g(\mathbf{x})]}{1 + \exp[g(\mathbf{x})]} \quad (8)$$

and the

$$\text{odds ratio} = \frac{p(1) / [1 - p(1)]}{p(0) / [1 - p(0)]} \quad (9)$$

In the regression on the employment-unemployment decision, "1" denotes the employed and "0" the unemployed.

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<sup>19</sup> Income from welfare and unemployment benefits are also excluded since we are interested in the effect on market earnings.

#### 4. The Data

Detailed data on the migrant ratio exist only from 1995 onward. At the time of writing the last available income survey was for the year 2000. Therefore, the observation period was set at 1995 to 2000.<sup>20</sup>

The vector includes three types of variables for each individual:

- (1) personal characteristics: household number, age, gender, number of children (est.), labor market status, occupation, economic branch, wage, spouse's wage, etc.,
- (2) macroeconomic variables: rate of unemployment, aggregate demand, the average wage (all quarterly data);.
- (3) economic policy variables, such as migrant ratio (annual data) and the replacement ratio (on a quarterly basis).

The data on income support are calculated, based on the National insurance law, and based on the individual's and his or her household's characteristics in the data set, thus reflecting only an approximation to the actual level of income support.<sup>21</sup>

The income survey is carried out 4 times a year and published on an annual basis. Since this allows for quarterly distinction of each observation within the year, the attached macroeconomic variables are also on a quarterly basis, which conveniently adds variability to the data. The size of the income survey has been growing over the years. All in all, the pooled data set for the whole observation period includes about 125000 observations. The population analyzed includes men aged between 15 and 64 and women between 15 and 59 (in order to exclude retirement age).

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<sup>20</sup> In order to assess the impact effect of government policy of migrant workers, it would have been preferable to include also the years 1992 to 1994, during which the government's policy concerning foreign workers was radically changed, but due to the lack of data this was not possible.

<sup>21</sup> Unfortunately, the actual income support cannot be drawn from actual data, since the income survey reports only on the sum total of a host of transfer payments.

## 5. Empirical Results

This section discusses the results from the regressions on the wage structure (tables 3 and 4), on real wages (tables 5, 6 and 7), on the probability to be out of the labor force (tables 8 and 9) and on the probability to be employed versus unemployed. The results on market-income (from labor) inequality (table 10) conclude this section.

### 5.1 The Effect of Migrant Workers on the Wage Structure

The presence of non-Israeli workers importantly affects the economy's wage structure. Their distribution is concentrated in specific branches, mostly in low skills. In the short run we therefore expect a negative impact on the wages of Israeli low skilled workers due to the substitutive relationship. We expect this impact effect to grow with the intensity of the migrant ratio. We further expect to find a positive impact effect in occupations, which are considered complementary to low skilled work, e.g. managers at various levels.

Following are the main conclusions from tables 3 and 4:

As a by-product, this study confirms the result, known from other studies, that education pays: it tends to improve the rank in the wage distribution.<sup>22</sup> This is indicated by the variable of the "last frequented school" and by the "number of school-years". In all regressions the number of school-years appears positively as rank-increasing. Interestingly, the highest marginal reward is found in the regression for Arab women. Studies in a Yeshiva<sup>23</sup> worsen the wage position of Jewish men. The same is true for Secondary school and for technically oriented High Schools. Similar results hold for Jewish women. Studying at an academic institution raises the rank in the general regression, for men, while for women (both Jewish and non-Jewish) and for the Arab Israelis the coefficient is positive, though not significant. Some of the educational institutions are significant at the general level (regressions 1 and 2 in table 3) but not so in most of the detailed regressions by nationality and gender. These results are consistent with the commonly held belief that the high-tech sector is not sufficiently open to the highly-educated Arab population. This result suggests that

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<sup>22</sup> For a fuller treatment of this issue in Israel see for example Frisch and Mealem (1999).



remuneration does not function sufficiently well as an incentive for human capital formation in the Israeli Arab community.

Men tend to achieve a higher rank in the wage distribution than women. This result confirms many labor market studies in Israel and abroad. The rank of Jewish men and women tends to exceed that of non-Jews respectively and to a similar degree.<sup>24</sup> For women (both Arab and Jewish) the wage position shows a slight negative trend over time. Non-Jewish wage-earners do not exhibit a statistically significant time trend.

The marital status: Marriage favors the rank in the Jewish population. Divorce and the single status lower the rank of Arab women.

The type of occupation is an important determinant of the wage rank. Occupation in academia or in the free professions is particularly rewarding for all population groups. A possible policy implication is therefore that wage differentials for disadvantaged Arab women could be effectively reduced in favor of that group by subsidizing academic studies. Managerial activity raises the rank in all populations, except for Arab women. All other occupations are either negative or inconclusive. Lack of skills enters the various regressions significantly with substantially negative coefficients. From casual observation we know that employers prefer to expose the higher skilled to job training. In order to reduce wage differentials the government should therefore probably aim at improving human capital among the unskilled.

Experience is found to improve the position on the Lorenz curve for wage earners. Unemployment worsens the position. In other words, this means that unemployment tends to shift the whole Lorenz curve away from equality. The regressions also endorse the well-known result, that immigration<sup>25</sup> is accompanied with an initial fall in the immigrants' relative wages.

The influence of non-Israeli workers on the wage distribution:

Let us first clarify the variables. The migrant intensity for each employed person appears in his vector with the relevant year index. This number is then multiplied by a

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<sup>23</sup> A school of Jewish studies beyond High School.

<sup>24</sup> The income survey does not distinguish between Muslim, Christian Arabs, Druze and other (very small) minorities, e.g. other Christians. When we use the term Arab, this includes all non-Jews in the sample.

<sup>25</sup> Here immigration stands for Jewish immigration, which is accompanied with full citizenship, as distinct from the migration of foreign workers.

dummy variable, defined as following: A value of 1 for individuals with less than 12 years of schooling or low skills, and a value of 0 otherwise. Those with a positive value are called “weak workers”. Those, who are not considered weak, will have a zero in their migrant intensity variable. Strong workers are defined as workers with either more than 12 years of schooling or with an academic, managerial or professional occupation. This variable thus combines the migrant intensity with a variable that indicates the individual’s respective economic weakness or strength. Since the migrant intensity is defined separately for the major economic branches, we obtain separate variables for each economic branch. It was found that the migrant intensity weakened the wage rank of the “weak” while strengthening the rank of the “strong”. The directions of the effect were consistent in regressions 1 to 3 (mainly in regression 1) except for construction and trade. In the various population groups the results are statistically less significant. The signs of the coefficient are as expected, except for Arab women. This insignificance may be due to the low number of observations, which is probably due to the low participation rate of this population group. This result implies that the entrance of non-Israeli workers into a limited number of economic branches of the labor market caused a deterioration of the earnings capacity of low skilled and poorly educated workers, not only in the economic branches that were directly involved (such as agriculture), but also in industry and business services. However, at the same time it improved the rank of workers with strong economic attributes.

Two conclusions are worth noting:

- (1) The results are significant also in branches with low migrant intensity, suggesting the presence of a general equilibrium effect, which spreads beyond the directly affected branches.
- (2) The effect of non-Israeli workers on the wage structure was not uniform. Economically weak workers suffered a wage loss, while the economically stronger workers enjoyed a wage increase.

**Table 3: The Determinants of the the Individual's Rank in the wage structure**

Dependent variable: The rank of the Israeli individual's gross wage on the (yearly) Lorenz curve of wage earners- 1999 to 2000						
OLS	Regression 1: general		Regression 2: men		Regression 3: women	
Explanatory Variable	Parameter Estimate	Prob> T	Parameter Estimate	Prob> T	Parameter Estimate	Prob> T
Intercept	0.4489	0.0001	0.4867	0.0001	0.4642	0.0001
Year	-0.0001	0.0001	0.0000	0.0760 *	-0.0001	0.0001
Gender: m=1, f=0	0.0549	0.0001				
Jewish =1, Non-Jewish =0	0.0367	0.0001	0.0373	0.0001	0.0347	0.0001
Year 1995	-0.0102	0.0027	-0.0103	0.0281	-0.0114	0.0213
Year 1996	-0.0133	0.0001	-0.0109	0.0194	-0.0165	0.0008
Electricity	0.1033	0.0001	0.1063	0.0001	0.0865	0.0001
Public sector	0.0413	0.0001	0.0438	0.0001	0.0361	0.0001
Education	0.0070	0.0137	0.0024	0.6013 *	0.0072	0.0746 *
Health	0.0005	0.8602 *	0.0004	0.9419 *	0.0020	0.6260 *
Community	0.0096	0.0052	0.0007	0.8854 *	0.0224	0.0001
Households	0.0194	0.0001	0.0384	0.0001	0.0132	0.0082
Transportation	0.0443	0.0001	0.0371	0.0001	0.0589	0.0001
Banking and Insurance	0.0868	0.0001	0.0974	0.0001	0.0816	0.0001
Other	0.0494	0.0001	0.0518	0.0001	0.0659	0.0008
Primary School to 7th grade	-0.0365	0.0001	-0.0350	0.0002	-0.0385	0.0011
Technical high school	-0.0213	0.0043	-0.0163	0.0877 *	-0.0347	0.0033
High school	-0.0138	0.0636 *	-0.0120	0.2065 *	-0.0189	0.1093 *
Yeshiva	-0.1127	0.0001	-0.1059	0.0001	0.0412	0.3763 *
Post-High school	0.0079	0.3058 *	0.0064	0.5197 *	0.0030	0.8058 *
Academic Institution	0.0292	0.0002	0.0270	0.0087	0.0242	0.0535 *
Other school	-0.0016	0.8515 *	-0.0054	0.6399 *	-0.0043	0.7492 *
Years of schooling	0.0094	0.0001	0.0094	0.0001	0.0094	0.0001
Married	0.0357	0.0001	0.0441	0.0001	0.0272	0.0004
Divorced	0.0023	0.7272 *	0.0148	0.1686 *	-0.0069	0.3955 *
Widow(er)	0.0058	0.4614 *	0.0301	0.0412	-0.0018	0.8479 *
Single	0.0053	0.3929 *	0.0178	0.0722 *	-0.0043	0.5838 *
Academic occupation	0.0711	0.0001	0.0681	0.0001	0.0835	0.0001
Free profession	0.0374	0.0001	0.0282	0.0001	0.0492	0.0001
Manager	0.0708	0.0001	0.0693	0.0001	0.0842	0.0001
clerk	-0.0300	0.0001	-0.0314	0.0001	-0.0238	0.0016
Skilled in services	-0.0598	0.0001	-0.0410	0.0001	-0.0669	0.0001
Skilled in agriculture	-0.0792	0.0001	-0.0841	0.0001	-0.0519	0.0141
Skilled in manufacturing	-0.0543	0.0001	-0.0472	0.0001	-0.0891	0.0001
Unskilled	-0.0840	0.0001	-0.0832	0.0001	-0.0739	0.0001
Work experience	0.0094	0.0001	0.0101	0.0001	0.0095	0.0001
Work experience ( squared )	-0.0001	0.0001	-0.0001	0.0001	-0.0001	0.0001
Unemployment rate	-2.7503	0.0001	-2.8727	0.0001	-2.7061	0.0001
New immigrant in the 90s	-0.0252	0.0001	-0.0219	0.0001	-0.0208	0.0001
<b>Migrant intensity : "economically weak " persons</b>						
Manufacturing	-0.1887	0.0057	-0.2318	0.0049	-0.3232	0.0099
Construction	0.0038	0.3142 *	-0.0004	0.9261 *	0.0237	0.2090 *
Agriculture	-0.0169	0.0012	-0.0158	0.0101	-0.0244	0.0145
Trade	-0.1021	0.4661 *	-0.2832	0.1014 *	-0.0713	0.7700 *
Food and tourism	-0.0126	0.1288 *	-0.0203	0.0592 *	-0.0173	0.1830 *
Business services	-0.1434	0.0001	-0.2709	0.0001	0.0035	0.9314 *
<b>Migrant intensity : "economically strong " persons</b>						
Manufacturing	0.4517	0.0001	0.6093	0.0001	0.5190	0.0001
Construction	0.0140	0.0001	0.0145	0.0002	0.0120	0.1284 *
Agriculture	0.0173	0.0022	0.0196	0.0035	0.0173	0.1003 *
Trade	0.1806	0.1017 *	0.2451	0.0946 *	0.1197	0.4786 *
Food and tourism	0.0007	0.9106 *	-0.0276	0.0018	0.0291	0.0030
Business services	0.1350	0.0001	0.1681	0.0001	0.1292	0.0001
Number of Observations	64736		35258		29477	
Adjusted R 2	0.443		0.448		0.430	

\*indicates insignificant coefficients at Pr&gt;0.05

**Table 4: The Determinants of the the Individual's Rank in the Wage Structure**

Dependent variable : The rank of the Israeli individual's gross wage on the (yearly) Lorenz curve of wage earners - 1995to 2000								
OLS	Regression 4: Jewish men		Regression 5: Arab men		Regression 6: Jewish women		Regression 7: Arab women	
Explanatory Variable	Parameter Estimate	Prob> T	Parameter Estimate	Prob> T	Parameter Estimate	Prob> T	Parameter Estimate	Prob> T
Intercept	0.5248	0.0001	0.483382	0.0001	0.4961	0.0001	0.4523	0.0001
Year	0.0000	0.0336	6.319E-05	0.0917 *	-0.0001	0.0001	-0.0002	0.0017
Gender: m=1, f=0								
Jewish=1, Non-Jewish=0								
Year 1995	-0.0094	0.0842 *	-0.013377	0.1212 *	-0.0091	0.0787 *	-0.0178	0.2935 *
Year 1996	-0.0115	0.0296	-0.006297	0.4926 *	-0.0161	0.0016	-0.0142	0.4365 *
Electricity	0.1082	0.0001	0.036225	0.1784 *	0.0863	0.0001	0.1026	0.4072 *
Public sector	0.0412	0.0001	0.075799	0.0001	0.0358	0.0001	0.0653	0.0002
Education	-0.0098	0.058 *	0.097383	0.0001	0.0067	0.1107 *	0.0343	0.0139
Health	-0.0029	0.591 *	0.04654	0.0001	0.0025	0.5447 *	0.0168	0.2204 *
Community	0.0020	0.7029 *	0.0086	0.4093 *	0.0234	0.0001	0.0193	0.3425 *
Households	0.0412	0.0001	0.027682	0.0311	0.0127	0.0149	0.0124	0.4823 *
Transportation	0.0408	0.0001	0.02503	0.0016	0.0607	0.0001	-0.0029	0.9130 *
Banking and Insurance	0.0945	0.0001	0.145331	0.0001	0.0828	0.0001	0.0205	0.4343 *
Other	0.0499	0.0001	0.087705	0.0217	0.0622	0.0018	0.1464	0.2375 *
Primary School to 7th grade	-0.0419	0.0003	-0.011885	0.3894 *	-0.0378	0.0026	0.0005	0.9905 *
Technical high school	-0.0232	0.0478	-0.001483	0.9218 *	-0.0386	0.0018	0.0309	0.4712 *
High school	-0.0163	0.1644 *	-0.001903	0.8970 *	-0.0198	0.1089 *	-0.0016	0.9701 *
Yeshiva	-0.1061	0.0001	0.134603	0.0940 *	0.0474	0.3375 *	-0.0033	0.9803 *
Post-High school	0.0011	0.9311 *	0.00404	0.8060 *	0.0009	0.9445 *	0.0128	0.7763 *
Academic Institution	0.0237	0.0579 *	0.017426	0.3169 *	0.0226	0.0836 *	0.0329	0.4838 *
Other school	-0.0120	0.3763 *	0.014338	0.5803 *	-0.0072	0.6038 *	0.0249	0.6562 *
Years of schooling	0.0092	0.0001	0.009392	0.0001	0.0093	0.0001	0.0131	0.0001
Married	0.0443	0.0001	0.049897	0.1604 *	0.0305	0.0001	-0.0224	0.4158 *
Divorced	0.0118	0.2985 *	0.062908	0.1330 *	-0.0026	0.7605 *	-0.0746	0.0172
Widow(er)	0.0274	0.0798 *	0.074741	0.1599 *	0.0022	0.8207 *	-0.0593	0.0925 *
Single	0.0134	0.2044 *	0.030818	0.3884 *	0.0050	0.5411 *	-0.0934	0.0008
Academic occupation	0.0664	0.0001	0.079489	0.0001	0.0810	0.0001	0.1040	0.0100
Free profession	0.0260	0.0001	0.034979	0.0132	0.0455	0.0001	0.0817	0.0346
Manager	0.0652	0.0001	0.091849	0.0001	0.0813	0.0001	0.0826	0.0997 *
clerk	-0.0330	0.0001	-0.014337	0.2806 *	-0.0255	0.0010	-0.0219	0.5650 *
Skilled in services	-0.0423	0.0001	-0.019128	0.1130 *	-0.0705	0.0001	-0.0251	0.5057 *
Skilled in agriculture	-0.0840	0.0001	-0.06804	0.0005	-0.0472	0.0462	-0.0159	0.7777 *
Skilled in manufacturing	-0.0491	0.0001	-0.020341	0.0790 *	-0.0875	0.0001	-0.0484	0.2087 *
Unskilled	-0.0864	0.0001	-0.062246	0.0001	-0.0743	0.0001	-0.0615	0.1012 *
Work experience	0.0109	0.0001	0.006215	0.0001	0.0101	0.0001	0.0035	0.0010
Work experience(squared)	-0.0001	0.0001	-6.65E-05	0.0001	-0.0002	0.0001	0.0000	0.9305 *
Unemployment rate	-2.8220	0.0001	-3.090418	0.0001	-2.7335	0.0001	-2.3260	0.0069
New immigrant in the 90s	-0.0206	0.0001	-0.002342	0.7718 *	-0.0220	0.0001	-0.0135	0.2420 *
<b>Migrant intensity "economically weak" persons</b>								
Manufacturing	-0.2655	0.0054	0.065105	0.6873 *	-0.2936	0.0309	0.5470	0.1068 *
Construction	-0.0032	0.5839 *	0.006624	0.2054 *	0.0045	0.8259 *	0.1388	0.0021
Agriculture	-0.0124	0.1415 *	-0.017598	0.0374	-0.0265	0.0264	0.0015	0.9377 *
Trade	-0.2462	0.2431 *	-0.047722	0.8657 *	-0.3580	0.1645 *	2.3574	0.0014
Food and tourism	-0.0255	0.0597 *	-0.004288	0.7898 *	-0.0152	0.2686 *	-0.0180	0.6469 *
Business services	-0.2906	0.0001	-0.04296	0.5814 *	-0.0037	0.9310 *	0.0813	0.5355 *
<b>Migrant intensity "economically strong" persons</b>								
Manufacturing	0.6163	0.0001	0.362113	0.0552 *	0.5641	0.0001	-0.5121	0.2327 *
Construction	0.0169	0.0003	0.007824	0.2365 *	0.0147	0.0742 *	-0.0172	0.5286 *
Agriculture	0.0192	0.0142	0.024588	0.0371	0.0173	0.1266 *	0.0054	0.8550 *
Trade	0.2537	0.1334 *	0.218215	0.4408 *	0.2449	0.1642 *	-1.0415	0.0809 *
Food and tourism	-0.0267	0.0082	-0.003672	0.8366 *	0.0292	0.0039	0.0254	0.5645 *
Business services	0.1811	0.0001	0.045627	0.4895 *	0.1443	0.0001	-0.1789	0.1000 *
Number of Observations	28870		6387		27514		1962	
Adjusted R2	0.422		0.400		0.417		0.491	

## 5.2 The Effect of Migrant Workers on Real Wages

In order to investigate which effect dominates - substitution or complementarity - we regress real wages on various population groups by economic branches (tables 5 and 6) and by occupations (table 7). The regressions, on which tables 5 and 6 are based, include - besides migrant intensity - the usual variables (gender, religion, experience, number of school-years, other family members' income, marital status and occupation), which are not shown here<sup>26</sup>. Each cell in table 5 reports on the direction of the effect of the migrant intensity variable in the regression based on the population group indicated in the first column of the corresponding row in the table.

Migrant intensity differs considerably between the various branches. Nevertheless, judging from the regressions in table 5, we find that in most of the branches the relationship is complementary in the sense that an increase in migrant intensity raises real wages. In construction – a highly migrant intensive branch, the effect is insignificant, while in some of the regressions of agriculture the complementarity parameter is statistically significant. In business services, food and tourism and in community services (which include personal care for the aged and invalids), sectors that have experienced increasing migrant intensity, complementarity is also the dominant effect. The only sector in which substitution dominates, is industry, where migrant intensity has been low.

Table 6 differs from table 5 only by the addition of a one-year lag for migrant intensity. The result is a further weakening of statistical significance and a reversal of the negative coefficient (which becomes insignificant) in industry. Judging on the basis of tables 5 and 6 then, would hint at a relatively beneficial influence from migration on real wages, which to some extent contradicts the results from tables 3 and 4. However, the nature of the effect becomes clearer in table 7.<sup>27</sup> We find that the lower are the professional requirements of the occupation, the more the effects become negative (and statistically significant). The economically weakest persons (unskilled workers) are among the losers in practically all branches, whereas for managers and academics, the effect is more ambiguous.

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<sup>26</sup> Available upon request from the author

<sup>27</sup> Each row represents a regression, which includes - besides migrant intensity – variables, such as gender, religion, experience, number of school-years, other family members' income, marital status and economic branches, which are not shown here.

**Table 5: The Direction of the Partial Effect of Migrant Workers on Israeli Real Wages 1)**

by Economic Branch

		Construction	Agriculture	Business services	Food and Tourism	Community services	Industry
1	General	** <sub>-</sub>	+	+	+	+	-
2	General, age 45+	** <sub>-</sub>	+	+	+	+	-
3	General, age 25-44	** <sub>+</sub>	** <sub>+</sub>	+	** <sub>+</sub>	+	-
4	Men	** <sub>-</sub>	+	+	+	+	-
5	Men, age 45+	* <sub>-</sub>	+	+	+	+	-
6	Men, age 25-44	** <sub>+</sub>	** <sub>+</sub>	+	** <sub>+</sub>	+	-
7	Women	** <sub>+</sub>	+	+	+	+	-
8	Women, age 45+	** <sub>-</sub>	#N/A	+	* <sub>+</sub>	+	-
9	Women, age 25-44	** <sub>-</sub>	#N/A	+	#N/A	+	-
10	Jewish Men	** <sub>-</sub>	* <sub>+</sub>	+	+	+	-
11	Jewish Men, age 45+	-	+	+	+	+	-
12	Jewish Men, age 25-44	** <sub>+</sub>	** <sub>+</sub>	+	** <sub>+</sub>	+	-
13	Arab Men	* <sub>+</sub>	+	* <sub>+</sub>	** <sub>+</sub>	** <sub>+</sub>	* <sub>-</sub>
14	Arab Men, age 45+	** <sub>+</sub>	** <sub>+</sub>	** <sub>+</sub>	** <sub>-</sub>	** <sub>+</sub>	** <sub>-</sub>
15	Arab Men, age 25-44	** <sub>+</sub>	** <sub>-</sub>	* <sub>+</sub>	** <sub>+</sub>	** <sub>+</sub>	-
16	Jewish Women	** <sub>+</sub>	#N/A	+	+	+	* <sub>-</sub>
17	Jewish Women, age 45+	#N/A	#N/A	+	+	+	** <sub>-</sub>
18	Jewish Women, age 25-44	** <sub>-</sub>	#N/A	+	** <sub>+</sub>	+	-
19	Arab Women	#N/A	#N/A	+	#N/A	#N/A	-
20	Arab Women, age 45+	#N/A	#N/A	* <sub>-</sub>	#N/A	#N/A	** <sub>-</sub>
21	Arab Women, age 25-44	#N/A	#N/A	+	** <sub>+</sub>	#N/A	** <sub>-</sub>

1) The sign indicates the direction of the effect No superfix - implies a 95% or higher statistical significance;

\* indicates statistical significance at 90-95 percent;

\*\* indicates that the parameter is not statistically significant

**Table 6: The Direction of the Partial Effect of Migrant Workers on Israeli Real Wages 1)**

by economic branch, including one lag

		Agriculture	Business services	Food and Tourism	Construction	Industry
		t-1,t	t-1,t	t-1,t	t-1,t	t-1,t
1	General	-,+	+,+	+,+	**-, -	+,**-
2	General, age 45+	*-, +	#N/A	#N/A	#N/A	#N/A
3	General, age 25-44	-, **+	#N/A	#N/A	#N/A	#N/A
4	Men	-, +	+,**+	+,+	**-, -	+,**-
5	Men, age 45+	**-, +	#N/A	#N/A	#N/A	#N/A
6	Men, age 25-44	**-, **+	#N/A	#N/A	#N/A	#N/A
7	Women	-, +	+,**+	**-, +	**-,**-	+,**-
8	Women, age 45+	#N/A	#N/A	#N/A	#N/A	#N/A
9	Women, age 25-44	#N/A	#N/A	#N/A	#N/A	#N/A
10	Jewish Men	**-, +	+,**+	**+, **+	**-, -	+,**-
11	Jewish Men, age 45+	, +	#N/A	#N/A	**-, -	#N/A
12	Jewish Men, age 25-44	**-, **+	#N/A	#N/A	#N/A	#N/A
13	Arab Men	**-, **+	**+, **+	+, **+	**-,**-	+,**-
14	Arab Men, age 45+	#N/A	#N/A	#N/A	**-,**-	#N/A
15	Arab Men, age 25-44	#N/A	#N/A	#N/A	#N/A	#N/A
16	Jewish Women	#N/A	+,**+	**-, +	**-,**-	+,**-
17	Jewish Women, age 45+	#N/A	#N/A	#N/A	#N/A	#N/A
18	Jewish Women, age 25-44	#N/A	#N/A	#N/A	#N/A	#N/A
19	Arab Women	#N/A	+,**+	#N/A	#N/A	+,**-
20	Arab Women, age 45+	#N/A	#N/A	#N/A	#N/A	#N/A
21	Arab Women, age 25-44	#N/A	#N/A	#N/A	#N/A	#N/A

- 1) The sign indicates the direction of the effect . No superfix - implies a 95% or higher statistical significance;  
 \* indicates statistical significance at 90-95percent;  
 \*\* indicates that the parameter is not statistically significant .

In a forthcoming study, using the present data base Cohen (2002) extends the results of table 6, by using a variable of “economically weak” and “economically strong” workers, as developed in tables 3 and 4. He finds, that the “economically weak” workers’ wages experienced a significant reduction, while the opposite was true for the wages of “economically strong” workers.

**Table 7: The Direction of the Partial Effect of Migrant Workers on Israeli Real Wages<sup>1)</sup>  
by Occupation**

Occupation	Construction	Industry	Food and Tourism	Agriculture	Business services
Academic occupation	-	+	** <sub>-</sub>	* <sub>-</sub>	** <sub>-</sub>
Managers	** <sub>+</sub>	** <sub>+</sub>	** <sub>-</sub>	-	+
Free profession	** <sub>-</sub>	** <sub>+</sub>	-	** <sub>-</sub>	+
Clerks	* <sub>-</sub>	** <sub>-</sub>	-	** <sub>-</sub>	** <sub>-</sub>
Skilled workers	** <sub>-</sub>	-	-	-	-
Unskilled workers	** <sub>-</sub>	-	-	-	-

- 1) The sign indicates the direction of the effect.  
 No superfix - implies a 95% or higher statistical significance;  
 \* indicates statistical significance at 90-95percent;  
 \*\* indicates that the parameter is not statistically significant .

### 5.3 The Effect on the Probability of Non-participation in the Labor Force

A more permanent and socially consequential influence on the individuals' economic well being than the changes in real wages stems from the effect of migrant intensity on labor force participation. The regressions are presented in tables 8 and 9.

Following are the main conclusions:

**Gender and Nationality:** Men are less likely than women to be outside the labor force. So are Jewish workers compared to non-Jewish workers (this result is statistically more significant among women).<sup>28</sup>

**The replacement ratio:** This ratio operates as a relative price variable. The higher the ratio, the higher the incentive to exit the labor force. Evidence shows that even a slight increase in the replacement ratio (either due to an increase in the income support or a fall in the alternative wage) has a considerable negative impact on the probability of participation in the labor force. This variable has been found to be statistically significant with respect to all population groups. As shown in tables 8 and 9, the odds ratio of the replacement ratio is significantly smaller than 1 for all the population groups. Furthermore the ratio is also sensitive in the domain between zero and 1: the odds ratio in all regressions is below 0.1 for a zero replacement rate and about 3 to 9



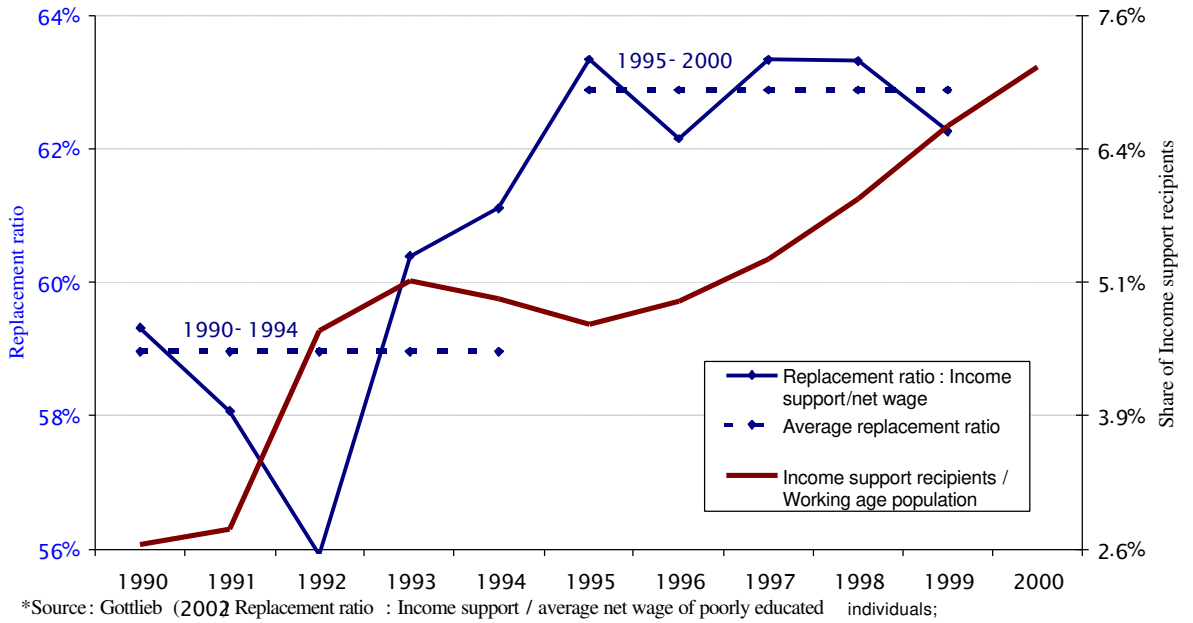
times higher (but still below 1) for a replacement rate between zero and 1, the reference replacement rate being above 1. Since the replacement rate can effectively be manipulated by the government, this implies that the government could reverse the negative incentive through conscious management either by reducing the individual's incentive to apply for income support and by strengthening "make-work-pay" policies, or else, by raising the alternative wage (e.g. through efficient minimum wage enforcement for migrants, implementation of penalties on the hiring of illegal migrants). Chart 5 suggests, that the replacement ratio played probably a significant role in explaining the sharp and prolonged increase in the share of income support recipients out of the working age population.<sup>29</sup> It also emphasizes the need for a policy, which can reverse the current disincentive, as reflected in the worsening of the replacement ratio. We conclude that the government should adopt a sensible and well enforced permit policy by (a) reducing the number of permits for migrants and by implementing a more balanced skill requirement instead of the present bias in favor of unskilled migrants.

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<sup>28</sup> A similar result is obtained by Brender et al. (2001).

<sup>29</sup> This chart shows the actual number of households whose head is in working age (15-64, 59 for women) enjoying income support divided by the working age population. The chart is reproduced from Gottlieb (2002). See also Shaviv (1999).

**Chart 5: The Replacement Ratio and the Share of Income Support Recipients**



The result concerning the work-discouraging effect of the number of children is consistent with other empirical studies<sup>30</sup>. The relatively low McFadden  $R^2$  stresses the need for further research in this area.

<sup>30</sup> The data do not allow for a distinction between the effect of the number of children and child allowances. The latter's idiosyncratic structure, as implemented in Israel, probably bias the results toward high birth rates.

**Table 8: The Determinants of the Probability of being outside the Labor Force**

Dependent variable : outside the labor force=1, inside the labor force=0

Logistic regression		All		Men		Women	
Reference group	variable	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio
	constant	0.6392	.	-1.3083	.	1.0972	.
	gender (male =1)	-1.5442	0.213				
	Religion (Jewish=1)	-0.8729	0.418	-0.0263	0.974 *	-1.532	0.216
	New immigrant	-0.1959	0.822	-0.1738	0.84	-0.302	0.739
Academic Institution	Primary School-7th grade	0.0227	1.023 *	-0.3293	0.719	0.2847	1.329
	Technical high school	0.0224	1.023 *	-0.2563	0.774	0.1452	1.156
	High school	0.0988	1.104 *	-0.0636	0.938 *	0.148	1.16
	Yeshiva	3.3119	27436	3.1033	22271	0.3308	1.392 *
	Post-High school	-0.042	0.959 *	-0.0486	0.953 *	-0.0394	0.961 *
Academic Institution	Other school	0.171	1.187	0.2541	1.289 *	0.115	1.122 *
Married	Divorced	-0.6704	0.512	0.1103	1.117 *	-0.7544	0.47
	Widow(er)	-0.1291	0.879 *	0.583	1.791	-0.2005	0.818
	Single	-1.0938	0.335	-0.3543	0.702	-1.533	0.216
Experience: 25 years or more	0 - 4 years	1.1496	3.157	1.1693	3.22	1.1809	3.257
	5 - 14 years	0.5235	1.688	-0.0847	0.919 *	0.6672	1.949
	15 - 24years	0.3183	1.375	0.222	1.249	0.3735	1.453
Replacement ratio : 1 % or more	0	-2.7609	0.063	-3.5202	0.03	-2.638	0.072
	0 - 1%	-1.5749	0.207	-1.3002	0.272	-1.7682	0.171
migrant intensity 0% - 10%	11 - 14%	0.2221	1.249	0.4083	1.504	0.1543	1.167
	14% or more	0.4172	1.518	0.8065	2.24	0.2806	1.324
Years of schooling: 16 years or more	up to 8 years	1.9529	7.049	1.5747	4.829	2.1409	8.507
	9 - 10years	1.2588	3.521	0.8705	2.388	1.461	4.31
	11 - 12years	0.8469	2.332	0.4484	1.566	1.0175	2.766
	13- 15years	0.4536	1.574	0.2743	1.316	0.5708	1.77
year 1999	year 1999	-0.0192	0.981 *	-0.0488	0.952 *	-0.0098	0.99 *
	year 1997	0.0845	1.088	0.0635	1.066 *	0.1284	1.137
Number of children: up to 3	4 - 7 children	0.6692	1.953	0.3505	1.42	1.0364	2.819
	more than 8 children	1.2964	3.656	0.7571	2.132	2.1279	8.398
Number of observations		83415		40545		42870	
Response Profile							
1		20235		5701		14534	
0		63180		34844		28336	
McFadden R^2		0.238		0.263		0.229	

\*indicates insignificant coefficients at  $P > 0.05$

**Table 9: The Determinants of the Probability of being outside the Labor Force**

Dependent variable : outside the labor force =1, inside the labor force =0

Logistic regression		Jewish Men		Non-Jewish Men		Jewish Women		Non-Jewish Women	
Reference group	variable	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio	Parameter Estimate	Odds Ratio
	constant	-1.310	.	-2.101	.	-0.447	.	1.549	.
	New immigrant	-0.140	0.870 *	-0.365	0.694 *	-0.029	0.972 *	-2.525	0.080
Academic Institution	Primary School -7th grade	-0.231	0.794 *	-1.100	0.333	0.223	1.250	-0.213	0.809 *
	Technical high school	-0.029	0.972 *	-1.843	0.158	0.355	1.426	-1.279	0.278
	High school	0.135	1.144 *	-1.106	0.331	0.258	1.294	-0.218	0.804 *
	Yeshiva	3.056	21.251	2.546	12.750 *	0.511	1.667 *	-1.328	0.265 *
	Post-High school	0.009	1.009 *	-0.442	0.643 *	0.095	1.100	-0.873	0.418
Married	Other school	0.311	1.365 *	-0.026	0.974 *	0.166	1.181 *	-0.093	0.911 *
	Divorced	0.151	1.163 *	0.312	1.367 *	-0.707	0.493	-1.796	0.166
	Widow (er)	0.508	1.663	1.597	4.936	-0.127	0.881 *	-1.093	0.335
Experience : 25 years or more	Single	-0.301	0.740	-0.258	0.773 *	-1.197	0.302	-3.832	0.022
	0 - 4 years	1.210	3.352	0.638	1.892	1.073	2.925	1.657	5.243
	5 - 14 years	-0.088	0.916 *	-0.146	0.864 *	0.596	1.815	0.937	2.552
Replacement ratio : 1 % or more	15 - 24 years	0.203	1.225	0.200	1.221 *	0.387	1.473	0.070	1.072 *
	0	-3.438	0.032	-3.714	0.024	-2.671	0.069	-3.089	0.046
migrant intensity 0% - 10%	0 - 1%	-1.432	0.239	-0.293	0.746 *	-1.777	0.169	-2.409	0.090
	11 - 14%	0.484	1.623	0.218	1.243 *	0.238	1.269	-0.422	0.656
Years of schooling : 16 years or more	14 % or more	0.859	2.362	0.705	2.024	0.341	1.406	-0.037	0.963 *
	up to 8 years	1.477	4.378	2.385	10.859	1.938	6.943	3.901	49.435
	9 - 10 years	0.653	1.921	1.967	7.151	1.166	3.209	3.359	28.748
	11 - 12 years	0.253	1.288	1.730	5.642	0.824	2.280	2.090	8.088
year 1999	13 - 15 years	0.241	1.273	0.762	2.143	0.528	1.696	0.883	2.418
	year 1997	-0.074	0.929 *	0.073	1.076 *	-0.031	0.970 *	0.188	1.207 *
Number of children : up to 3	year 1997	0.039	1.040 *	0.210	1.233 *	0.107	1.113	0.555	1.743
	4 - 7 children	0.415	1.514	0.231	1.260	1.026	2.791	0.790	2.203
	more than 8 children	0.763	2.145	0.710	2.033	2.033	7.638	3.301	27.135
Number of observations		34151		6394		36731		6139	
Response Profile									
1		4787		914		9918		4616	
0		29364		5480		26813		1523	
McFadden R <sup>2</sup>		0.263		0.298		0.130		0.400	

\*indicates insignificant coefficients at Pr&gt; 0.05

Similar logit regressions on the probability of being employed versus unemployed were much less successful. The main explanatory variables that were significant are the occupation (odds ratio smaller than 1 and decreasing with inferiorly remunerated occupations compared to managerial occupation), work experience (odds ratio greater than 1 from 5 years and more) and spouse income (surprisingly the odds ratio was greater than 1).<sup>31</sup> The overall results for migrant intensity were inconclusive. The replacement ratio could not be used, since the data on unemployment do not include information on its duration and therefore the relevant replacement ratio cannot be properly calculated.

<sup>31</sup> Regression results are available upon request from the author.

One possible explanation for the relatively better success of the participation equation compared to the employment/unemployment equation is that the process of worker migration is a stock variable as is the exit from the labor force, whereas a person's unemployment status resembles more a flow variable, since an unemployed person will either return to employment, or, if chronically unemployed, will tend to drop out of the labor force, after becoming discouraged from seeking employment. This might be one explanation for the better performance of migrant intensity in the participation equation, compared to the unemployment equation. Indeed, the sample size grows heavily toward the latter years.

#### **5.4 The Effect on Inequality in Market Earnings from Work**

Perhaps the most striking and consequential effect on the well being of the Israeli population is the impact of the Israeli government's migrant worker policy on market earnings from work. This effect can be measured on various income definitions. Since the main focus in this study is to analyze the consequences on the earning capacity and on the Israeli population's ability to be integrated in the labor force, the preferred concept is gross earnings from work, including self-employment.<sup>32</sup>

The empirical results up to now provide a clear indication: We expect economically weak Israelis, such as the poorly educated and low skilled, who lost their jobs and eventually left the labor force, to be the main losers from the government's current migrant worker strategy. This result is reflected in table 10.

While regression 1 in table 3 relates exclusively to Israeli wage earners, the regression in table 10 relates to the working age population as a whole, thus including in addition to wage earners also the self-employed, the unemployed and the people outside the labor force.<sup>33</sup> The regression on the individual rank on the corresponding Lorenz curve points to a significant increase in gross earnings inequality due to migrant intensity.<sup>34</sup> Interestingly, the coefficients of both the weak and the strong members of

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<sup>32</sup> This is the reason for the focus on earned income from work rather than net post-tax and post transfer income or the inclusion of capital income.

<sup>33</sup> The income survey reports positive gross earnings from work only for the employed and the self-employed. The missing value in the vectors of the non-employed can thus logically be imputed to be zero, as was done in this study.

<sup>34</sup> See Flug and Kassir, 2001 for an extensive analysis of poverty in Israel.

the working age population are negative, indicating a worsening of their ranks, but the absolute value of the coefficient of the “economically weak” turns out to be about twice as high as that of the “economically strong”. The conclusion is that the personal income distribution worsened considerably over time. In other words the Lorenz curve became increasingly bent, implying a rising Gini-coefficient. In other words, the growing migrant intensity played an important role in explaining increasing earnings inequality. Similarly to table 3, academic education, the number of school-years, marriage, a remunerating occupation, a long work experience, male gender and being Jewish all improve the individual’s rank in the income distribution.

**Table 10 Determinants of the Rank \*  
in the Distribution of Earnings from Work**

Dependent variable : Rank of Earnings from Work

OLS	Coefficients	Prob > ITI	Pr>.05
<b>Explanatory Variables</b>			
Constant	0.1798	0.0001	
Gender: m=1, f=0	0.0878	0.0001	
Religion : Jewish=1, non-Jewish=0	0.0113	0.0001	
1995dummy	-0.0126	0.2079	*
1996dummy	-0.0049	0.6523	*
1997dummy	0.0005	0.9374	*
Primary School to 7th grade	-0.0318	0.0001	
Technical high school	-0.0114	0.0007	
High school	-0.0050	0.1255	*
Yeshiva	-0.0957	0.0001	
Post-High school	0.0004	0.9037	*
Academic Institution	0.0244	0.0001	
Number of School Years	0.0058	0.0001	
Married	0.0226	0.0001	
Divorced	0.0037	0.4722	*
Widow(er)	0.0220	0.0001	
Academic occupation	0.1115	0.0001	
Free profession	0.0218	0.0001	
Manager	0.2030	0.0001	
clerk	0.0165	0.0001	
Skilled in services	-0.0829	0.0001	
Skilled in agriculture	-0.1156	0.0001	
unskilled	-0.0738	0.0001	
Work experience	0.0064	0.0001	
Work experience (squared)	0.0001	0.0001	
Unemployment rate	-0.5026	0.3335	*
New immigrant in the 90s	-0.0247	0.0001	
<b>Migrant Intensity</b>			
Economically Weak Worker	-0.3555	0.0001	
Economically Strong Worker	-0.1668	0.0001	
<b>Labor Market Status</b>			
Unemployed	-0.2745	0.0001	
Outside the Labor Force	-0.1567	0.0001	
Number of Observations :		113718	
Adjusted R <sup>2</sup>		0.5543	

\*indicates insignificant coefficients at Pr> 0.05

# The rank is calculated relative to earnings in the same year.

## 6. Conclusions

The opening up the Israeli labor market to migrant workers in the early 1990s reflected a conscious government decision to hire foreign workers in specific low-skill-intensive branches, in order to substitute for the Palestinian workers, barred from access, due to a security-oriented political decision. The exposure was at first strictly limited to the agriculture and construction sectors. Later on, permits were also extended to certain services sectors, mainly the care for the aged and the chronically sick and invalid population. At some stage the computer industry's demand for permits for computer specialists was denied, largely due to the strong enough pressure group, which opposed the idea for fear of competition and the unavoidable fall in wages in the hi-tech sector. Besides the policy driven exposure to migrant workers, the recent surge in the number of illegal foreign workers reflects a general tendency of an inflow of workers from countries with low per capita income and an excess supply of labor to countries with significantly higher per capita income, which is one facet of globalization, reflected also in the Israeli economy. The combination of inadequate enforcement of labor laws, economic interests involved in hiring migrant workers at lower cost than that of hiring Israeli competing workers and of the latter's (rational) short term preference to exit the labor force and their absorption into the more lucrative national income support scheme, prevented until now an efficient struggle with the detrimental economic and social consequences that ensued.

The empirical results suggest that earnings inequality was negatively affected from the interaction of the government's migrant-workers policy and the existing income support scheme for persons in working age. This situation, which resulted in the exclusion of economically weak workers from the labor force, is therefore to a significant extent the direct responsibility of a faulty government policy. The government's decision – through its permit policy and an inadequate implementation of labor laws – on exposing exclusively the low skilled occupations to migration, focused the deterioration of earnings inequality on the economically weak part of the Israeli society. It was found that the worsening in the earnings inequality was caused more by the exclusion of Israelis from the labor force than by a fall in wages. The analysis of the effect on relative wages suggests that there were parallel forces at work: substitution, which caused a downward pressure on wages of economically weak workers and a complementary effect, causing upward pressure on wages of



workers, which are economically better off. The effects on relative wages were not limited only to the economic sectors, which had been exposed to a sizeable inflow of migrant workers. Within a relatively short time they spread to other sectors as well.

It turns out, that the relevant policy tools, as reflected in the replacement ratio, i.e. the ratio of income support divided by the alternative wage, are indeed powerful. This study therefore emphasizes the potential for a reversal if the government's labor market strategy were to change. The major policy tools for such a reversal are (1) an efficient reduction of the number of permits, (2) avoidance of the bias in permit policy toward low skilled workers, (3) efficient implementation of labor laws and (4) a change in the government's income support policy together with an active labor market policy, aimed at creating an incentive for labor force participation. Such measures have been successfully implemented in economies that underwent reforms in their welfare policy and in the areas of job training and job search. In Israel this reform still remains to be implemented.

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