On the Measurement of Wage Mobility and its Decomposition

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Abstract

This paper proposes a new index of relative wage mobility and uses Mincerian earnings function to derive a breakdown of this mobility into components measuring respectively the impact of human capital, differences in rates of return on human capital and unobservable characteristics. This wage mobility index is also decomposed into wage growth, structural mobility (change in wage inequality) and exchange mobility (re-ranking). An empirical illustration is given, based on the 1983 and 1995 Israeli Censuses.

Key Words: exchange mobility - Israel - structural mobility - wage mobility

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1. Introduction

The literature on income inequality and wage dispersion has often taken a static approach to the analysis of income distributions, analyzing for example the trend of inequality in a given country over time or comparing inequality in various countries at a point in time. Much scarcer are the attempts to look at what happened over time to specific individuals or households.

The growing availability of panel data makes it now possible to take a more dynamic view of inequality and to focus one's attention on the concept of mobility rather than on that of inequality but here a distinction has to be made between inter- and intra-generational mobility. The focus of the present paper is on intra-generational mobility but even in this case there is no consensus about the way income and wage mobility should be measured.

Fields and Ok (1999) and Fields (2008) in surveys on mobility measurement introduced a second distinction, one that separates studies of macro-mobility from micro-mobility analyses. Macro mobility studies focus on the overall amount of mobility and try to answer questions concerning, for example, the percentage of individuals who stay over time in the same quantile. These quantiles may be defined on the basis of relative thresholds (e.g. population deciles at each period) or fixed thresholds (e.g. income intervals based on the population deciles of the original period), a useful distinction made by Hungerford (1993) as well as by Jarvis and Jenkins (1998). A typical element p_{ij} in such a transition matrix will therefore indicate the proportion of the total population that was in quantile i in period t but moved to quantile j in period t'. Various mobility measures have been derived from such matrices. The most popular is probably an index proposed by Shorrocks (1978) which has been used, for example, by Buchinsky, Fougère and Kramarz (1998), Buchinsky and Hunt (1999), Canto (2000) and Ramos (1999). Shorrocks (1978) proposed also mobility indices derived from transition matrices, that obey the period invariance principle, that is, that are not sensitive to the number of periods separating time t from time t'. Other mobility indices derived from transition matrices measure rather the degree of independence between the lines (quantile of origin) and the columns (quantile of destination). Among such measures of independence one may cite the "ϕ of independence" (Bigard et al., 1998), the likelihood ratio G^2 (Hungerford,

1993), an index ϕ or λ of asymmetry (Bigard et al., 1998; Hungerford, 1993), Cramer's V (Hungerford, 1993) and the correlation ratio which was used by Canto (2000), Gustafsson (1994), Hauser and Fabig (1999) and Jarvis and Jenkins (1998).

Micro mobility studies, on the contrary, deal rather with questions about the determinants of the income or positional changes of individual income recipients (see, Fields, 2008) and it is in fact this aspect of mobility that will be stressed in this paper.

A third distinction to be drawn is that between measures of time-independence and measures of movement. The focus is on time-independence when one is interested in finding out how dependent current income is on past income. The other type of study tries rather to compare the incomes of the same individuals (in intra-generational studies) between one year and another and to discover how much income movement has taken place.

But even here several approaches may be taken. Fields (2008) makes a distinction between five concepts.

The first one is that of "positional movement", the idea being that an individual experiences positional movement if he/she changes quintiles, deciles or ranks. Bartholomew (1973) was probably the first one to propose such a measure but it has been adopted (as such or in a related form) by Bigard et al. (1998), Buchinsky, Fougère and Kramarz (1998), Buchinsky and Hunt (1999), Dickens (2000), Hauser and Fabig (1999), Hungerford (1993), Raferzeder and Winter-Ebmer (2007), Ramos (1999) and Cardoso (2006).

A second notion is that of share movement and the latter is assumed to take place if an individual's income varies relative to the mean income (e.g. Aaberge et al., 2002). Some authors proposed mobility indices taking into account both the change in income and that in ranks. A distinction is then made between the concept of structural mobility (which refers to the "anonymous" change over time in income inequality) and exchange mobility (the focus being here on changes in ranks). This distinction was introduced by Markandya (1982) and may be found also in the works of Silber (1995), Van Kerm and Jenkins (2003), Beenstock (2004) and Ruiz-Castillo (2004).

The third concept is that of non-directional income movement which looks at the extent of fluctuation in individuals' incomes, no matter whether there is an upward or downward movement (see, for example, Fields and Ok, 1996).

A fourth notion, called directional movement, makes a distinction between the direction of the movement and thus the observer is assumed to care not only about the amount of the income change but also about its direction (see, Fields and OK, 1999a).

Finally the focus of the fifth notion of income movement is on mobility as an equalizer of longer-term incomes (see, Fields, forthcoming) and wonders whether the income variations experienced by individuals cause the inequality of longer-term incomes to be different from the inequality of the original incomes One of the most popular measures based on such an approach is again an index originally proposed by Shorrocks (1993) and defined as the complement to one of the ratio of the inequality of the average incomes of the individuals during the period considered over a weighted sum of the inequality of individual incomes in each of the sub-periods considered. Various inequality indices may be used (e.g. Gini index, Theil index, coefficient of variation, mean log deviation of incomes or wages, variance of logarithms). Such an approach may be found in the works of Aaberge et al. (2002), Buchinsky and Hunt (1999), Canto (2000), Gustafsson (1994), Hofer and Weber (2002), Jarvis and Jenkins (1998), Raferzeder and Winter-Ebmer (2007) although the latter call this aspect of mobility, earnings volatility. Using an idea originally suggested by Murdoch and Sicular (2002), Buchinsky and Hunt (1999) have also shown how such an approach allows a decomposition of mobility into between and within groups mobility, where the groups are defined on the basis of the predicted earnings of the individuals, the latter being derived from traditional Mincerian earnings functions.

Several additional points should be stressed. First there have been various attempts to derive axiomatically measures of income mobility and here a distinction should be made between the case where mobility is conceptualized in terms of social welfare (see, King, 1983, Chakravarty, Dutta and Weymark, 1985, and Ruiz-Castillo, 2004) and that where a descriptive rather than an ethical approach is used and where desirable properties of an income mobility index are specified and then an attempt is made to derive the (family of) indices that have these properties (e.g. Tsui, 2005). Another useful distinction is that made between a relative approach to income mobility where the analysis is conducted only in terms of income shares and an absolute approach which is based on the use of income in, say, $ terms.

The focus of the present paper is on intra-generational micro-mobility and it looks at mobility as movement rather than as time independence. It takes a relative approach

to mobility but will not only look at the movement of income shares but also at variations in the ranking of the individuals. Finally the income mobility index that has been selected is derived from the welfarist approach to mobility taken by Silber and Weber (2005). They had suggested three new mobility indices based on a welfarist approach and related to the Gini index. These indices took an absolute approach in the sense that there is no mobility if all incomes increase by the same dollar amount. These indices were decomposed additively into two or three components. The three indices proposed by Silber and Weber (2005) included a growth and a structural mobility component. Two of them included also an exchange mobility component where such a mobility (which refers to re-ranking) was considered either as welfare increasing or as welfare decreasing.

The present paper extends the approach originally proposed by Silber and Weber (2005) by applying their ideas to the logarithms of incomes (wages), thus taking a relative approach to mobility. But its main contribution is that, on the basis of Mincerian earnings functions, it shows how such a mobility index, as well as each of its three components, may be decomposed into three elements corresponding respectively to the impact of human capital characteristics, that of the rates of return on these characteristics and as well as that of unobservable characteristics.

The paper is organized as follows. Section 2 defines a new index of wage mobility while section 3 analyses its properties. Section 4 shows that it is possible to decompose this index into three components measuring respectively the impact of human capital characteristics, the rates of return on these characteristics and unobservable characteristics. Section 5 presents an illustration based on Israeli Census data for the years 1983 and 1995. Concluding comments are finally given in Section 6.

2) Welfare Change and the Measurement of Mobility

The link between social welfare and mobility has been examined at length by Silber and Weber (2005). The section below summarizes the main elements of their approach.

Using the concept of "equally distributed equivalent level of income" introduced by Atkinson (1970) we may define the Gini index I_G as

$I_G = 1 - (y_{EG} / \bar{y})$	(1)

where $\bar{y}$ refers to the average income in the population and y_{EG} to the "equally distributed equivalent level of income", derived on the basis of the implicit welfare function that "lies behind" the Gini index (see, Donaldson and Weymark, 1980, for more details on this welfare function and its generalization). y_{EG} represents therefore the welfare W_G of society, assuming the latter is computed on the basis of the social welfare function which is related to the Gini index. Since the Gini index is equal to twice the area lying between the Lorenz curve[1] and the diagonal, the area lying below the Lorenz curve is then equal to half the value of the ratio $(y_{EG} / \bar{y})$.

The Generalized Lorenz curve (see, Shorrocks, 1983) is derived by multiplying the variable on the vertical axis of the Lorenz curve (cumulative income shares) by the average income. The area lying between a generalized Lorenz curve and a straight line joining the origin and a point with coordinates 1 on the horizontal axis and the mean income $\bar{y}$ on the vertical axis will therefore be equal to half the Gini index times the mean income. On the other hand we also know that the Gini index is equal to half the mean difference Δ divided by the mean income, where the mean difference Δ is defined as

$\Delta = (1/n^2)\sum_{i=1}^{n}\sum_{j=1}^{n}\lvert y_i - y_j \rvert$	(2)

where y_i (y_j) is the income of individual $i(j)$ and n the total number of individuals. The "equally distributed equivalent level of income", y_{EG}, may thus be defined as

$y_{EG} = \bar{y} - (1/2)\Delta$	(3)

so that the area S lying below the Generalized Lorenz curve may be expressed as

$S = (1/2)y_{EG} = (1/2)[\bar{y} - (1/2)\Delta]$	(4)

[1] The Lorenz curve is obtained by plotting on the horizontal axis the cumulative population shares and on the vertical axis the cumulative income shares, the individuals being ranked by increasing incomes.

since, as mentioned previously, the area below the Lorenz curve is equal to $(1/2)(y_{EG}/\bar{y})$.

Let us now call $\bar{y}_1$ and $\bar{y}_0$ the mean incomes, Δ_1 and Δ_0 the mean differences, I_{G1} and I_{G0} the Gini indices and y_{EG1} and y_{EG0} the "equally distributed levels of income" at times 1 and 0.

Using (4), a first approach to the measurement of the change in welfare (ΔW_a) between times 0 and 1 amounts therefore to writing that

$\Delta W_a = (y_{EG1} - y_{EG0}) = [\bar{y}_1 - (1/2)\Delta_1] - [\bar{y}_0 - (1/2)\Delta_0]$	(5)

Note that in defining the welfare of society at times 0 and 1 we have assumed in (5) that we rank the individuals at time t by the incomes they received at time t $(t = 0,1)$.

We may however imagine computing the change in welfare between times 0 and 1 by assuming that the incomes of the individuals changed but not their rank. We would then define the welfare at time 1 on the basis of the incomes the individuals had at time 1 but of the ranks they had at time 0. Similarly we could define the welfare at time 0 on the basis of the incomes the individuals had at time 0 but of the ranks they had at time 1. This is a standard issue in the theory of index numbers and Deutsch and Silber (1999) have shown that this problem exists also when measuring income inequality.

We may therefore think of an alternative way of defining the change in welfare and express it as ΔW_b with

$\Delta W_b = [\bar{y}_1 - (1/2)P\Delta_1] - [\bar{y}_0 - (1/2)\Delta_0]$	(6)

In (6) $P\Delta_1$ refers to what could be called the "Pseudo-Mean Differences" at time 1, this "Pseudo-Mean Difference" being equal to twice the product of the mean income by the "Pseudo-Gini index"[2].

[2] One uses the expression of "Pseudo-Gini index" rather than that of "Gini index" when, in computing the Gini index at, say, time t, we rank the individuals not according to the income they had at time t but according to another ranking criteria, such as, for example, the income they had at another time, say, $(t-1)$. For more details on the concept of "Peudo-Gini", see, Fei, Ranis and Kuo, 1979, or Silber, 1989.

We may even think of a third way of defining the change in welfare and express it as ΔW with

$\Delta W_c = [\bar{y}_1 - (1/2)\Delta_1] - [\bar{y}_0 - (1/2)P\Delta_0]$	(7)

In (7) $P\Delta_0$ refers to the "Pseudo-Mean Difference" at time 0.

We will now assume that the three ways of defining the change in social welfare between times 0 and 1 $(\Delta W_a, \Delta W_b, \Delta W_c)$ correspond in fact to three different approaches to the measurement of income mobility between times 0 and 1.

Using (5) we may write that

$\Delta W_a = [\bar{y}_1 - \bar{y}_0] + [(1/2)(\Delta_0 - \Delta_1)]$ $= Growth + Structural\ \ Mobility$	(8)

Therefore, as mentioned previously, ΔW_a corresponds to the traditional way of measuring welfare change. In terms of income mobility this approach defines mobility as a function of only two components: a first one, growth, which reflects the growth in average income, and a second one, Structural Mobility, which measures in fact the change in inequality and will have a positive impact on welfare if inequality decreases between times 0 and 1.

Looking at the second definition of the welfare change between the two periods, as it is expressed in (6), we may write that

$\Delta W_b = [\bar{y}_1 - (1/2)P\Delta_1] - [\bar{y}_0 - (1/2)\Delta_0]$ $= [\bar{y}_1 - \bar{y}_0] + [(1/2)(\Delta_0 - \Delta_1)] + [(1/2)(\Delta_1 - P\Delta_1)]$ $= Growth + Structural\ \ Mobility + Exchange\ \ Mobility$	(9)

When comparing (8) and (9) we observe that ΔW_b includes like ΔW_a a first term measuring average income growth and a second one measuring structural mobility (inequality change) but it has an additional term which measures in fact exchange mobility, that is, the amount of individual ranking that took place between times 0 and 1, assuming this re-ranking is computed on the basis of the incomes at time 1 (that is, as $[(1/2)(\Delta_1 - P\Delta_1)]$).

It should be stressed that the approach to welfare underlying the definition of ΔW_b assumes that, ceteris paribus, the more re-ranking there is, the highest the increase in

welfare, since by definition $\Delta_1 \succ P\Delta_1$ (the Gini index is always greater than the Pseudo-Gini index).

The third definition of welfare change, as given in (7) may be also expressed as

$$\begin{aligned}\Delta W_c &= [\bar{y}_1 - (1/2)\Delta_1] - [\bar{y}_0 - (1/2)P\Delta_0] \\ &= [\bar{y}_1 - \bar{y}_0] + [(1/2)(\Delta_0 - \Delta_1)] + [(1/2)(P\Delta_0 - \Delta_0)] \\ &= \textit{Growth} + \textit{Structural Mobility} + \textit{Exchange Mobility}\end{aligned} \qquad (10)$$

When comparing (8), (9) and (10) we observe that ΔW_c includes like ΔW_a and ΔW_b a first term measuring average income growth and a second one measuring structural mobility (inequality change) but, like ΔW_b, it has an additional term which measures also exchange mobility, that is, the amount of individual ranking that took place between times 0 and 1. This time however this re-ranking is computed on the basis of the incomes at time 0 (that is, as $[(1/2)(P\Delta_0 - \Delta_0)]$) and since $P\Delta_0 \prec \Delta_0$, the more re-ranking there is, the lower the welfare change.

Exchange mobility (re-ranking) is thus assumed to have a positive impact on welfare when the latter is measured via ΔW_b and a negative effect on welfare when the latter is measured via ΔW_c.

To summarize these various results we may first conclude that in all three ways of expressing overall mobility as a change in welfare (see, (8), (9) and (10)) the growth and structural mobility components are identical, growth being assumed to have a positive effect on welfare while an increase in inequality has a negative impact on welfare. Second while the first approach to welfare change (ΔW_a) does not include an exchange mobility component, the two other approaches have such an element. The second approach to welfare change (ΔW_b) assumes that, ceteris paribus, the greater the intensity of re-ranking that is observed between periods 0 and 1, the higher the *increase* in welfare. The third approach to welfare change (ΔW_c) assumes however, ceteris paribus, that the more re-ranking there is, the higher the *decrease* in welfare. The choice between these three ways of measuring overall mobility should therefore depend on how one looks at re-ranking. It can be ignored, be considered as having a positive impact on social welfare or assumed to have a negative effect on welfare.

In defining previously the Gini index as being equal to half the ratio of the mean difference of the incomes over the (arithmetic) mean income, we define it in fact as

half the ratio of the absolute value of the expected income gap (in $ terms) between two individuals selected randomly (with repetition) over the average income.

If instead of computing the Gini index of the individual incomes (expressed in $ terms), we compute half the mean difference[3] of the logarithms of these individual incomes, we estimate in fact half the value of the expected percentage difference (in absolute value) of the incomes of two individuals selected randomly with repetition (see, Deutsch and Silber, 2008). This is clearly not the same as the Gini index of the incomes but it is conceptually similar. In both cases we estimate the expected percentage difference between the incomes of two individuals. In the first case however this percentage is estimated with respect to the overall average income while in the second case it somehow estimated with respect to the average of the incomes that have been randomly selected.

Given this similarity between these two approaches we will from now on define income (wage) mobility on the basis of the logarithms of the incomes (wages). This will allow us combining the use of the mean difference of the logarithms of the wages with the literature on Mincerian earnings functions where the dependent variable is precisely the logarithm of wages.

3. On the Definition of Wage Mobility Indices

The algorithm described in section 2 to compute the Gini index (defined there as half the ratio of the mean difference over the mean income) is not the only way of computing the Gini index. One, among the many other algorithms that have been proposed to compute the Gini index I_G of the individual incomes, defines it (see, Berrebi and Silber, 1987) as

$I_G = \sum_{i=1}^{n}((n-2i+1)/n)(y_i/n\bar{y})$	(11)

[3] The mean difference, as mentioned previously, appears in the numerator of the Gini index.

where n is the number of individuals in the population, y_i the income of individual i, $\bar{y}$ the average income and it is assumed that $y_1 \geq ... \geq y_i \geq ... \geq y_n$.

Recalling the definition of the Gini index in terms of the mean difference that was mentioned previously, we may apply the index defined in expression (11) to the logarithms of wages and derive that the mean difference of the logarithms of wages may be expressed as

$\Delta = (2/n^2)\sum_{i=1}^{n}(n-2i+1)\ln y_i$	(12)

Let now $\overline{\ln y_1}$ and $\overline{\ln y_0}$ refer to the means of the logarithm of the actual wage received[4], on average, by individuals in period 1 and 0. Let also $\ln y_{00}$ and $\ln y_{11}$ refer respectively to the logarithm of the wage individuals receive at times 0 and 1, the individuals being ranked by decreasing value of their wage. Let $\ln y_{10}$ be the vector of the logarithms of the wages of the individuals at time 1 when the wages are ranked by their decreasing values at time 0.

Combining (9) and (12) we may express the overall wage mobility based on the second approach to mobility measurement, one that assumes that growth and exchange mobility have a positive impact on welfare while an inequality change (structural mobility) will have a positive (negative) effect on welfare if it is a inequality decrease (increase), as

[4] $\overline{\ln y_t}$ is the arithmetic mean of the logarithms of wages in period t $(t = 0,1)$ while $e^{\overline{lny}_t}$ is the geometric mean of the wages.

$$M = (\overline{\ln y_1} - \overline{\ln y_0}) + (1/n^2)\sum_{i=1}^{n}[(n-2i+1)(\ln y_{00} - \ln y_{11})] + (1/n^2)\sum_{i=1}^{n}[(n-2i+1)(\ln y_{11} - \ln y_{10})] \quad (13)$$

The first element in (13), $(\overline{\ln y_1} - \overline{\ln y_0})$ is an approximation of the growth rate of the wages between times 0 and 1. The second element, $(\frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln y_{00} - \ln y_{11}))$, gives the impact of the change in anonymous wage dispersion, measured as the change in the expected wage gap, in percentage terms. This structural mobility is equal to the difference between the values of half the mean difference of the logarithm of wages at time 0 and 1. Note that in defining structural mobility we assume no change in the ranking of the individuals (and hence no exchange mobility) since at each period (0 or 1) the logarithms of the wages of the individuals are ranked by decreasing values. The third element measures exchange mobility and, as already stressed, it assumes that, ceteris paribus, the greater the intensity of re-ranking between the two distributions of (the logarithms of) wages in periods 0 and 1, the higher the increase in mobility. Note that in this case exchange mobility is defined in fact as being equal to the difference between the values of half the mean difference in period 1 (since $\ln y_{11}$ is the vector of logarithm of the wages at time 1 ranked by decreasing value of the logarithm of the wages these individuals have at time 1) and half of what has been called previously the "Pseudo mean difference" of the logarithm of wages in period 1 (since $\ln y_{10}$ is the vector of logarithms of the wages at time 1 ranked by decreasing value of the logarithm of the wages these individuals had at time 0).

4. Properties of the Wage Mobility Index

1) Equal dollar additions to all wages

If a sum *a* is added to all wages, there will be no exchange mobility, since there will be no re-ranking. There will however be wage growth and structural mobility. More precisely each wage will increase by this amount *a* so that $\ln y_1 = \ln(y_0 + a)$. As a consequence the growth component of mobility in expression (13), will be equal to $\overline{\ln(y_0 + a)} - \overline{\ln y_0}$. This element will be positive if a>0 and negative if a<0.

Similarly structural mobility which appears as the second element on the R.H.S of (13), becomes $\frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln y_{00} - \ln(y_{00} + a))$.

This element will be positive if a>0 and negative if a<0.

When a>0, the element $\frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)\ln y_{00}$ is greater than the element $\frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln(y_{00} + a))$.

The overall mobility (M) will therefore be expressed as

$(\overline{\ln(y_0 + a)} - \overline{\ln y_0}) + \frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln y_{00} - \ln(y_{00} + a))$	(14)

This total amount of mobility will thus be positive if a>0 and negative if a<0.

2) Multiplying all wages by a constant:

If all wages are multiplied by a constant $(1+k)$, there will evidently be no variation in the amount of structural mobility because this element is equal to

$M = \frac{1}{n^2}\sum_{i=1}^{n}[(n-2i+1)(\ln y_{00} - \ln y_{00}(1+k))] = \frac{1}{n^2}\sum_{i=1}^{n}[(n-2i+1)(\ln y_{00} - \ln y_{00} - \ln(1+k))] =$ $-\frac{1}{n^2}\sum_{i=1}^{n}[(n-2i+1)(\ln(1+k))]$	(15)

But $\frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln(1+k)) = 0$ because $\frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1) = 0.$ There will also be no re-ranking. The only impact of such changes in the wages will be on the growth component. More precisely the mean (geometric) wage will be multiplied by $(1+k)$ so that $\overline{\ln y_1} = \overline{\ln(y_0(1+k))}$. Hence total mobility will be equal to $\ln(1+k)$, that is, $M = \ln(1+k)$ so that $M > 0$ if $k > 0$ and $M < 0$ if $k < 0$.

3) The impact of transfers:

Assume an amount γ is transferred from individual i with wage y_{0i} at time 0 to individual j who has a wage y_{0j} at time 0, assuming $y_{0i} > y_{0j}$ $(i < j)$. We will also suppose that this transfer does not involve any re-ranking. This transfer will modify the mean logarithm of wages and it will also have an impact on the structural mobility component. Clearly with no re-ranking there will be no exchange mobility. Mobility will therefore be expressed as

$M = \overline{\ln y_1} - \overline{\ln y_0} + \frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln y_{00} - \ln y_{11}) =$ $\overline{\ln y_1} - \overline{\ln y_0} + \frac{n}{n^2}\sum_{i=1}^{n}(\ln y_{00} - \ln y_{11}) + \sum_{i=1}^{n}\frac{1-2i}{n^2}(\ln y_{00} - \ln y_{11}) =$ $\overline{\ln y_1} - \overline{\ln y_0} + (\overline{\ln y_0} - \overline{\ln y_1}) + \sum_{i=1}^{n}\frac{1-2i}{n^2}(\ln y_{00} - \ln y_{11}) =$ $\sum_{i=1}^{n}\frac{1-2i}{n^2}(\ln y_{00} - \ln y_{11})$	(16)

Since an amount γ is transferred from individual i with wage y_{0i} at time 0 to individual j who has a wage y_{0j} at time 0, assuming $y_{0i} > y_{0j}$ $(i < j)$, we end up with

$M = \frac{(1-2j)}{n^2}[\ln y_{0j} - \ln(y_{0j} + \gamma)] + \frac{(1-2i)}{n^2}[\ln y_{0i} - \ln(y_{0i} - \gamma)]$	(17)

It may be observed that the first expression is positive while the second term is negative but smaller than the first expression, given the concavity of the logarithmic function. Hence mobility will be positive.

4) The case of "population replication"

Assume that instead of having one individual earning wage y_{0i} at time 0 $i = 1 \ldots n$ (where n is the original size of the population) we now have m individuals earning the wage y_{0i} at time 1 ($i = 1 \ldots n$). This corresponds to what Dalton (1920) called the principle of population. Clearly such a change will not have any impact on the average logarithms of wages so that there will be no growth. It is easy to show that there will also be no structural mobility and no re-ranking. As a consequence a "population replication" does not induce any wage mobility.

5) The case of an "income swap"

Assume that between times 0 and 1 the wages of two individuals i and j are swapped so that $\ln y_{1j} = \ln y_{0i}$ and $\ln y_{1i} = \ln y_{0j}$. Assume no change in the other wages, that is $\ln y_{1k} = \ln y_{0k} \quad \forall \quad k \neq i, j$. Clearly the average logarithms of wages will not change so that the growth component of mobility will be equal to zero. In

addition there will not be any structural mobility. However, there will be exchange mobility.

We will have

$$M = \frac{(n-2i+1)}{n^2}(\ln y_{1i} - \ln y_{0j}) + \frac{(n-2j+1)}{n^2}(\ln y_{0j} - \ln y_{1i}) = \frac{2}{n^2}(j-i)(\ln y_{1i} - \ln y_{0j}) \quad (18)$$

This expression is positive since by assumption $\ln y_{1i} > \ln y_{0j}$ and $j \succ i$ and therefore a wage swap induces mobility.

More precisely this wage mobility will be greater, the greater the wage and rank difference between the two individuals whose wages were swapped. If the permutation of wages is more complex, it can always be translated into the sum of a certain number of swaps so that the result that was just mentioned applies also to this more general case.

5. Estimating the contributions of the explanatory variables, the regression coefficients of these variables and unobservable characteristics to the relative wage mobility

Let us now apply Oaxaca's (1973) decomposition of the difference between the average (geometric) wages in two periods to the definition of mobility given previously. As in Oaxaca (1973) we start by defining the semi-logarithmic wage function originally proposed by Mincer (1974) as

$$\ln y_t = \sum_{l=1}^{L} \beta_l x_{lt} + u_t \quad (19)$$

where l denotes human capital characteristic l[5], β_l is the vector of rates of return on the various human capital characteristics l at time t[6], u_i is the vector of the residuals of the regression, representing the impact of unmeasured human capital characteristics. We will call $\bar{x}_{lt}$ the vector of the mean values of human capital characteristic l at time t .

The difference between the average values of the logarithms of wages at time 0 and 1, which is approximately equal to the growth rate of the wages between times 0 and 1, may therefore be expressed as

$$\overline{\ln y_1} - \overline{\ln y_0} = \sum_{l=1}^{L} \beta_{l1} \bar{x}_{l1} - \sum_{l=1}^{L} \beta_{l0} \bar{x}_{l0} \qquad (20)$$

Expression (20) shows that growth may be caused either by changes between the two periods in the average levels of human capital characteristics or/and in the rates of return on these human capital characteristics. Expression (20) may also be expressed as follows. Let $\sum_{l=1}^{L} \beta_{l1} \bar{x}_{l0}$ refer to what the expected logarithm of wages would have been in period 0, had the rates of return on the human capital characteristics been those received in period 1 and the level of human characteristics, those observed at time 0. Let also $\sum_{l=1}^{L} \beta_{l0} \bar{x}_{l1}$ represent the expected logarithm of wages at time 1, had the rates of return on human capital characteristics been those received at time 0 and the levels of these characteristics, those observed at time 1.

Following Reimers (1983) we may then write that

$$\overline{\ln y_1} - \overline{\ln y_0} = \sum_{l=1}^{L} \frac{(\beta_{l1} + \beta_{l0})}{2} (\bar{x}_{l1} - \bar{x}_{l0}) + \sum_{l=1}^{L} \frac{(\bar{x}_{l1} + \bar{x}_{l0})}{2} (\beta_{l1} - \beta_{l0}) \qquad (21)$$

[5] More generally l refers to an explanatory variable since some explanatory variables may not be human capital characteristics. For simplicity we will keep using the expression "human capital characteristics".

[6] More generally β_l is the coefficient of the explanatory variable l but, for simplicity, we will keep using the expression rate of return on the human capital characteristic.

The second element of the measure of mobility previously described measures structural change, which is the pure change in relative inequality that was observed during this same period.

We can now decompose this structural mobility and write that

$$St = \frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln y_{i0} - \ln y_{i1}) = \frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)[(\sum_{l=1}^{L}\beta_{l0}x_{li0} + u_{i0}) - (\sum_{l=1}^{L}\beta_{l1}x_{li1} + u_{i1})] \quad (22)$$

Using the well-known result according to which $(ab-cd) = \frac{(a+c)}{2}(b-d) + \frac{(b+d)}{2}(a-c)$ we end up with

$$St = (1/n^2)\sum_{i=1}^{n}(n-2i+1)\{[\sum_{l=1}^{L}((\beta_{l0}+\beta_{l1})/2)(x_{li0}-x_{li1}) + \sum_{l=1}^{L}((x_{li1}+x_{li0})/2)(\beta_{l0}-\beta_{l1})] + (u_{i0}-u_{i1})\} \quad (23)$$

Note that in defining structural mobility we assume no changes in the ranking of the individuals (and hence no exchange mobility) since at each time (0 or 1) the logarithm of the wages of the individuals are ranked by decreasing values.

The third component measures exchange mobility, that is, the element that represents the intensity of re-ranking having occurred during the period.

In equation (13) exchange mobility is expressed as $Ex = \frac{1}{n^2}\sum_{i=1}^{n}(n-2i+1)(\ln y_{11} - \ln y_{10})$.

Since y_{10} is a permutation of y_{11}, we can write that $\ln y_{10} = \ln \tilde{y}_{11}$ where the elements of $\ln \tilde{y}_{11}$ are the same as those of $\ln y_{11}$ but they have been re-ranked. More precisely let $\ln \tilde{y}_{11}$ be the vector of (the logarithms of) individual incomes at time 1 ranked by decreasing values of the logarithm of their income at time 0. Similarly let $\tilde{x}_{l1}$ be the vector of human capital characteristic l at time 1 ranked by their (decreasing) value at time 0.

We may then write that $\ln y_{10} = \ln \tilde{y}_{11} = \sum_{l=1}^{L} (\beta_{l1} \tilde{x}_{l1} + \tilde{u}_1)$ where the elements of the vectors of human capital characteristics $\tilde{x}_{l1}$ and of the unobservables $\tilde{u}_1$ are the same as those of x_{l1} and u_1 but they have been re-ranked in the same way as the element of $\ln \tilde{y}_{11}$. Then we may derive an expression for the contribution of each human capital characteristic and of the unmeasured characteristic to the exchange mobility.

We then obtain

$$Ex = (1/n^2) \sum_{i=1}^{n} (n - 2i + 1)(\ln y_{11} - \ln \tilde{y}_{11})$$
$$= (1/n^2) \sum_{i=1}^{n} (n - 2i + 1)[\sum_{l=1}^{L} (\beta_{l1} x_{l1} + u_1) - \sum_{l=1}^{L} (\beta_{l1} \tilde{x}_{l1} + \tilde{u}_1)] \quad (24)$$

This expression indicates that the degree of exchange mobility between the distributions is a function of two elements: a first element reflects differences in the human capital characteristics possessed by the individuals affected by permutation and the second element is due to differences in unmeasured characteristics among the individuals affected by the permutation.

We then end up with

$$Ex = (1/n^2) \sum_{i=1}^{n} (n - 2i + 1)[\sum_{l=1}^{L} \beta_{l1} (x_{l1} - \tilde{x}_{l1}) + (u_1 - \tilde{u}_1)] \quad (25)$$

6. An Empirical Illustration: Wage mobility in Israel between 1983 and 1995

6.1. The Data

The empirical illustration that will be presented here is based on the Israeli Censuses for the years 1983 and 1995. The data set includes households that had been asked to fill a questionnaire on their income in April 1983 as well as in September 1995. Such an extended questionnaire was added to the regular Census questionnaire for 20% of the households. Thus the joint sample includes about 4% (20% of 20%) of the population. This is still a large sample of the population and it provides an opportunity to study the extent of wage mobility in Israel during that period. The data have some obvious shortcomings. There are only two observations (1983 and 1995)

but, on the other hand, the sample size is big and there is no sample attrition. This is particularly useful when long-term mobility (12 years) is being investigated.

The dependent variables in our regressions are the logarithms of the hourly wages in 1983 and 1995. The sample analyzed includes Jewish male salaried workers[7] between 25 and 50 years of age. The latter restriction is made so that they should not be too old in 1995 and not too young in 1983. We divided the population in three groups: individuals born in Asia or Africa (Easterners), in Europe or America (Westerners)[8] and in Israel. Note that the sample does not include immigrants who arrived in Israel after 1983, particularly during the large wave of immigration from the former USSR that started at the end of 1989. We excluded individuals who belong to the first or last centile of the 1983 or 1995 wage distribution because of the likelihood of measurement errors. We finally ended up with 6017 observations for each Census year. Mincerian earnings functions were estimated separately for Easterners (1805 observations), Westerners (1465 observations) and individuals born in Israel (2747 observations). Descriptive statistics for these three groups are presented in Table 1.

6.2. Estimating earnings functions

The estimation of such earnings functions raises two issues. First, there may be a endogeneity bias because of *individual* unobserved heterogeneity. There are indeed some individual characteristics such as motivation, abilities that are not observed and they may affect some explanatory variables such as education, experience or occupation as well as the dependent variable, wages. The parameters can thus be biased. Two main strategies have been proposed in the literature to deal with individual unobserved heterogeneity. The first one consists of applying instrumental variables methods such as Heckman's two step procedure (1979). Our data however do not provide such instruments.

The second approach requires having data for different periods of time so that one can apply OLS to a model in first differences. This method considers therefore that the wage growth between two periods rather than the wage level is the dependent variable and this wage growth is then regressed on the change of individual characteristics that took place between two periods. With such a transformation all the time-invariant

[7] The sample of non Jewish male salaried workers between 25 and 50 years of age was too small; hence the database we used included only Jewish males.

[8] This group includes also Jews born in Australia, New Zealand or South Africa.

characteristics are eliminated as well as the individual unobserved heterogeneity[9] so that the parameters will be estimated without bias. Since in this study we need to estimate the parameters of time-invariant explicative variables, we cannot apply it.

This is why we propose another approach. We suggest introducing dummy variables indicating the position of individuals in the wage distribution in 1983 in the 1995 earnings function and the position of individuals in the wage distribution in 1995 in the 1983 earnings function. Such dummy variables may serve as proxies for the unobserved individual characteristics. The idea is that the position of an individual in the wage distribution may capture the effects of ability or motivation on wages, impacts that are assumed to remain constant over time. We thus introduce the 1^{st}, 5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, 95^{th}, 99^{th} centiles of the wage distributions.

A second source of bias is the potential existence of unobserved *group* heterogeneity. The argument here is that each group may have unobserved characteristics linked to their area of origin and such characteristics may affect both the wage and the explanatory variables, in particular education, experience and seniority. In other words we may want to assume that the response of an individual belongs to a kind of group specific fuzzy set, that is, the response of an individual may be endogenous and depend on the group to which he/she belongs. Such an endogeneity bias would clearly prevent us from comparing parameters between groups. For example, we could not rank the groups as far as the returns on individual characteristics are concerned because differences in returns may be due to differences in unobserved group characteristics. To solve this issue, we propose using a normalized measure of the explanatory variables[10] (e.g. education, experience, seniority, their squares and their interactions). As an illustration of the proposed standardization approach we take the case of education and propose to define a standardized educational variable ED_{st} as

ED_{st} = [(Years of education for an individual – Minimum years of education for the group) / (Maximum years of education for the group – Minimum years of education for the group)]

The definitions of the variables are given in Appendix 1. The results of the estimations are given in Tables 2.1 to 2.6. We first present results based on a simple

[9] Under the assumption that the individual unobserved heterogeneity is time-invariant.

[10] We borrow this idea from the work of Cerioli and Zani (1990) on fuzzy poverty measurement.

OLS procedure (method *A*), then results which are obtained when dummy variables are introduced to indicate the position of the individual in the wage distribution at another period of time (method *B*), and finally results derived when, in addition to introducing the position of the individual in the wage distribution at another period of time, we also normalize the quantitative explanatory variables (method *C*).

First we observe that when method *B* rather than method *A* is adopted, the coefficients in the regression are reduced, especially those of the educational variable, and such a result seems to be coherent with the idea that in using method *B* we succeed in controlling unobserved individual heterogeneity. One may also note that there are small differences in the ranking of the coefficients when method *B* is compared with method *C*,

Let us now turn to the results obtained when adopting method *C*. We obviously cannot directly interpret the coefficients but we can compare the results obtained for the various groups as well as observe differences over time. It appears that the rates of return on education among the Easterners were equal to 119.6% in 1983 but had a non significant effect in 1995. Those for the Westerners were equal to 115% in 1983 and 200.2% in 1995 while those for those born in Israel were equal to 246.1% in 1983 and 246.7% in 1995. Consequently, whereas the returns on education increase over time for Westerners, they fall and become insignificant for Easterners. This result suggests that there are differences between the groups in the quality of education and that such differences became even deeper over time.

As far as experience is concerned, the data of Tables 2.1 to 2.6 indicate, that in 1983 the return to experience was 0.884 for Easterners, 1.362 for Westerners and 2.283 for those born in Israel. However, for Westerners, experience has an additional impact of 91.1% on earnings, via its interaction with seniority. As a whole, the returns to experience are identical for Westerners and those born in Israel. Among Westerners, the experience in both Israel and in the country of origin is valorized on the market, whereas among Easterners experience has a much smaller return. The experience variable did not seem to have any significant impact on wages in 1995, whatever the group considered. This result suggests that the impact of experience on earnings is especially important at the beginning of the career, but beyond 13 years of experience, other determinants of wages are probably more important, such as the occupation, which may capture the effects of experience. The data indicate also that in 1983, among Easterners, married individuals earned on average 13.4% more than widowers

(widows), single or divorced individuals, this differential being equal to 11.3% in 1995. The corresponding figures among those born in Israel were 11.4% and 11.9% and among Westerners 11.9% and 13.7%.

6.3. Decomposing wage mobility

These earnings functions were then used to apply the wage mobility decomposition techniques described previously. Table 3 gives the value of the mobility index separately for the three subgroups[11] as well as the decomposition of wage mobility into the three components corresponding respectively to growth, structural mobility and exchange mobility. It should be stressed that since the dummy variables measuring the position of the individuals at the other Census were introduced to serve as proxies for the unobserved individual characteristics, these variables will be assumed to be part of the "unobservables".

It appears that the growth component was equal to almost 30% for Easterners, 27% for Westerners and 41% for individuals born in Israel. When we look at the specific contributions of human capital characteristics, rates of return on these characteristics and "unobservables" to this growth component, we first observe that none of these three components was significant among Easterners, since the bootstrap intervals (see, Efron and Gong, 1983, for more details on this technique) given in Table 3 include for each of these components the value zero. This result suggests that the different contributions to wage growth among Easterners are quite heterogeneous at the individual level. This would imply that the contribution of wage growth to the overall mobility may be due to human capital characteristics for some individuals but to the rates of return on these characteristics or to the "unobservables" for other individuals. In other words there is no general rule for this group whose members seem to have different types of wage mobility.

For Westerners or for the group of individuals born in Israel, Table 3 indicates that the most important contribution to wage growth is that of the coefficient of the explanatory variables, what we have labeled previously "rates of return on the human capital characteristics". Among those born in Israel, for example, the growth component was equal to 41% of which 29% is due to the contribution of rates of return. Similarly, among Westerners the contribution of rates of return is of 33%. As

[11] The database we used included only Jews so that the subgroups of the Jewish population correspond to different continents of birth.

previously mentioned, this contribution is not significant among Easterners. Since these rates of return depend on market conditions, their magnitude may not be the same in 1983 and 1995, and this is probably why the contribution of the rates of return is so important for the wage growth of Westerners and of those born in Israel. One should however stress that this variation in the coefficients of variables such as education or industry may concern only some educational categories or some specific industries, in particular those which are much in demand. As a consequence, if Easterners have a rather low level of education or if they often work in industries in decline, they will not benefit from the change in the rates of return. The descriptive statistics in Table 1 seem to confirm this hypothesis since we observe that the mean educational level is lower among Easterners and that they are less represented in dynamic industries such as financing and business services, or in an occupation like management.

Finally, we may note that the contribution of human capital characteristics is significant and positive for those born in Israel (4.9%) whereas it is significant and negative for Westerners (–8.2%). Such a result would suggest that, among those born in Israel but not among Westerners, the mean human capital characteristics are of higher value in 1995 than in 1983. This seems to be confirmed by the descriptive statistics since we may observe in Table 1 that the proportion of individuals in management or in the scientific and academic sector increased by 3.1% and 9% for Westerners but by 19.3% and 12.3% for those born in Israel. We can thus expect that, on average, the change in human capital characteristics was higher among those born in Israel than among Westerners.

Table 3 also indicates that the structural mobility component (measuring the pure change in relative inequality) was significantly negative for all the three groups, but its impact is quite small (-3.4% for Easterners, -2% for those born in Israel and -3.8% for Westerners). Note however that this reduction in wage inequality is mostly the consequence of the “unobservables”, which could, for example, reflect the impact of policies aiming at helping those with the lowest wages.

As far as exchange mobility is concerned, Table 3 indicates that its magnitude is the same (0.18) for each of the three groups and that this exchange mobility is also mainly explained by the "unobservables". In other words it is not education or experience that

influence exchange mobility but rather unobserved individual characteristics such as motivation, abilities or social capital. Needless to say, in such a case, it is much more difficult for policy makers to devise measures having an impact on this kind of mobility.

Finally we may also observe that the overall wage mobility is much higher among those born in Israel than among the two other groups. A look in Table 4 at the confidence intervals based on the bootstrap technique confirms that mobility is significantly higher among individuals born in Israel and slightly higher among Easterners than Westerners. Table 4 summarizes the results of the decomposition of the wage mobility into human capital, rates of return and unobservable characteristics components. It appears that among Easterners the overall mobility is equal to 44% of which almost 28% are due to differences in "unobservables" (a share of 62%, as indicated in Table 5). Note that the contribution of the other components is not significant. Such a result may suggest two things. First, wage mobility among Easterners is mostly due to unobserved characteristics such as motivation, abilities or social capital rather than to education or experience. Such a conclusion makes in fact sense if we assume, which is generally true, that education in this group is of a lower quality. Second, as a whole, the group of Easterners is rather heterogeneous.

Among individuals born in Israel the overall mobility index is equal to 57% of which 29% (corresponding to a share of 51%, as shown in Table 5) are related to rates of return on human capital characteristics, that is, to the impact of the regression coefficients and 6.3% (a share of 11.1%, as seen in Table 5) to human capital characteristics. One may observe that, for those born in Israel, the contribution of the "unobservables" to the overall mobility is not significant.

Finally, among Westerners, the mobility index is equal to 41% of which 31% (which, as indicated in Table 5, corresponds to a share of 77%) is due to rates of return on human capital characteristics. The impact of the other two components is not significant for this population subgroup. One should stress that even though it appears that among Westerners the impact of rates of return (the regression coefficients) is higher than among those born in Israel, the bootstrap confidence intervals show that this percentage difference (51% versus 77%) is not significant. Since the contribution of the “unobservables” is not significant, we may conclude that the exogenous

variables introduced in our model explain quite well the degree of wage mobility among Westerners and those born in Israel.

7. Conclusion

In the present paper a new index of wage mobility was defined and broken-down into three elements measuring respectively the average wage growth (in percentage terms), the change in wage dispersion (gap between the mean differences of the logarithms of wages in both periods) and the change in the ranking of the individuals.

We then extended Oaxaca's (1973) approach to decompose the first element which measures wage growth into components reflecting respectively the impact of human capital characteristics, rates of return on these characteristics and "unobservables". The second element of the wage mobility index is called structural mobility and is due to changes in wage inequality. It was broken down into three components measuring respectively the impact of changes in human capital characteristics, in the rates of return on these characteristics and in unobserved characteristics. The third component of the overall wage mobility is called exchange mobility and assumes that re-ranking has a positive impact on mobility. This exchange mobility was broken down into two components measuring respectively the impact of human capital characteristics and of unobserved characteristics.

The empirical illustration focused on wage mobility in Israel between 1983 and 1995. It showed that wage mobility was significantly higher among Jews born in Israel, and that for this group wage mobility is mainly due to the rates of return on human capital characteristics and the human capital characteristics. In trying to explain this difference between the degree of wage mobility among those born in Israel and among Easterners and Westerners, we stressed several points. First, among Easterners, human capital characteristics (e.g. education) are probably of lower quality and thus less likely to contribute to wage mobility. "Unobservables" such as social capital or abilities play certainly a greater role. Second, we advanced the hypothesis that the population which constitutes the subgroup of Easterners is much more heterogeneous so that there is much more diversity in the types of individual wage mobility. Third, among Westerners, the main determinants of wage mobility, in particular of wage growth, are the rates of return on human capital characteristics. In fact we observed that the average level of human capital characteristics among

Westerners did not increase between 1983 and 1995 whereas such an increase occurred among those born in Israel. One possible explanation for such a difference is that lifelong learning may have been more difficult for Westerners, a group composed of individuals who were born abroad and had thus already to face all the difficulties related to the assimilation process in a new country.

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Appendix 1: Definitions of the Variables

Hourly wage - Average monthly gross salary divided by 4.33 (number of weeks per month) and then divided by the number of hours of work per week.
Experience – Potential experience. We have defined experience in the traditional way, that is, as age minus years of schooling minus 6 (This implies that the years spent in the army are considered as part of the working experience).
Experience squared – The square of the number of years of potential experience.
Seniority in the country – The number of years an individual has been living in Israel.
Seniority square in the country – The square of the number of years an individual has been living in Israel.
Education – Years of schooling.
Education square – The square of the number of years of schooling.
Seniority*Education – Number of years an individual has been living in Israel times the number of years of education.
Seniority*Experience – Number of years an individual has been living in Israel times Experience.
Married – A dummy variable equal to 1 if the individual is married, to 0 otherwise (divorced, widow or separated).
Industry 0 – A dummy variable equal to 1 if the individual is employed in the agricultural industry, to 0 otherwise.
Industry 1 – A dummy variable equal to 1 if the individual is employed in sub-group 1 of the mining and manufacturing industry[12], to 0 otherwise.
Industry 2 – A dummy variable equal to 1 if the individual is employed in sub-group 2 of the mining and manufacturing industries[13], to 0 otherwise.
Industry 3 – A dummy variable equal to 1 if the individual is employed in the electricity and water industries, to 0 otherwise.
Industry 4 – A dummy variable equal to 1 if the individual is employed in the construction industry, to 0 otherwise.
Industry 5 – A dummy variable equal to 1 if the individual is employed in trade activities, restaurants or the hotel industry, to 0 otherwise.
Industry 6 – A dummy variable equal to 1 if the individual is employed in the transport, storage or communication industries, to 0 otherwise.
Industry 7 – A dummy variable equal to 1 if the individual is employed in the financing and business services industry, to 0 otherwise.
Industry 8 – A dummy variable equal to 1 if the individual is employed in the public and community services industry, to 0 otherwise.
Industry 9 – A dummy variable equal to 1 if the individual is employed in the personal and other service industries, to 0 otherwise.
Industry . – A dummy variable equal to 1 if the industry in which the individual is employed is unknown, to 0 otherwise.
Occupation 1- A dummy variable equal to 1 if the individual is employed in scientific and academic occupations, to 0 otherwise.
Occupation 2- A dummy variable equal to 1 if the individual is employed as a technician or as free lance, to 0 otherwise.

[12] Sub-group 1 includes mining and quarrying, food, textiles, clothing, leather and product, wood and products, paper and products, printing and publishing and rubber and plastic.
[13] Sub-group 2 includes chemicals, petroleum, non metallic minerals, basic metal industry, metal products, machinery, electrical and electronic equipment, manufacture of transport equipment, diamonds and miscellaneous.

Occupation 3- A dummy variable equal to 1 if the individual is employed as a in manager, to 0 otherwise.
Occupation 4- A dummy variable equal to 1 if the individual has an office or administrative occupation, to 0 otherwise.
Occupation 5- A dummy variable equal to 1 if the individual is employed in sales and related occupations, to 0 otherwise.
Occupation 6- A dummy variable equal to 1 if the individual is employed in service occupations, to 0 otherwise.
Occupation 7- A dummy variable equal to 1 if the individual is employed in agricultural occupations, to 0 otherwise.
Occupation 8- A dummy variable equal to 1 if the individual is employed in industrial occupations, to 0 otherwise.
Occupation 9- A dummy variable equal to 1 if the individual is employed in building or transportation occupations, to 0 otherwise.
Occupation .- – A dummy variable equal to 1 if the occupation of the individual is unknown, to 0 otherwise.

TABLE 1: Descriptive Statistics

		Easterners	Born in Israel	Westerners
Wage in 1983	Mean	23.3	27.4	30.4
	Standard Deviation	13.9	15.9	16.9
Wage in 1983	Mean	32.2	41.9	41.1
	Standard Deviation	20.9	25	24.4
Experience in 1983	Mean	20.9	13.9	18.5
	Standard Deviation	8.1	6.7	7.8
Experience in 1995	Mean	33	26.1	31
	Standard Deviation	8.1	6.9	8.1
Education in 1983	Mean	10.5	13	13.3
	Standard Deviation	3.5	3.4	3.5
Education in 1995	Mean	10.7	13.2	13.2
	Standard deviation	3.5	3.4	3.6
Seniority in 1983	Mean	26.6		20.8
	Standard deviation	7.6		11.5
Seniority in 1995	Mean	38.6		32.8
	Standard deviation	7.6		11.5
Marital status in 1983	%	93	85	94.5
Marital status in 1995	%	94.9	92.3	94.3
Industry in 1983	Agricultural	4.8	5.2	4.3
	Mining and manufacturing	12.6	7.8	9.1
	Mining and manufacturing	23.1	21.6	29.5
	Electricity and water industry	1.9	3.1	3.7
	Construction	7.9	3.6	2.7
	Trade activities, restaurant or hotel	8.3	8.6	6.6
	Transport, storage or communication	8.5	7.8	6.5
	Financing and business services	5.7	11.5	7.9
	Public and community services	24.6	27.9	27.4
	Personal and other services	2.7	3	2.4
Industry in 1995	Agricultural	6	5.1	4.4
	Mining and manufacturing	9.8	6.4	5.7
	Mining and manufacturing	21.2	21.7	27.2
	Electricity and water industry	2.1	3	4.1
	Construction	7.2	4.4	3.3
	Trade activities, restaurant or hotel	9.9	11.1	8.2
	Transport, storage or communication	9.2	8.6	7.1
	Financing and business services	8.2	14.2	12.2
	Public and community services	24.4	24.2	25.7
	Unknown	2.1	1.3	2.1
Occupation in 1983	Scientific and academic sector	14	21.1	25.6
	Technicians and free lances	9	14.5	16.2
	Management	5.9	10.9	9.6
	Office and administrative	13.4	13	9.8
	Sales and related occupations	3.4	5.1	3.3
	Services	7.4	4.8	3.7
	Agricultural	1.2	1	0.3
	Industrial	25.7	16.9	20.4
	Building and transportation	15.9	10.9	8.6
	Unknown	4.2	1.9	2.5
Occupation in 1995	Scientific and academic sector	14.5	23.7	27.9
	Technicians and free occupation	5.4	8.2	10.5
	Management	6.7	13	9.9
	Office and administrative	15.5	14.6	12.6
	Sales and related occupations	3.4	5.5	3.6
	Services	4.3	3.4	2.9
	Agricultural	0.9	0.6	0.3
	Industrial	19.8	13.6	16.7
	Building and transportation	14.8	8.2	7.2
	Unknown	14.7	9.1	8.3

TABLE 2.1 : 1983- Earnings Function for the Easterners

1805 INDIVIDUALS	METHOD A		METHOD B		METHOD C	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Intercept	1.572	0.249***	1.697	0.257***	1.735	0.245***
Experience	0.018	0.009**	0.020	0.008**	0.884	0.364**
Experience square	-0.0001	0.0002	-0.0002	0.0002	-0.346	0.356
Seniority	0.032	0.01092***	0.030	0.010***	1.389	0.489***
Seniority square	-0.0004	0.0002**	-0.0004	0.0002**	-0.924	0.397**
Education	0.051	0.0189***	0.043	0.018**	1.196	0.508**
Education square	0.0007	0.0006	0.0007	0.0006	0.528	0.432
Seniority*Experience	-0.0001	0.0003	-0.00006	0.0003	-0.111	0.450
Seniority*Education	-0.0002	0.0005	-0.0005	0.0004	-0.413	0.371
Married	0.170	0.047***	0.134	0.045***	0.134	0.045***
Industry 0	-0.033	0.058	0.0004	0.05499	0.0004	0.05499
Industry 1	-0.145	0.041***	-0.132	0.039***	-0.132	0.039***
Industry 3	-0.145	0.085*	-0.281	0.081***	-0.281	0.081***
Industry 4	-0.148	0.047***	-0.153	0.045***	-0.153	0.045***
Industry 5	-0.202	0.050***	-0.205	0.048***	-0.205	0.048***
Industry 6	-0.039	0.046	-0.092	0.044**	-0.092	0.044**
Industry 7	-0.014	0.058	-0.082	0.056	-0.082	0.056
Industry 8	-0.095	0.037***	-0.131	0.035***	-0.131	0.035***
Industry 9	-0.102	0.075	-0.117	0.071	-0.117	0.071
Occupation 1	0.054	0.042	0.009	0.040	0.009	0.040
Occupation 2	0.182	0.048***	0.109	0.046**	0.109	0.046**
Occupation 3	0.289	0.056***	0.205	0.054***	0.205	0.054***
Occupation 4	0.044	0.042	-0.0009	0.040	-0.0009	0.040
Occupation 5	0.004	0.074	-0.012	0.070	-0.012	0.070
Occupation 6	-0.101	0.053*	-0.094	0.050*	-0.094	0.050*
Occupation 7	-0.020	0.111	-0.082	0.105	-0.082	0.105
Occupation 9	-0.050	0.038	-0.061	0.036*	-0.061	0.036*
Occupation NSP	-0.011	0.061	-0.045	0.058	-0.045	0.058
5%			-0.208	0.125*	-0.208	0.125*
10%			-0.186	0.122	-0.186	0.122
25%			-0.096	0.116	-0.096	0.116
50%			0.065	0.115	0.065	0.115
75%			0.130	0.115	0.130	0.115
90%			0.343	0.117***	0.343	0.117***
95%			0.340	0.124***	0.340	0.124***
99%			0.485	0.126***	0.485	0.126***
100%			0.201	0.157	0.201	0.157
R2	0.2163		0.2999		0.2999	

TABLE 2.2 : 1983- Earnings Function for those born in Israel

2747 INDIVIDUALS	METHOD A		METHOD B		METHOD C	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Intercept	1.088	0.125***	1.378	0.152***	1.269	0.156***
Experience	0.059	0.006***	0.054	0.006***	2.283	0.239***
Experience square	-0.001	0.0002***	-0.001	0.0002***	-1.659	0.256***
Education	0.134	0.016***	0.091	0.016***	2.461	0.4278***
Education square	-0.002	0.0006***	-0.001	0.0005**	-0.786	0.398**
Married	0.142	0.028***	0.114	0.027***	0.114	0.027***
Industry 0	-0.099	0.045**	-0.069	0.043	-0.069	0.043
Industry 1	-0.057	0.039	-0.051	0.038	-0.051	0.038
Industry 3	0.093	0.058	0.001	0.056	0.001	0.056
Industry 4	-0.104	0.052**	-0.100	0.050**	-0.100	0.050**
Industry 5	-0.198	0.041***	-0.161	0.039***	-0.161	0.039***
Industry 6	-0.104	0.040***	-0.123	0.039***	-0.123	0.039***
Industry 7	-0.055	0.037	-0.099	0.035***	-0.099	0.035***
Industry 8	-0.161	0.029***	-0.168	0.028***	-0.168	0.028***
Industry 9	-0.067	0.058	-0.071	0.056	-0.071	0.056
Occupation 1	0.130	0.037***	0.067	0.035*	0.067	0.035*
Occupation 2	0.201	0.037***	0.136	0.036***	0.136	0.036***
Occupation 3	0.191	0.041***	0.099	0.039**	0.099	0.039**
Occupation 4	0.093	0.038**	0.065	0.037*	0.065	0.037*
Occupation 5	0.036	0.053	0.021	0.050	0.021	0.050
Occupation 6	0.063	0.051	0.045	0.049	0.045	0.049
Occupation 7	-0.122	0.100	-0.173	0.096*	-0.173	0.096*
Occupation 9	0.021	0.038	0.003	0.036	0.003	0.036
Occupation NSP	-0.110	0.073	-0.091	0.070	-0.091	0.070
5%			-0.090	0.102	-0.090	0.102
10%			-0.080	0.100	-0.080	0.100
25%			-0.007	0.094	-0.007	0.094
50%			0.172	0.093*	0.172	0.093*
75%			0.311	0.094***	0.311	0.094***
90%			0.396	0.095***	0.396	0.095***
95%			0.458	0.101***	0.458	0.101***
99%			0.459	0.103***	0.459	0.103***
100%			0.524	0.129***	0.524	0.129***
R2	0.2892		0.3526		0.3526	

TABLE 2.3 : 1983- Earnings Function for the Westerners

1465 INDIVIDUALS	METHOD A		METHOD B		METHOD C	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Intercept	1.527	0.207***	1.850	0.230***	1.864	0.227***
Experience	0.036	0.008***	0.032	0.007***	1.362	0.317***
Experience square	-0.0009	0.0002***	-0.0008	0.0002***	-1.438	0.360***
Seniority	0.023	0.008***	0.014	0.007*	0.703	0.365*
Seniority square	-0.0006	0.0001***	-0.0005	0.00011767***	-1.293	0.294***
Education	0.083	0.023***	0.046	0.022**	1.150	0.555**
Education square	-0.0008	0.0008	-0.0002	0.0007	-0.112	0.462
Seniority*Experience	0.0005	0.0002**	0.0005	0.0002***	0.911	0.326***
Seniority*Education	0.0001	0.0004	0.0002	0.0003	0.235	0.348
Married	0.131	0.058	0.119	0.055**	0.119	0.055**
Industry 0	-0.232	0.065***	-0.166	0.062***	-0.166	0.062***
Industry 1	-0.305	0.048***	-0.274	0.046***	-0.274	0.046***
Industry 3	0.047	0.069	-0.079	0.067	-0.079	0.067
Industry 4	-0.243	0.079***	-0.234	0.075***	-0.234	0.075***
Industry 5	-0.271	0.057***	-0.210	0.055***	-0.210	0.055***
Industry 6	-0.096	0.055*	-0.159	0.053***	-0.159	0.053***
Industry 7	-0.041	0.053	-0.109	0.051**	-0.109	0.051**
Industry 8	-0.259	0.036***	-0.289	0.034***	-0.289	0.034***
Industry 9	-0.294	0.086***	-0.304	0.082***	-0.304	0.082***
Occupation 1	0.212	0.044***	0.125	0.043***	0.125	0.043***
Occupation 2	0.219	0.045***	0.154	0.043***	0.154	0.043***
Occupation 3	0.261	0.054***	0.179	0.052***	0.179	0.052***
Occupation 4	0.092	0.051*	0.070	0.049	0.070	0.049
Occupation 5	-0.049	0.079	-0.088	0.075	-0.088	0.075
Occupation 6	-0.031	0.074	-0.012	0.071	-0.012	0.071
Occupation 7	-0.100	0.220	-0.144	0.211	-0.144	0.211
Occupation 9	0.085	0.052	0.061	0.050	0.061	0.050
Occupation NSP	0.012	0.086	-0.020	0.082	-0.020	0.082
5%			0.005	0.137	0.005	0.137
10%			-0.026	0.134	-0.026	0.134
25%			-0.006	0.127	-0.006	0.127
50%			0.166	0.125	0.166	0.125
75%			0.350	0.126***	0.350	0.126***
90%			0.481	0.128***	0.481	0.128***
95%			0.471	0.136***	0.471	0.136***
99%			0.558	0.139***	0.558	0.139***
100%			0.352	0.175**	0.352	0.175**
R2	0.3018		0.3744		0.3744	

TABLE 2.4 : 1995- Earnings Function for the Easterners

1805 INDIVIDUALS	METHOD A		METHOD B		METHOD C	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Intercept	1.784	0.485***	2.32	0.473***	2.432	0.268***
Experience	0.014	0.013	-0.006	0.013	-0.253	0.542
Experience square	-0.00006	0.0002	0.0002	0.0002	0.465	0.585
Seniority	0.029	0.015*	0.016	0.014	0.789	0.692
Seniority square	-0.0001	0.0002	-0.00002	0.0002	-0.061	0.619
Education	0.027	0.023	0.026	0.022	0.628	0.536
Education square	0.002	0.0006***	0.0008	0.0006	0.456	0.337
Seniority*Experience	-0.0003	0.0003	-0.0002	0.0003	-0.625	0.824
Seniority*Education	-0.0004	0.0005	-0.0003	0.0005	-0.310	0.511
Married	0.134	0.055**	0.113	0.052**	0.113	0.052**
Industry 0	-0.171	0.059***	-0.122	0.056**	-0.122	0.056**
Industry 1	-0.093	0.048*	-0.038	0.046	-0.038	0.046
Industry 3	0.309	0.089***	0.339	0.084***	0.339	0.084***
Industry 4	0.085	0.055	0.144	0.053***	0.144	0.053***
Industry 5	-0.134	0.050***	-0.053	0.048	-0.053	0.048
Industry 6	0.093	0.049*	0.120	0.047**	0.120	0.047**
Industry 7	0.108	0.052**	0.091	0.050*	0.091	0.050*
Industry 8	0.021	0.039	0.073	0.037*	0.073	0.037*
Industry 9	0.075	0.089	0.090	0.084	0.090	0.084
Occupation 1	0.144	0.045***	0.122	0.043***	0.122	0.043***
Occupation 2	0.192	0.061***	0.113	0.059*	0.113	0.059*
Occupation 3	0.449	0.058***	0.342	0.055***	0.342	0.055***
Occupation 4	0.116	0.044***	0.068	0.042	0.068	0.042
Occupation 5	-0.058	0.076	-0.110	0.072	-0.110	0.072
Occupation 6	-0.034	0.068	-0.030	0.065	-0.030	0.065
Occupation 7	-0.104	0.134	0.003	0.128	0.003	0.128
Occupation 9	-0.055	0.044	-0.045	0.042	-0.045	0.042
Occupation NSP	-0.130	0.044***	-0.124	0.042***	-0.124	0.042***
5%			0.031	0.127	0.031	0.127
10%			-0.098	0.124	-0.098	0.124
25%			0.034	0.116	0.034	0.116
50%			0.153	0.115	0.153	0.115
75%			0.292	0.115**	0.292	0.115**
90%			0.42520	0.117***	0.42520	0.117***
95%			0.65311	0.125***	0.65311	0.125***
99%			0.59941	0.128***	0.59941	0.128***
100%			0.27522	0.159*	0.27522	0.159*
R2	0.2595		0.3381		0.3381	

TABLE 2.5 : 1995- Earnings Function for those born in Israel

2747 INDIVIDUALS	METHOD A		METHOD B		METHOD C	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Intercept	1.332	0.186***	2.049	0.205***	2.037	0.169***
Experience	0.028	0.010***	-0.002	0.010	-0.088	0.410
Experience square	-0.0003	0.0002*	0.00007	0.0002	0.181	0.421
Education	0.147	0.018***	0.103	0.018***	2.467	0.425***
Education square	-0.003	0.0006***	-0.002	0.0006***	-1.197	0.358***
Married	0.146	0.037***	0.119	0.035***	0.119	0.035***
Industry 0	-0.170	0.050***	-0.103	0.048**	-0.103	0.048**
Industry 1	-0.0484	0.045	-0.0239	0.043	-0.0239	0.043
Industry 3	0.301	0.061***	0.269	0.058***	0.269	0.058***
Industry 4	-0.047	0.053	-0.020	0.051	-0.020	0.051
Industry 5	-0.133	0.038***	-0.086	0.037**	-0.086	0.037**
Industry 6	-0.001	0.041	0.041	0.039	0.041	0.039
Industry 7	0.105	0.035***	0.113	0.034***	0.113	0.034***
Industry 8	-0.032	0.031	0.022	0.030	0.022	0.030
Industry 9	0.149	0.089*	0.177	0.086**	0.177	0.086**
Occupation 1	0.220	0.038***	0.175	0.036***	0.175	0.036***
Occupation 2	0.178	0.045***	0.114	0.044***	0.114	0.044***
Occupation 3	0.405	0.041***	0.345	0.040***	0.345	0.040***
Occupation 4	0.104	0.039***	0.083	0.038**	0.083	0.038**
Occupation 5	0.057	0.053	0.038	0.050	0.038	0.050
Occupation 6	0.068	0.062	0.039	0.059	0.039	0.059
Occupation 7	-0.083	0.135	-0.001	0.130	-0.001	0.130
Occupation 9	0.127	0.045***	0.104	0.043**	0.104	0.043**
Occupation NSP	0.045	0.043	0.034	0.042	0.034	0.042
5%			0.023	0.107	0.023	0.107
10%			-0.055	0.105	-0.055	0.105
25%			0.091	0.099	0.091	0.099
50%			0.229	0.098**	0.229	0.098**
75%			0.371	0.098***	0.371	0.098***
90%			0.477	0.100***	0.477	0.100***
95%			0.570	0.106***	0.570	0.106***
99%			0.618	0.108***	0.618	0.108***
100%			0.684	0.136***	0.684	0.136***
R2	0.2864		0.3486		0.3486	

TABLE 2.6 : 1995- Earnings Function for the Westerners

1465 INDIVIDUALS	METHOD A		METHOD B		METHOD C	
Variable	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**	**Coefficient**	**Std Error**
Intercept	0.922	0.357***	1.704	0.373***	2.054	0.253***
Experience	0.020	0.013	-0.003	0.013	-0.162	0.591
Experience square	-0.0004	0.0002*	-0.00003	0.0002	-0.094	0.642
Seniority	0.047	0.011***	0.033	0.011***	1.618	0.533***
Seniority square	-0.0004	0.0001***	-0.0003	0.0001**	-0.982	0.478**
Education	0.111	0.025***	0.083	0.024***	2.002	0.571***
Education square	-0.0009	0.0008	-0.001	0.0007	-0.553	0.415
Seniority*Experience	0.0001	0.0002	0.00002	0.0002	0.053	0.556
Seniority*Education	-0.0009	0.0004**	-0.0006	0.0004	-0.727	0.451
Married	0.178	0.059***	0.137	0.056**	0.137	0.056**
Industry 0	0.045	0.072	0.126	0.069*	0.126	0.069*
Industry 1	-0.098	0.065	-0.028	0.062	-0.028	0.062
Industry 3	0.412	0.073***	0.379	0.069***	0.379	0.069***
Industry 4	-0.109	0.081	-0.022	0.077	-0.022	0.077
Industry 5	-0.158	0.058***	-0.094	0.055*	-0.094	0.055*
Industry 6	0.106	0.059*	0.156	0.056***	0.156	0.056***
Industry 7	0.063	0.050	0.087	0.047*	0.087	0.047*
Industry 8	0.049	0.040	0.121	0.039***	0.121	0.039***
Industry 9	0.086	0.100	0.124	0.096	0.124	0.096
Occupation 1	0.222	0.048***	0.147	0.046***	0.147	0.046***
Occupation 2	0.201	0.056***	0.118	0.054**	0.118	0.054**
Occupation 3	0.329	0.059***	0.251	0.057***	0.251	0.057***
Occupation 4	0.007	0.054	-0.030	0.051	-0.030	0.051
Occupation 5	0.001	0.082	-0.032	0.078	-0.032	0.078
Occupation 6	-0.163	0.090*	-0.140	0.086	-0.140	0.086
Occupation 7	0.044	0.240	0.036	0.229	0.036	0.229
Occupation 9	-0.010	0.063	-0.009	0.060	-0.009	0.060
Occupation NSP	-0.047	0.060	-0.099	0.057*	-0.099	0.057*
5%			-0.095	0.147	-0.095	0.147
10%			-0.095	0.143	-0.095	0.143
25%			0.054	0.135	0.054	0.135
50%			0.207	0.133	0.207	0.133
75%			0.377	0.134***	0.377	0.134***
90%			0.484	0.136***	0.484	0.136***
95%			0.537	0.145***	0.537	0.145***
99%			0.526	0.148***	0.526	0.148***
100%			0.671	0.185***	0.671	0.185***
R2	0.3236		0.3932		0.3932	

Table 3: Decomposition of the Wage Mobility between 1983 and 1995 into Growth, Structural and Exchange Mobility

Elements of the Decomposition	Easterners	Individuals Born in Israel	Westerners
Growth (GR)	0.296* (0.27;0.32)	0.411* (0.39; 0.43)	0.271* (0.24;0.3)
Contribution of Human Capital Characteristics	0.012 (-0.04;0.07)	0.049* (0.019; 0.08)	-0.082* (-0.15; -0.19)
Contribution of Rates of Return on Human Capital Characteristics	0.154 (-0.14;0.4)	0.288* (0.06; 0.53)	0.33* (0.02;0.63)
Contribution of Unobservable Characteristics	0.129 (-0.13;0.42)	0.074 (-0.16; 0.29)	0.025 (-0.3; 0.33)
Structural Mobility (St)	-0.034* (-0.045;-0.023)	-0.0196* (-0.03; -0.01)	-0.038* (-0.05; -0.02)
Contribution of Human Capital Characteristics	-0.011*(-0.016;-0.005)	0.0028 (-0.002; 0.008)	-0.003 (-0.01;0.003)
Contribution of Rates of Return on Human Capital Characteristics	-0.006 (-0.02;0.004)	-0.0038 (-0.009; 0.009)	-0.015* (-0.028;-0.002)
Contribution of Unobservable Characteristics	-0.017* (-0.03; -0.002)	-0.023* (-0.04; -0.008)	-0.02* (-0.04; -0.001)
Exchange Mobility (Ex)	0.181* (0.17;0.19)	0.176* (0.17;0.18)	0.178* (0.16;0.19)
Contribution of Human Capital Characteristics	0.018* (0.01;0.03)	0.011* (0.008;0.02)	0.022* (0.018;0.03)
Contribution of Unobservable Characteristics	0.163* (0.15;0.17)	0.165* (0.15;0.17)	0.16* (0.14;0.17)
Overall Wage Mobility M (M = GR + St + Ex)	0.443* (0.42;0.47)	0.568* (0.54;0.59)	0.412* (0.38;0.44)

Note: The numbers in parenthesis give confidence intervals based on the bootstrap technique.
* significant.

Table 4: Decomposition of the Overall Wage Mobility between 1983 and 1995 into Components Reflecting the Impact of Human Capital Characteristics, Rates of Return on these Characteristics and Unobservable Characteristics.

Elements of the Decomposition	Easterners	Individuals born in Israel	Westerners
Overall Wage Mobility Index	0.443* (0.42;0.47)	0.568* (0.54;0.6)	0.412* (0.38;0.44)
Contribution of Human Capital Characteristics	0.019 (-0.04;0.08)	0.063* (0.03;0.1)	-0.063 (-0.12;0.003)
Contribution of Rates of Return on Human Capital Characteristics	0.149 (-0.14;0.41)	0.289* (0.06;0.53)	0.313* (0.004;0.62)
Contribution of Unobservable Characteristics	0.276* (0.02;0.55)	0.216 (-0.02;0.44)	0.16 (-0.15;0.46)

Note: The numbers in parenthesis give confidence intervals based on the bootstrap technique.
significant.

Table 5: Percentage Decomposition of the Overall Wage Mobility between 1983 and 1995 into Components Reflecting the Impact of Human Capital Characteristics, Rates of Return on these Characteristics and Unobservable Characteristics.

Elements of the Decomposition	Easterners	Individuals born in Israel	Westerners
	100%	100%	100%
Contribution of Human Capital Characteristics	4.27% (-7.8%;19%)	11.09%* (6%;17.5%)	-15.4% (-30.7%;6.2%)
Contribution of Rates of Return on Human Capital Characteristics	33.55% (-32%;91%)	50.85%* (9.7%;93%)	76.17%* (0.1%;150%)
Contribution of Unobservable Characteristics	62.18%*(4.12%;127%)	38.06% (-4.1%;77%)	39.23% (-35%;114%)

Note: the numbers in parenthesis give confidence intervals based on the bootstrap technique.
* significant.