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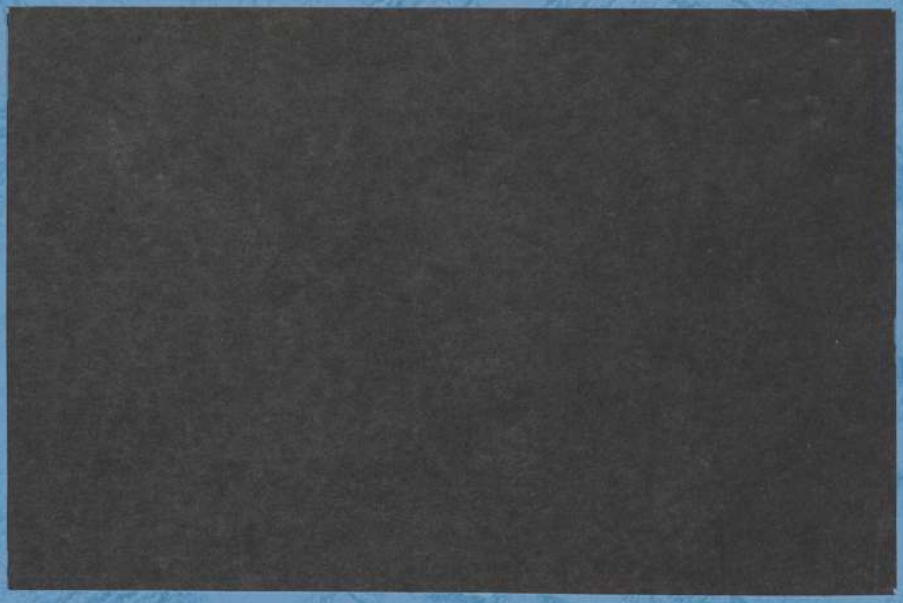

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הפקולטה למדעי החברה אוניברסיטת תל-אביב

RESISTING MIGRATION: WAGE RIGIDITY AND INCOME DISTRIBUTION

by

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ABSTRACT

Like any trade activity, migration tends to generate gains to all parties involved, the migrants as well as the native–born population. However, with a mal–functioning labor market, migration will exacerbate the imperfections in the market. Consequently, it may lead to losses to the native–born population which typically are quite sizable. Another economic problem raised by migration is the additional toll imposed on the welfare–state income–distribution institutions. Being unable to exclude migrants from the various entitlement programs and public services, the modern welfare state can find migration rather costly. These two economic considerations may help explain the resistance to migration despite the pure gains–from–trade benefits created by it. Immigration could be more beneficial to the native–born population when the labor markets are better–functioning and the welfare programs are less comprehensive.

JEL Classification: F22, H11

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NON TECHNICAL SUMMARY

The conventional wisdom of welfare economics is that free flow of goods and factors of production (including labor) tend to enhan ce the efficiency of the allocation of resources within and across countries. Migration, which typically shifts labor from economies with low productivity to economies with high productivity, should accordingly raise global output. It is also well known that a country stands to gain from in-migration which raises the consumption of the native-born (domestic output minus the wage payments to the migrants). Even though certain sectors in the labor-receiving country (e.g., native-born labor which is a substitute for foreign labor) may lose, there are conceivably some non-distortionary (lump-sum) redistribution mechanisms which can compensate these sectors.

Nevertheless, in practice, one can find widespread resistance to guest workers or migrants in the labor-receiving country. This paper highlights, by means of a stylized model, these two economic considerations, which may explain the reason behind such resistance.

First, if wages are rigid (due to unionism, search costs, efficiency wage contracts, etc.), labor migration may well reduce the share of the native-born population (skilled labor, unskilled labor, and capital) in the migration-induced domestic income. Furthermore, we find that while with flexible wages the gain from migration is minuscule, with wage rigidity, migration may cause substantial losses to the native-born population. Also, with

wage rigidity migration induces investment misallocation between human and physical capital which exacerbates the losses.

Second, low-income migrants typically increase the economic costs that are associated with (the non-lumpsum) income redistribution policies (thereby imposing an additional burden on a modern welfare state that attracts immigration). In the face of immigration, a typical welfare state may find that it is impossible to redistribute income to the native-born population in a way which will make all domestic sectors better off.

Consequently, one may conjecture that thf the Western European countries) than in economies with more labor market flexibility and less comprehensive social welfare programs (such as the United States). To be able to benefit from the standard gains-from-trade benefits, the government may want to improve the functioning of the labor markets (with possible compensation to wage earners which compete with the unskilled migrants) and to activate less comprehensive welfare programs.

The paper develops a stylized model in order to articulate these considerations. The model is then calibrated to assess the magnitude of the gains and the losses from migration.

1 Introduction

The conventional wisdom of welfare economics is that a free flow of goods and factors of production (including labor) enhances the efficiency of the allocation of resources. Migration which typically shifts workers from economies with low productivity of labor to economies with high productivity of labor can accordingly raise global output. It is also well known that generally a country stands to gain from in-migration, which tends to increase its consumption (output, minus wage payments to migrants). Even though certain sectors in the receiving country (e.g. native-born workers that are a substitute for migrants) may lose, there are conceivably some non-distortionary lump-sum redistribution mechanisms that enlarge the share of every sector in the national pie.

Nevertheless, in practice, one may often find a widespread resistance to guest workers or migrants in the receiving (destination) country. In this paper we highlight two **economic considerations** that may explain the reasons behind such resistance.

First, when wages are rigid (due to unionism, search costs, efficiency wage elements, etc.), migration may well lower the total share of the native population (skilled labor, unskilled labor, capital, etc.) in the domestic output. Furthermore, while with flexible wages the gain from migration is miniscule, with wage rigidity, migration may inflict a substantial loss to the native population. Also, with wage rigidity migration induces a misallocation of investment between human and physical capital.

Second, low-income migrants increase the economic costs of non lump-sum income redistribution policies (which are inevitably more common in practice), thereby imposing a burden on the modern welfare state. For instance, a typical welfare state may find it impossible to redistribute income in a way that makes all sectors better off. Indeed, the opposite may be true; all may lose from migration. Thus, one may conjecture that resistance

to migration should be stronger and more widespread in economies with less wage flexibility and more comprehensive welfare programs (such as many of the countries in Western Europe) than in economies with more wage flexibility and less comprehensive welfare programs (such as the United States).

The paper is organized as follows. Section 2 analyzes the effects of wage rigidity and investment in physical and human capital on the potential gains from migration. Section 3 describes the implications of the modern welfare state for the welfare gains (losses) from migration. We conclude the paper in Section 4.

2 Wage Flexibility and Migration

Following Saint-Paul (1994), we assume a stylized economy in which there are only two types of labor productivity: "low" and "high". While a high productivity worker provides one efficiency unit of labor, the low productivity worker provides only $\rho < 1$ efficiency units of labor. A person can acquire education which makes her a high-productivity worker (denoted "skilled" worker). If she does not acquire education she remains a low-productivity worker (denoted "unskilled" worker). There is a continuum of individuals varying in their cost of acquiring education (due to innate ability). We assume that the distribution of these costs in the population is uniform over the interval $[0, \bar{c}]$.

Each individual can either invest in human capital (through education) or in physical capital (which yields a return r). There exists a cut-off cost level, c^*, such that all those with education-cost below c^* invest in human capital and become skilled workers while all the rest remain unskilled. Denoting the wage per efficiency unit by w, the cut-off cost level is determined by an equality between the marginal return and marginal opportunity cost (via investment in physical capital) to education:

$$(1+r)c^* = [(1-u_1) - \rho(1-u_2)]\ w, \tag{1}$$

where u_i is the unemployment rate among workers of type i (where $i = 1$ denotes "skilled" and $i = 2$ denotes "unskilled".) Notice that in calculating the return to education, one must take into account the differential wage and the probability of attaining employment for skill level i (namely, $1 - u_i$).

Thus, the proportion (x) of skilled workers in the total population is given by:

$$x = c^*/\bar{c}. \tag{2}$$

Therefore, a total of

$$\int_0^{c^*} (c/\bar{c})dc = (c^*)^2/2\bar{c} \equiv H \tag{3}$$

is invested in human capital.

Denoting by I the initial endowment, the endogenously determined stock of physical capital (K) is given by:

$$K = I - H. \tag{4}$$

Finally, we specify a Cobb-Douglas production function for the GDP of this economy with constant returns to scale:

$$Y = AK^{\alpha}L^{1-\alpha}, \tag{5}$$

where

$$L = x(1-u_1) + \rho(1-x)(1-u_2) + \rho m \tag{6}$$

is the input of labor in efficiency units.[1] (Notice that the two types of labor are assumed, for simplicity, to be perfect substitutes in production.) The proportion of unskilled migrants in the native labor force is denoted by m. Assuming that capital does not depreciate, $Y + K$ is available for consumption at the end of the production process.[2] The wage rate (w) and the return to capital, r, are given by the standard marginal productivity conditions:

$$w = (1 - \alpha)A(K/L)^{\alpha} \tag{7}$$

and

$$r = \alpha A(L/K)^{1-\alpha}. \tag{8}$$

We now explore two market regimes. In the first, the wages are flexible and completely clear the labor market. In the second regime wages are rigid, which gives rise to unemployment. We now turn to these two cases.

2.1 Flexible Wage

To set a benchmark case we start with perfect wage flexibility (the market-clearing case), and no unemployment, that is, $u_1 = u_2 = 0$. Given the proportion of migrants (m), equations (1)-(8) determine the equilibrium levels of $w_F, r_F, c_F^*, x_F, H_F, K_F, Y_F$, and L_F as functions of m. (The subscript F stands for the "Flexible" wage model.)

The aggregate consumption of native-born workers (who also own all the stock of physical capital) is taken as a welfare indicator (W). This measure is equal to GNP (that

[1]Note that the native-born labor force is normalized to one.

[2]To sharpen the analysis human capital is assumed to depreciate fully.

is, GDP, minus wage payments to foreign labor), plus the underpreciated stock of physical capital. Thus, the change of welfare due to migration is given by:

$$\Delta W_F = \Delta Y_F + \Delta K_F - w_F(m)\rho m \tag{9}$$

where $\Delta Z = Z_F(m) - Z_F(0)$ and $Z_F = W_F, Y_F, K_F$.

Graphically, ΔW can be illustrated with the help of the marginal product of labor schedule in Figure 1. Accordingly, let the schedule denoted by MP_L describe the marginal product of labor at the pre-migration stock of capital (that is, $K_F(0)$). Suppose for a moment that migration does not change the stocks of physical capital (K_F) and human capital (x_F). In this case we obtain the standard measure of the gains from migration, which is represented by the area of the triangle ABC.

Obviously at this stage there is also a change in the functional distribution of income between capital and labor. The wage rate (w) declines and therefore wage payments to native-born workers fall by the area of the rectangle EMAC. The return to capital (r) rises and thus the total return to capital increases by the area of the trapezoid EMAB. The area of the triangle ABC represents the net gain to the native-born population. This functional redistribution of income also changes the size distribution of income. To see this, notice that the unskilled workers own more physical capital than the skilled workers because all have the same initial endowment and the unskilled workers retain all of their initial endowment in the form of physical capital, while the skilled workers invest part of it in human capital. Also, within the group of skilled workers, the more able workers (those with a lower cost of eduction, c) own more physical capital than the less able workers. Accordingly, the curve ABEF in figure 2 depicts the ownership of physical capital as a function of the individual cost of acquiring education (c). Thus, while the decline in the wage rate (w) affects the labor

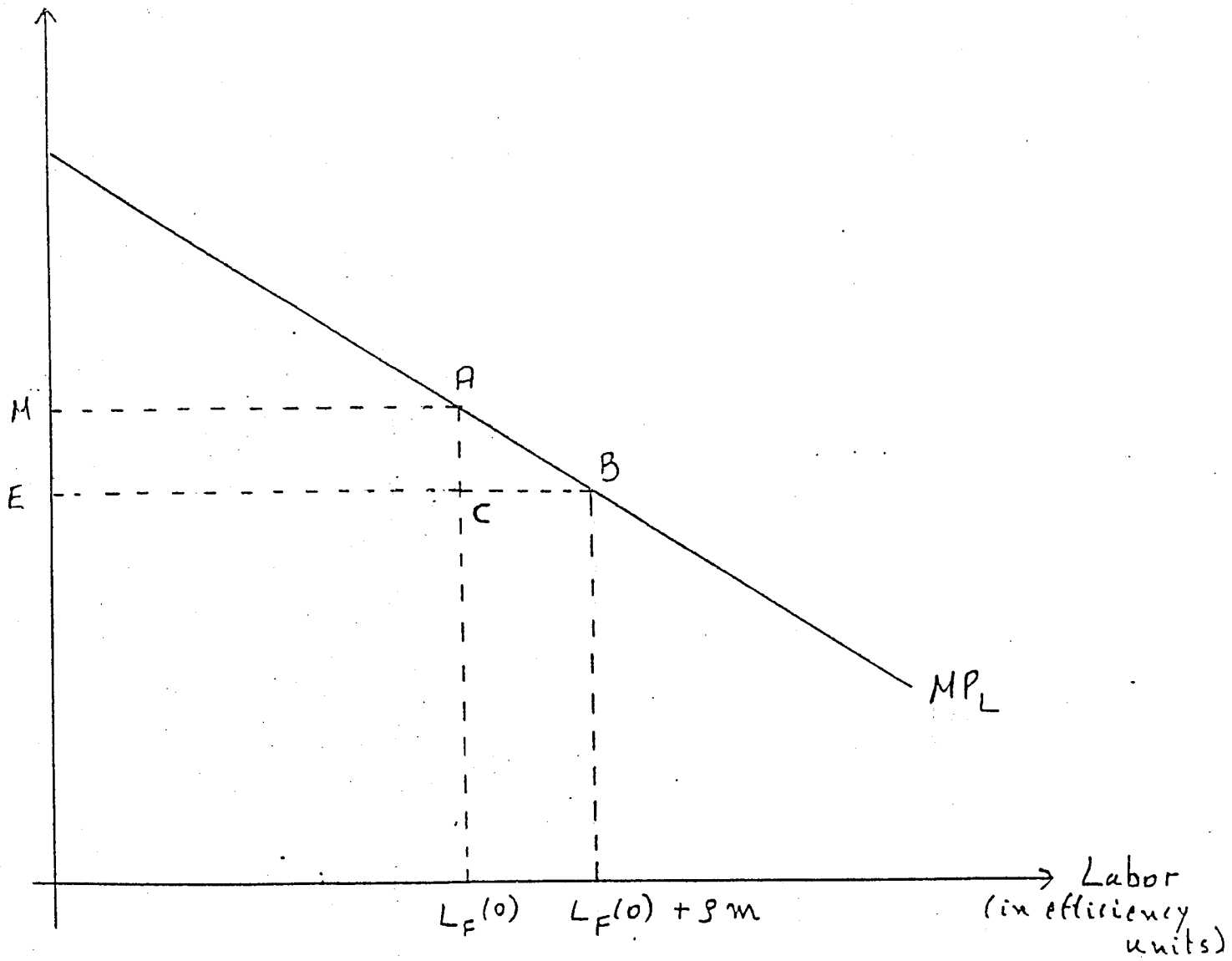

Figure 1: Migration-Induced Welfare Change For Fixed Stocks of Human and Physical Capital

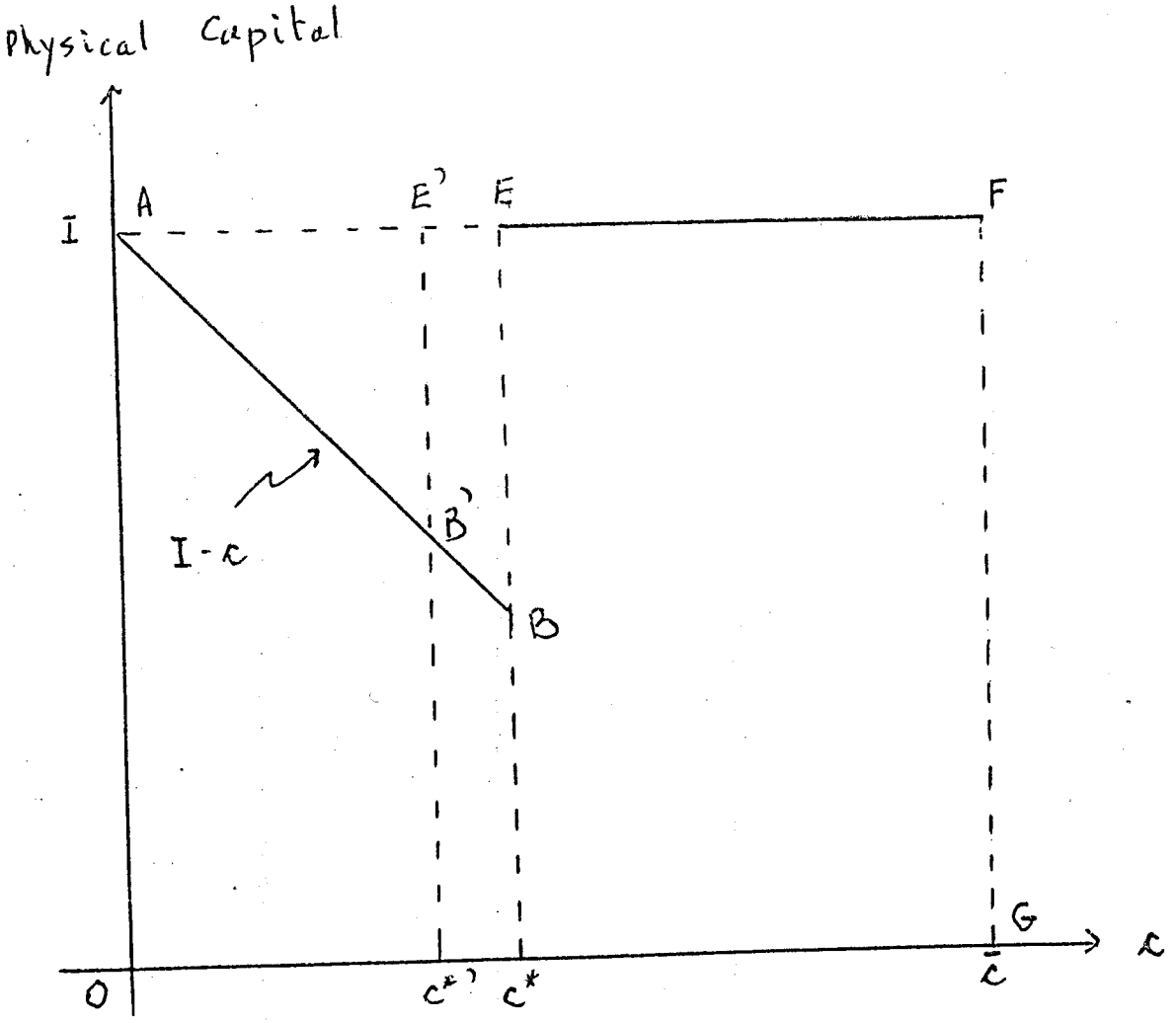

Figure 2 : Ownership of physical capital according to cost of education (c).

income of all native-born workers in the same proportion, the rise in the return to physical capital (r) has a differential effect on the native-born workers according to their ownership of physical capital, as described in figure 2.

Now let the stocks of physical and human capital adjust to the change in factor prices. Since the wage per efficiency unit falls, the return to human capital falls as well and therefore investment is shifted from human capital to physical capital. As a result, the MP_L curve in figure 1 rises and the supply of effective labor falls. The additional adjustment must raise the total gain from migration (over the standard measure of gain), accruing to both native-born individuals and migrants because the underlying competitive allocation is Pareto-efficient (for every exogenously given level of migration).

However, the gain to the native-born workers which is the focus of our attention here (as measured by equation (9)) may actually fall by this adjustment in the stocks of physical and human capital, because of the familiar terms-of-trade effect. The initial (pre-adjustment) decline in w lowers the return to human capital and increases the return to physical capital. As a result, the induced adjustment in the allocation of investment raises the stock of physical capital and lowers the stock of human capital. Consequently, the ratio of physical capital to labor (in efficiency units) rises and w rises as well. Thus, the capital stock adjustments lead to a deterioration in the terms of the trade of the receiving country; that is, the wage paid on imports of labor services (of the migrants) increases. This wage increase may actually more than offset the efficiency gain resulting from the adjustments in the capital stock. Nevertheless, altogether the destination country must gain from migration because the classical gains- from-trade argument is still valid.

Table 1 illustrates the magnitude of the gains from migration. It turns out that the standard gain which accrues to the native-born workers for fixed K, H and x (the familiar triangle ABC in Figure 1) is quite small: A migration of the size of 10% of the native-

born population generates a gain to the native-born population amounting to 0.045% of their consumption. The induced shift of investment from human to physical capital actually reduces this gain in our setup, but not by much, to 0.044%.

Table 1: Gains from Migration:
Flexible Wages

Percentage of Migrants in the Native-Born Population	Standard Gain	Gain from the Reallocation of Investment between Human and Physical Capital	Total Gain
2	0.0019	-0.0001	0.0018
4	0.0075	-0.0001	0.0074
6	0.0166	-0.0003	0.0163
8	0.0290	-0.0004	0.0286
10	0.0446	-0.0006	0.0440

Note:

[a] The gain is measured as a percentage of the aggregate consumption of the native-born population which is equal to $GNP + K$.

[b] The parameter values are: $\alpha = 0.33$, $\rho = 0.75$, $\bar{c} = 2$, $I = 1$, $A = 1$.

2.2 Rigid Wages

Consider now some imperfections in the labor market which prevent wages from fully adjusting downward so as to fully clear the market in the wake of migration. Consequently, migration must create unemployment among the native-born workers. There are quite a few attempts in the literature to model imperfections in the labor market and the reason for persistent unemployment (e.g. Layard and Nickell (1990), Pissarides (1990)). To sharpen the analysis we make the extreme assumption that wages are frozen at their pre-migration market-clearing levels.

Strictly speaking, it does not matter in in this model whether migrants are skilled or unskilled since the various labor types are assumed to be perfect substitutes. All that matters is how much labor in efficiency units has been brought in with migration. Nevertheless, as a matter of interpretation, we assume that the migrants are all unskilled and that they replace only unskilled native-born workers, since skilled workers have typically some advantage in the job market over unskilled workers.

In this case, we have $u_1 = 0$ and w_R is fixed at the pre-migration wage level, that is $w_R = w_F(0)$. (The subscript R stands for the "Rigid" wage model.) Thus, for any given level of m, equations (1)-(8) determine $u_{2R}, r_R, c_R^*, x_R, H_R, K_R, Y_R$ and L_R as functions of m. In essence w and u_2 change roles between the flexible and rigid wage models. In the flexible wage model, $u_2 = 0$ and w is determined by the market-clearing condition in the labor market. In the rigid wage model, w is fixed (at the pre-migration, flexible wage equilibrium level) and u_2 is equal to the excess supply of labor.

Schedule MC in figure 3 describes the marginal product of labor for the pre-migration

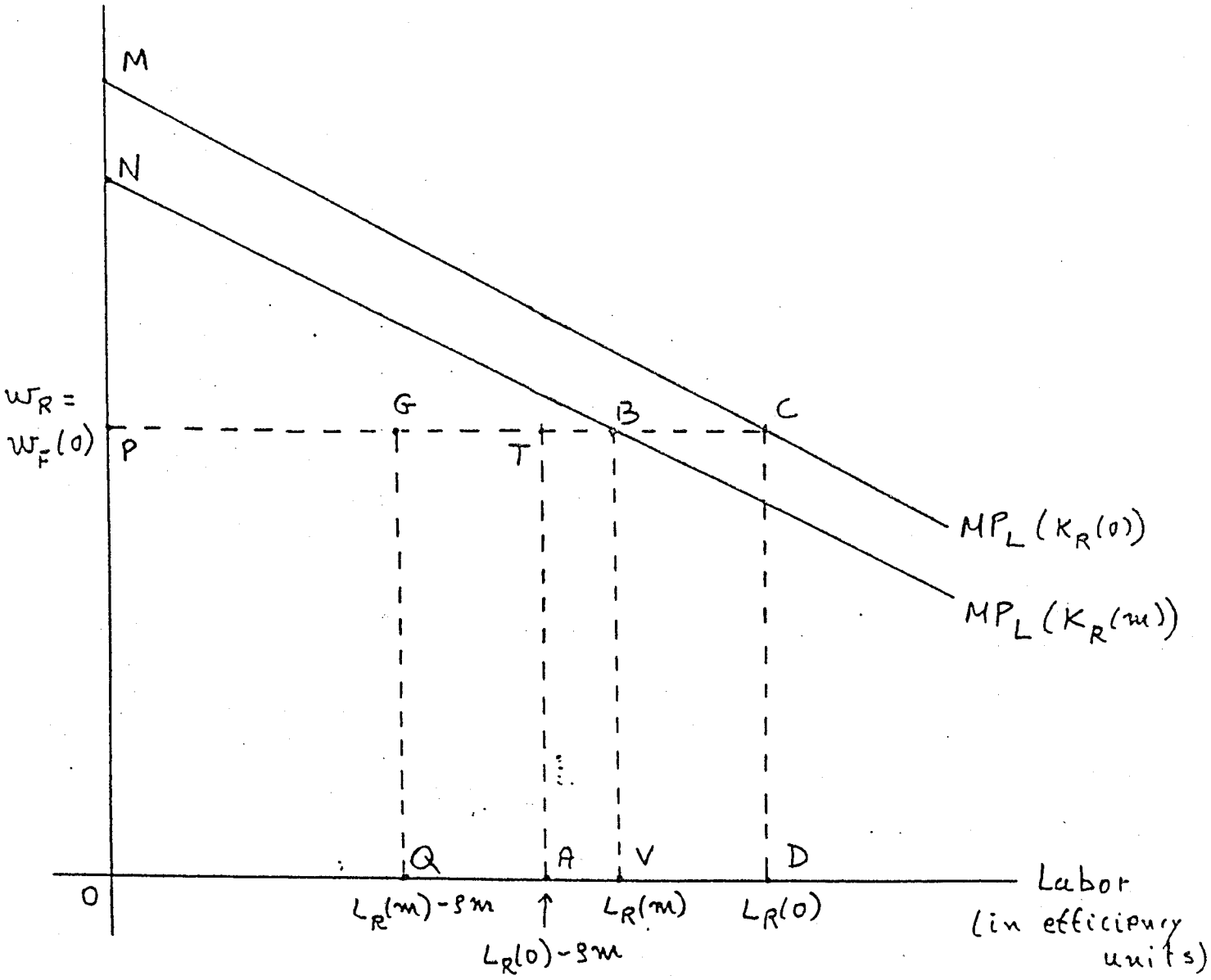

Figure 3 : Migration-Induced Welfare Loss with Rigid Wages

stock of capital ($K_R(0)$). Pre-migration GNP is thus measured by the area OMCD. If K and x were fixed, migration will reduce GNP to an amount represented by the area OMCTA, a loss which is measured by the area of the rectangle ATCD. However, since unemployment among the unskilled workers rises, the expected return to education must rise as well (see equation (1)). Hence, a chunk of investment switches from physical to human capital. Thus, K must fall and x must rise, which leads to an even further increase in unskilled labor unemployment. The marginal product of labor schedule shifts downward to NB and the post-adjustment GNP is measured by the area $ONBGQ$. Thus, the fall in K and the increase in x induce an additional loss in GNP by an amount which is measured by the sum of the areas $NMCB$ and $QGTA$. In addition, aggregate consumption of the native-born population falls also by the amount in which K falls. (Recall that aggregate consumption of the native-born population is equal to GNP, plus the undepreciated capital stock owned by the native-born population.)

It is useful to compare the two cases: the flexible and the rigid wage cases. In the former case, the migration per se (even before adjustment in the allocation of investment between human and physical capital) raises the welfare of the native-born population. In the absence of market-distortions, the induced adjustment in the two forms of capital (i.e. a shift from human to physical capital resulting from the wage decline) further enhances world-wide efficiency. However, the native-born population may not enjoy any part of this global efficiency gain because it may be more than offset by the deterioration in the terms of trade (that is, the rise of the wage paid to migrants). In the case of wage rigidity, however, the migration per se lowered the welfare of the native-born population, since foreign labor merely drove out domestic labor. The induced reallocation of investment from physical to human capital further reduces the welfare of the existing population. Indeed, the additional investment in human capital is a total loss, in the sense that even a penny of the investment

is not recovered. Nevertheless, the private net yield to the individual making the investment is positive, thereby producing the (socially wrong) market incentive for such an investment.

It turns out that the extra loss in GNP, due to the reallocation of investment between human and physical capital, relative to the loss that results from the mere substitution of native-born workers by migrants is quite substantial. Table 2 illustrates the relative magnitudes of these two measures of loss. When migrants make up 10 percent of the native-born population, the loss due to the reallocation of investment is about as much as 1/7th of the total loss. Our sensitivity analysis suggests that when the share of capital in GDP (namely, α) is lowered from 1/3 to 1/4, the standard loss rises from 2.98% of consumption to 3.3% and the total loss rises from 3.43% to 3.97%. Thus, the relative importance of the loss due to the reallocation of investment rises from 1/7th to 1/6th of the total loss. An increase in the productivity gap between skilled and unskilled labor (i.e. a decline in ρ) also raises the relative importance of the loss due to the reallocation of investment from physical to human capital: from 14% to 18% of the total loss.

Table 2: Losses from Migration
Rigid Wages

Percentage of Migrants in the Native-Born Population	Loss from Substitution of Domestic Labor by Foreign Labor	Loss from Reallocation of Investment between Human and Physical Capital	Total Loss
2	0.60	0.07	0.67
4	1.19	0.16	1.35
6	1.79	0.25	2.04
8	2.40	0.33	2.73
10	2.98	0.45	3.43

Note:

[a] The loss is measured as a percentage of the aggregate consumption of the native-born population which is equal to $GNP + K$.

[b] The parameter values are: $\alpha = 0.33$, $\rho = 0.75$, $\bar{c} = 2$, $I = 1$, $A = 1$.

3 The Welfare State and Migration

Income distribution makes a developed welfare state more attractive to poor migrants from the less developed countries, even when these migrants do not qualify for all the ingredients of the entitlement programs. Therefore, migration has a strong implication for the welfare of the native-born residents in the destination country. A recent study by Borjas (1994) indicates that foreign-born households in the U.S. accounted for 10 percent of households receiving public assistance by 1990 and for 13 percent of total cash assistance distributed, even though they constituted only 8 percent of all households in the U.S. We now introduce into the model income distribution policies in order to demonstrate these considerations.[3] For the sake of simplicity we consider the flexible wage case only.

Suppose that the government levies an egalitarian income tax. Many studies (e.g. Mirrlees (1971)) suggest that a best egalitarian income tax may be approximated by a linear tax. We therefore introduce into our model an income tax with a flat rate (t) and a lumpsum cash demogrant (β). If all families are of similar size and age structure, the uniform demogrant may capture also the free provision of public services such as health, education, etc.

We continue to assume that the individual labor supply is fixed, so that the income tax does not distort individual labor-supply decisions. However, we endogenize migration decisions by assuming that migration depends on international net-income differentials. Specifically, suppose that there is a (given) net wage rate (w^*) for unskilled labor in the

[3] Wildasin (1991) examines similar issues, but he focuses on the functional distribution of income (between labor and land rent).

source country which is below the net income of unskilled workers in the destination country when there is no migration. Unskilled labor then migrates from the source country to the destination country until this gap is closed:

$$(1-t)\rho w + \beta = w^*. \tag{10}$$

An income tax (which is levied also on capital income) typically distorts investment decisions between physical and human capital. The reason for this is because investment in human capital (i.e. the cost of acquiring education) is not tax-deductible, while investment in physical capital is deductible via depreciation allowances (see Nerlove, Razin, Sadka and von-Weizsaecker (1993)). In order to focus on migration and income distribution, we therefore abstract from this distortion by assuming that the cost of education is tax-deductible. Thus, equation (1) which determines the cutoff cost level (c^*) now becomes:

$$[1+r(1-t)]c^* - tc^* = (1-\rho)w(1-t),$$

which can be rewritten as:

$$c^*(1+r) = w(1-\rho),$$

so that the tax does not affect investment decisions at all, and we are back to equation (1).

The other equations of the flexible wage model (namely, equations (2)-(8)) remain also intact (with, obviously, $u_1 = u_2 = 0$). However, we have to add now a budget constraint for the government. Since the income tax is levied on both labor and capital income and on both native-born and migrant workers, it follows that the entire GDP (namely, Y) is subject to the tax. As the cost of investing in human capital is tax-deductible and the demogrant is paid to both native-born individuals and migrants, the government budget constraint is:

$$t(Y-H)-\beta(1+m)=0. \tag{11}$$

The disposable income or consumption of a native-born individual with an education-cost level of c is given by:[4]

$$v(c)=\begin{cases} w(1-t)+tc+\beta+(I-c)[1+r(1-t)] & \text{for } c\le c^* \\ \rho w(1-t)+\beta+I[1+r(1-t)] & \text{for } c\ge c^*. \end{cases} \tag{12}$$

The government is free to set its income redistribution policy variables (t and β) in any desirable way which is compatible with its budget constraint. To fix ideas, suppose that the government wishes to offset the effect of migration on the disposable income of native-born unskilled individuals. Specifically, suppose that a native-born unskilled worker enjoys a disposable income (or consumption) of $\overline{v}$ when migration is not allowed and the government is inactive ($t=\beta=0$). Thus, when migration is allowed, the government chooses t and β so as to maintain: $v(c)\ge\overline{v}$ for all $c\ge c^*$.

Employing (12), we thus write:

$$\rho w(1-t)+\beta+I[1+r(1-t)]=\overline{v}. \tag{13}$$

The model is now fully determined. Equations (1)-(8), (10), (11) and (13) can be solved for the 11 endogenous variables: $w, r, c^*, x, H, K, Y, L, m, t$ and β. Given this policy that renders unskilled labor indifferent to migration, we simulate the model in order to examine the effect of migration on skilled labor.

[4]The reader can verify that total consumption of native-born individuals (i.e. $\int_0^{\overline{c}} v(c)(1/\overline{c})dc$) is equal to GNP (i.e., $(Y-w^*m)$), plus the stock of physical capital (i.e., K). This, of course, follows from Walras's Law.

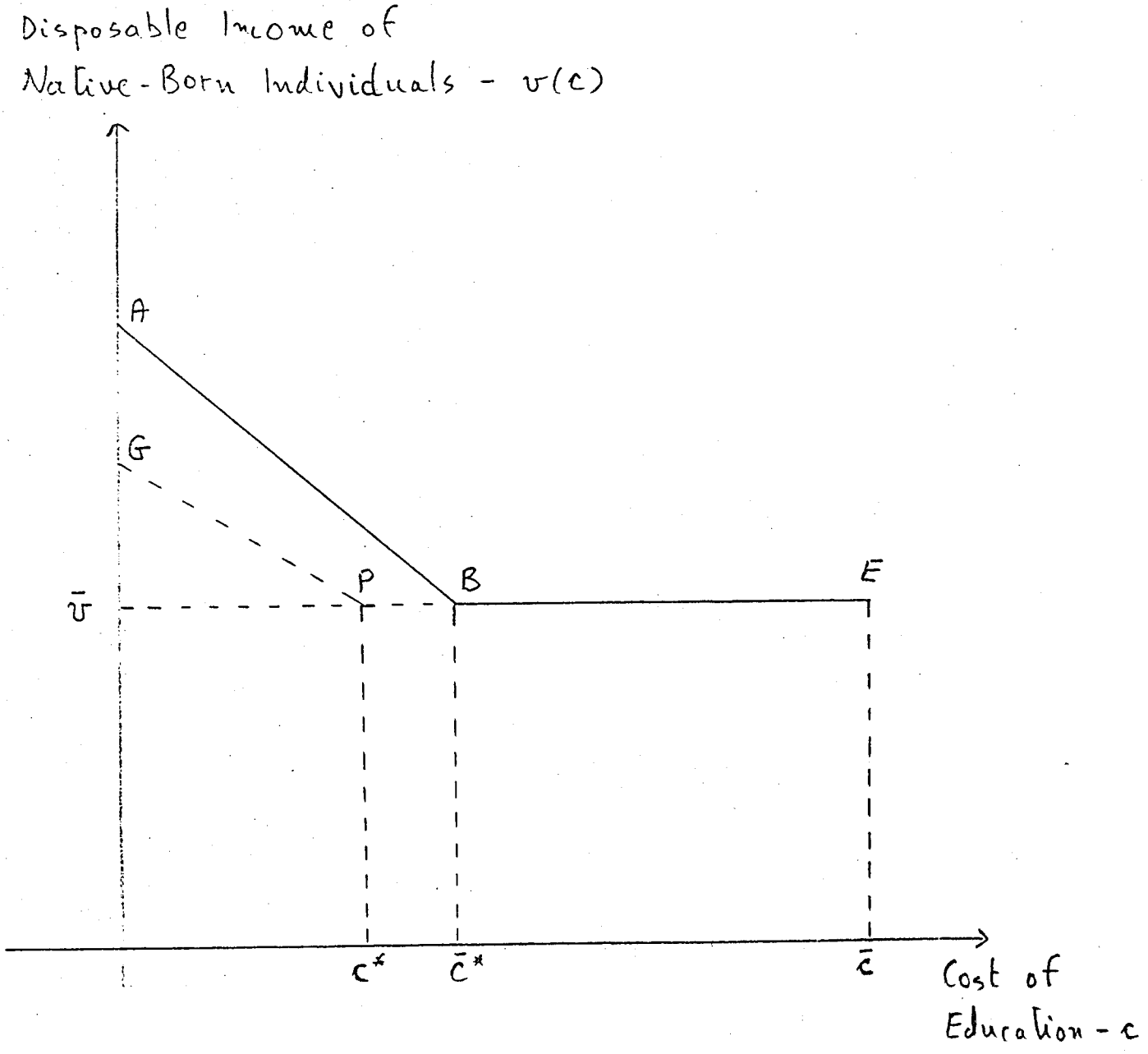

Figure 4: The Distribution of Disposable Income Before and After Migration.

The results are described in figure 4 where w^* was taken to be just 0.5% below the pre-migration and absent-government wage of unskilled labor in the destination country. (The other parameters in the model are as in Tables 1 and 2). Without migration the cutoff cost-of-education level is $\bar{c}^*$and the curve $v(c)$ is described by ABE. Naturally, given the egalitarian ownership of initial endowment (I), disposable income monotonically (and linearly) declines in the cost of acquiring education for those who choose to acquire education, and then remains flat for the unskilled labor (i.e. for $c \geq c^*$). Allowing free migration and unskilled labor (low income) compensating policy, the number of migrant workers reaches about 12% of the number of native-born workers. The cutoff cost-of-education level shifts inward to c°. (This is because w falls and r rises.) The disposable income curve becomes GPBE. Thus, all the pre-migration skilled workers lose and some of them (those at the high end of the distribution of the cost of education among the pre-migration skilled labor, i.e. those with a c-level between c^* and $\bar{c}^*$) choose to become unskilled. Thus, with the present redistribution policy, migration is **Pareto-inferior** for all the native-born population: the migrants are net users of the tax system and this is not offset by the traditional gains from trade, shown in section 2 to be rather minuscule. Certainly one can find no Pareto-improving government policy with free migration.

4 Conclusion

Just like any trade activity in well-functioning markets, migration tends to generate gains to all parties involved: the migrants as well as the native population. But typically these gains tend to be rather low. However, when the labor market is mal-functioning, migration exacerbates imperfections in the market. Consequently, it may lead to losses to the native-born population which can be quite sizable.

Another problem raised by migration is the toll it imposes on the welfare state. Being unable to perfectly exclude migrants from various entitlement programs and public services, the modern welfare state finds it more and more costly to run its various programs. These costs often cannot be offset by the relatively small gains from trade associated with immigration.

These two economic considerations may help explain why there is strong resistance to migration. Thus, immigration could be more beneficial to the native-born population when the labor markets are better-functioning and the welfare programs are less comprehensive.

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