

Immigration and Social Justice

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Thomas Piketty¹

ABSTRACT

Can the opening of the borders in the North be harmful to the unskilled workers of the South, who are the most disadvantaged people in the world? With two production factors, migration between South and North is always beneficial to Southern unskilled workers since they are the most abundant factor. However, with three factors (three skill levels, or two levels and one imperfectly mobile capital input), opening the borders may lead to a decrease in the wage of the Southern unskilled if their complementarity with high-skill labor or capital in the North is sufficiently low compared to the lesser skilled workers of the South. Several recent studies suggest that the elasticity of complementarity falls sharply beyond a certain skill gap. However, nothing proves that these effects are sufficiently high to compare the optimal policy of opening the borders from the viewpoint of Rawlsian distributive social justice with the policy of closing the borders implemented recently in Europe, *a fortiori* with an open border policy beneficial to highly skilled workers of the South.

INTRODUCTION

The political economy of migration is paradoxical from the point of view of pure economic logic. On the one hand, the lowest skilled workers are generally the most hostile towards migrant workers, which is consistent with their economic interest since any skill group in general benefits from its relative scarcity.² On the other hand, left-wing parties—though they

¹ Paris School of Economics. Thanks to Michael Kremer, Coen Teulings and Yves Younes for stimulating discussions.

² During the first round of the presidential election in France in 1995, 27% of blue collar workers voted for Jean-Marie Le Pen, against 19% of white collar workers, 10% of mid-level professionals and 6% of executives (Le Monde, April 25, 1995).

support and are supported in their majority by the popular classes ³—hold political views that, compared to right-wing parties, are more favorable to migrant workers.

These tensions, which seem strange if political actors pursue the “rational self-interest” emerging from public choice models in the modern economic literature, become understandable once we take into account the fact that political actors generally try to hold a coherent views (at least in appearance) about a just society and social justice. For example, left-wing parties support migrant workers by focusing on the equal capacity of individuals to be integrated in the social life of the host country regardless of their country or cultural background, and therefore on equal opportunity. By contrast, right-wing parties would insist on the inertia of individual socio-cultural roots, on the unavoidable inequality in the capacity to assimilate and therefore on the limits of a “global” society and on the benefits of “national preference.” ⁴

Left-wing parties rarely suggest opening borders in order to give these persons right to the same range of opportunities regardless of their birthplace. Actually the periods of high immigration in rich countries are far from systematically coinciding with periods when the left is in power—the latter often requests a more humane treatment of the immigrants who are already established on the territory, without necessarily advocating an increase in their size. One argument often used by the left to justify the limited attention given to potential migrants from poor countries is that a complete open border policy would not necessarily be a good thing for those same countries: it would benefit mostly the high-skill workers from poor countries and the

³ During the second round of the presidential elections in 1995, 57% of blue collar workers voted for Lionel Jospin, against 55% of white collar workers, 51% mid-level professional, and 41% of executives (Le Monde, May 10, 1995)

⁴ For example, according to Salt et al. ([1994], table 7.5., p. 179) and Friedberg et Hunt [1995], fig. 1), the average number of migrants settling in France was about 50,000 per year between 1980 and 1992, a period during which the government was essentially socialist whereas, during the same period, the corresponding figure was approximately 300,000 per year in Germany, 150,000 per year in the United Kingdom, and between 800,000 and 1,000,000 per year in the United States, three countries with right-wing governments. On the political origins of the 1980s and 1990s in the United States, which was a period of high immigration similar to the 1880-1914 period. See for example Younes [1994].

low-skill workers would not be able to seize the opportunity and would remain in a persistent state of underdevelopment. Another traditional argument is that given the actual state of public opinion on this matter, opening the borders would risk provoking violent tensions that would end up being harmful for the very migrants whose existence one claims to improve. The first argument is essential: it actually plays a key role in the political discourse, to the extent that it implies that opening the borders is not the just “ideal” policy⁵ and therefore that it is useless to attempt to find convincing arguments about the advantages of opening the borders.

The objective of the paper is to analyze and evaluate the conditions that validate such view: under which conditions would it be accurate to say that the most disadvantaged workers in poor countries, and hence in the world, would suffer from a complete opening by rich countries of their borders? In other words, what is the optimal level of immigration from the perspective of Rawlsian distributive justice?

The analysis is conducted using a basic model with two distributions of workers by skill level initially living in two countries, the “North” and the “South”. The same production function with constant returns of scale allows the production of a good that is homogenous in the two countries with inelastic quantities of capital and labor available at various skill levels. The assumption of a homogeneous good implies that international trade in good and services does not play any role in that model and allow us to focus on the question of the migration of the labor force.⁶

⁵ That is, the just policy in a world in which we would have the time and an infinite ability to convince every one of what a just policy actually is.

⁶ In a more general model where both the North and South would produce and exchange different goods by using different combinations of production inputs, the results we arrive at would be valid for international trade and not only for migration. But the free trade of commodities between countries endowed with different distributions of workers by skill levels is merely a very imperfect substitute for the international migration of the labor force, due to complementarities between production inputs existing within a same country and within a same production space, and to the fact that several good and services are not internationally tradable. Because Bangladesh is able to export

To begin with, we remind the reader that, in such a model, the complete opening of the borders between North and South leads to the most “efficient” allocation of human resources and hence to the highest average wage at world level (section 2).

By ignoring the possibility of compensatory fiscal transfers between losers and winners resulting from opening the borders—which in practice are always costly and limited—we then ask under what conditions the opening of the borders would also lead to an increase in the minimum wage at world level. First we show that, if there are only two skill levels,⁷ opening the borders leads the Southern unskilled to migrate to the North until their relative weight in the North reaches that of the South and until the unskilled wage in both countries reaches the same level—a level that is higher than the one existing initially in the South (section 3).

But this not necessarily the case if there are at least three levels of skills (section 4). For example, assume that “low-skill” (illiterate) workers, “skilled” workers (literate), and a small minority of “high-skill” workers live in the South while a very small quantity of low-skill workers and a substantial quantity of skilled and highly skilled workers live in the North. The opening of the borders would lead the Southern literate workers to work with (or for) the Northern high-skill workers and not anymore with the Southern low-skill, hence their wage would decrease as compared to their initial position. We specify the conditions under which such a phenomenon can occur and show that it is necessary for the relationship between the complementarity elasticity of two skill levels and the distance separating the two skill levels to have an inverted U (\cap) shape. We show that the same phenomenon can occur with two levels of

its rice and textiles does not change the fact that the quantity available of land, equipment, and literate workers by resident is very low compared to that in western countries—a fact which only migration could change. Free capital movement would only perfectly substitute for the free migration of people if each country were endowed with the same distribution of workforce by level of skills. (see section 2).

⁷ Similarly if only one level of skill exists (one homogenous labor input) and one imperfectly mobile capital input (see section 3).

skill and imperfectly mobile capital concentrated in the North if complementarity between the Southern low-skill and Northern capital is sufficiently low as compared to the complementarity between Southern skilled and Northern capital. In other words, the opening of borders can be harmful for Southern low-skill workers if their skill level is too low to be able to benefit from production inputs available in the North—whereas other inputs available in the South take advantage of this opportunity.

Finally, we examine several recent empirical estimates of this elasticity of complementarity: it appears that the effects described above are qualitatively realistic but it is not proven that they could be sufficiently strong quantitatively for the opening of the borders to be harmful to Southern low-skill workers (section 5). Section 6 concludes.

EFFECTS OF MIGRATION ON AVERAGE INCOME

Let us consider two countries, North and South, with populations I_N and I_S . Each agent i is characterized by a skill level $q(i) \in \{1; \dots; Q\}$ where $Q \geq 2$ is the number of different level of skills. The Northern population (resp. the Southern) is characterized by skill distribution $(m_N(q))_{1 \leq q \leq Q}$ (resp. $(m_S(q))_{1 \leq q \leq Q}$): in the North there are $m_N(q)$ workers with skill q (resp. $m_S(q)$ workers in the South). The world stock of physical capital is denoted k , and fixed capital in the North is denoted k_N (resp. k_S in the South), with $k = k_N + k_S$.

Each country has access to the same technology, represented by an aggregate production function $F(m(1), m(2); \dots; m(Q); k)$ which transforms the quantities $m(1), m(2), \dots, m(Q)$ of skill level Q and one quantity k of capital into a quantity of homogenous good

$Y = F(m(1); \dots; m(Q); k)$. We assume that it is a constant returns to scale technology with respect to $Q + 1$ production inputs:

$$\forall \lambda > 0, F(\lambda m(1), \lambda m(2); \dots; \lambda m(Q); \lambda k) = \lambda F(m(1), m(2); \dots; m(Q); k)$$

In other words, one country twice as large as another but rigorously identical in terms of the distribution of its production inputs yields twice as much. The absence of increasing returns to scale enables us to abstract from “country size effects” and to focus our attention on the “composition effects.”⁸ Consider F_1, \dots, F_Q, F_k the first derivatives of function F (marginal productivities), and $(F_{qq'}, F_{qk})_{1 \leq q, q' \leq Q}$ the second derivatives of F , which satisfy all traditional properties.⁹

Finally let us assume that labor supply is inelastic: workers supply one labor unit corresponding to their skill q , regardless of the wage $w(q)$ that is offered for that skill in their own country. The labor market is competitive as long as, in each country, the wage $w(q)$ is equal to the marginal productivity of the skill q in that country.

⁸ Clearly, introducing increasing returns to scale would reinforce the advantage of opening the borders, *ceteris paribus*. Borjas [1995] notes that using a production function with increasing returns to scale at the aggregate level, is often used in growth theory and international trade theory but is not sufficiently well founded empirically to include it in our analysis of the effects of migration.

⁹ i.e., $F_1, \dots, F_Q, F_k > 0, F_{qq} \leq 0 \forall q \in \{1; \dots; Q\}, F_{kk} \leq 0$.

Let us assume first that the border between the North and the South is closed. In the North, wages are established at a level such that, at equilibrium, all available inputs are utilized, so that the national income in the North Y_N is given by:

$$Y_N = F(m_N(1); \dots; m_N(Q); k_N)$$

The equilibrium wages in the North ($w_N(1); \dots; w_N(Q)$) for the range of skills, as well as the rate of return on capital r_N (interest rate, rate of return), are given by their respective marginal productivities:

$$\forall q \in \{1; \dots; Q\}, w_N(q) = F_q(m_N(1); \dots; m_N(Q); k_N)$$

$$r_N = F_k(m_N(1); \dots; m_N(Q); k_N)$$

Similarly, in the South, national income Y_S , equilibrium wages ($w_S(1); \dots; w_S(Q)$) and the rate of return on capital r_S are given by:

$$Y_S = F(m_S(1); \dots; m_S(Q); k_S)$$

$$\forall q \in \{1; \dots; Q\}, w_S(q) = F_q(m_S(1); \dots; m_S(Q); k_S)$$

$$r_S = F_k(m_S(1); \dots; m_S(Q); k_S)$$

If we assume that the border between North and South is open for capital flows (but not for the labor force) and that the capital market is perfectly efficient, the world stock of capital k will be distributed between both countries so that rates of return are equalized at the world level, i.e., $r_N = r_S = r$. In practice, international capital mobility is constrained by a range of incentive problems (limited commitment capacity of a country not to expropriate foreign investors, high

costs of financial intermediation, etc) or simply by the fact that capital that is already located in one country (land, infrastructure, real estate) cannot be easily relocated: typically, the “apparent” marginal productivity of capital in the South r_S could be higher than in the North for a long period of time.¹⁰

Whatever the case may be, as long as the border remains closed for the labor force, the equilibrium wages $(w_N(1); \dots; w_N(Q))$ and $(w_S(1); \dots; w_S(Q))$ in the North and South will be generically different as long as the initial distributions $(m_N(q))_{1 \leq q \leq Q}$ and $(m_S(q))_{1 \leq q \leq Q}$ of which both countries are endowed are not strictly identical. The fact that the marginal productivity of the same production input takes different values in different production locations violates the traditional productive efficiency condition at the world level: typically, if a low skill q is more abundant in the South than in the North, its marginal productivity in the South $w_S(q)$ will be lower than its level in the North $w_N(q)$. This means that a transfer of one unit of low skill from South to North would increase production in the North by an amount greater than the decrease in production in the South.

Let us now assume that the border is completely opened to the flow of labor and that transportation costs between North and South are negligible.¹¹ The migratory equilibrium would

¹⁰ There are limits to this type of argument. As noted by Lucas [1990], if the difference in national income between India and United-States were simply explained by the inequality of the stock of physical capital of those two countries, this would imply that the marginal productivity of capital is 58 times greater in India than in the United-States. It is difficult to conceive that incentives issues could bring this ratio down to 1. It suggests that inequality between skill distributions plays a key role.

¹¹ The existence of high transport costs could explain why low-skill workers from the South whose monetary gain resulting from migration is lower than that of skilled workers, and who generally cannot borrow money, could be the victim of an opening of the border. But such an argument is not decisive: transport costs are declining and are now

reach a level such that nobody has an incentive to migrate, i.e., wages for different skill levels take the same value in the North as well as in the South, which we note $(w_{N+S}(1); \dots; w_{N+S}(Q))$. Given that labor supply is inelastic and that technology exhibits constants returns to scale, these wages are equal to the marginal productivity of inputs as long as all available skills are fully employed at the world level.

$$\forall q \in \{1; \dots; Q\}, w_{N+S}(q) = F_q(m_N(1) + m_S(1); \dots; m_N(Q) + m_S(Q); k_N + k_S)$$

$$r_{N+S} = F_k(m_N(1) + m_S(1); \dots; m_N(Q) + m_S(Q); k_N + k_S)$$

The world income Y_{N+S} is then given by:

$$Y_{N+S} = F(m_N(1) + m_S(1); \dots; m_N(Q) + m_S(Q); k_N + k_S)$$

This world income Y_{N+S} , which corresponds to the free market equilibrium at world level, is the maximum world income that can be obtained given technology and available production inputs.¹² It cannot be inferior to the world income $Y_N + Y_S$ corresponding to the closed border regime and, generically, it is strictly superior as long as wages were not rigorously identical in the North and in the South in the closed border regime.

Proposition 1. Opening the borders leads to a higher world income, and thus to a higher average income

$$Y_{N+S} > Y_N + Y_S$$

much lower than the monetary gain resulting from migration to the North; and there are now several mechanisms and networks through which credit can be obtained in advance.

¹² This equivalence between free market equilibrium and maximization of total income simply results from the maximization of firms' profit, which implies that we will always be on the efficiency frontier of the production area. Thus it is equivalent to maximizing total income since all inputs are inelastically available and are fully used up, and there is only one consumption good. This equivalence would not be verified if the labor supply elasticities were positives: for example, if the elasticity of the low-skill labor supply in the North is greater than the other elasticities, then subsidizing the Northern low-skilled labor (which could be done indirectly by closing the borders) could lead to a greater total income. More generally, this equivalence would not be valid if several goods of consumption related to different levels of income: the concept "total income" could not be separated anymore from distributive considerations.

Let us remember that, in the presence of constant returns of scale *vis-à-vis* $Q+1$ production inputs, the international mobility of Q inputs would be sufficient to reach the same world production optimum Y_{N+S} only if $Q+1$ production inputs are mobile: if the borders are opened to flows of Q types of labor but closed to capital flows, the migration equilibrium—which equalizes the prices of Q labor inputs—would also lead to the equalization of the rates of returns on capital both in the North and South, so that capital flows would be unnecessary. Similarly, the international mobility of capital would be a perfect substitute for international migration if only one skill existed ($Q=1$). Not so in the case we are interested in, which is $Q \geq 2$.

EFFECTS OF MIGRATION ON MINIMUM INCOME WITH TWO SKILLS

The fact that the average income is greater in an opened border regime does not imply that all individual wages are greater: the free market equilibrium at world level does not guarantee a Pareto improvement of the market equilibrium with closed borders. The fact that total income is greater would, however, generate a distribution of wealth, once borders are opened, such that everyone would benefit from the openness. Several reasons explained why such transfers are limited in practice.

(i) The State always observes imperfectly the characteristics of individuals on the basis of which it would like to condition its transfers (negatives or positives), so that administrative and disincentive costs could be substantial on a larger scale.¹³

¹³ In the model described above, it would be “sufficient” to know the technology, the distribution by skills and observe the individual incomes to be able to redistribute wealth at zero cost given the inelasticity of labor supply. The result would have been different if we introduced the (more realistic) possibility for workers to transit between skills, under specific conditions and then let their income vary within a given skill group.

(ii) Competitions between governments to attract fiscal benefits (that is to say the fact that both North and South are not homogenous political entities) strongly reduce their capacity to redistribute: a Northern country cannot decide alone to tax heavily those who benefit the most from migration.

(iii) Totally compensating Northern low-skill workers for the costs that migration imposes would require that a large number of workers with similar skills be treated differently on a same territory depending on whether they are “born and bred Northerners” or migrants. This raises a number of substantial problems (for example, how should the intergenerational transmission of these differences be handled in that case?)

(iv) Independently of these practical difficulties, public opinion has not yet clearly admitted that it could be legitimate to have a fiscal redistribution among workers after having freely allowed the labor market to play its allocative role. Indeed—quite aside from the migration issue—modern governments rarely implement explicit redistributions among wage earners.¹⁴

One should not exaggerate the importance of these limits to fiscal compensation but, given these limits, we ask the following: assuming that these transfers are inexistent or insignificant—which is often the case in practice—under which conditions does opening the border lead to an increase in mean income and in the minimum wage? That is to say, if we call

¹⁴ Moreover, it is because of this that the net budgetary impact of migration is clearly positive in all Western countries: the main solidarity efforts in the modern welfare state being directed toward the elderly (health and retirement benefits) and not toward low wage earners, the social security contributions by low-wage migrant workers are significantly larger than the public expenditures directed at them—even if they have many children and migrate to a country with generous family allocations (see Storesletten [1996] for a complete estimation in Switzerland). This could be changing, however, as indicated by transfer systems directed at low-wages recently developed in the United States.

w_m the wage of the most disadvantaged in a closed border regime ($w_m = \text{Min}\{w_N(1); \dots; w_N(Q); w_S(1); \dots; w_S(Q)\}$) and w_m^* the wage of the most disadvantaged workers under an open border regime ($w_m^* = \text{Min}\{w_{N+S}(1); \dots; w_{N+S}(Q)\}$), under which conditions does $w_m^* > w_m$? What is the optimal quantity of migration from the point of view of the most disadvantaged and, hence, of Rawlsian distributive justice?

A transparent answer can be provided using an often-used framework with two types of skills, the “unskilled” and the “skilled”. Abstracting for the moment from the existence of capital input k , assume that $Q = 2$ and consider any production function $F(m(1), m(2))$ exhibiting constant returns of scale *vis-à-vis* production factors $m(1)$ and $m(2)$. Let us note $q = 1$ the lowest skill (the one with the lowest marginal productivity) and $q = 2$ the highest skill. By definition, the South is the country with the greatest amount of unskilled workers with respect to the number of skilled workers:

$$\frac{m_S(1)}{m_S(2)} > \frac{m_N(1)}{m_N(2)}$$

In the closed border regime, the wage $w_S(1)$ of the Southern unskilled is given by $w_S(1) = F_1(m_S(1); m_N(1))$ or, given the constant returns of scale assumption, by $w_S(1) = F_1(m_S(1)/m_S(2); 1)$. Similarly, the wage $w_N(1)$ of the Northern unskilled is given by $w_N(1) = F_1(m_N(1)/m_N(2); 1)$.

Since $F_{11} \leq 0$ the unskilled wage is a diminishing function of the ratio between the number of unskilled and the number OF skilled workers, and therefore we have $w_S(1) \leq w_N(1)$: the Southern unskilled pay for their relative abundance as compared to the North so that the minimum wage w_m at world level in a closed border regime is equal to $w_S(1)$.

Now, if we open the borders so that the Southern unskilled decide to migrate massively to the North until they reach the point where the ratio of the number of unskilled workers and of the number of skilled workers becomes equal, both in the North and in the South, to the world ratio $(m_N(1) + m_S(1) / m_N(2) + m_S(2))$. The unskilled wage will be given by:

$$w_{N+S}(1) = F_1((m_N(1) + m_S(1)) / (m_N(2) + m_S(2)); 1)$$

Since $(m_N(1) + m_S(1) / m_N(2) + m_S(2)) \in]m_N(1) / m_N(2); m_S(1) / m_S(2)[$ and $F_{11} \leq 0$, we infer that $w_{N+S}(1) \in]w_S(1); w_N(1)[$ the minimum wage $w_m^* = w_{N+S}(1)$ under an open border regime is greater than the minimum wage $w_m = w_S(1)$ under a closed border regime.¹⁵

The same reasoning would apply to the case where there is only one type of labor ($Q = 1$) and one capital input k : starting from an initial condition where capital is only imperfectly mobile internationally, and hence where the South is abundant in labor and the North is abundant in capital, thus leading to wages that are lower in the South than in the North, the opening up of the borders to the labor force leads to a massive migration from South to North and hence to an increase in the minimum wage at the world level, in addition to an increase in total income.

However, this reasoning could not apply to the case where there are two skill levels and one imperfectly mobile capital input, as we will demonstrate in the next section.¹⁶

To summarize, we have:

¹⁵ w_m^* is strictly greater than w_m provided that there is a positive complementarity between the two skill levels, i.e. as long as the elasticity of substitution between the two skill levels of the function $F(m(1), m(2))$ is not infinite.

¹⁶ However, we can demonstrate that the reasoning would be valid in the case of the production function $F(m(1), m(2); k)$ if we assume that capital is perfectly mobile internationally, including in a closed border regime.

Proposition 2: *In presence of two immobile production factors (two levels of skills, or one level of skill and one capital input), opening the borders also leads to an increase in the minimum wage: $w_m^* > w_m$*

The fact that opening the borders leads to a greater minimum wage at world level, obviously, does not solve all our problems: the Northern unskilled experienced a decrease in their income (and the unemployment rate would increase if we were to introduce unemployment) and it would doubtlessly be difficult to compensate them entirely for the reasons cited above. Nevertheless, if the world were as transparent as the bipolar world described in this section—that is to say if migration from South to North always unambiguously benefited the Southern most disadvantaged workers—the political discourse which cast doubts on the benefits of migration for the Southern countries would not have much weight, and would consequently affect immigration policies. In fact, the world is more complex and does not easily lead to unambiguous conclusions.

EFFECTS ON THE MINIMUM INCOME WITH $n > 3$ SKILLS

The reasoning discussed above—in which South-North migration is an opportunity for the Southern most disadvantaged workers to exit from the relative abundance from which low-skill workers suffer from—does not apply as long as at least three distinct skill levels (or two skill levels and one imperfectly mobile capital input, which is similar—see below). Intuitively, the reason is simple: as soon as we leave the bipolar world (unskilled vs. skilled, labor vs. capital) by introducing intermediate categories, opening the borders between two worlds that are uneven in terms of their distributions could benefit first those whose skills are not too far from the average

in the North and not simply those whose skills are abundant in the South, and therefore could leave the latter worse off than before. Let us start with an example.

Example 1. Three Skill Levels

Let us assume three skill levels ($Q = 3$) and abstract, to simplify, from the capital input. To clarify ideas, let us call skill $q = 1$ the group of illiterate workers, who represent a small minority of the population in Northern countries but can typically account for 50-60% of the labor force in the poorest countries in the South (Indian subcontinent, Sub-Saharan Africa),¹⁷ $q = 2$ the group of literate workers who did not have access to higher education and who account for an important part of the population (more than 50% in the North, and slightly less in the South), and $q = 3$ the group of highly skilled workers (small minority in the South, and large minority in the North).

Consider technologies $F(m(1), m(2), m(3))$ with constant returns of scale as described in Kremer and Maskin (1996): each production unit requires two workers, one playing the role of “manager” and the other of “assistant”; if the manager’s level of human capital is h_M and that of the assistant is h_A , then production is $y = h_A h_M^2$. In other words, the level of human capital of the manager “counts more” in total production than that of the assistant. The manager-assistant metaphor can obviously be interpreted in a broader sense: complementarity between the illiterate farmer and the literate technician in a village, the craftsman and the engineer, the secretary and the executive, etc. Note $h(1) < h(2) < h(3)$ the three human capital levels corresponding to the three skill levels. The key issue is to know who is going to work with whom in equilibrium: either the more skilled workers will function as manager in the same production units where low-

¹⁷ See for example Drèze and Sen [1995]

skill workers would function as assistant, or the more skilled workers will work among themselves, and so will the low-skill workers.

To simplify, assume that there are no workers with skill $q=3$ in the South and no workers with skill $q=2$ in the North: ($m_S(3) = m_N(1) = 0$). We can easily show that, as long as the ratios $h(2)/h(1)$ and $h(3)/h(2)$ are below a specific threshold $\lambda^* > 1$, literate workers will work with Southern illiterate workers and high-skill workers will work with Northern literate workers. Conversely, if the ratios $h(2)/h(1)$ and $h(3)/h(2)$ are greater than λ^* then it would be efficient for high-skill workers in both countries to work together and allow the low-skill workers to do so as well.¹⁸ Assuming that $h(2)/h(1)$ and $h(3)/h(2)$ are actually inferior than λ^* , and assuming that $m_N(2) < m(3)$ and $m_S(1) < m_S(2)$ in such a way that, both in the North and in the South, there would be excess demand for low-skill workers in a closed border regime. In the North, there would be $m_N(2)$ production units involving a highly skilled manager and a literate assistant, with individual production $h(2)h(3)^2$,¹⁹ whereas the remaining highly skilled workers $m_N(3) - m_N(2)$ will create $(m_N(3) - m_N(2))/2$ production units in which both manager and assistant are highly skilled, hence the individual production would be $h(3)h(3)^2 = h(3)^3$; the equilibrium wage $w_N(3)$ of high-skill workers would be equal to their marginal productivity $h(3)^3/2$, and the equilibrium wage of the literate would be equal to their marginal productivity

¹⁸ Because of the equivalence between the market equilibrium and maximization of total income in such model (see above), there is “separation” if the associated production, i.e. $h(2)^3 + h(1)^3$, is greater than the production obtained if both skill groups act together, hence $2h(1)h(2)^2$. Denoting $\lambda = h(2)/h(1)$, this condition is equivalent to $\lambda^3 + 1 = 2\lambda^2$, therefore $\lambda > \lambda^* = (1 + \sqrt{5})/2$. A similar property would be valid in the more general case of a production function $y = h_A^\alpha h_M^\beta$, with $\beta > \lambda$

¹⁹ This last hypothesis is not entirely consistent with the numerical approximation given above on the skill distribution in the North and in the South, but things would work out if we assume that each production unit involves one manager and n assistants.

$h(2)h(3)^2 - h(3)^3/2$. Similarly, in South, the wage $w_s(2)$ would be equal to $h(2)^3/2$ and the wage $w_s(1)$ would be equal to $h(1)h(2)^2 - h(2)^3/2$. The minimum wage at world level is given by $w_m = w_s(1) = h(1)h(2)^2 - h(2)^3/2$.

Let us now assume now that borders are open to labor force flows. Southern literate workers now have the opportunity to work with (or for) Northern high-skill workers. Assume that $m_N(1) > m_N(2) + m_S(2)$ so that, potentially, all literate workers in the world could work with (or for) Northern high-skill workers. If we assume that the skill gap $h(2)/h(1)$ between illiterate and literate is sufficiently high compared to the gap $h(3)/h(2)$ between literate and high-skill, then this is exactly what will happen:²⁰ in equilibrium, there will be $m_N(2) + m_S(2)$ production units that involve a high-skill manager and a literate assistant, in which the wage $w_{N+S}(3)$ of the high-skill workers would be $h(3)^3/h(2)$ and the wage $w_{N+S}(2)$ of the literate would be $h(2)h(3)^2 - h(3)^3/h(2)$, whereas the Southern illiterate $m_S(1)$ would yield $m_S(1)/2$ production units with manager and assistant being both illiterate and the wage $w_{N+S}(1)$ equal to $h(1)^3/2$. The minimum wage is now $w_m^* = w_{N+S}(1) = h(1)^3/2$, which is lower than the minimum wage $w_m = h(1)h(2)^2 - h(2)^3/2$ prior to the opening of the border. The wage of the

²⁰ The exact condition for a market equilibrium is that the wage loss experienced by Southern low-skill workers when they work alone ($h(1)h(2)^2 - h(2)^3/2 - h(1)^3/2$) be inferior to the wage increase $h(2)h(3)^2 - h(3)^2/2 - h(2)^3/2$ earned by the Southern illiterate workers when working as assistant to Northern high-skill workers rather than being manager of a Southern low-skill worker. If we write $\lambda = h(2)/h(1)$ and $\lambda' = h(3)/h(2)$, it is sufficient for λ to be sufficiently high compared with λ' for the condition $h(1)h(2)^2 - h(2)^3/2 - h(1)^3/2 < h(2)h(3)^2 - h(3)^2/2 - h(2)^3/2$ to hold: for example if $\lambda = \lambda^*$ and $\lambda' < \lambda^*$, then the first term is zero and the second is positive (see footnote 18), and the inequality would remain valid if λ is close to λ^* by continuity.

literate and of the high-skill workers in the North has not changed—the Northern literate workers have captured all the benefits of economic integration.

Intuitively, this is consistent with a situation in which Indian peasants are too illiterate to be able to do any kind of work in the North, and where the opening the borders with the North simply prevents them from having the benefit of working with literate peasants who, previously, allowed them to somewhat increase their productivity (by reading the user’s guide of the tractor, or whatever) but now migrate North to work for Westerners.

The conditions described in this first example show that the opening of the borders can be harmful to Southern low-skill workers: what is required is that the complementarity between two skill levels decrease sufficiently rapidly when the gap between both skills increases—such that the gap between illiterate and literate is greater than the gap between literate and very literate (high-skill) to such an extent that the opening of borders dispossesses Southern illiterate workers from the complementarity they previously enjoyed with “their” literate workers.

For a general technology $F(m(1); \dots; m(Q))$, we define the elasticity of complementarity $c_{qq'}$ between two level of skills q and q' as the percentage wage increase of skill q generated by an increase in the number of workers with skill q' corresponding to one percent of the labor force. $c_{qq'}$ is equal to $\frac{F_{qq'} F}{F_q F_{q'}}$ ²¹. For $q=q'$, we always have $c_{qq} < 0$: the marginal productivity of a group with a given skill decreases as its relative abundance increases. The specific technology introduced by Kremer and Maskin (1996) implies that, at an aggregate level,

²¹ See Hammermesh [1993]

the elasticity of complementarity c_{13} between illiterate and high-skill would also be negative: by “attracting” the literate workers with whom they are strongly complementary, a rise in the number of high-skill workers can reduce the marginal productivity of illiterate workers. This property illustrates a more general and extremely intuitive hypothesis: the elasticity of complementarity $c_{qq'}$ is maximum and positive for an intermediate level of skill gap $|q - q'|$, though it may be lower—and even negative—at very low or very high levels of this gap. That is to say, the curve linking the elasticity of complementarity and skill gap has a “ \cap ” shape which increases first then decreases.²² In order for the opening of the borders to be harmful to low-skill workers, a necessary and sufficient condition is that this \cap -shaped curve decrease sufficiently rapidly at the skill gap level which separates Southern low-skill workers from high-skill workers in the North (the most abundant).²³ We summarize these observations in the following proposition:

Proposition 3. With $Q \geq 3$ skill levels, opening the borders leads to a decrease of the minimum wage if the elasticity of complementarity between Southern low-skill workers and Northern skilled workers is sufficiently negative.

If these conditions are present, the socially optimal immigration policy from the point of view of Rawlsian distributive justice is not the complete opening of the borders. The “socially optimal borders,” i.e., the borders maximizing the minimum wage at the world level, would be the

²² It is consistent with a “ \cup ” curve linking the elasticity of substitution between two skill groups and the distance between these two skill groups.

²³ In the first order approximation, opening the borders would lead to a smaller minimum wage if $\sum_{1 \leq q \leq Q} c_{1q} m_N(q) < 0$, i.e. if c_{1q} is sufficiently negative for skills q where $m_N(q)$ is high.

borders that link the low-skill workers with the greatest number of workers with intermediate skills but carefully leaves high-skill workers on the other side of the border. It would be equivalent to sending South all the Northern intermediate-skill workers! No immigration policy seem to succeed in achieving such a “social optimum”. In particular, a Northern policy that would only allow Southern low-skill workers—assuming that skills are sufficiently observable to make such a policy feasible (which seems unlikely)—would in no way improve things. Purely and simply closing the borders could then become the least worse policy. Another consequence of the \cap -shaped curve of the elasticities of complementary is that, in such world, only the moderately skilled are able to “help” the low-skill workers while the best thing that the high-skill workers can do is to pay taxes whenever that is possible...

A similar phenomenon would occur with two skill groups and imperfectly mobile capital—the latter playing the same role as high-skill labor in the North in our previous example. Consider the following circumstance.

Example 2. Two Skill Levels and One Imperfectly Mobile Capital Input

Assume two skill levels ($Q = 2$) where $q = 1$ is the illiterate labor force abundant in the South and missing in the North, and $q = 2$ literate labor force, and an imperfectly mobile capital input k distributed exogenously between stock k_N and stock $k_S \ll k_N$ in the South. Consider the constant returns of scale technology $F(m(1);m(2);k)$ so that we have $F(m(1);m(2);k) = G(m(1) + k; m(2))$ where G is a production function with constant returns of scale *vis-à-vis* its two production inputs. Capital and unskilled labor-force are then perfectly

substitutable (we can use either a machine or a craftsman) whereas the skilled labor-force is complementary to them.

In a closed border regime, the wage $w_S(1)$ of Southern illiterate workers is given by:

$$w_S(1) = F_1(m_S(1); m_S(2); k_S) = G((m_S(1) + k_S) / m_S(2); 1)$$

In an open border regime, the wage $w_{N+S}(1)$ of Southern illiterate workers is given by:

$$w_{N+S}(1) = F_1(m_S(1); m_N(2); m_S(2); k_N + k_S) = G_1((m_S(1) + k_N + k_S) / (m_N(2) + m_S(2)); 1)$$

Suppose that k_N is sufficiently high relative to k_S and to $m_S(1)$ such that $k_N / m_N(2)$ is greater than $k_N + m_S(1) / m_S(2)$. Then $w_{N+S}(1) < w_S(1)$: by giving Southern skilled workers the opportunity to work with capital in the North, opening the borders creates a deterioration in the status of Southern unskilled workers.

Proposition 4. With two levels of skills and one capital factor imperfectly mobile, opening the borders lead to a decrease in the minimum wage if the elasticity of complementarity between unskilled labor and capital is sufficiently negative.

Which Parameters for a Just Immigration ?

We have identified simple conditions for the complementarity elasticities of production function and the skill dispersion in the North and in the South under which the opening of the borders can be harmful to low-skill workers in the South. Are empirical estimates available for these parameters ?

The forces at play identified here are qualitatively realistic and are well documented in the literature. Several recent studies have shown that complementarity elasticities between different inputs production vary considerably if the different skill level are sufficiently disaggregated. Teulings (1996) estimate the complementarity elasticities between skill deciles using US data and finds that they shift from about -3 for the workers in the first decile to approximately +2.5 when the skill gap is more important.²⁴

Kremer and Maskin (1996) test the empirical prediction central to their technology model [see example 1 above] knowing that high-skill workers increasingly work among themselves as the skill gap between them and low-skill workers increases. They show that in the United States, in France and in the UK, the “segregation” between different skill levels in various types of firms has considerably increased over the last twenty years: for example, in France, the correlation between wage levels of workers from the same firm has increased by more than 20% (from 0.36 to 0.44) between 1986 and 1992. As noted by Kremer and Maskin (1996), “economic activity tend to shift from firms such as General Motors, which employ skilled and unskilled workers, to firms such as Microsoft and McDonald’s which only employ one skill level.” Even if it is possible that a greater part of this effect is due to a technology shift rather than to an increase of the skill gap for any given technology, it is astonishing that an increase of the correlation has occurred in all economic sectors so that it is not simply a manifestation of the transition toward services. It has been particularly high in the United States where the dispersion of skills has increased the most. Everything supports the notion that, beyond a certain skill gap threshold,

²⁴ See Teulings ([1996], table 5. The technology and econometric specification considered by Teulings [1996] prevent him from detecting a possibly decrease in the elasticities of complementarity beyond a given skill gap. Therefore this study does not document the idea of a “U”-curve but it tells us that the rising part of the curve has an extremely steep slope.

complementarity may become so small that workers from different skill levels would essentially evolve in essentially separate economies. The idea of the “ \cap ” curve seems empirically valid, at least qualitatively.

Krusell et al. (1996) also validate the idea that capital is more complementary with skilled work than with unskilled work: using US data, they estimate that skilled work and capital are highly complementary (with an elasticity of substitution of 0.3) whereas low-skill labor and capital are highly substitutable (with an elasticity of substitution of 2.5).

These empirical estimates indicate that it is plausible that opening the borders could be harmful to low-skill workers of the South because they have too few skills to benefit from high-skill work or capital in the North, which attract Southern skilled workers by separating them from Southern unskilled workers. The notion that Southern low-skill workers are rarely the ones who take advantage of the opening of the borders is also supported by the fact that migrant workers are rarely illiterate though 50% of the population of several Southern countries is illiterate. For instance, the United States practices a relatively open border policy while Canada uses a point-system that allows it to attract more high-skill migrants than if it had a less open policy as in Europe (particularly in France). Despite the rapid evolution of the composition of immigration in the United States over the last 20 years, the average number of recent educated migrants (less than 5 years) in the United States in 1990 was 11.9 years against 13.2 for the remaining American population.²⁵ In other words, even though recent migrants into the United

²⁵ See Borjas ([1995], Table 1). In 1990, more than 80% of recent migrants in the United States were from Asia and Latin America, whereas in the 1950s and 1960s more than 50% were from Europe (See Friedberg and Hunt ([1995], Table 2). This low difference between the average skill of immigrants and of the native population may explain why the estimated effects of migration on average income have a modest size (Borjas, Freeman and Katz [1992] estimate that about 25% of the increasing wage gap between skills over the 1980s in the United States is explained by migration.)

States have sensibly lower skills than US-born citizens, these migrants are mostly “literate” (as in category $q=2$ of example 1) and not illiterate.

Nevertheless, the fact that it is plausible that opening the borders could be harmful to Southern low-skill workers does not imply that the forces at work are sufficiently large quantitatively to make it happen. The fact that Southern low-skill workers are, in fact, less present among workers who have migrated North does not imply necessarily that they are not skilled enough to take advantage of a link with the North: indeed, even in a country which does not attempt explicitly to attract highly skilled migrants by using a system of points or quota, several aspects of the visa policy show that, in practice, it is much more difficult for low-skill worker to find work in the North (for instance, in order to obtain a professional visa for the migrant worker, the employer often has to prove that the migrant is endowed with specific skills that are in short supply among the US born population)

Let us return then to the numerical estimates of the complementarity elasticities. The studies mentioned above provide evidence that the elasticity of complementarity between the low-skill in the South and the skilled and/or capital in the North are sufficiently low, no study has yet established that they are negative. For instance, the values estimated by Krussel et al. (1996) of the elasticity of substitution between capital, skilled labor and unskilled labor, although more extreme than standard estimations, are not sufficient to generate the negative elasticity of complementarity between capital and unskilled labor.²⁶ Intuitively, a low but positive elasticity

²⁶ Krussel et al. [1996] estimate a production function of the type $F(m(1); m(2); k_{st}; k_{eq}) = k_{st}^\alpha [m(1)^{(\sigma-1)/\sigma} + (m(2)^{(\rho-1)/\rho} + k^{(\rho-1)/\rho}_{eq})^{\rho(\sigma-1)/\sigma(\rho-1)}]^\sigma$, where k_{st} is capital in the form of buildings and k_{eq} is capital in the form of equipment. They found $\alpha = 0.12$, $\sigma = 2.47$, $\rho = 0.35$. The elasticity of complementarity $c_{m(1)k}$ between skilled work of type 1 and equipment is the sign of $[(1 - \alpha)\sigma / (\sigma - 1)] - 1$ thus +0.49 (with $\alpha = 0.12$, the elasticity σ must be greater than 8.2 for $c_{m(1)k}$ to be negative).

means that rickshaw drivers in Calcutta would lose their clients as the Northern borders open but they would also benefit from Northern capital and infrastructure by becoming “manual laborer, craftsman” in the North so that the global effect on their wage would be, on average, slightly positive.

Regarding the negative elasticity of complementarity between the Southern unskilled and the Northern highly skilled, it is worth remarking that the trend documented by Kremer and Maskin (1996) would tend to increase the value of this elasticity: the fact that the gap between the high-skilled and literate workers in the North becomes so high that Northern high-skill workers start working among themselves reduces the risks for Southern illiterate workers to lose their literate companions as well, in the case of border opening. This notion is reinforced by the fact that the low skill level of the Northern unskilled workers is in constant progression: the gap between the unskilled and the fairly skilled tends to narrow compared to the gap between the fairly skilled and the highly skilled, and this reduces the accuracy of a negative elasticity of complementarity between Southern low-skill workers and Northern highly skilled workers. Intuitively, this implies that since the fairly skilled in the North tend to work increasingly among themselves in order to serve hamburgers to the highly skilled, opening the borders would not isolate the Southern under-skilled but conversely would enable them to participate in the army of service providers for the highly skilled on the North and then slightly increase their wage.

CONCLUSIONS

International migration has always played a minor role in the discourse and doctrine of left-wing parties. Yesterday, international migration played a small role because, according to the dominant discourse, all one had to do to make poverty disappear was to put an end to capitalist

Note however that it is an estimation of the elasticity of substitution between capital and low-skill American work and not with low-skill Southern work.

exploitation in the world. Today, a more modest argument plays a similar role. It implies that opening the borders may not be the best solution to reduce poverty in the South because it could benefit only highly skilled workers from the South and be harmful to low-skill workers.

In this paper, we took this argument seriously and derived the conditions under which the opening of borders would be harmful to Southern low-skill workers. Existing estimates suggest that the important parameters of our model do not take sufficiently extreme values to indicate that the Southern low-skilled would not benefit at all from the opening of borders in the North. But these parameters merit further empirical study. Explaining such conditions would also explain why it is difficult to accept the almost-complete closed border policy of countries like France in the 1980s and 1990s.

REFERENCES

- BORJAS G. [1995], "The Economic Benefits from Immigration," *Journal of Economic Perspectives* 9 (2), p. 3-22.
- BORJAS G., FREEMAN R. et KATZ L. [1992], " On the Labor Market Effects of Immigration and Trade ", in G. BORJAS et R. FREEMAN (eds), *Immigration and the Work Force: Economic Consequences for the United States and Source Areas*, Chicago, University of Chicago Press.
- DRÈZE J., SEN A. [1995], *India: Economic Development and Social Opportunity*, Oxford, Oxford University Press.
- FRIEBOERG R., HUNT J. [1995], « The Impact of Immigrants on Host Country Wages, Employment and Growth », *Journal of Economic Perspectives* 9 (2), p. 23-44.
- HAMMERMESH D. [1993], *Labor Demand*, Princeton: Princeton University Press.
- KREMER M., MASKIN E. [1996], "Segregation by Skill and the Rise in Inequality" Mimeo, MIT et Harvard.
- KRUSSEL P., OHANIAN L., RIOS-RULL J. V. et VIOLANTE G. [1996], " Capital-Skill Complementarity and Inequality ", Mimeo, University of Rochester.

LUCAS R. [1990], " Why Doesn't Capital Flow from Rich to Poor Countries? ", American Economic Review 80, p. 92-96.

SALT J., SINGLETON A., HOGARTH J. [1994], *Europe's International Migrants*, HMSO.

STORESLETTEN K. [1996], « Sustaining Fiscal Policy Through Immigration ", Mimeo, University of Stockholm.

TEULINGS C. [1996], " A Generalized Assignment Model of Workers to Jobs for the US Economy ", Mimeo, University of Amsterdam.

YOUNES Y. [1994], « Géo-économie politique de la transformation de l'économie américaine ", Document de travail, CEPREMAP, n° 94-09.

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