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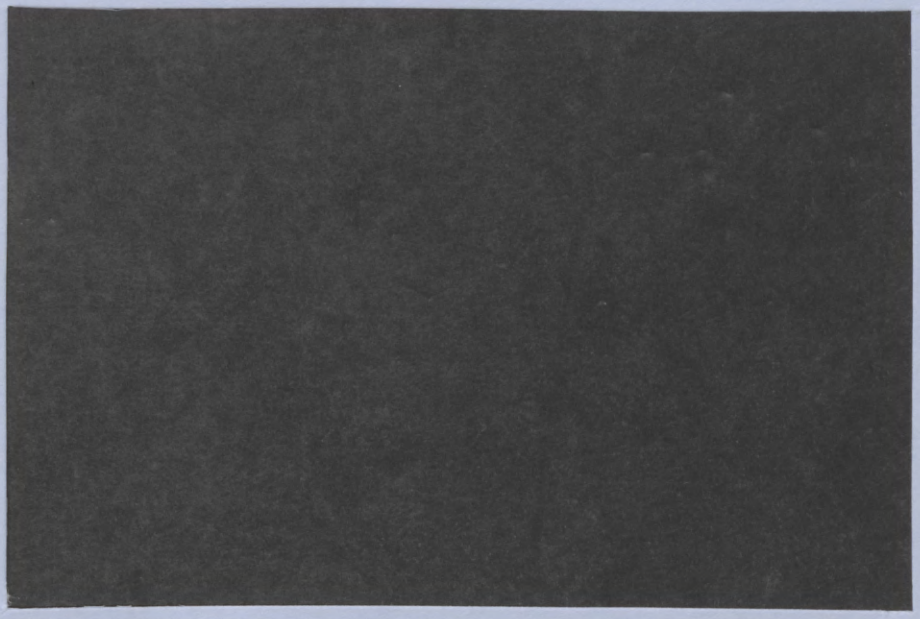



מכון סאקלר לכלכלה
אוניברסיטת תל-אביב

# INTERNATIONAL MIGRATION AND INTERNATIONAL TRADE

by

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## 1. Introduction

The study of international trade and international migration occupies a relatively small part of standard economic analysis. Conventionally, international trade theory tends to ignore international migration, which essentially changes the distribution of national communities. Similarly, the literature on international migration typically abstracts from the effects of labor migration on international flows of goods, services and capital. This chapter, which combines elements from these seemingly disjoint parts of the literature and presents them in a consistent analytical framework, lays the ground for the integration of the two disciplines into a unified treatment.

The chapter is organized as follows. In section II we present some key empirical regularities associated with the volume of trade in goods and services and the volume of capital flows among the major industrialized countries. We also survey some of the major long–term trends of international migration. These patterns of commodity trade, capital flows, and migration, motivate the choice of topics and issues examined in subsequent sections. Section III explains how different trade models account for substitution and complementarity patterns between labor mobility and commodity trade, and what are the crucial elements in the models that are responsible for the contrasting predictions on the direction and magnitude of international flows. In section IV we analyze some important asymmetries between capital mobility and labor mobility, which can break down the substitution between the flow of labor and capital driven by the underlying international distribution of relative endowments. Section V outlines the backbone of an analytical framework designed for welfare evaluations of international migration, which is distinguishable from the mere exports of labor services. To sharpen the welfare analysis of global population dispersion, in section VI we present a benchmark framework in which

there are no legal or other impediments to the determination of population size of each country and only economic considerations take place. Section VII assesses the limits imposed on the intracountry redistribution policies as a result of potential and actual intercountry population flow.

The purpose of this chapter is to suggest that application of the simple models presented in the various sections allow a reconsideration of important real world interactions between international trade and international migration and their role in the process of increased efficiency and growth of the world economy.

## II. Empirical Regularities and Trends

International trade and international migration are closely intertwined. The international migration of people can often substitute for both international movements of capital and international trade of goods and services. However, in many important cases international migration is a complement to international flows of capital or commodities. Although economics can by itself generate various patterns and magnitudes of international flows, political conflicts and ethnic rifts quite often play a dominant role. Historically, political factors served to halt trade among hostile nations and at the same time to encourage nations to go on a track of economic self–sufficiency (autarky) in preparation for military conflicts. And in other cases, political, and especially ethnic factors stimulated migration of people and transfer of minorities (e.g. as from the "old" world of Europe to the "new" world of the Americas and Australia). Obviously, in this survey we do not attempt to deal with political, social or ethnic factors underlying international flows of people, capital and goods. Our concern here is economics.

## 1. International Trade in Goods and Services

Over the years, one can detect a clear trend of growth in the volume of international trade. This may be due to several main factors that facilitated trade: (i) technological improvements lowered both the money and time costs of transportation; (ii) output growth reinforced international trade (especially, via intra–industry trade); (iii) the public at large and policy–makers in particular became more and more aware of the mutual gains from trade and have gradually been pushing for removal of tariff and non–tariff trade barriers.

The surplus in the current account of the balance–of–payments, which is equal to net trade flows (i.e. exports minus imports) cannot properly measure the volume of trade. For instance, when trade is balanced and the surplus is nill, it obviously does not mean that there is no trade. For this reason, it is customary to measure the volume of trade by gross trade flows, i.e. by the sum of exports and imports. Alternatively, one can look just at exports or imports in order to infer trends over time or to compare among different countries.

Figure 1 depicts the growth rates of exports, and of gross domestic products for the six major industrialized countries, from the eighteenth century until now. Exports grew much faster than GDP throughout this period, except for the period covering the two world wars, which was governed by political conflicts and protectionist attitudes.

Similarly, Table 1 shows the sharp increase in the volume of trade in recent years of the major economic power in the world, the United States. In this table the volume of trade is measured by the sum of exports and imports, as a percentage of GNP. The volume of trade stayed about constant from 1929 until the end of the 1950s, around 9%–11% of GNP (except for a deep dip during the second world war period), and then took off in the

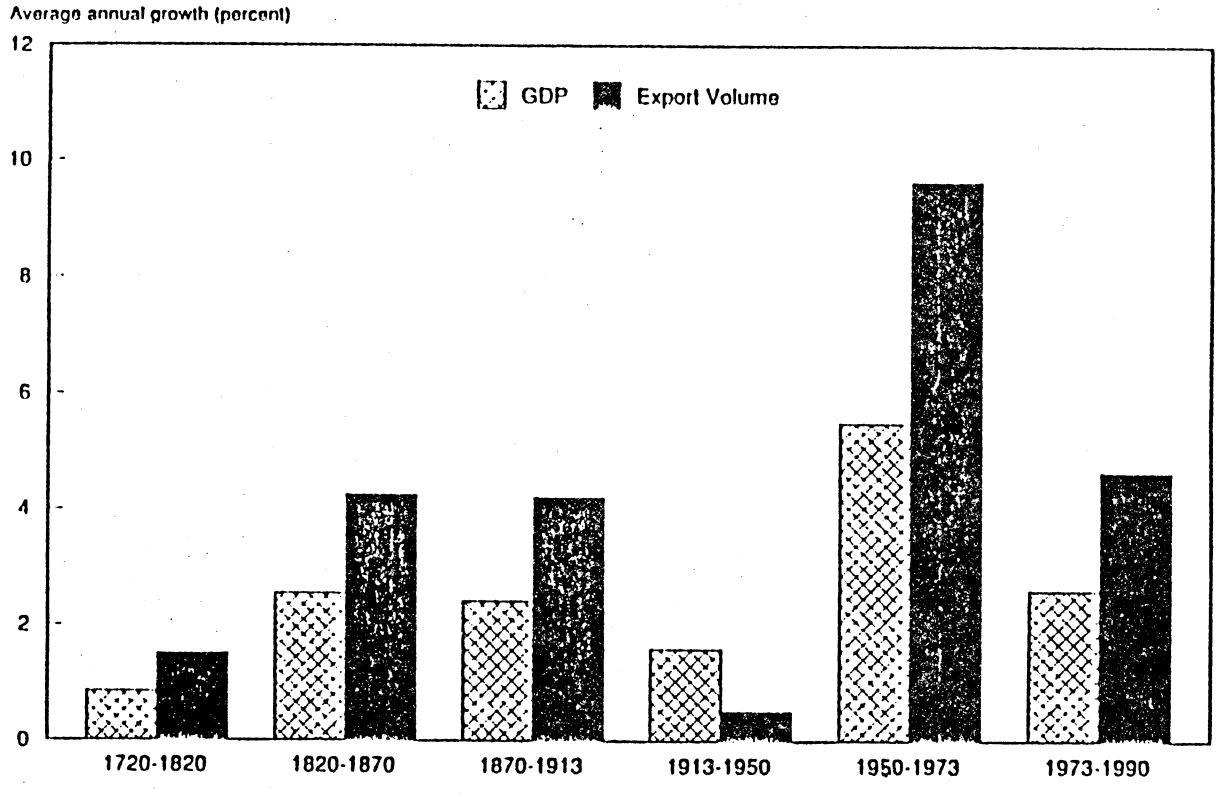


Figure 1: GDP and Export Growth Trends, 1720-1990

Note: The figure for first period GDP uses 1700-1820 data. Data are for France, Germany, Italy, Japan, the United Kingdom, and the United States. Not all countries are represented in the first two periods. The figure is reproduced from the Economic Report of the President, United States Government Printing Office, February 1992.

Sources: U.S. Department of Labor, International Monetary Fund, The World Bank, and Maddison, Phases of Capitalist Development.

TABLE 1: U.S. GNP AND VOLUME OF TRADE, 1929-1991 (Selected Years)

| Year | GNP (in billions of 1982 $) | Volume of Trade[1] (in billions of 1982) | Volume of Trade[1] (percent of GNP) |
|---|---|---|---|
| 1929 | 709.6 | 79.5 | 11.0 |
| 1933 | 498.5 | 46.9 | 9.4 |
| 1939 | 716.6 | 66.3 | 9.2 |
| 1944 | 1380.6 | 78.4 | 5.7 |
| 1946 | 1096.9 | 111.0 | 10.1 |
| 1950 | 1203.7 | 113.8 | 9.5 |
| 1955 | 1494.9 | 153.8 | 10.3 |
| 1960 | 1665.3 | 200.8 | 12.1 |
| 1965 | 2087.6 | 266.7 | 12.8 |
| 1970 | 2416.2 | 386.6 | 16.0 |
| 1975 | 2695.0 | 500.5 | 18.6 |
| 1980 | 3187.1 | 720.9 | 22.6 |
| 1985 | 3618.7 | 838.6 | 23.2 |
| 1986 | 3717.9 | 924.0 | 24.9 |
| 1987 | 3845.3 | 1022.1 | 26.6 |
| 1988 | 4016.9 | 1145.3 | 28.5 |
| 1989 | 4117.7 | 1240.7 | 30.1 |
| 1990 | 4157.3 | 1486.1 | 35.7 |
| 1991 | 4126.2 | 1534.8 | 37.2 |

[1] Volume of trade is measured in this table by the sum of exports and imports.

Source: Economic Report of the President, United States Government Printing Office, February 1992.

sixties and reached a level of 37% of GNP in 1991. In absolute terms, the volume of trade increased from 79.5 billions of 1982 dollars in 1929 to 1534.8 billions of 1982 dollars in 1991 (almost a twenty–fold increase). By comparison, GNP rose from 709.6 billions of 1982 dollars in 1979 to 4126.2 billions of 1982 dollars in 1991 (about a six–fold increase only).

2. International Capital Flows

The historical developments of international capital flows show ups and downs until the last two decades. Early on, there were quite sizable flows during the gold standard period. The international flows of capital shrank during the period covering the two world wars and the Bretton–Woods era of fixed exchange rates and capital controls that started in 1944 and lasted until 1973. More recently, international capital movements picked up considerably with the liberalization of the internatioanal capital markets.

In economies that are open to international flows of capital, net capital flows are acounted for by the difference between national saving and investment. Net capital flows are measured by the current account deficits or surpluses in the balance of payments. Net exports – by surpluses; and net imports – by deficits. Of course, net capital flows (or current account deficits and surpluses) understate the scope of international capital movements. They do not fully measure flows of capital into and out of a country. Typically, removal of barriers to international capital movements is followed by a two–way increase in gross capital flows. These are not necessarily reflected in the net exports or imports of capital.

Table 2 shows the developments in the measure of gross international capital movements of the seven major industrial countries (The G–7) during the 1970s and 1980s. The volume of international capital movements is measured in this table by the sum of

TABLE 2: GROSS INTERNATIONAL CAPITAL MOVEMENTS OF THE SEVEN MAJOR INDUSTRIAL COUNTRIES, 1970-1989

| Country | (Percentages of GNP/GDP) 1970-1974 | 1975-1979 | 1980-1984 | 1985-1989 |
|---|---|---|---|---|
| Canada | 5.9 | 5.9 | 7.9 | 5.6 |
| France | 7.0 | 9.0 | 8.6 | 11.2 |
| Germany (FRG) | 6.0 | 9.2 | 9.9 | 14.2 |
| Italy | 9.4 | 4.9 | 5.2 | 3.7 |
| Japan | 3.3 | 2.4 | 5.4 | 19.5 |
| United Kingdom | 6.4 | 11.4 | 26.6 | 32.6 |
| United States | 2.5 | 3.4 | 4.8 | 5.8 |

This table is reproduced from Frenkel, Jacob A., Assaf Razin and Efraim Sadka, International Taxation in an Integrated World, MIT Press, 1991.

Source: International Monetary Fund

capital exports and capital imports. To normalize the units of measurement and facilitate intercountry comparisons, the volume of capital movements is expressed as a percentage of GNP (or GDP). The table reveals the dramatic increase in capital movements from the early 1970s through the late 1980s. In this regard, the United Kingdom and Japan stand out. In both, gross capital flows (as percentages of GNP) rose about fivefold during the two decades (from 6.4 to 32.6 in the United Kingdom, and from 3.3 to 19.5 in Japan). In the United States and Germany, the share of gross capital flows in GDP more than doubled during the period. In fact, in recent years the degree of integration of capital markets (as measured by gross capital movements) has grown more rapidly than the degree of integration of goods markets (as measured by the gross volume of trade in goods and services, that is, exports plus imports).

3. International Migration

International migration is driven by a multitude of factors: social, political, religious, ethnic and economic. Some of these elements are pushing people to migrate from their country of origin (e.g. religious persecution) and others attract the migrants to their country of destination (as the "land of unlimited opportunities"). Occasionally, countries may impose strict restrictions on the exodus of people (e.g. the former–Communist bloc). And, very often, potential destination countries impose strict entry quotas (e.g. the United States, Canada). The observed patterns of international migration reflect a combination of these factors and barriers. We now briefly describe these patterns over the last two centuries.

Evidently, the flow of people from the "old world" of Europe to the "new world" of the Americas and Australia in the second half of the 19th century and early 20th century

stand out as the major international migration waves. Great Britain has been a primary source of the registered out–migration from Europe throughout this period although its share petered down gradually (see Table 3). Germany supplied a sizable share of the migrants early in this period but came down to almost zero at the end. Italy, Portugal and Spain started out very low, but then rose to become a major supplier at the end of the period.

Table 4 presents the distribution of registered migrants from Europe among the most important people receiving countries. Evidently, the United States stands out as the largest destination country throughout the period, absorbing between about 60 to 80 percent of the registered migrants. In fact, as indicated by Table 5, net migration contributed a significant portion of the total growth of the white population in the United States. For instance, net migration accounted for as much as 32 to 43 percent of the total increase in the white population during 1880–1910. Nevertheless, the share of the United States even when combined with Canada, another significant destination country, fell down against the rising share of the South American and Australian continents.

After World War II, both the magnitude and the source composition of immigration to the United States changed significantly. Table 6 emphasizes the sharp decline in total immigration to the United States, compared with the pre–World War I period, and the marked decline in the share of Europe as an origin of the immigrants. In its stead, the Latin American and Asian countries became a major source.

Also in the period after the second world war, one can detect a clear increase both in inter–European migration (especially, from the relatively poor South to the relatively rich North) and in migration from North African and Mediterranean countries to Europe.

TABLE 3: THE DISTRIBUTION OF REGISTERED MIGRANTS FROM EUROPE BY COUNTRY OF ORIGIN, 1846-1910 (percent)

| Country of Origin | 1846-1850 | 1851-1860 | 1861-1870 | 1871 1880 | 1881-1890 | 1891-1900 | 1901-1910 |
|---|---|---|---|---|---|---|---|
| Austria and Hungary | - | 2 | 2 | 3 | 6 | 10 | 18 |
| Germany | 43 | 29 | 24 | 19 | 17 | 7 | 2 |
| Great Britain | 47 | 62 | 59 | 51 | 32 | 24 | 22 |
| Ireland | - | - | - | 5 | 9 | 6 | 2 |
| Italy | - | - | 1 | 5 | 1 | 22 | 29 |
| Portugal and Spain | - | 2 | 3 | 4 | 9 | 15 | 12 |
| Russia | - | - | - | 2 | 4 | 7 | 7 |
| Scandinavian Countries | 3 | 3 | 9 | 7 | 7 | 6 | 6 |
| Others[1] | 7 | 2 | 2 | 4 | 15 | 3 | 2 |
| Total: (thousands) | 422 | 2122 | 2660 | 3304 | 7977 | 7150 | 12,704 |

Source: Koerner (1990), based on Woytinski and Woytinski (1953).

[1] Belgium, France, Netherlands, Poland and Switzerland.

TABLE 4: THE DISTRIBUTION OF REGISTERED MIGRANTS FROM EUROPE BY COUNTRY OF DESTINATION (1846-1910) (Percent)

| Country of Destination | 1846-1850 | 1851-1860 | 1861-1870 | 1871 1880 | 1881-1890 | 1891-1900 | 1901-1910 |
|---|---|---|---|---|---|---|---|
| African Colonies | 2 | 5 | 2 | 1 | 1 | 1 | 3 |
| Argentina and Uruguay | - | 2 | 7 | 10 | 13 | 11 | 12 |
| Australia and New Zealand | - | 1 | 6 | 6 | 4 | 7 | 11 |
| Brazil | - | 4 | 3 | 6 | 7 | 18 | 5 |
| Canada | 16 | 9 | 9 | 5 | 5 | 4 | 8 |
| United States | 79 | 77 | 71 | 71 | 70 | 57 | 59 |
| Others | 3 | 2 | 2 | 1 | - | 2 | 2 |
| Total: (thousands) | 1,588 | 3,394 | 3,273 | 3,987 | 7,518 | 6,423 | 14,939 |

Source: Koerner (1990), based on Woytinski and Woytinski (1953).

TABLE 5: THE COMPOSITION OF GROWTH OF THE WHITE POPULATION IN THE UNITED STATES, 1800-1930

| Period | The Share of Natural Growth in Total Growth | The Share of Net Migration in Total Growth |
|---|---|---|
| 1800-1810 | 96.0 | 4.0 |
| 1810-1820 | 96.5 | 3.5 |
| 1820-1830 | 95.4 | 4.6 |
| 1830-1840 | 86.5 | 13.5 |
| 1840-1850 | 73.5 | 26.5 |
| 1850-1860 | 65.3 | 34.7 |
| 1860-1870 | 72.0 | 28.0 |
| 1870-1880 | 71.5 | 28.5 |
| 1880-1890 | 57.1 | 42.9 |
| 1890-1900 | 68.5 | 31.5 |
| 1900-1910 | 58.2 | 41.8 |
| 1910-1920 | 83.0 | 17.0 |
| 1920-1930 | 78.4 | 21.6 |

Source: Koerner (1990), based on Rostow (1978).

TABLE 6: MIGRATION TO THE UNITED STATES BY CONTINENT ORIGIN, 1950-1985 (Percent)

| Continent of Origin | 1950-1954 | 1955-1959 | 1960-1964 | 1965-1969 | 1970-1974 | 1975-1979 | 1980-1985 |
|---|---|---|---|---|---|---|---|
| Asia | 3 | 7 | 8 | 14 | 29 | 35 | 47 |
| Europe | 65 | 49 | 39 | 33 | 24 | 18 | 12 |
| Central and South America | 16 | 28 | 36 | 41 | 40 | 42 | 36 |
| Others | 16 | 16 | 17 | 12 | 7 | 5 | 5 |
| Total: (thousands) | 1,099 | 1,400 | 1,419 | 1,795 | 1,923 | 2,291 | 3,395 |

Source: Koerner (1990, Table 20).

Table 7 illustrates the volume of emigration from the Mediterranean countries in Europe[1] and North Africa to the North–West European countries. The table also indicates the tendency to remigrate back to the country of origin. This may be due to absorption hardships in the host country and/or changes in political regimes and the patterns of economic prosperity in the country of origin. Occasionally, emigrants tend to remigrate to their country of origin on retirement. In some of the population sending countries the effect of emigration on the working age population is much more pronounced than on the total population (see Table 8). For instance, Portugal lost as much as one–half of the potential increase in the working age population due to emigration.

On the population receiving side, the developed countries of North–West Europe are unique (see Table 9). In 1950, France had the largest absolute number of foreigners (1,760 thousand). In 1982, with the Federal Republic of Germany at this time already established as an economic superpower, foreigners were mostly attracted there. Percentage–wise, Luxembourg had always been exceptionally high in this context. Noteworthy is the fact that in all countries (except for France and the Netherlands), the percentage of foreigners in employment is higher than in population. This indicates that foreigners have, on average, fewer dependents than the veterans (in 1982).

With the new world order that followed the collapse of communism, one can except the major flows of migrants to take place from the former Eastern Bloc to Western countries which are willing to absorb migrants (some European countries, Israel, etc.).

The stylized facts and trends reported in this section motivate the choice of topics and issues examined in the subsequent sections. Although the various real world

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[1] Including Portugal.

TABLE 7: MIGRATION IN THE POST-WORLD WAR II PERIOD BY COUNTRY OF ORIGIN, SELECTED COUNTRIES (in thousands)[1]

| | Emigration | | Re-migration | |
|---|---|---|---|---|
| Country | 1950-1959 | 1960-1984 | 1950-1959 | 1960-1984 |
| Greece | 40 | 730 | - | 138 |
| Italy | 1,512 | 3,490 | 877 | 3,026 |
| North African Countries | 1,161 | 7,429 | 425 | 6,673 |
| Portugal | 23 | 1,129 | - | - |
| Spain | - | 2,288 | - | 1,595 |
| Turkey | - | 955 | - | - |
| Yugoslavia | - | 1,276 | - | 1,011 |

[1] Figures refer only to emigration and re-migration to and from North-West European Countries, respectively.

Source: Koerner (1990, Table 7).

TABLE 8: GROWTH OF WORKING AGE POPULATION IN SOUTH EUROPEAN COUNTRIES WITH AND WITHOUT MIGRATION, 1950-1975

| Country | Annual Rate of Growth of Working Age Population (%) | | | |
|---|---|---|---|---|
| | Actual (With Migration) | | Without Migration | |
| | 1950-1960 | 1960-1975 | 1950-1960 | 1960-1975 |
| Greece | 1.0 | 0.6 | 1.2 | 0.9 |
| Italy | 0.6 | 0.7 | 0.8 | 0.8 |
| Portugal | 0.5 | 0.6 | 1.2 | 1.0 |
| Spain | 0.8 | 1.0 | 1.1 | 1.1 |

Source: Koerner (1990, Table 12).

TABLE 9: SHARE AND NUMBER OF FOREIGNERS IN POPULATION AND IN EMPLOYMENT IN MAJOR EUROPEAN DESTINATION COUNTRIES, SELECTED YEARS

| Country | Share of Foreigners In Population 1950 | In Population 1982 | In Employment 1962 | In Employment 1982 |
|---|---|---|---|---|
| Belgium: | | | | |
| Total(thousands) | 323 | 886 | 170 | 332 |
| Percentage | 4.3 | 9.0 | - | 9.1 |
| Federal Republic of Germany | | | | |
| Total (thousands) | 568 | 4,667 | 549 | 2,038 |
| Percentage | 1.1 | 7.6 | 1.7 | 8.1 |
| France | | | | |
| Total (thousands) | 1,760 | 4,459 | 1,093 | 1,503 |
| Percentage | 4.1 | 8.2 | 5.6 | 7.2 |
| Luxembourg | | | | |
| Total (thousands) | 29 | 96 | 20 | 52 |
| Percentage | 10.0 | 26.0 | - | 33.0 |
| The Netherlands | | | | |
| Total (thousands) | 104 | 543 | 47 | 185 |
| Percentage | 1.1 | 3.8 | - | 3.7 |
| Switzerland | | | | |
| Total (thousands) | 285 | 926 | 424 | 526 |
| Percentage | 6.1 | 14.3 | - | 17.3 |

Source: Koerner (1990, Table 13).

developments provide a stimulus for the analysis, the orientation of our paper is analytical. The purpose is to identify key channels and pertinent mechanisms through which international migration affect international trade, both in terms of positive and normative economic analysis.

## III. Substitution and Complementarity between Labor Mobility and Commodity Trade

Labor mobility or immobility has strong implications for international trade in goods and services. In the simplest of all trade models – the Ricardian model which serves to illustrate the forces underlying the directions of trade and the gains from it — labor mobility fundamentally changes the principles governing the patterns of trade. Recall that in this model, labor is the sole factor of production. In the absence of labor mobility, each country exports the good in which it has a comparative cost advantage and imports the good in which it has a comparative cost disadvantage. The commodity terms of trade will be bounded between the inter–industry cost ratios of the two countries.

Now, suppose that labor mobility is allowed and a single world wage rate is established. Each good will be produced in the country where its absolute cost of production is lower. Thus, the pattern of trade is changed in the basic sense that it is determined by absolute rather than comparative productivity advantage. Evidently, at the equilibrium factor prices, the country will export the good in which it has comparative cost advantage unless all people emigrate to one country.

The simple Ricardian model does not allow important mechanisms by which labor mobility can affect international trade in goods and services. To analyze these mechanisms, we shall present a more general model with two factors (labor and capital), two goods, and possibly different technologies in the two countries.

Our starting point will be a set of assumptions that nullify all forces that can generate either commodity trade or labor mobility. By relaxing these assumptions, one at a time, we create room for commodity trade and incentives for labor mobility and we can then study their interaction. Following Markusen (1983), we initially assume that:

(i) The two countries have the same relative endowments of capital and labor;

(ii) The two countries have the same technologies.

Obviously, with constant returns to scale and the same homothetic preferences for the two countries, there will be no commodity trade between the two countries and no cross–country factor price differentials that can lead to international factor mobility.

a. Substitution

Now let us relax assumption (i) and assume that the two countries differ in their relative factor endowments. Suppose that labor and capital are initially locked within the national boundaries.

Let there be two goods (x and y), two factors – labor (L) and capital (K) — and two countries – home (H) and foreign (F). This is the familiar Heckscher–Ohlin–Samuelson model of international trade. Suppose for concreteness that good x is more labor–intensive than good y (in the two countries that have identical technologies), that is:

$$(1) \qquad \frac{a_{Lx}}{a_{Kx}} > \frac{a_{Ly}}{a_{Ky}}$$

for all factor price ratios, where $a_{ij}$ is the unit input requirement of factor i in the production of good j, and where $i = L, K$ and $j = x,y$.

Suppose that country H is (relative to capital) more abundant in labor than country F, that is:

$$(2) \qquad \frac{\bar{L}^H}{\bar{K}^H} > \frac{\bar{L}^F}{\bar{K}^F},$$

where $\bar{s}^i$ is the endowment of factor s in country i and where $s = L, K$ and $i = H,F$).

Suppose good y is the numeraire with its price set to unity in both countries and denote by $p^i$, $r^i$ and $w^i$ the price of good x, the rental price of capital and the wage rate in country i, respectively, where $i = H,F$.

First, observe the quite intuitive result due to Stolper and Samuelson (1947): an increase in the wage rental ratio (w/r) raises the unit cost of the labor–intensive good (x) relative to the unit cost of the capital–intensive good (y) and must therefore raise the relative price (p) of the labor–intensive good.

Now, consider the autarky equilibrium in the two countries. Since country H has a higher relative endowment of labor than country F, it is natural and straightforward to show (see below) that under autarky labor will be relatively less expensive in country H, i.e.:

$$(3) \qquad \frac{\bar{w}^H}{\bar{r}^H} < \frac{\bar{w}^F}{\bar{r}^F},$$

where $\bar{w}^i$ and $\bar{r}^i$ are the autarky prices of labor and capital respectively in country i and

where i = H,F. Hence, by the Stolper–Samuelson theorem, the autarkic price of good x is lower in country H than in country F. Thus, when trade is allowed, good x will be exported from country H to country F until commodity prices are equalized across countries. Of course, good y will be exported from country F to country H. The common equilibrium price of x in both countries will be higher than the autarkic price of x in country H and lower than the autarkic price of x in country F. (With more than two commodities, various complementarity–substitution configurations may, however, determine an equilibrium price which is outside the autarkic–price range.)

The conclusion of this model, known as the Heckscher–Ohlin Proposition, is that in the absence of international factor mobility, each country exports the good which is intensive in its abundant factor; and commodity trade equalizes not only commodity prices but also factor prices across countries. Thus, when free commodity trade takes place, it nullifies the incentives for factors to move from one country to another.

Now suppose that commodity trade is not allowed. In this case, factor (say, labor) mobility can fully substitute for commodity trade. In the above set–up, labor from the labor–abundant country (country H) will be employed in country F until factor prices are equalized. It then follows from the Stolper–Samuelson proposition, that commodity prices will also be equalized across countries. In this case, commodity trade becomes redundant (see Mundell (1957)).

In both cases, with either commodity trade and no labor mobility or labor mobility and no commodity trade, the same international allocation of consumption obtains (even though patterns of production and trade differ). Thus, if the only difference between the two countries lies in their relative abundance of labor, then commodity trade and labor (or capital) mobility are perfect substitutes. When both free commodity trade and factor

mobility are possible, there is a complete indeterminancy between the two modes of international flows.

It remains to show that (2) implies (3), that is: the country with the higher initial labor–capital ratio will have, under autarky, a lower wage–rental ratio. This result follows from the Rybczynski proposition which asserts that at a given factor price ratio, a higher labor–capital endowment ratio results in a higher x to y output ratio (where good x is more labor–intensive than good y). To see this, observe that at a given factor price ratio, the cost–minimizing labor–capital ratio is fixed. Full employment requires that:

$$(4) \qquad \frac{\frac{a_{Lx}}{a_{Ly}}\frac{x}{y} + 1}{\frac{a_{Kx}}{a_{Ky}}\frac{x}{y} + 1} = \frac{\bar{L}}{\bar{K}} .$$

Equation (4) implies that an increase in the relative endowment of labor (namely, $\bar{L}/\bar{K}$) necessitates an increase in the relative output of the good which is more intensive in labor (good x in our case).

Now suppose that country F is at an autarky equilibrium. At this autarky factor price ratio (say, $\bar{w}^F/\bar{r}^F$) and the associated commodity price ratio (say, $\bar{p}^F$), country H, which is relatively more abundant in labor, will produce a higher x/y ratio. Since preferences are identical across countries and homothetic, it follows that country H has the same relative demand as country F. Hence, at the autarky price ratios of country F (namely, $\bar{w}^F\bar{r}^F$ and $\bar{p}^F$), country H has an excess supply of good x and an excess demand for good y. This implies that at an autarky equilibrium in country H we must have:

$$\bar{p}^H < \bar{p}^F \text{ and } \bar{w}^H/\bar{r}^H < \bar{w}^F/\bar{r}^F .$$

Thus, we have shown that (2) implies (3). (In the nxn case this proposition is somewhat weaker, namely: $(\bar{q}^H - \bar{q}^F)(V^H - V^F) \leq 0$ where $\bar{q}$ is the autarkic factor price vector and $V$ is the factor endowment vector).

b. Complementarity

Let us now reinstate assumption (i) about identical relative endowments across countries, but relax assumption (ii). That is, suppose that technologies are not identical. For simplicity and concreteness, suppose that country H has a more productive technology for producing good x than country F, in a Hicks–neutral sense, that is:

$$G_x^H(K_x, L_x) = \alpha G_x^F(K_x, L_x), \quad \alpha > 1, \tag{5}$$

and that the technologies for producing $y$ are identical, that is:

$$G_y^H(K_y, L_y) = G_y^F(K_y, L_y) , \tag{6}$$

where $G_j^i$ is the production function of good $j$ in country $i$, and where $j = x,y$ and $i = H,F$.

It is quite natural and straightforward to show that at autarky, country H, which is more efficient in producing good x than country F, will have a lower price of x, that is:

$$\bar{p}^H < \bar{p}^F. \tag{7}$$

The autarkic relative demand (and consequently relative supply) of the two goods (x/y) is therefore higher in country H than in country F. Note that the contract curve in the Edgeworth box is identical for the two countries by the assumptions of identical relative factor endowments in the two countries and only a Hick–neutral technological difference in good x (see Figure 2) between them. In this box, country H will therefore be at a point such as $H^*$, and country F – at $F^*$. Hence, the factor price ratio (w/r) is higher in country H, that is:

$$\frac{\bar{w}^H}{\bar{r}^H} > \frac{\bar{w}^F}{\bar{r}^F}. \tag{8}$$

Now, suppose that commodity trade is allowed but no factor mobility. Then country H will export good x and import good y until p is equalized between the two countries. The free trade price ratio must lie between $\bar{p}^H$ and $\bar{p}^F$. Therefore, the output ratios will become more divergent, that is, country H will move closer to $O_y$ and country F – closer to $O_x$. Hence, the post–trade factor price ratios (w/r) will grow even more divergently than in (8): in country H, which increases its relative output of the labor–intensive good (x), labor will become even more expensive than capital, compared to the pre–trade situation.

Now, suppose that factor mobility (labor and capital) is allowed alongside trade in commodities. Labor will move from country F to country H and capital will move in the opposite direction. By the Rybczinski proposition, at the initial commodity trade price, there will be an excess supply of good x in country H and an excess supply of good y in country F. Exports of x from country H and its imports of y will further rise. Thus, factor mobility reinforces trade in commodities. In this setup of country specific external

economies factor mobility and commodity trade complement each other.

Another phenomenon that can generate complementarity between commodity trade and labor mobility is external economies of scale. Being external to the individual firm, economies of scale still preserve perfect competition. Suppose for concreteness that there are external scale economies in the production of good x. If countries differ in absolute size, but have identical relative factor endowments, Markusen (1983) showed that the larger country will export good x. As this good is more labor–intensive, the relative price of labor (w/r) in the free commodity trade equilibrium is higher in country H. Allowing labor to move from country F to country H will further increase the excess supply of good x in country H, via both the Rybczinski effect and the external scale economies effect, thereby generating an even higher volume of trade.

## IV. Substitution Between Labor Mobility and Capital Mobility

Classical economic setups suggest that factors of production will move, when not locally or otherwise constrained, from locations where their marginal product is low to other locations where their marginal product is high. With frictionless factor mobility, eventually each factor of production generates the same marginal product wherever it is employed. In fact, with identical constant returns to scale technologies everywhere and two factors (capital and labor), it suffices that one factor is freely mobile to equalize the marginal product of each factor everywhere.

To see this, consider the famous scissors diagram (Figure 3) in which the marginal product of capital curves of the two countries (home and foreign) that comprise the world economy are depicted from opposite directions. Following MacDougall (1960), suppose that originally the world allocation of capital is at A, with the home country having a

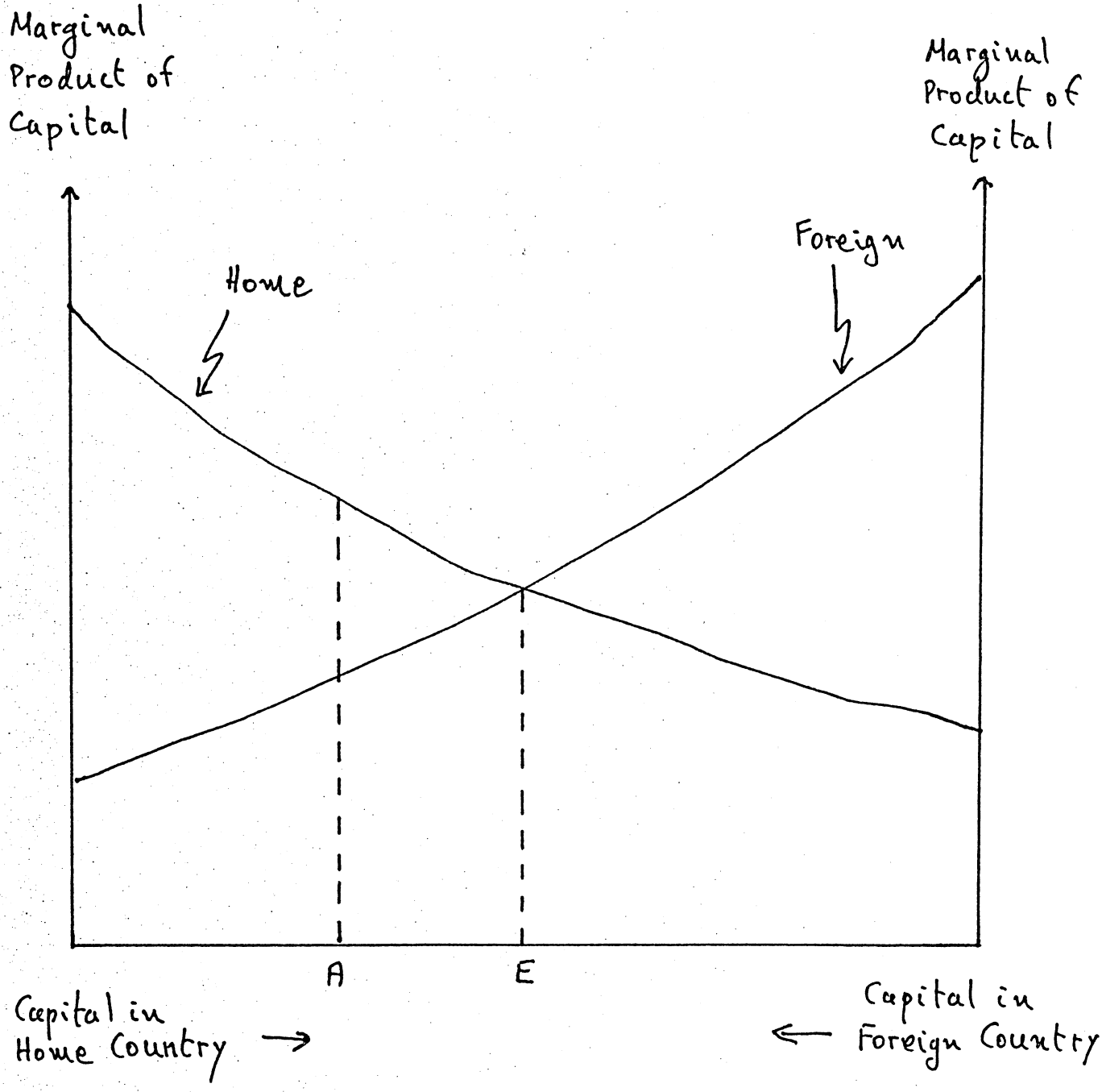


Figure 3 : The Allocation of Capital Between The Home Country and The Foreign Country

higher marginal product of capital than the foreign country. Now suppose that labor is stuck within national borders but capital is internationally mobile. Then capital will flow from the foreign country to the home country until the marginal product of capital is the same in the two countries. This occurs at point E. Recall that with constant returns to scale technologies, the marginal product of each factor depends only on the capital/labor ratio. Thus, originally the home country had a lower capital/labor ratio than the foreign country and the subsequent flow of capital that equalized the marginal products of capital brought about an identical capital/labor ratio in the two countries. But this implies also that the marginal products of labor are equalized as well. Similarly, mobility of labor in the opposite direction (that is, from the home country to the foreign country) would have generated equal marginal products of capital, in addition to equal marginal products of labor.

Evidently, the observed international differentials in marginal products are enormous. For instance, the real wage in the United States is about 15 times higher than the real wage in India (see Summers and Heston (1988)). The first explanation for this difference that comes to mind is the marked difference in skills or the human capital between American workers and Indian workers. After correcting for these differences (based on estimates by Krueger (1968)), Lucas (1990) finds that the wage per effective labor (adjusted for human capital) in the United States is still three times higher than the wage per effective labor in India. Obviously, Indian labor can by no means enter freely to the United States, so as to eliminate this observed wage differential. But when labor has a higher marginal product in the United States, it must be the case that capital has a higher marginal product in India. (According to Lucas's calculations, the marginal product of capital in India is five times higher than the marginal product of capital in the United

States.) Then Lucas very correctly posed the puzzle, why capital from the United States and other rich countries does not flow into India and other less developed countries.

To some extent, one may possibly resolve the puzzle by resorting to technological risk (e.g. Grossman and Razin (1984)), economic distortion (e.g. Bhagwati and Srinivasan (1983)), political and social unrest, and the like. Lucas, however, was able to suggest an alternative explanation for the puzzle about the lack of capital flow from developed to less–developed countries, based on the new developments in growth theory.[1] According to this explanation there is no difference in the marginal product of capital between the United States and India. Instead, there is only a productivity difference that is generated by an external economy effect of human capital. Lucas poses that investment in human capital not only augments the effective labor supply of the worker who made such an investment but rather also contributes to the productivity of all other workers. Taking this external effect into account, Lucas suggests a resolution to the lack of capital flow puzzle.

The existence of an external productivity effect suggests that even though capital has no incentive to move from rich countries to poor countries, labor nevertheless has a strong incentive to move from poor countries with low levels of human capital to rich countries with high levels of human capital.[2] Immigration quotas serve to check the brain drain.

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[1] These developments endogenize the long–run growth rate through dynamic increasing returns (e.g. Romer (1986)).

[2] A similar observation about the direction of migration is made also by Galor and Stark (1991) in an overlapping generations model with immobile capital.

## V. Welfare Evaluation

### 1. The Asymmetry between International Mobility and Migration

So far, we have considered only labor mobility, as distinct from migration. By labor mobility we refer to the mobility of labor as merely a factor of production (indistinguishable from other factors such as capital for this matter), without any mobiliby of the consumption entity embodied in labor. The individual or the household is perceived as providing labor services in another region or country without changing her national residency. Therefore, she remains an integral element of the welfare calculus of her original country even though she exports her labor services. Thus, labor mobility creates no new conceptual issues of welfare evaluation. The set of people over which the social welfare function is defined does not change as a result of international labor mobility.

In contrast, labor migration is perceived not merely as an export of labor services, but rather as a change in the distribution of national communities. The migrant no longer belongs to the origin community and becomes a member of the destination community. This raises a conceptual welfare issue in both the origin and the destination country. In evaluating the social welfare of the source country, should we consider the pre–migration or the post–migration population? Similarly, when evaluating the social welfare function of the destination country, should we take into account only the welfare of the veterans or consider the welfare of the migrants as well. Obviously, at each point in time, a democratic society, in evaluating alternative policies, takes into account the welfare of all existing members, regardless of whether they were born into this society or just recently joined it by migration. The conceptual welfare issue is about whether to take into account the welfare of those who may join or leave the society in the future. This issue is particularly relevant when evaluating a policy that is directly and significantly going to

cause population shifts (e.g. naturalization policy, social security benefits to people who left the country or are newcomers, etc.).

This conceptual issue which arises here in the context of international migration is akin to the issue of population growth in a closed economy. When evaluating population growth policies, there is the issue of whether to take into account only the welfare of those alive in the present or also the welfare of those who are not yet born. This debate is surveyed in Nerlove, Razin and Sadka (1987).

Nevertheless, there are two important welfare evaluation asymmetries between population growth and international migration. First, by revealed preference, migrants are better off after than before migration, for otherwise they would have stayed in their home country. In contrast, it is a deep philosophic issue whether the yet–unborn child will be better off if not born at all. (Indeed, this issue is endlessly debated in many countries on abortion cases). Second, with altruistic parents the yet–unborn child is indirectly represented in the social welfare function of the existing population through her parents' welfare, though only partially, because her utility per se is not an independent argument in the social welfare function of the existing society. In contrast, the migrant (unless having altruistic relatives in the destination country) is not represented in the social welfare function of the existing population in the destination country.

It is beyond the scope of this chapter to resolve this conceptual issue and offer an appropriate way of making interpersonal welfare comparisons (particularly between veterans and migrants). Instead, we follow Bhagwati and Srinivasan (1983) in identifying who gains and who loses from international migration and by how much.

2. Gains and Losses from International Migration

The scissors diagram in Figure 4 describes the allocation of people between two countries: a Source Country (SC) and a Destination Country (DC). We assume that the immobile factors are owned only by the country residents. Suppose that the initial allocation of people is at point A where the DC marginal product of labor (which is equal to the real wage) is higher than the SC marginal product of labor. If free migration is possible, people will migrate from the SC to the DC until the marginal products of labor are equalized at point B. The migrants earn a higher wage. Their net gain is represented by the area FNMK. Output in the DC is increased by a sum represented by the area AHMB, of which a sum represented by the area ANMB is paid to the migrants in wages. Thus, the net gain of the veterans in the destination country is represented by the area NHM. Output in the SC falls by an amount represented by the area AFMB, of which the sum represented by the area AFKB was initially paid in wages to those who migrated. The net loss to the residents of the SC, "those left behind," is represented by the area FMK. World–wide, there is a positive net gain which is represented by the area FHM. But, as we have just seen, not all gain. The migrants and veterans in the destination country gain, but those left behind in the source country lose. Thus, in principle there exists a bilateral transfer from the DC to the SC which can make everyone better–off. Furthermore, looking only at the gain to the migrants, it by itself still exceeds the loss to those left behind. Therefore, the migrants themselves can compensate (for instance, by an exit tax) those left behind.

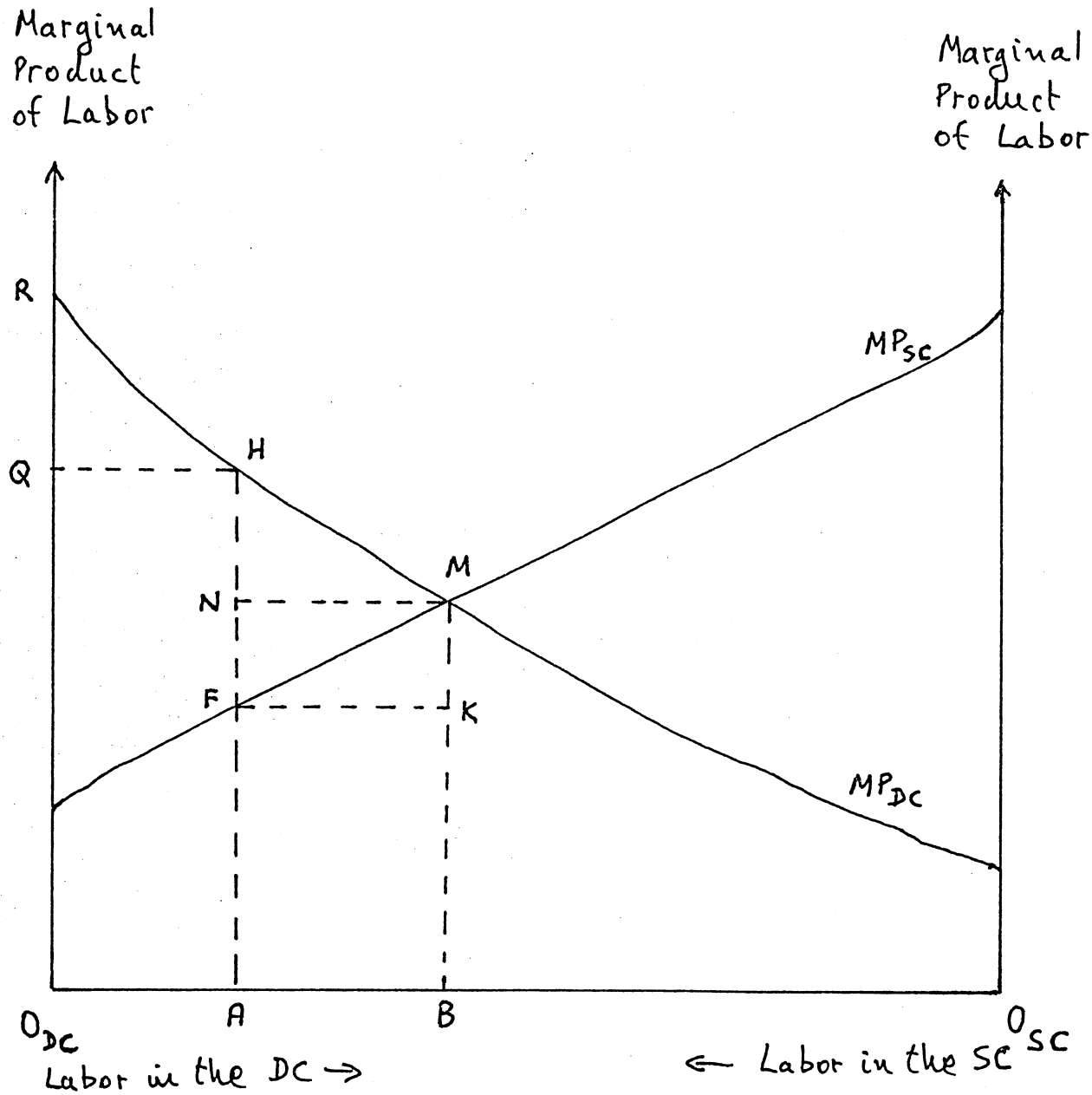


Figure 4: Gains and Losses From International Migration

## VI. Global Population Dispersion: The Efficient Population Size of a Country

By its very virtue, international migration changes the population size of countries. It is therefore instructive to look at a benchmark framework in which there are no legal or other impediments to the determination of the population size of each country. Suppose a country can freely choose the number of its citizens or residents among a global pool of potential world residents. What is the most efficient size in this case?

This issue is tantamount to well–dealt issues in the local public finance literature (e.g. Berglas and Pines (1981), Wildasin (1986)) and in the economic geography literature (e.g. Krugman (1990)). The basic idea underlying the determination of the efficient population size is that there are factors that yield advantages to size and others that generate disadvantages to size, and an efficient size is obtained when the two groups of factors just balance each other. In the first group, there are commonly mentioned increasing returns to scale, public goods (that are jointly consumed by all members of the community and their cost can thus be shared), etc. In the second group, we can cite diminishing marginal productivity of labor due to the existence of some fixed factor of production such as land; costs of transportation from the marketplace or the production site and to the consumption place; congestion effects in the consumption of public goods or utilization of public inputs (e.g. road congestion), etc.

The interaction between these factors can be most neatly seen in a model in which there is just one force pushing for higher size and another force pushing in the opposite direction.[3] Suppose that there is a pure public good that generates an advantage to size and a fixed factor of production (say, land) that causes labor to have a diminishing

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[3] Such a model is commonly employed in order to establish the Henry George (1913) proposition that suggests that the efficient size of government is such that it can be financed by a one hundred percent tax on land rents.

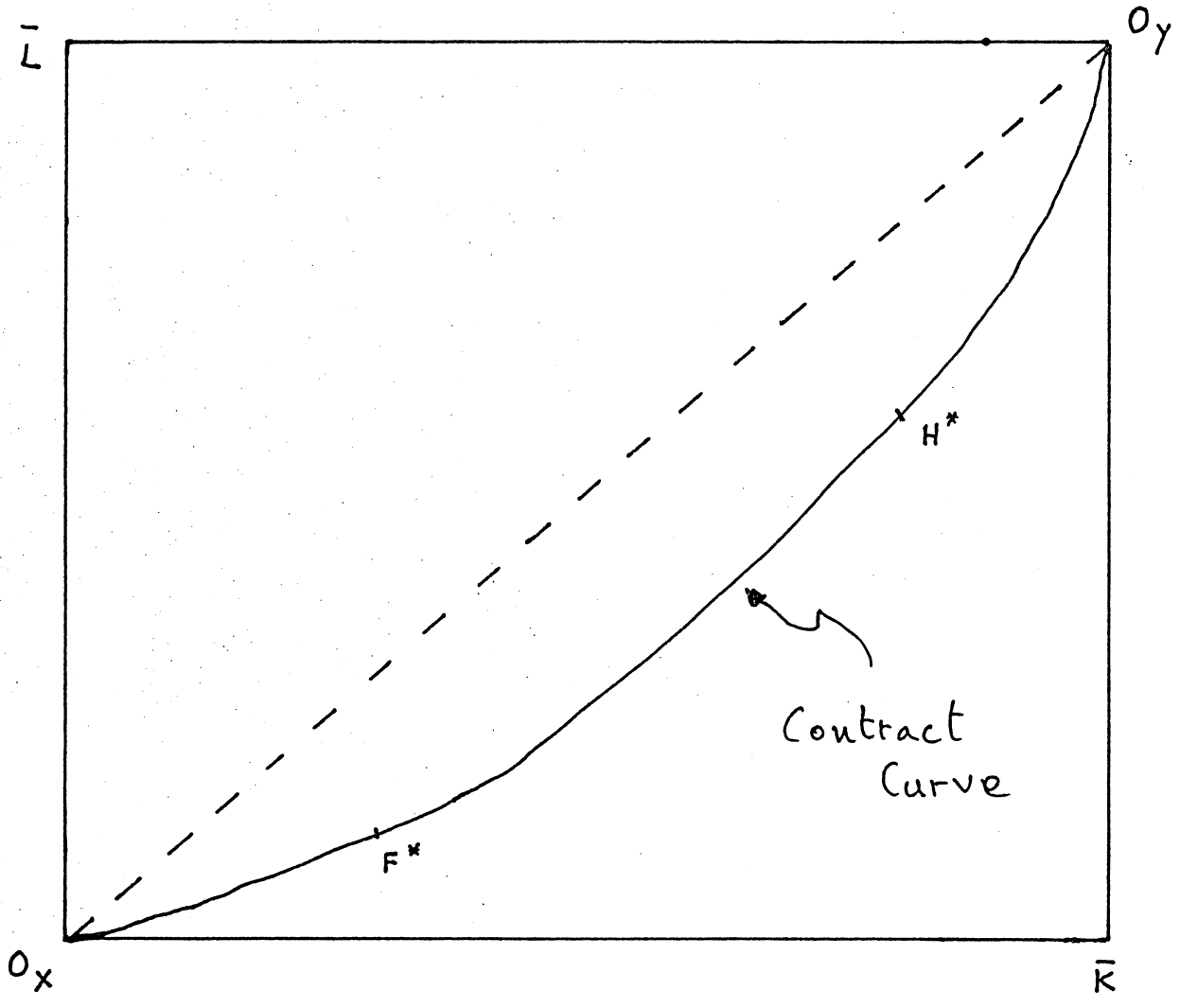


Figure 2 : Edgeworth Box Diagram

marginal product, thereby generating a disadvantage to size. To simplify, suppose that all individuals are alike and that there is, in addition to the public good, only one other good which is privately consumed. To sharpen the analysis we assume the world economy can be divided up into any number of countries at little cost.

Formally, the efficient population size is obtained by maximizing the common utility level

$$u(G,c), \tag{9}$$

subject to the resource constraint

$$F(T,n) \geq nc + G, \tag{10}$$

where $G$ and $c$ are, respectively, public and private consumption, $F$ is a constant returns–to–scale production function, $T$ is the fixed endowment of land, and $n$ is the size of population. The resource constraint simply states that total output (namely, $F(T,n)$) must be divided between public consumption (namely, $G$) and total private consumption (namely, $nc$). The latter is equal to the private consumption of a representative individual (namely, $c$) times the number of people in the community (namely, $n$). The determination of the efficient population size is graphically depicted in Figure 5. For each given population size ($n$), we first find the optimal levels of private and public consumption and, consequently, utility. The latter is therefore a function of $n$ (namely, $u = u^{*}(n)$) and its graph is as shown in Figure 5. The slope of this graph is equal to $u_G(F_n - c)$, where $u_G$ is the marginal utility of public consumption and $F_n$ is

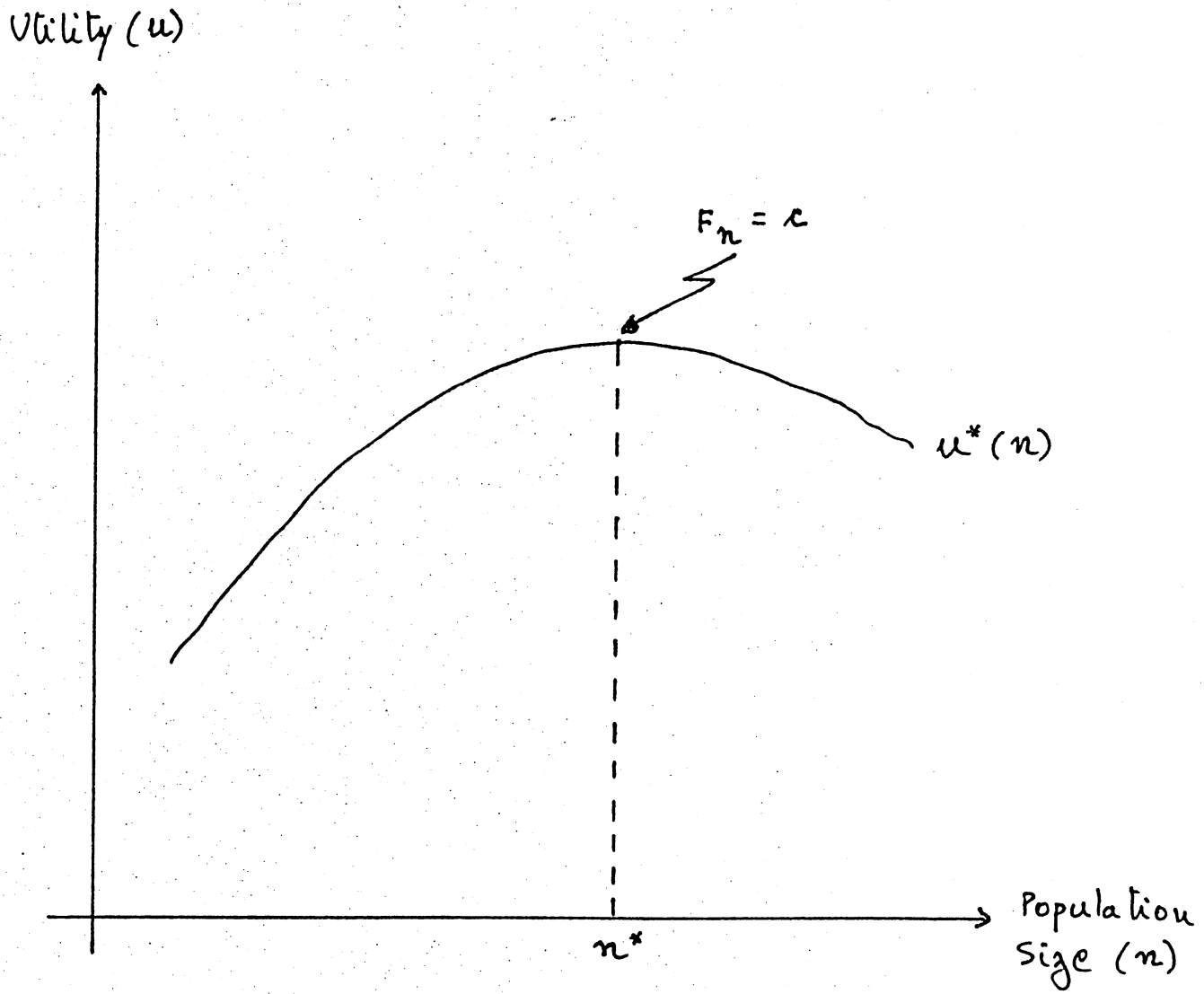


Figure 5: Efficient Population Size

the marginal product of labor. The explanation of this result is straightforward: an additional person contributes her marginal product to society, but takes out her private consumption, leaving a net contribution of $F_n - c$ to the rest of the society, which can be expressed by $u_G(F_n - c)$ in utility terms.

Notice that the additional person takes out only her private consumption, and not public consumption because, by definition, she is a free rider on the jointly consumed public good. Since the marginal product is diminishing (due to the fixed endowment of land), then the net contribution to the rest of the society of an additional person is first positive and then becomes negative. The efficient population size is obtained when the marginal product of labor equals private consumption.

An interesting implication of the rule determining the efficient population size is that each person privately consumes only her marginal product. Thus, the whole land rent is left to finance public consumption. Thus, a country which has an efficient population size, provides an efficient public consumption at a level which is fully covered by a one–hundred percent tax on land rents (the so–called Henry George rule).

In this framework international migration is determined by a bundle of a real wage and public good provision. In–Migration will stop when this bundle is no better than what is offered elsewhere. Out–migration will cease when nowhere is a better bundle offered. For simplicity we considered formally only two elements that affect efficient population size: a real wage that falls with the size of population and a public good whose per–capita cost falls with the size of population. But the fundamental principles involved would carry over in more general frameworks pertaining to international migration. If, however, the number of countries is given it may not be efficient to allocate the world population equally among them and inter–country transfers may be necessary.

## VII. International Migration and the Limits of Intra–Country Redistribution

The modern welfare state typically redistributes income in one way or another from the rich to the poor. This may be done by a variety of means, such as progressive income taxation, cash transfers to the poor, in–kind transfers to the poor (food stamps; provision of housing, medical care, education; etc.), indirect subsidies to necessities (food, public transportation), and the like. Such redistribution makes a developed welfare state more attractive to poor migrants from less developed countries, even when these migrants do not qualify for all the ingredients of the entitlement programs. Therefore, migration has strong implication for the welfare of the veteran residents in the destination country. Following Wildasin (1991), we shall illustrate these considerations in a stylized model with one immobile factor whose distribution is the underlying source of inequality and internationally mobile workers (natives and migrants).

For this purpose we return to the model of section V which, redrawn in Figure 6, where the curves "$MP_{DC}$" and "$MP_{SC}$" portray the marginal products of labor in the Destination Country (DC) and the Source Country (SC), respectively. Suppose that the fixed factor is land and that it is owned by immobile landlords, and consider the income distribution in the DC between the landlords and the original native workers. Assume that initially the allocation of (native) workers between the DC and the SC is at point A in Figure 6 and no migration is allowed. The income of workers is represented by the area $O_{DC}QHA$ and the income of landlords – by the area QRH. This initial distribution of income is represented by point A in Figure 7. Suppose redistribution takes the form of a subsidy (possibly negative) to workers, financed by a lump–sum tax on landlords. Since we assume that the supply of labor of each worker is perfectly inelastic, this redistribution scheme creates no distortions, i.e., the size of the national pie remains unchanged. Hence,

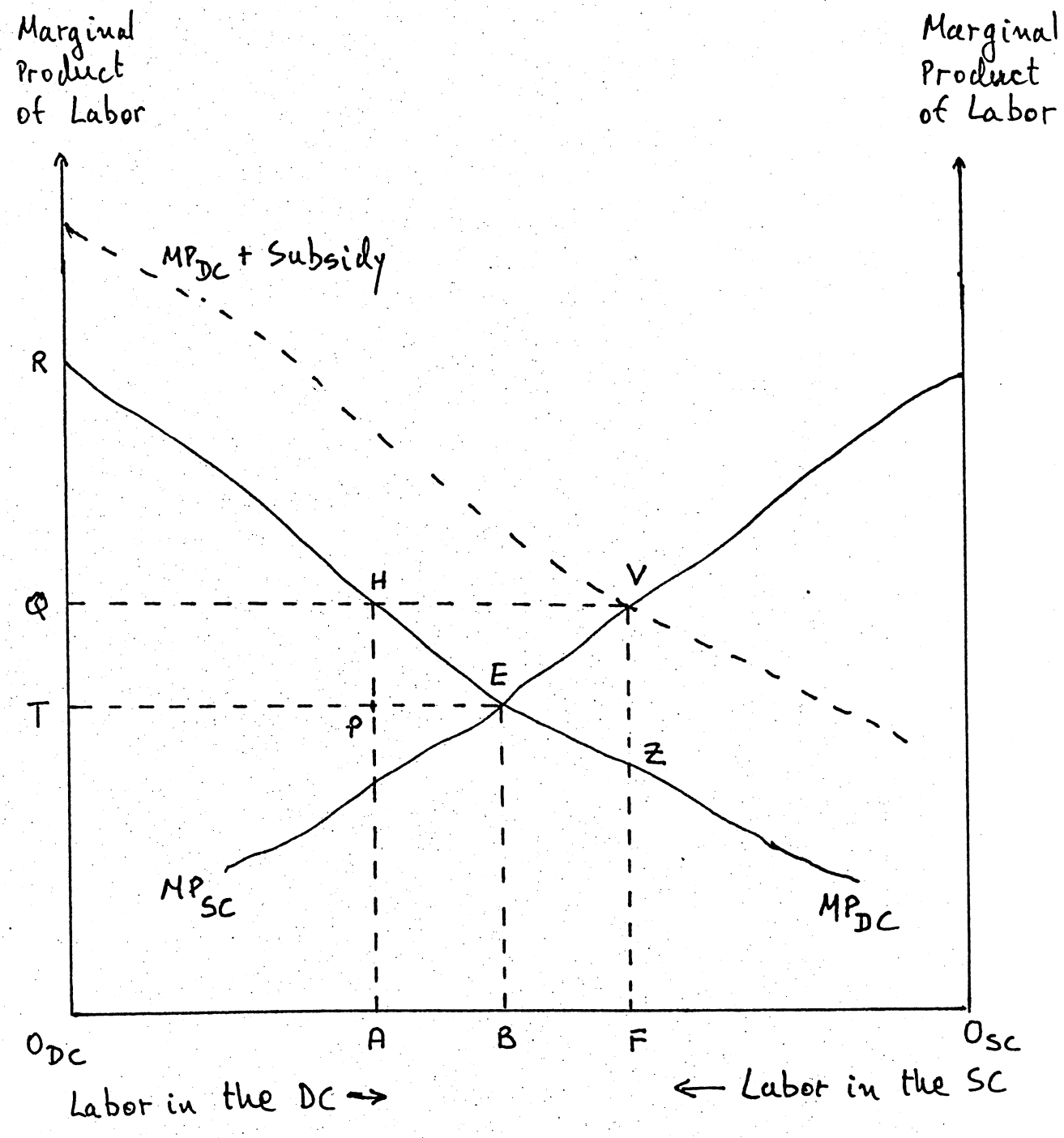


Figure 6: The Allocation of Workers Between The DC and The SC

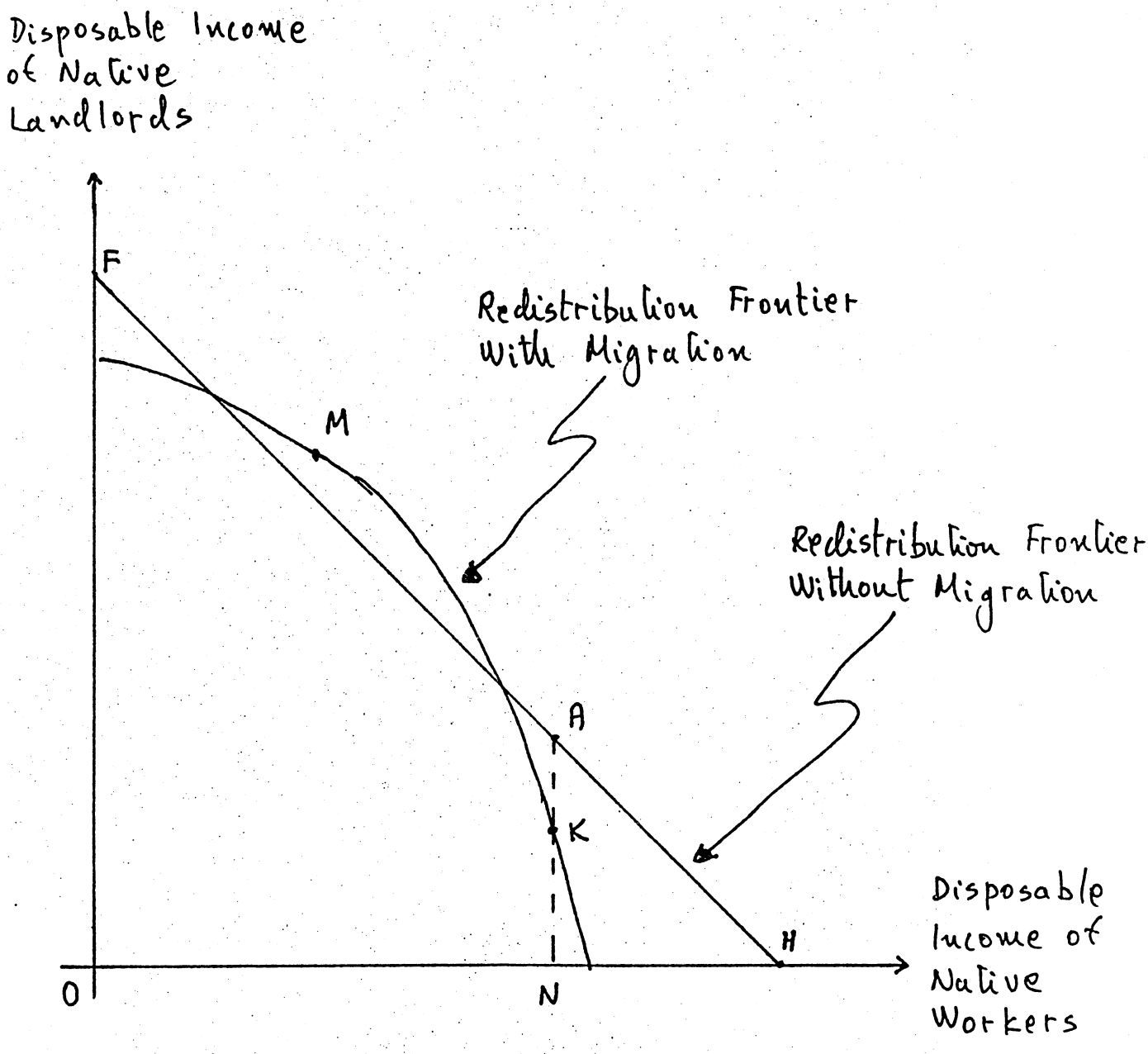


Figure 7: The Income Redistribution Frontiers With and Without Migration

the income redistribution frontier is a straight line with a slope of unity (in absolute terms) — the line FAH in Figure 7.

Now, suppose that free migration is allowed. When no redistribution takes place in the DC (i.e. the subsidy to workers in the DC is zero), then AB workers will migrate from the SC to the DC. The wages in the DC falls from $O_{DC}Q$ to $O_{DC}T$ and the total income of the native workers in the DC falls from $O_{DC}QHA$ to $O_{DC}TPA$. At the same time, income of landlords rises from QRH to TRE. The total income of native workers and landlords rises from $O_{DC}RHA$ to $O_{DC}REPA$. Thus, the income distribution point in this case, denoted by M in Figure 7, lies to the northwest of point A and outside the no–migration income redistribution frontier FAH.

Now, suppose that redistribution takes place in the DC, and let us trace out in Figure 7 the income redistribution frontier in this case. A subsidy to workers in the DC raises the demand curve for workers in the DC from "$MP_{DC}$" to "$MP_{DC}$ + Subsidy." The subsidy brings more migrants to the DC, raises the wage received by workers (natives, migrants and "those left behind"), raises the total income of native workers in the DC, but lowers the net income of DC's landlords. (Note that the subsidy to workers is financed by a lump–sum tax on landlords.) The subsidy is no longer distortion–free, and the income redistribution frontier is no longer a straight line with a unitary slope. Recall that the total wage of native workers in the no–migration, no–subsidy case was $O_{DC}Q$ in Figure 6 and their total income was ON in Figure 7. Now, suppose that with migration we still want to preserve the income level ON, of native workers. The amount of the subsidy that is required for this purpose is VZ in Figure 6. An amount of AF workers migrates to the DC in this case. Total income of landlords is equal to total output ($O_{DC}RZF$ in Figure 6), less total wage income, including the wage subsidy (which is equal to the tax levied on

landlords), received by workers ($O_{DC}QVF$ in Figure 6). That is, total income of landlords in the DC is equal to QRH, minus HVZ. This income is obviously smaller than QRH. Thus, the income redistribution frontier with migration passes below point A in Figure 7; say it passes through point K.

Migration therefore changes the income redistribution frontier in a nontrivial way. In a certain range, migration shifts the frontier outward and in some other ranges – inward. With no redistribution, migration lowers the income of native workers and raises the income of native landlords. If a redistribution scheme attempts to preserve for native workers at least the income that they had before migration (and with no redistribution), it must make landlords worse–off than they were in the pre–migration, no redistribution case; and vice versa.

This framework brings up another nonaltruistic motive for foreign aid. The international trade literature has already brought to our attention the possiblity that a country could sometimes become better off by giving foreign aid, because the terms of trade may change in its favor (e.g. Samuelson (1952), Bhagwati, Brecher and Hatta (1983)). In the present framework, gains through terms of trade changes are absent, because there is only one tradable good. Nevertheless, the DC benefits from giving foreign aid to the SC, if this aid serves to finance a subsidy to workers in the SC, thereby containing the migration from the SC to the DC, which migration was seen to impose a toll on the redistribution policy of the DC. Indeed, as shown in Wildasin (1991), the foreign aid shifts outward almost the entire income redistribution frontier in the presence of free migration.

# REFERENCES

Berglas, Eitan and David Pines (1981), "Clubs, Local Public Goods, and Transportation Models: A Synthesis," Journal of Public Economics, 15, 141–162.

Bhagwati, Jagdish, N., Richard Brecher and Tatsuo Hatta (1983), "The Generalized Theory of Transfers and Welfare: Bilateral Transfers in a Multilateral World," American Economic Review, 73, 606–618.

Bhagwati, Jagdish, N. and T.N. Srinivasan (1983), "On the Choice Between Capital and Labor Mobility," Journal of International Economics, 14, 209–221.

Bhagwati, Jagdish N. and T.N. Srinivasan (1983), Lectures on International Trade, MIT Press (Cambridge, USA).

Galor, Oded and Oded Stark (1991), "The Impact of Differences in the Levels of Technology on International Labor Migration," Journal of Population Economics, 4, 1–12.

George, Henry (1914), Progress and Poverty, Doubleday (New York).

Grossman, Gene M. and Assaf Razin (1984), "International Capital Movements Under Uncertainty," Journal of Political Economy, 92, 286–306.

Koerner, Heiko (1990), Internationale Mobilitaet Der Arbeit, Wissenschftliche Buchgesellschaft, Darmstadt.

Krueger, Ann O. (1968), "Factor Endowments and Per Capita Income Differences Among Countries," Economic Journal, 78, 641–659.

Krugman, Paul (1990), "Increasing Returns and Economic Geography," NBER Working Paper No.3275.

Lucas, Robert E. Jr. (1990), "Why Doesn't Capital Flow from Rich to Poor Countries?" American Economic Review, Papers and Proceedings, Vol. 80, No. 2, 92–96.

MacDougall, G.D.A. (1960), "The Benefits and Costs of Private Investment from Abroad: A Theoretical Approach," Economic Record, 36, .13–35.

Markusen, James R. (1983), "Factor Movements and Commodity Trade as Complements," Journal of International Economics, 14, 341–356.

Mundell, Robert A. (1957), "International Trade and Factor Mobility," American Economic Review.

Nerlove, Marc, Assaf Razin and Efraim Sadka (1987), Household and Economy: Welfare Economics of Endogenous Fertility, Academic Press (Boston, USA).

Romer, Paul M. (1986), "Increasing Returns and Long–Run Growth," Journal of Political Economy, 94, 1002–1037.

Rostow, W.W. (1978), The World Economy: History and Prospect, London Basingstoke.

Samuelson, Paul A. (1952), "The Transfer Problem and Transport Costs: The Terms of Trade when Impediments are Absent," Economic Journal, 62, 278–304.

Stolper, Wolfgang F. and Paul A. Samuelson (1941), "Protection and Real Wages," Review of Economic Studies, 9, 58–73.

Summers, Robert and Alan Heston (1988), "A New Set of International Comparisons of Real Product and Price Levels: Estimates for 130 Countries, 1950–1985," Review of Income and Wealth, 34, 1–25.

Wildasin, David, E. (1986), Urban Public Finance, Harwood Economic Publishers.

Wildasin, David E. (1991), "Income Redistribution and Migration," Working Paper No.2 Center for Economic Studies, University of Munich.

Woytinski, W.S. and E.S. Woytinski (1953), World Population and Production: Trends and Outlook, New York.

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