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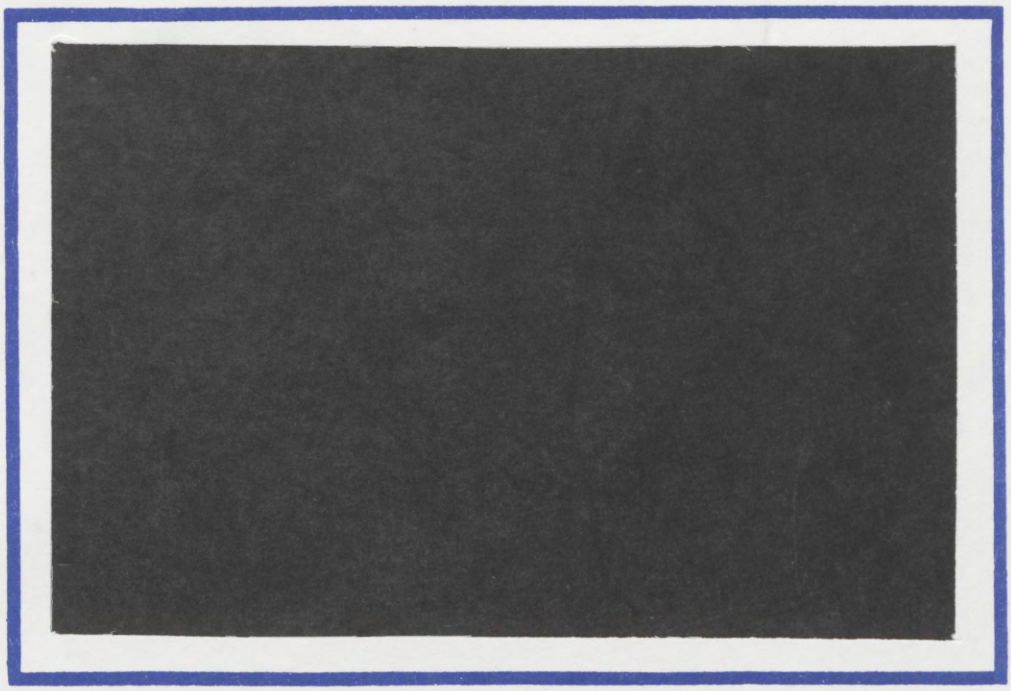

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INTERACTIONS BETWEEN INTERNATIONAL MIGRATION AND INTERNATIONAL TRADE: POSITIVE AND NORMATIVE ASPECTS

by

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1 Introduction

The study of international trade and international migration occupies a relatively small part of the 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 paper, 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 paper is organized as follows. In section 2 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 3 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 4 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 5 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 6 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 7 assesses the limits imposed on the intracountry redistribution policies as a result of potential and actual intercountry population flow.

The purpose of this paper 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 in the process of increased efficiency and growth of the world economy.

2 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 in 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.

2.1 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:

- technological improvements lowered both the money and time costs of transportation;

- output growth reinforced international trade (especially, via intra-industry trade);
- 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. Note also that high growth rates of exports are accompanied also by high growth rates of GDP. For instance, the exceptionally high growth rate of GDP in the fifties and sixties (about 6% annually) occurs when exports grew at an even higher rate (about 10% annually). In contrast, the inter world war period is marked by a very low growth rate of both exports and GDP. This casual observation may suggest the existence of a positive interaction between trade liberalization and economic growth.

Similarly, Table 1 shows the sharp incrase 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 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

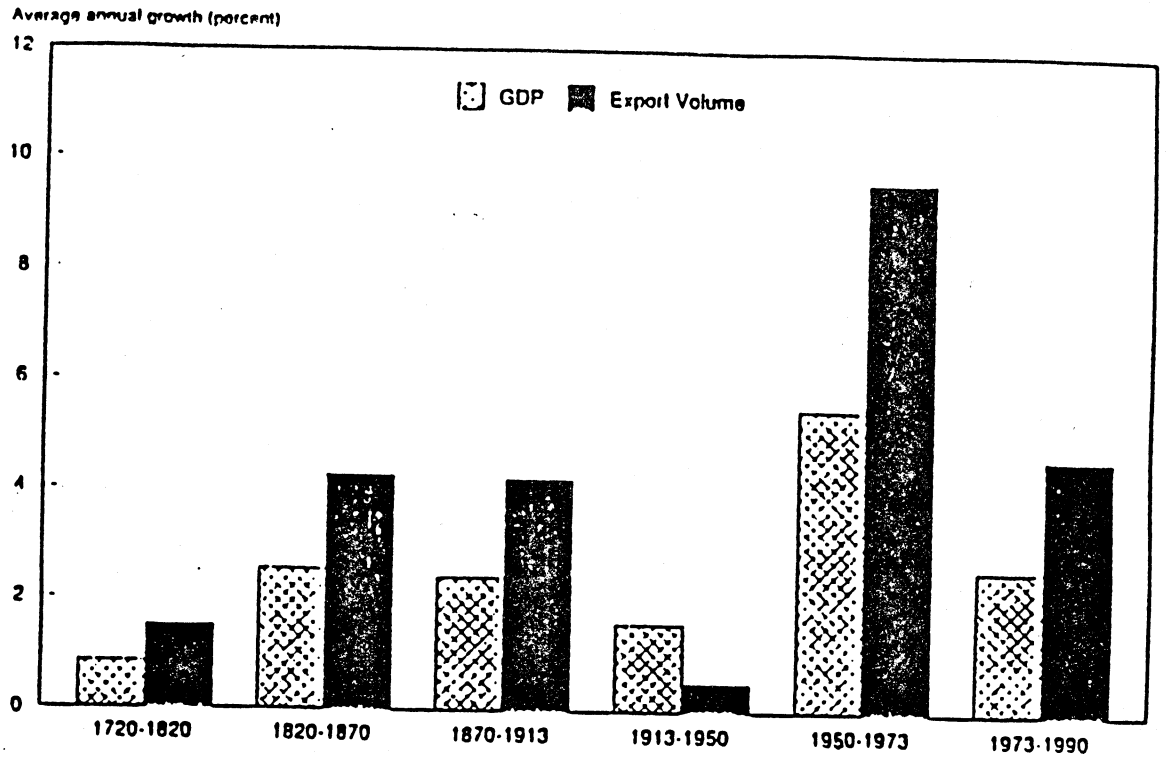

Figure 1: GDP and Export Growth Trends, 1720-1990

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.

of 1982 dollars in 1991 (almost a twenty-fold increase). By comparion, 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).

2.2 International Capital Flows

The historical developments of international capital flows shows 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 international capital markets.

In economies that are open to international flows of capital, *net* capital flows are accounted 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 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

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

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).

2.3 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 Stated, 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 flows 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 that accelerated over time. 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 sizeable share of the migrants early in this period but came down to almost zero at the end. One explanation for the decline in emigration from Germany can be the 1871 unification of Germany, which brought about for the first time in the whole world the nowadays - familiar elements of the welfare state, such as national health insurance (Krankenversicherung) in 1883 and the old age benefits (Pensionsversicherung) in 1889. Interestingly enough, the Italian unification marked an opposite trend, namely the acceleratioin of emigration.

Portugal, Spain and Italy started out very low, but then rose to become

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.

a major supplier at the end of the period Noteworthy is Ireland which, despite its small population, supplied 5-9 percent of the overall migration from Europe at the end of the 19th century.

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[1]. 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 compositon 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[2], 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

[1]Hatton and Williamson (1992) give the following historical perspective: "In the century following 1820, an estimated 60 million Europeans set sail for labor-scarce New World destinations. About three fifths of these went to the United states. By comparion, earlier migration from labor-abundant Europe had been a mere trickle and other 19th centry emigrations from, for example, India and China were also relatively modest. The only comparable intercontinental migration was the black slaves from Africa to the Americas and the Caribbeans. Indeed, it was only in the 1840's that the movement of Europeans into North America exceeded the Africans, and it was not until the 1880's that the cumulative total of Europeans exceeded African immigration".

[2]Note that the United States started to impose immigration quotas in 1921. This marked the end of a century-long period of free mass immigration to the New World.

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).

increase both in inter-European migration (especially, from the relatively poor South to the relatively rich North) and in migration from North African and Mediteranean countries to Europe.

Table 7 illustrates the volume of emigration from the Mediteranean countries in Europe[3] and North Africa to the North-West European countries. Notice that the fifties and sixties are marked by high economic growth and low unemployment in Western and Northern Europe. Table 7 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 either after acquiring some professional skill and expertise and accumulating enough non-human wealth (so that they can start their own small business in their home country) or upon 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 a one-half of the potential incrase in the working age population due to emigration[4].

On the population receiving side, the developed countries of North-West Europe stand out (see Table 9). In 1950, France had the largest absolute number of foreigners (1,760 thousand). In 1983, 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

[3]Including Portugal.

[4]In 1983, about 30% of the Portugese population lived outside Portugal (see OECD 1985).

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).

European countries, Israel, etc.). This kind of migration very much resembles the South-North (and West) migration in post-world war II Europe.

A review of recent developments in international migration, conducted by Stanton-Russell and Teitelbaum (1992), states: "The magnitude of human flows accross national boundaries has become very large over the past three decades. Estimates are necessarily crude, but as of the late 1980's, some 80 million persons were residents outside their nations of citizenship. Conservatively, these numbers are likely to have reached 100 million since the dissolution of the former Soviet Union and are expected to increase further in the coming decades. The international financial flows that follow such human movements are substantial. The total value of official remittance inflows (credits) world wide was USD 65.6 billion in 1989, ... second in value only to trade in crude oil and larger than official development assistance."

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 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.

3 Substitution and Complementarity between labor Mobility and Goods Mobility

In an autarkic situation, different countries typically have different commodity prices and factor prices. Such a situation may have been a characteristics of protectionist preworld war II western Europe vis-a-vis the American market or may be a characteristics of the former East-European bloc, vis-a-vis the industrialized countries. For instance, Table 10 highlights the wage gap between Eastern Europe (with hourly wages below one USD) and the industrialized countries (with hourly wages typically above 10 USD). Obviously, if barriers to labor mobility are removed or eased up, then labor tends to

TABLE 10: WAGE GAPS AND POPULATION, (1990).

	Wage per hour (US $)	Population (millions)
Eastern Europe		
Poland	0.7	38
Hungary	0.7	11
Czechoslovakia	0.8	16
Bulgaria	0.2	9
Rumania	0.6	23
Yugoslavia	1.1	24
USSR (European)	0.9	222
Eastern Europe (total)	0.9	343
Industrialized countries		
Germany (West)	11	61
France	8	56
Italy	11	57
UK	8	57
EC (total)	9	340
EFTA (total)	13	25
Western Europe (total)	10	365
USA	13	250
Canada	13	27
Australia	14	17

Source: Layard et al. (1992)

migrate from low wage countries (e.g., East Europe) to high wage countries (e.g., West-Europe).

A crucial question for migration policy is whether trade in goods can narrow the wage gap, thereby reducing the pressure for labor migration, or such a trade widens the wage gap and further exacerbates the incentive to migrate. Put differently: is trade in goods a substitute or a complement to labor mobility?

To analyze the interaction between trade in goods and labor mobility, we shall employ a standard international trade 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 incentive 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.

We further assume that there are constant returns to scale and that the two countries have the same homothetic preferences. Under these assumptions, 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 indentical technologies), that is:

$$\frac{a_{Lx}}{a_{Kx}} > \frac{a_{Ly}}{a_{Ky}} \tag{1}$$

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

$$\frac{\bar{L}^H}{\bar{K}^H} > \frac{\bar{L}^F}{\bar{K}^F} \tag{2}$$

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.:

$$\frac{\bar{w}^H}{\bar{r}^H} < \frac{\bar{w}^F}{\bar{r}^F}, \tag{3}$$

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 configuration may, however, determine an equlibrium price which is outside the autarkic-price range.)

One can also calculate the factor content of the trade in goods. Denoting by Q_i^j and C_i^j. respectively, the output and the consumption of good $i = x, y$ in country $j = H, F$, we can calculate the net import vector of country H by:

$$M^H \equiv \begin{pmatrix} M_x^H \\ M_y^H \end{pmatrix} = \begin{pmatrix} C_x^H - Q_x^H \\ C_y^H - Q_y^H \end{pmatrix} \equiv C^H - Q^H.$$

Full-employment in country $i = H, F$ requires that

$$AQ^i = \begin{pmatrix} \bar{L}^i \\ \bar{K}^i \end{pmatrix} \equiv \bar{V}^i,$$

where

$$A = \begin{pmatrix} a_{Lx} & a_{Ly} \\ a_{Kx} & a_{Ky} \end{pmatrix}$$

is the unit-input-requirement matrix.

From the assumption of identical homothetic preferences it follows that

$$C^H = s^H(Q^H + Q^F) = s^H(A^{-1}\bar{V}^H + A^{-1}\bar{V}^F) \equiv s^H A^{-1}\bar{V}$$

where s^H is the share of country H in world-wide income and $\bar{V} \equiv \bar{V}^H + \bar{V}^F$ is the world factor endowment vector.

Hence,

$$M^H = C^H - Q^H = s^H(A^{-1}\bar{V}^H + A^{-1}\bar{V}^F) - A^{-1}\bar{V}^H.$$

Therefore, the factor content of the net import flows which is AM^H can be expressed as

$$AM^H = s^H\bar{V} - \bar{V}^H = s^H \begin{pmatrix} \bar{L}^H + \bar{L}^F \\ \bar{K}^H + \bar{K}^F \end{pmatrix} - \begin{pmatrix} \bar{L}^H \\ \bar{K}^H \end{pmatrix}. \tag{4}$$

Equation (4) gives a simple measure of the factor content of trade which depends only on initial factor endowments and the cross-country distribution of world income. This measure can be empirically computed. Since country H exports good x which is labor-intensive and imports good y which is capital-intensive, the factor content of its net imports follows a similar pattern: the labor component is negative while the capital component is positive. That is, country H implicitly exports labor and imports capital via its net imports of goods.

The conclusion of this model, known as the Heckscher-Ohlin Propositon, is that in the absence of international factor mobility, each country exports the good which is intensive in its abundant factor; and goods mobility 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 and/or capital will move in the opposite direction 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 fact, we can easily calculate the magnitude of the factor mobility that is needed to substitute for trade in goods. The magnitude of this mobility is given by equation (4) which describes the factor content of the trade in goods.

In both cases, with either commodity trade and no labor mobility or labor mobility and no commodity trade, the same international allocation of consumptin 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.

To complete the proof of the Heckscher-Ohlin Proposition, it remains to show that (2) implies (3), that is: the country with the higher initial labor-capital ratio will , under autarky, have 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:

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

This equation 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:

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

Thus, we have shown that (2) implies (3)[5].

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:

[5]In the $n x n$ case this proposition is somewhat weaker, namely: $(\bar{q}^H - \bar{q}^F)(\bar{V}^H - \bar{V}^F) \leq 0$ where $\bar{q}^i$ is the autarkic factor price vector and $\bar{V}^i$ is the factor endowment vector ($i = H, F$).

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

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 with only a Hicks-neutral technological difference in good x between them (see Figure 2). 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) (thereby crating more incentives for labor mobility). 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 propositon, 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. Indeed, country H with its superior technology will specialize in production of good x. Thus, factor mobility reinforces trade in commodities. In this setup of international technological differences in certain industries, factor mobility and commodity trade complement each other.

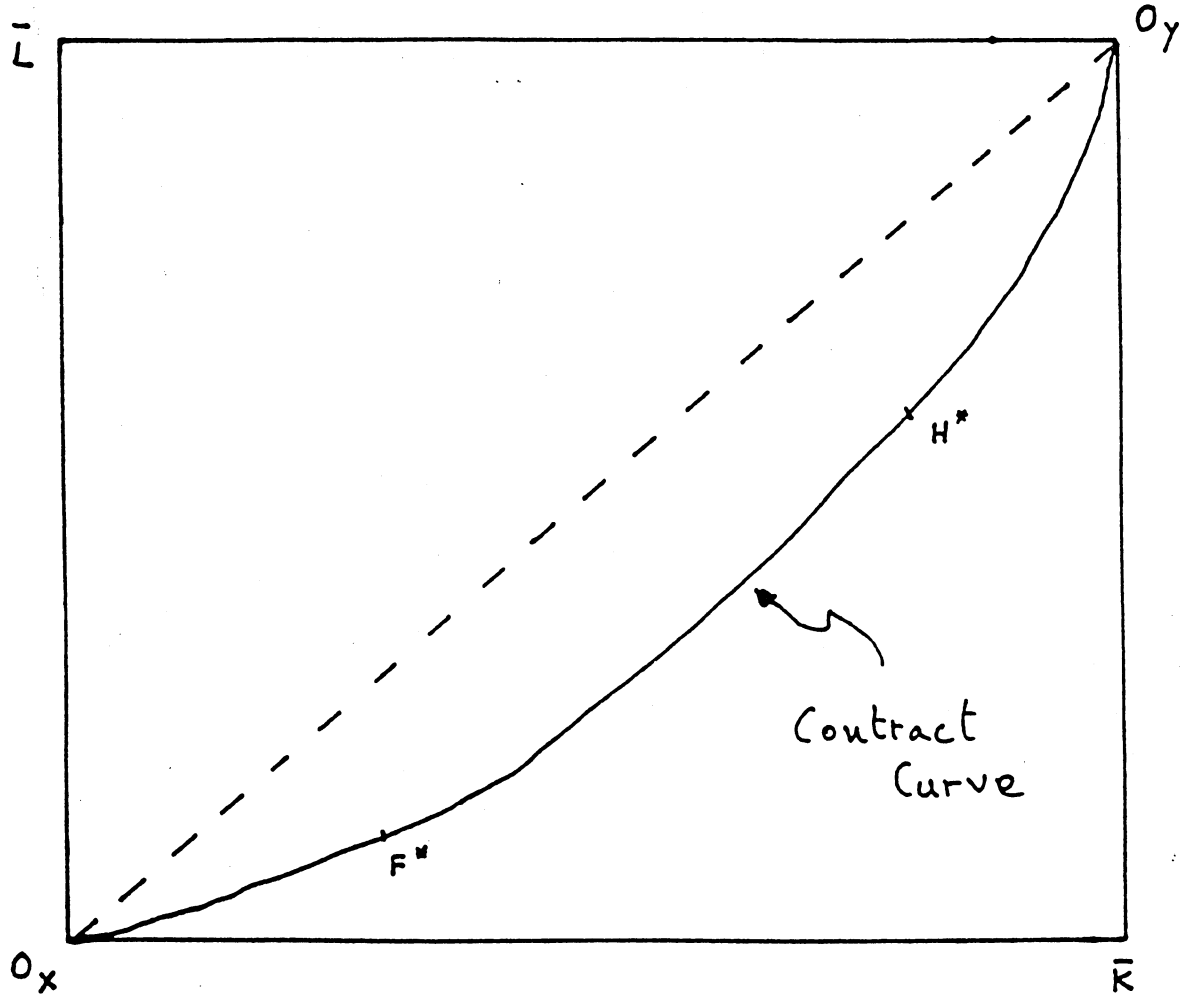

Figure 2 : Edgeworth Box Diagram

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 counrtry 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.

In a recent study on East-West migration, Layard et al. (1992) emphasize the role of trade in goods as an alternative to labor migration: "Given the difficulties posed by the prospect of very large-scale migration from East to West, and the risk that such large-scale migration could actually leave the remaining population in the East worse-off, we need to ask what alternatives are available. Ideally, policy should try to bring good jobs to the East *rather than* Eastern workers to the West. International trade ... *can* act as a substitute for migration. A free trade pact that ensures Eastern European countries access to the Western European market is the best single migration policy that could be put in place. In the amazing post-war reconstruction of Western Europe, the openness of the US market was a crucial factor. Western Europe now has the opportunity to provide a similar service to the East."

The gains from trade in goods notwithstanding, we have pointed out that such trade can be a complement to labor mobility in the sense that it widens the wage gap, thereby generating more incentives for labor migration. This phenomenon occurs when the high wage country enjoys some productivity advantage over the low wage country in key industries, such as manufacturing. Note also that the productivity advantage could merely reflect some superior infrastructure (roads, telecommunication systems, ports, energy, etc.) which is certainly the case in the East-West context. Thus, important elements of imigration policy should be investment in infrastructure (possibly funded by foreign aid) and direct foreign investment, which tends also to diffuse technology and raise productivity. Once productivity gaps are narrowed down,

trade in goods can further alleviate the pressure for labor migration.

4 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 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, orginally 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.

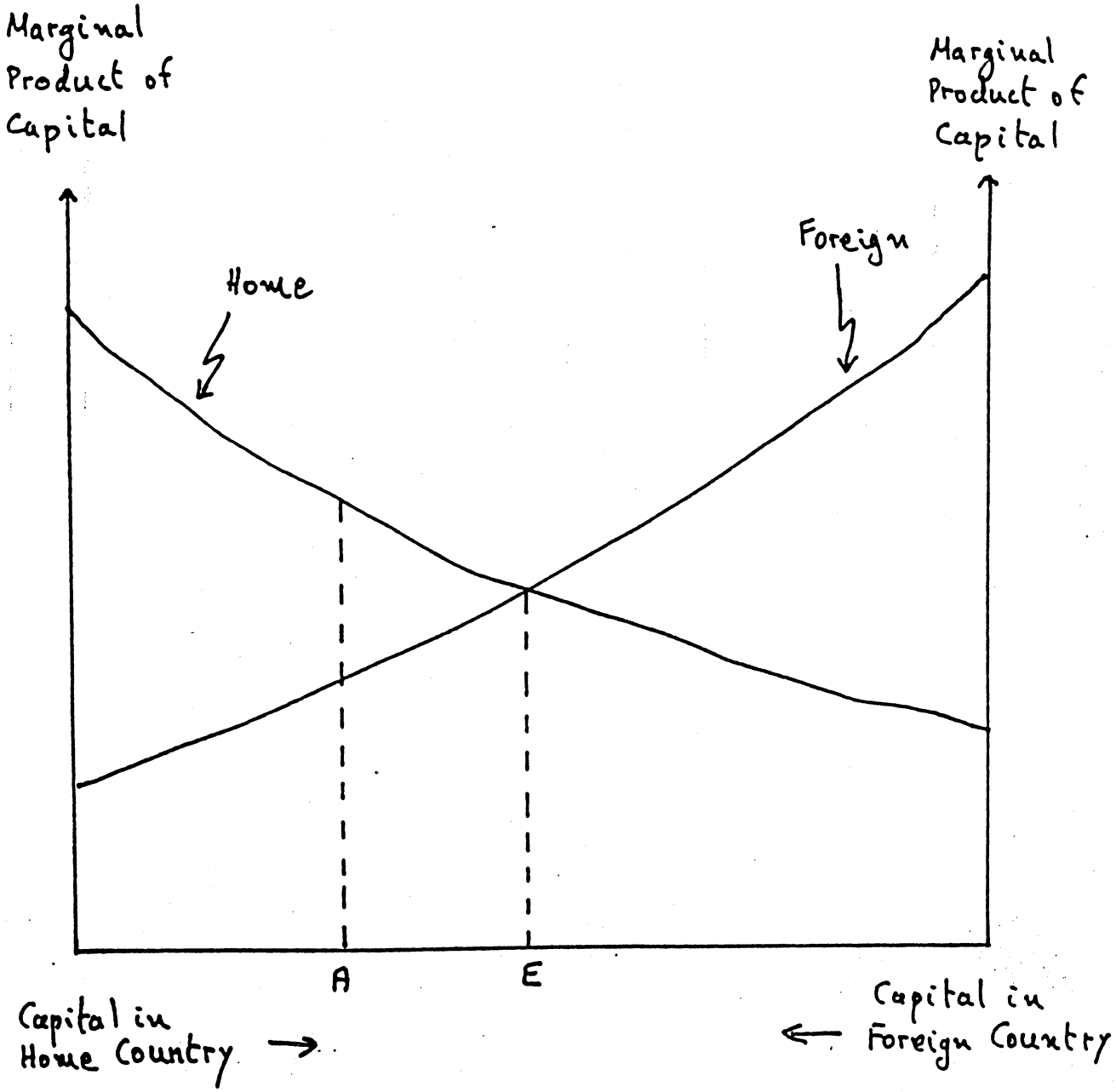

Figure 3: The Allocation of Capital Between The Home Country and The Foreign Country

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 distortions (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[6]. 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 argues 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 and capital. 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

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

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[7]. Immigration quotas serve to check the brain drain. Lucas's explanation can be digrammatically represented via factor price frontiers drawn in Figure 4 with the rental price of capital (r) plotted on the vertical axis and the wage rate (w) on the horizontal axis. An external productivity effect moves the factor price frontier outward. Thus, the United States and India can have the same rental price of capital even though Indian wage per effective labor is only one-third of its US counter-part. For instance, the United States could be at a point such as A on its factor price frontier while India would be at B.

The human capital based model (and particularly the external productivity effect) is a "bad news" for those who are looking for convergence in long-run productivity levels among countries (see Baumol (1986)). The brain drain, if allowed to take place (induced by the external effect), will tend to increase the diversity in the level of per-capita income across countries. In the presence of fixed costs of migration (under the same proportional income differentials across countries) skilled labor has greater incentives to migrate than unskilled labor, thereby generating larger income diversity.

The external effects give rise to variety of trade-related welfare issues when the model is extended to serveral sectors, some of them exhibiting increasing returns. The basic argument that a country cannot lose from free trade in goods is called into question and the possibility of multiple trade equilibria arises. Back in 1923, Frank Graham argued that a country may lose from free trade when it leads to a reallocation of resources from the increasing-returns-to-scale industry to the decreasing-returns-to-scale industry, since gross domestic product (evaluated at constant world prices) declines. On the other side, traditional gains from trade are augmented if the output of the increasing-returns-to-scale industry rises as a result of the new trade opportunities (see Krugman and Helpman (1985)). Multiple trade equilibria may therefore call for coordinated policy interventions which could extricate the global economy from low-welfare trade equilibria.

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

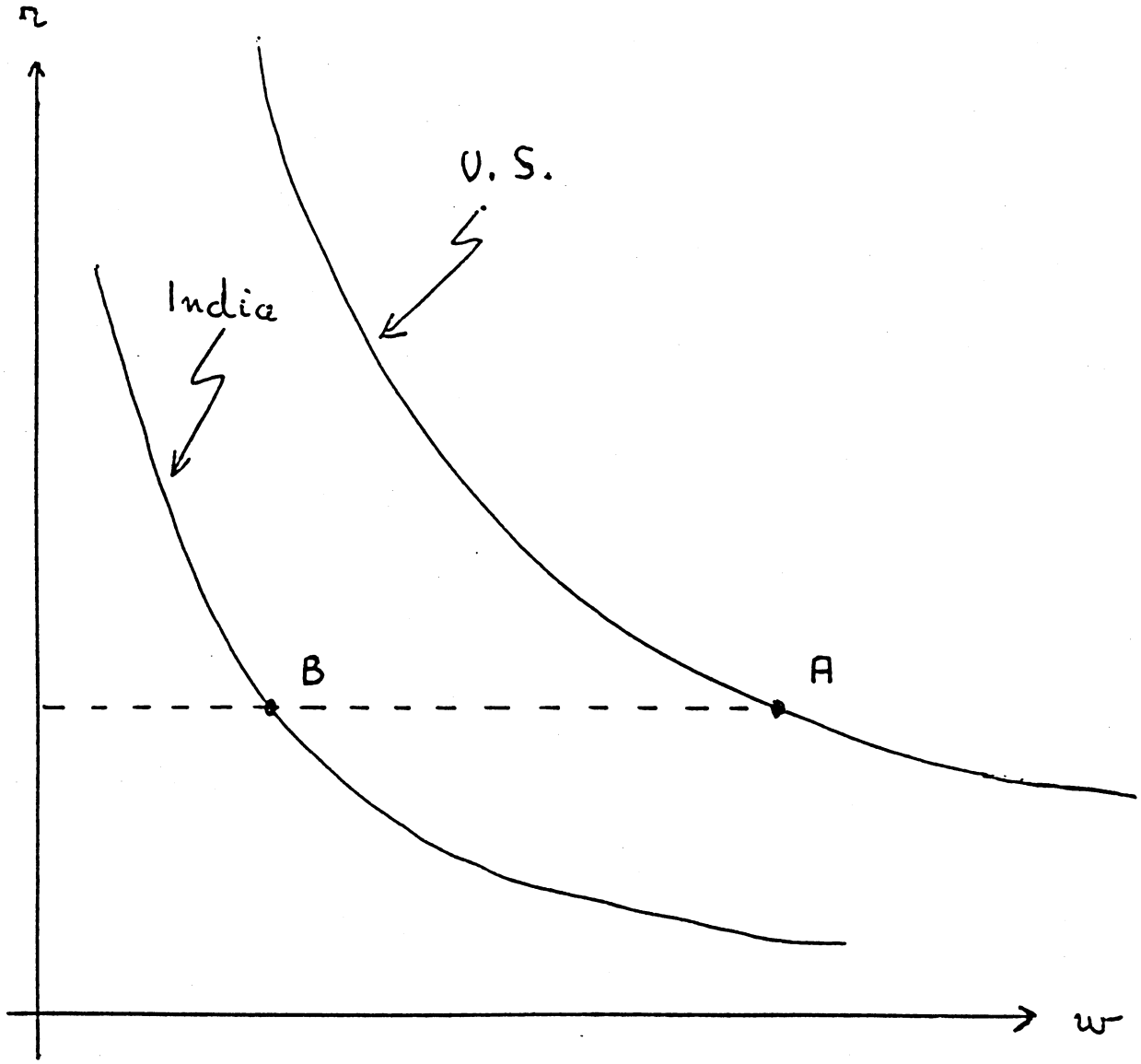

Figure 4 :: Factor Price Frontier

5 Welfare Evaluation

5.1 The Asymmetry between International Mobility and Migration

For welfare analysis one has to distinguish between labor mobility and migration. By labor mobility we refer to the mobility of 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 size of national communities. The migrant no longer belongs to the origin country community and becomes a member of the destination country 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.).

The 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 at present or also the welfare of those as yet unborn. 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 migration than before, for otherwise they would have stayed in their home country. In contrast, it is a deep philosophical 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 paper 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.

5.2 Gains and Losses from International Migration

The scissors diagram in Figure 5 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

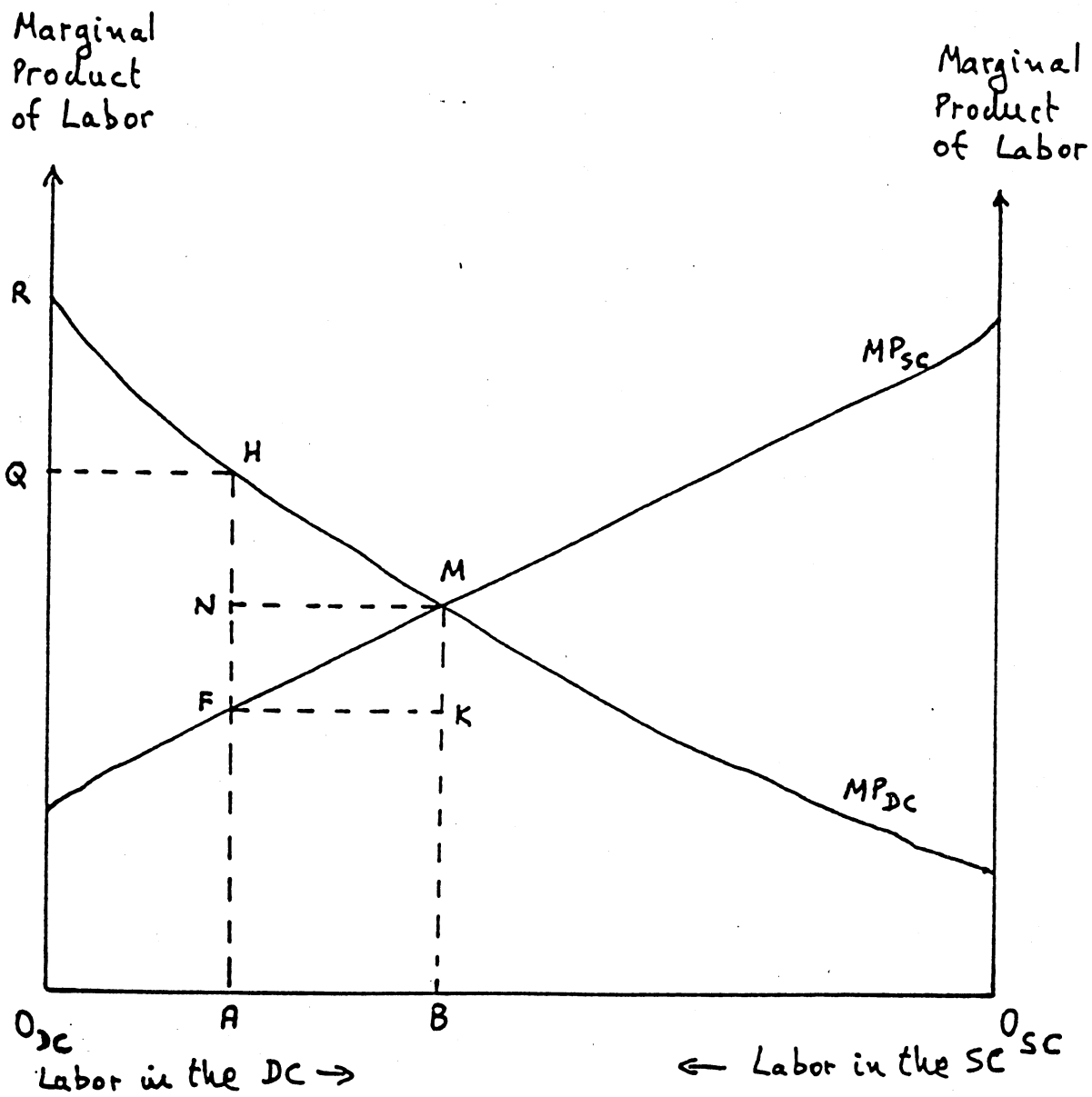

Figure 5: Gains and Losses From International Migration

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 groups gain. The migrants and veterans in the destination country gain, but those left behind in the source country lose[8]. 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 remittances) those left behind[9].

Alternatively, the government in the SC typically imposes an implicit emigration tax on the migrants. This tax can take the form of denial of entitlement programs that were paid for in the past by the migrants (old age or retirement benefits); in other cases, due to capital and foreign exchange controls, the migrants cannot realize the full value of their assets which are left behind; etc.

Hamilton and Whalley (1984) attempted to quantify the implications of barriers to labor mobility between high-wage and low-wage countries. They point out that the efficiency gains of the removal of immigration barriers

[8]If we distinguish between wage earners and landlords (or capitalists), then veteran wage earners in the DC lose, landlords in the DC gain, the left-behind wage earners in the SC gain and landlords in the SC lose. Evidently, in the DC, veteran wage earners gain more than what the landlords lose, so that a compensation scheme could be devised, so as to make both veteran wage earners and landlords better-off.

[9]As pointed out in section 2, official remittances amounted to 65.6 billion USD in 1989; see Stanton-Russell and Teitelbaum (1992).

are substantial. They suggest that the issue may be much more important to LDCs than the more conventional trade issues raised in the North-South debate.

6 Global Population Disperion: The Efficient Volume of Migration

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 migration size in this case?

This issue is tantamount to well-dealt issues in the local public finance literature (e.g., Berglas and Pines (1983), 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 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.[10] 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 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 that 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 6. For each given population size (n), we first find the optimal levels of private and public consumption and, consequently, utility. The optimal allocation is, of course, governed by the familiar Lindahl-Samuelson rule which

[10]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 (see Stiglitz (1977)).

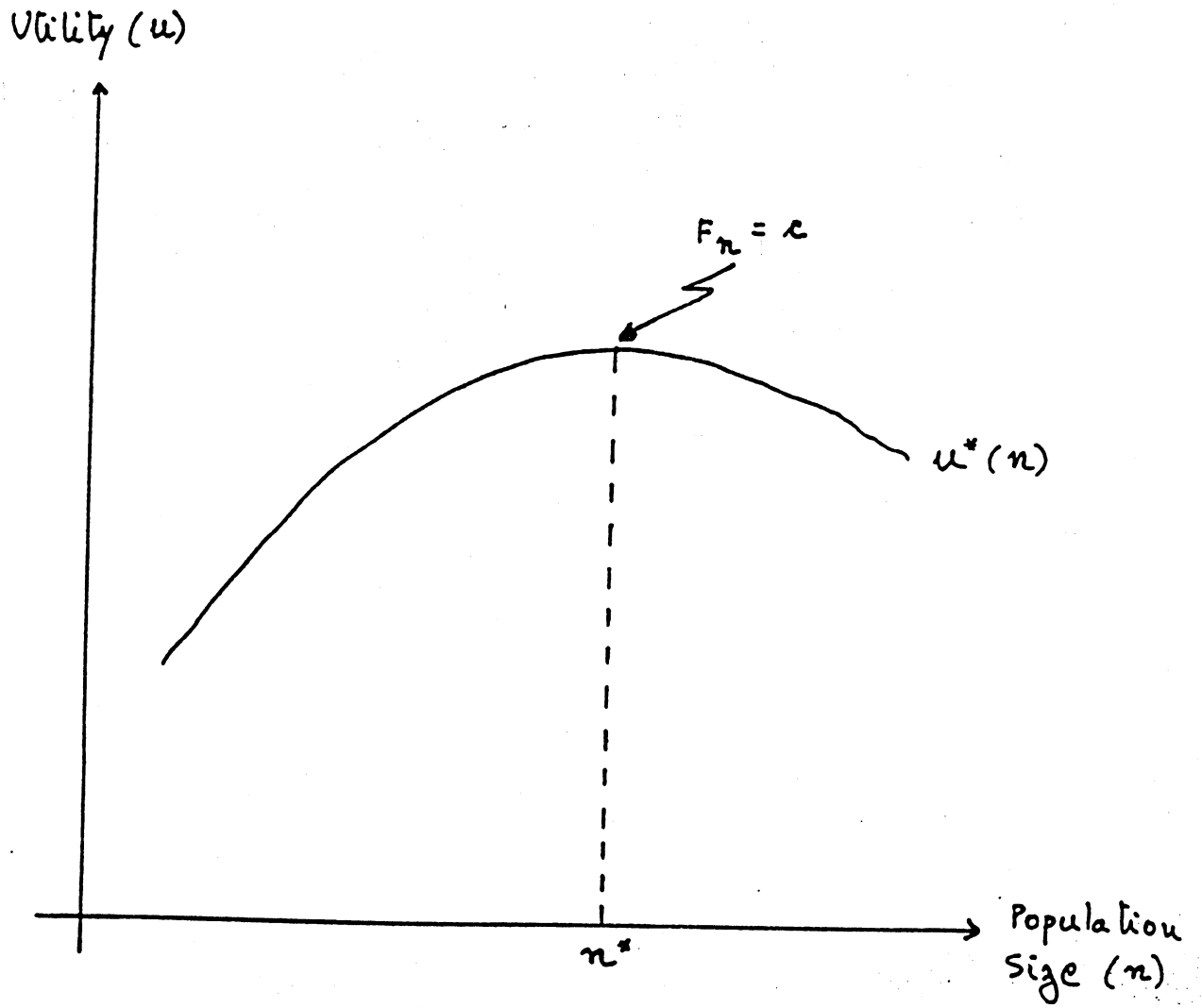

Figure 6: Efficient Population Size

states that the sum over the population of the willingness to pay for the public good (that is, nu_G/u_c where u_G and u_c are the marginal utilities of public consumption and private consumption, respectively) is equal to the marginal cost. The maximized level of utility (for a given n) is now a function of n (namely, $u = u^*(n)$). The curve $u = u^*(n)$ is as shown in Figure 6. The slope of this curve is equal to $u_G(F_n - c)$, where where F_n is the marginal product of labor. The explanation 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 expresed 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 collectively 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 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.

An interesting modification of the model used so far is to allow the government to distinguish between the veteran population and the migrant population. Suppose that the government wishes to maximize the utility of a

representative veteran. The would-be migrants will come if and only if the bundle of public good and a private good consumed in the destination country does not yield to the representative migrant a lower utility-level than her reservation utility level. This level is what she enjoys in the source country.

In this case, the efficient migration level is obtained by maximizing

$$u^{V}(G, c_V) \tag{11}$$

subject to the resource constraint

$$F(T, n_V + n_M) \geq n_V c_V + n_M c_M + G, \tag{12}$$

and the reservation utility constraint.

$$u^{M}(G, c_M) \geq \bar{u}^{M}, \tag{13}$$

where:

u^{V} - utility function of a veteran;

u^{M} - utility function of a migrant;

c_V - private consumption of a veteran;

c_M - private consumption of a migrant;

$\bar{u}^{M}$ - reservation utility level of a migrant;

n_V - (fixed) number of veterans;

n_M - number is migrants.

The control variables in this setup are G, c_V, c_M, and n_M. (Recall that the number of veterans is fixed.)

In this case, it will still be efficient to attract migrants (by public and private consumption provision) up to the point where the marginal product of a migrant worker is equal to her private consumption (that is $F_n = c_M$). Similarly, the Lindahl-Samuleson rule for the efficient provision of public goods still holds:

$$n_V(u_G^V/u_c^V) + n_M(u_G^M/u_c^M) = 1.$$

That is, the sum of the willingness to pay over the *entire* population (veterans and migrants) is equal to the marginal cost of the public good.

The only notable deviation is with respect to the Henry George rule. Consider the interesting case in which the reservation utility level of the imigrants is low enough, so that at the efficient migration size they enjoy a lower level of private consumption than the veterans (that is, $c_M < c_V$). In this case, the government will not tax away all the land rent but rather leave some of the land rent at the hands of the veterans, so that they can privately consume more than the migrants can.

7 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 5 which is redrawn in Figure 7, 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 7 and no migration is allowed. The income of workers is represented by the area $O_{DC}QHA$ and the income of landords - by the area QRH. This initial distribution of income is represented by point A in Figure 8. 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, the income redistribution frontier is a straight line with a slope of unity (in absolute terms) - the line FAH in Figure 8.

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 fall 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 8, 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 8 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

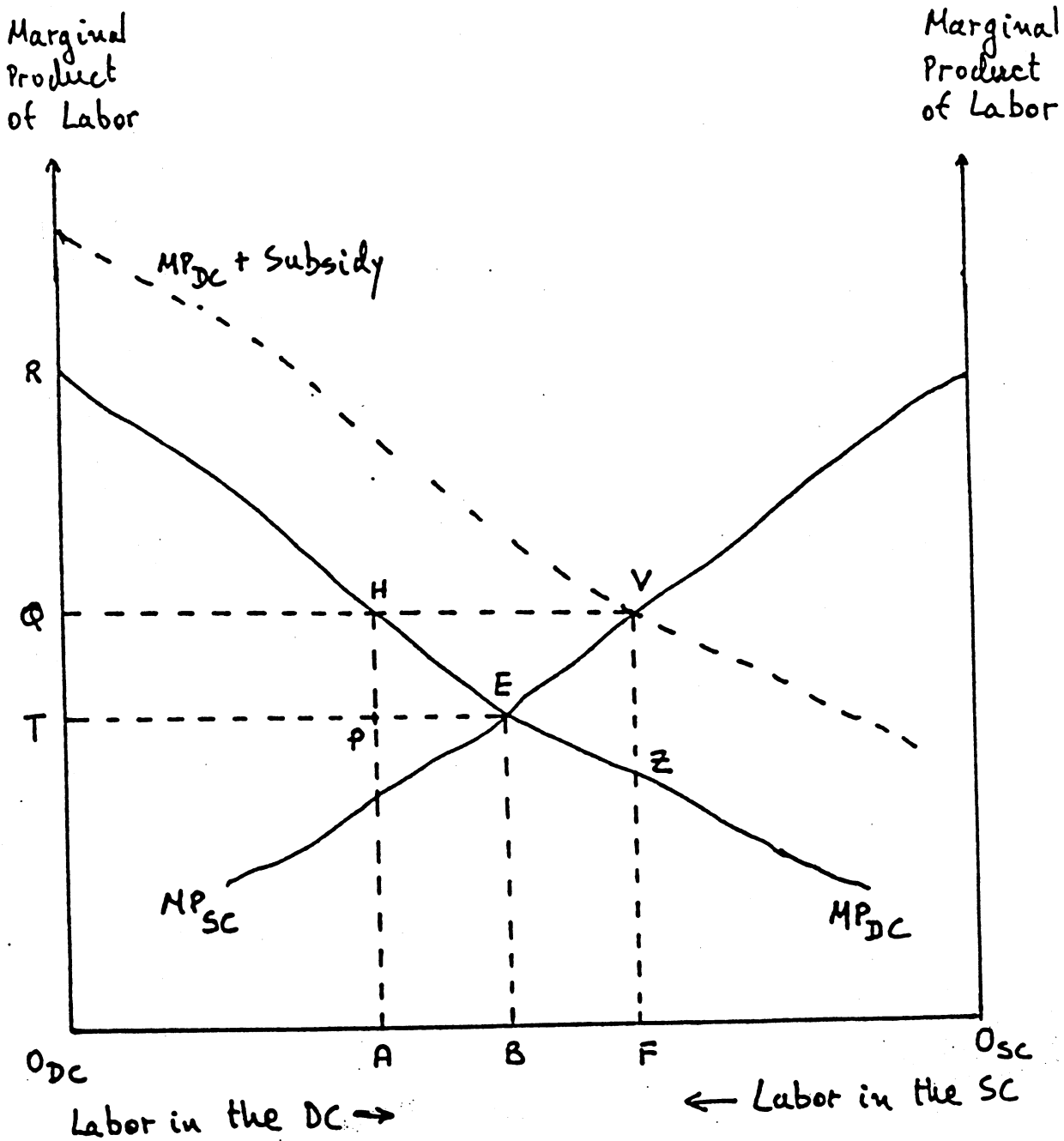

Figure 7: The Allocation of Workers Between The DC and The SC

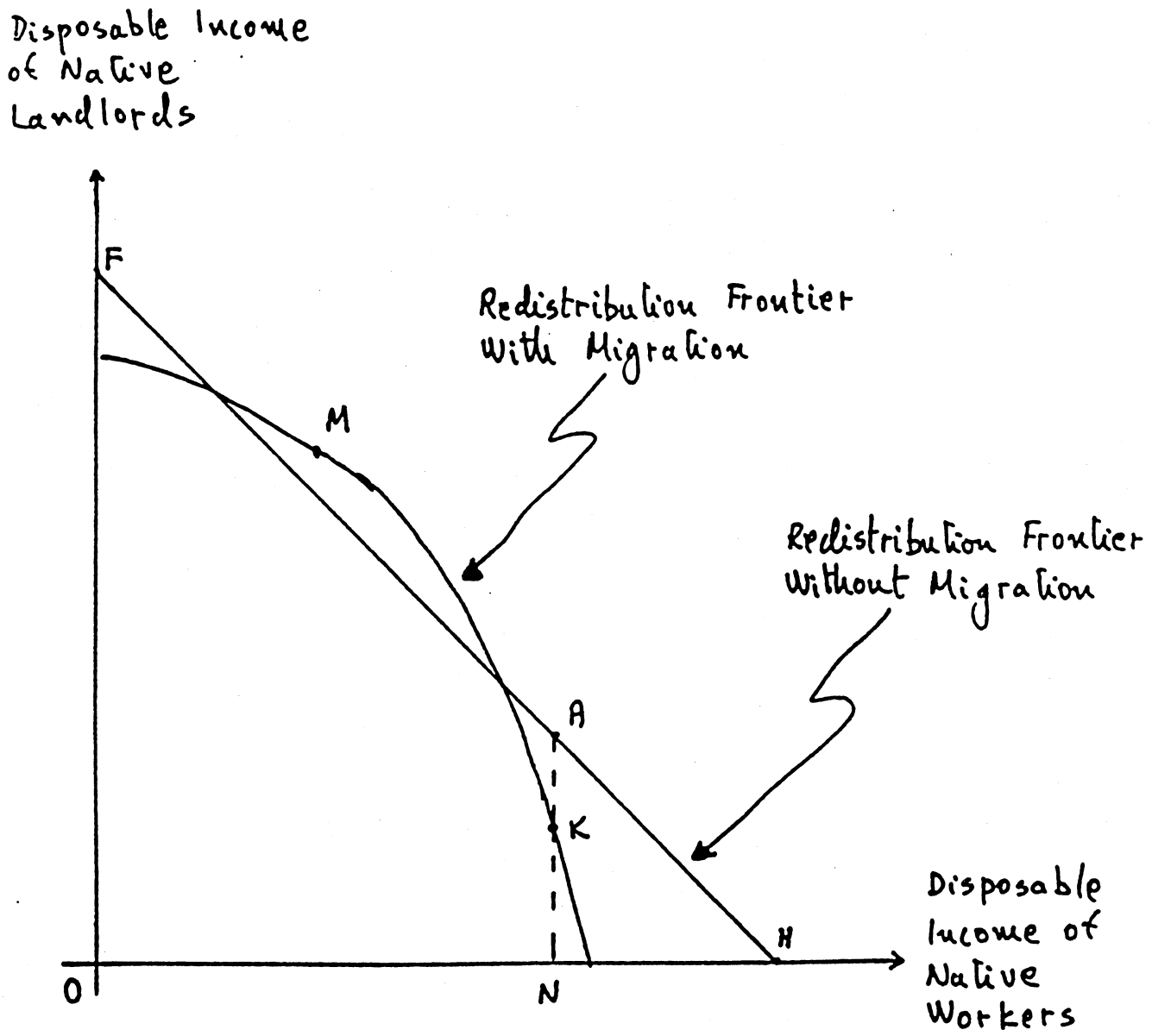

Figure 8: The Income Redistribution Frontiers With and Without Migration

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 7 and their total income was ON in Figure 8. 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 7. 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 7), 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 7). 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 8; say it passes through point K.

Migration therefore changes the income redistrution 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. In the neighborhood of K and to the left of it, both native groups (workers and landlords) are worse-off than in the absence of migration. Therefore, both of them will opt for imposing immigration quotas or other restrictions on immigration. The modern welfare state is therefore more receptive (on economic grounds) to the idea of restricting immigration, a hypothesis that is yet to be tested empirically.

This framework brings up another nonaltruistic motive for foreign aid. The international trade literature has already brought to our attention the possibility 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 (1951), 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 (especially, would-be migrants) 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 Myres, Hercowitz and Pines (1991) and Wildasin (1991), the foreign aid shifts outward almost the entire income redistribution frontier in the presence of free migration.

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