

THE INTERNATIONAL FLOW OF HUMAN CAPITAL*

By HERBERT B. GRUBEL, *University of Chicago*
and ANTHONY D. SCOTT, *University of British Columbia*

I

We have been drawn to the subject of this paper by recent strong manifestations of public interest in two major problems in international relations: first, the migration of highly skilled individuals to the U.S.—often referred to as the “brain drain”—and, second, the large-scale program of training foreign students in the U.S. Both of these problems have in common that they involve an international transfer of resources in the form of human capital that goes completely unrecorded in any official balance-of-payments statistics. This common feature clearly defines our field of analysis and excludes problems associated with the transfer of human capital services, such as occur in connection with the Peace Corps, programs of technical assistance through governmental agencies, technical and scientific advice by private corporations, etc.—all of which are reflected in official balance-of-payments statistics.

We have prepared some empirical estimates of the U.S. balance of trade in human capital from foreign student exchange and the immigration of scientists and engineers, which will shortly be published. These studies, while involving interesting conceptual problems of measurement, produced no startling results and suggest that in comparison with the size of the U.S. economy these capital flows are quite small. We present here only a few summary statistics to give an impression of the nature of the empirical results we have obtained. First, it turns out that the total U.S. program of foreign college student exchange, involving 58,000 foreign students in the U.S. and 11,000 American students abroad, resulted in a maximum net U.S. cost of only \$17 million in 1962, after appropriate adjustment of the gross cost for the human capital value of students electing to remain in the U.S. Second, the total human capital value of scientists and engineers immigrating to the U.S. during the thirteen-year period from 1949 to 1961 came to \$1.0 billion. Third, the role of foreigners in the American economics profession estimated on the basis of the National Science Foundation survey statistics is as follows: 12 percent are foreign born, 9 percent had also foreign high school training, but only 3 percent earned their

* This paper is part of a larger study concerned with the international migration of highly trained people, financed by the Rockefeller Foundation and directed by Harry G. Johnson, whom we thank for his support, both intellectual and financial.

highest professional degree abroad. Fourth, the shares of annual output of first-degree engineers lost by emigration to the U.S. by some major individual countries were found to differ widely between countries and tended to be surprisingly high in some instances. For example, Norway lost 24.1 percent, Greece 20.9 percent, Germany 9.5 percent, and France 1.2 percent of their annual output of first-degree engineers to the U.S. Finally, scientists and engineers are from six to twelve times as likely to emigrate to the U.S. as people in other professions, judging from the occupational composition of all immigrants and that of the labor force in the migrants' native countries.

While such empirical work sheds light on the quantitative importance of issues which all too often are argued in complete ignorance of any facts, we have found that nearly all discussions of the brain drain and exchange student programs suffer most seriously from the absence of any theoretical framework. The main part of this paper is devoted to a theoretical analysis of issues surrounding the international flow of human capital embodied in highly skilled migrants to the U.S. and in foreign students electing not to return to their native countries.

II

The argument that a country "loses" by the emigration of highly skilled individuals is most nearly always valid when we consider the "country" to be a nation state whose national objective is to maximize its military and economic power. From this point of view, a person's emigration absolutely reduces his country's mobilizable manpower, and its national output is lowered by the amount the emigrant contributed to it.

While this view of national losses is held quite widely, it is sorely outmoded in our age. The identification of military power with the number of a country's inhabitants, even if they are highly skilled, is very vague and precarious. Wealth, science, and technology dominate modern warfare, and it is quite easy for most nations to purchase military equipment on the world market at costs much below those that would have to be incurred in the development of individual national weapons systems. Economic power, in turn, depends not so much on aggregate national output as it does on per capita income, which may or may not be affected by an individual's emigration.

In place of this outmoded nationalist concept of a country, we suggest the use of another one, according to which a country is an association of individuals whose collective welfare its leaders seek to maximize. While the level of individual welfare is determined by many factors, including items of collective consumption such as military might and foreign economic influence, the most important determinant of

human welfare in the long run is the standard of living; that is, the quantity of goods and services available for consumption. Therefore, in the following analysis we will focus our attention on the changes in income brought about by the emigration of highly skilled individuals.

If a country wishes to maximize the income available to all its people, then emigration should be welcomed whenever two conditions are met. These are, first, that the emigrant improves his own income and, second, that the migrant's departure does not reduce the income of those remaining behind. The first condition is normally met when emigration is voluntary. Specification of the circumstances under which the second holds true will occupy the rest of this paper.

III

According to the traditional analysis of the migration of labor, the departure of a person normally raises the long-run average income of the people remaining, because it results in an increase in the nation's capital-labor ratio. In the case of the migration of a highly skilled person, however, this conclusion does not hold if the human capital embodied in the emigrant is greater than the country's total per capita endowment of human and physical capital, assuming perfect substitutability of the two forms of capital in the long run. In this case the emigration of a highly skilled person reduces the total income to be distributed among the residents of a country and it follows that in societies where this distribution occurs through planning or other nonmarket means the remaining population suffers a reduction in welfare.

In a market economy where persons are paid their marginal product, however, such a reduction in per capita income is only a statistical phenomenon which has no influence on the welfare of the remaining people: the emigrant removes both his contribution to national output and the income that gives him a claim to this share, so that other incomes remain unchanged. There may be income redistribution effects through changes in the marginal products of the remaining people, but since the brain drain involves rather small numbers of people, these effects are likely to be small enough to be safely considered negligible.

Thus it follows that in a market economy any effects that the emigration of a highly skilled person is likely to have on the welfare on those remaining behind must be sought either in short-run adjustment costs or in market failures.

The short-run costs are due to production losses—specifically those created by the unemployment or inefficient employment of factors of production whose effectiveness depends on cooperation with the skills the departing person takes along. The size of these costs depends on two elements. First, the greater the short-run substitutability of other

factors of production or skills for those that have emigrated, the smaller the inefficiencies and loss of output. Second, the more rapidly a replacement for the emigrant can be trained, the smaller the losses. It is difficult to generalize about the characteristics of individual professions or national education systems in regard to these qualities, but it seems reasonable to expect that the emigration of a well-established, experienced professional will cause greater frictional losses than would the emigration of a common laborer or the decision of a student not to return home. Also, we would expect that bursts of heavy emigration alternating with periods of low emigration rates present more difficult adjustment problems than do steady flows, even if the latter represent a greater long-run average than do the former, because of the economy's likely structural adjustments to predictable changes.

Of greater analytical interest than these short-run costs of adjustment to emigration are the long-run effects on welfare associated with failures of the free market to allocate resources efficiently. There are two main sources of such inefficiencies which appear to underlie most of the arguments about losses from the emigration of highly skilled persons.

The first category of losses has to do with genuine externalities, where the market fails properly to compensate the individual for the contributions he makes to society. It is important to note that these externalities must be directly associated with the personal characteristics of the emigrant and not his profession. Thus, if a typical doctor's work contains a large measure of social benefits for which he does not get compensated, these benefits are lost to society only for the length of time required to train another person to take his place as a doctor. It therefore follows that in many of the well-known instances of genuine external effects in consumption or production, emigration imposes only short-run frictional costs to society which disappear in the long run.

While it is difficult enough to find genuine cases of economically significant externalities in the real world, it is even more difficult to find cases which have the added limitation of being associated with a specific person. Examples coming to mind are the external diseconomies from alcoholism or the nonmarket benefits accruing to others from a person's propensity to engage in political or charity work without monetary compensation. The difficulty of finding meaningful examples may legitimately be taken as an indication of the relative unimportance of most externalities given the size of the resources allocated through properly functioning markets.

The second category of losses stems from market failure remedied through activities of the government. It is alleged that the emigration

of highly skilled persons affects others most significantly through changes in the cost of providing such government services.

In this connection, it is frequently suggested that public education is a social investment in individuals which emigrants fail to repay, and that therefore the highly trained in particular ought to be forced to repay this investment before they are allowed to leave the country. Such suggestions and the entire idea of a "debt to society" due to publicly-financed education appear to be based on misapprehension.

Society is a continuing organism, and the process of financing education represents an intergeneration transfer of resources under which the currently productive generation taxes itself to educate the young, who in turn upon maturity provide for the next generation of children and so on. What is relevant for our purposes of analysis is that the average burden of financing education falling on the emigrant's generation is not changed by his departure, because he takes along not only his contribution to tax revenue but also his children, on whom this share of revenue would have been spent.

Analogous arguments can be made for the financing of other government services such as defense, police protection, judicial services, etc. However, in all of these instances, including education, the conclusion that no adverse welfare effects result from a person's emigration is valid only if the incidence of taxes is equal to the incidence of benefits from government services.

There is evidence that the enjoyment of the quantitatively most significant services provided by governments is largely proportional to the taxpayers' income, which includes return on human capital. Defense—the largest item in the budget of many nations—benefits more those persons who, as a result of foreign conquests, would lose sizable stocks of assets than those who do not. Roads are used more by those who drive cars than those who walk. The amount of education demanded by the offspring of the highly educated is likely to be above that demanded by the children of people with average education. Only relatively few government services, such as public parks and those related directly to the welfare of the poor, contain elements of subsidy by high-income taxpayers. Therefore, the presumption is strong that the government can reduce many of the services it provides by nearly the same proportion by which tax revenues decline when a highly skilled person emigrates, changing the tax burden or income of the remaining people only marginally and certainly by much less than the gross reduction in tax revenues suggests.

It is true that if government services are provided through lumpy investment projects, reductions in government services may not be possible without increases in average cost. However, such increased burdens from reduced population are short run and last only until ei-

ther a new, optimum-scale plant replaces the old or as population returns to its old level. At any rate, in most countries complaining of the brain drain the problem is not one of possible excess capacity in public projects but rather one of overcrowding.

It is often argued that a country loses because the highly skilled emigrants would have worked on projects of great importance to the development of the country had they stayed at home. This argument is valid either if we take the nationalistic view of the country or if the person's work would have been associated with large external effects. In this case, also, the nationalistic view is to be rejected for the reasons presented earlier. While it is popular to argue that external effects are frequent in market economies, we have been unable to discover economically significant instances where individuals provide social services associated with their person rather than profession for which they are not paid—including in work fostering economic development.

Another frequently heard allegation is that the emigration of the highly educated is equivalent to a Darwinian process of selecting the best, which causes a reduction in the genetic "quality" of the country's human stock and influences national welfare in the long run. This is probably a valid argument in principle but its empirical significance is likely to be quite small, given the small relative size of the migratory flows and the population stocks. It should also be noted that the transmission of human characteristics through the genes is a rather unreliable process, and that the offspring of many intellectually distinguished emigrants never achieve their parents' level of attainment.

IV

While our analysis so far suggests that the emigration of highly skilled persons reduces the welfare of the remaining people only under rather rare circumstances, we can make a good case for the proposition that these types of emigrants in fact tend to increase the welfare of their former countrymen in several important ways.

Historically, emigrants have been known to raise significantly the incomes of their families at home through remittances. In more subtle ways emigrants can influence policies in the country of their new residence towards their native country, and often the emigrants retain an interest in their home countries' affairs, giving counsel and advice, which carry great weight because of the positions of independence and prestige they hold in the foreign country. Furthermore, the very act of emigration may be beneficial to those remaining behind just because of the public attention given to the individual's departure, which can lead to critical reappraisals of institutions and procedures and their ultimate modernization and improvement.

The potentially largest benefit to the people remaining behind, how-

ever, may accrue through the pure research of scientists and engineers in the foreign countries, contrary to the often heard allegation that the emigration of people in these fields is the source of greatest material losses. The product of basic research, knowledge, is a free good becoming available to all as it is published. Since most scientists move to countries where conditions of work are better for them, either because the new country is better able to furnish research equipment or because of stimulating colleagues, the probability is great that such moves increase the scientists' overall productivity. As a consequence of such emigration by scientists, the native countries not only obtain the scientific knowledge free, but they are actually likely to get more than they would have had the men stayed at home. Applied research also tends to benefit countries other than the one in which it is first put to use. Reductions in the cost of production or new product developments tend to spread through the world as a result of competition. As far as national prestige from scientific achievements is concerned, the scientists' native countries are perfectly free to claim these men as native sons, which in no way reduces the host-country's right to be proud that the work was done within its borders.

V

We conclude from this analysis that the transfer of human capital occurring when highly skilled people emigrate between countries always reduces the economic and military power of the migrant's native country, though by a smaller amount than it is often alleged. We have argued, however, that such concern with the effects on economic and military power is anachronistic and that a concern with the individual welfare of the population ought to take its place. From this point of view it was seen that the emigration of highly skilled persons is likely to cause economic losses in the short run until replacements for the emigrants can be trained. Long-run losses in a market economy are likely to be small and are primarily associated with externalities and with elements of income redistribution, in the government's tax and expenditure policies. Benefits to the native countries of the emigrants may be sizable, primarily because much of the output of highly skilled persons, especially scientists and engineers, tends to benefit the people of all countries. A good case can therefore be made for a continuation of present policies and the free movement of human capital throughout the world.