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# THE BRAIN DRAIN—IS A HUMAN-CAPITAL APPROACH JUSTIFIED? • ANTHONY SCOTT •

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## INTRODUCTION

TEN years ago, Brinley Thomas' excellent conference volume on international migration<sup>1</sup> contained papers mentioning the skills and education of immigrants, but almost no reference to the special problem of the emigration of scientists, professionals, and other highly qualified persons. The recognition of this special problem has been delayed, in my opinion, by the fact that in most decades the international flow of intellectuals has been in the form of voluntary exile (caused by political and religious developments) and involuntary flight (brought about by persecution). However, paralleling the waves of Jewish, White-Russian, Hungarian, Polish, Irish, and Baltic refugee and emigré intellectuals, was a steady stream of trained people from the United Kingdom, Scandinavia, the Low Countries, Spain, Portugal, France, and Italy who were going to the newly opened lands in the United States, Latin America, and the various nineteenth century empires. These migrations, moreover, were

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<sup>1</sup> Brinley Thomas, ed., *Economics of International Migration*, London, 1958.

often only the beginning—the same people or their children moved on to better prospects, sometimes again as refugees, but more often as a new “upper class” of migrants soon to be assimilated among the professionals of their new homeland.

It was, of course, not at all unusual in earlier centuries also to regard the movements of trained workers and professionals as the best—perhaps the only—practical means of transmitting information and technology. My inexpert reading of economic history, for example, conveys the impression that the geographic transfer of textile technology, like that of printing and publishing, was usually accomplished by the flight or migration of specialists. That these two industries are believed to have expanded and shifted in this way is important for general economic history, for they are usually said to be among the leaders, or even harbingers, of general economic growth.<sup>2</sup>

Such transmissions of information and technology are today the subject of research by international trade specialists rather than manpower scholars. The latter, apparently overwhelmed by the difficulties of conceptualizing manpower planning in developing societies, usually ignore the outflow of trained personnel, the gain of such personnel from other countries, and the in- and outflows of students moving from their homes to schools, or back to final occupations. It is not surprising, therefore, that the “brain drain” has emerged as a topic publicized and studied by economists not usually associated with population, migration, or scientific policy.<sup>3</sup>

The purpose of this paper is to draw attention to three types of economic research which have been applied to the policy question of the

<sup>2</sup> This observation is not essential for what follows. It appears to be substantiated, however, in the first four sources which I consulted: Stevan Dedijer, “Modern Migration,” in W. Adams (ed.), *The Brain Drain*, New York, 1968, pp. 9–28; W. W. Rostow, *The Stages of Economic Growth*, Cambridge, 1960; Herbert Butterfield, *The Origins of Modern Science*, New York, 1960; and W. C. Dampier, *A Shorter History of Science*, New York, 1957.

<sup>3</sup> Frederick Harbison, for example, after some important work on education and manpower planning, has turned to the brain drain. But his earlier volume, C. A. Myers and F. Harbison, *Education, Manpower and Economic Growth*, New York, 1963, neglected the existence of a world open economy in the market for trained personnel.

brain drain.<sup>4</sup> The first of these in time is concerned with welfare theory—helping to resolve whether and in what sense there *could* be a brain drain problem. This body of literature, of course, stems from official investigations and reports from the United Kingdom, the Organization for Economic Cooperation and Development, the United States, and Canada, and first attracted attention in Harry Johnson's "The Economics of the 'Brain Drain': the Canadian Case," published in 1965 (see footnote 35), followed by "The International Flow of Human Capital," by Grubel and Scott, published in 1966 (see footnote 36). Although there were elements of other approaches in both papers, they depended primarily upon a search for externalities to indicate whether the departure of scientists and professionals hurt or helped the country of origin.

A second approach seeks to obtain and explain the demographic data about migration. Authors have, therefore, specialized in making the best of censuses, migration returns, and special questionnaires, and in testing the explanatory power of income, distance, race, religion, and so forth, as determinants of the migration of skilled and highly qualified persons. Little of this work has proceeded beyond the working-up of tables and charts, but some of it has followed the lead of L. Sjaastad in his path-breaking "The Costs and Returns of Human Migration" (see footnote 6).

A third set of writings has attempted an application of the human capital approach, pioneered by T. W. Schultz and Gary Becker, for the analysis not only of education and manpower policies but also of individual behavior. In the hands of Grubel and Scott, Wilkinson, Parai,

<sup>4</sup> Among general Anglo-Saxon economists, almost the only important exception to the claim in this statement is Brinley Thomas, whose earlier studies of transatlantic migration are well-known. On the other hand, the work of mobility specialists working *within* a society has turned out to be very useful. One thinks here of Sjaastad, Weisbrod, Fein, and many others.

To attempt footnotes to establish the integrity of these three approaches would require a bibliographic article. In any case, the need is greatly reduced by the existence of two excellent bibliographies: S. Dedijer and L. Svenningson, *Brain Drain and Brain Gain*, Research Policy Program, Lund, Sweden, 1967; W. G. Scheurer, John C. Shearer and others, "Selected Bibliography International Movement of High-Level Human Resources (The 'Brain Drain') by Sender Area," Pennsylvania State University and University of Chicago Comparative Education Center, May 1967 (mimeographed); and by the bibliographies appended to recent articles by Bowman and Myers, Grubel and Scott, and Brinley Thomas.

Bowman and Myers, Rashi Fein, and a few others, human capital studies of migration have not proceeded very far beyond the onerous stage of obtaining the demographic data according to age, status, education, and occupation; all that has been attempted is to value the various categories created, either backward-looking, in terms of the costs and foregone production embodied in the migrating human capital, or forward-looking, in terms of the expected future earnings (wealth) of the migrants.

Of course, it is impossible to separate cleanly an exploratory literature into such distinct methodological "traditions," especially when the writers are themselves involved in the complex policy questions which inspired the whole blossoming of the subject. Thus, Johnson's most recent analyses used international trade theory more than Pigovian welfare economics; Weisbrod's work on migration has transcended public finance and manpower studies; and a number of authors have branched off their original trails to consider either the general problems of migration for growth and development in low-income countries or the particular problem of the return or nonreturn of students obtaining higher education abroad. The uninitiated may, therefore, be particularly grateful for the appearance of two compilations of papers: *The Brain Drain*, edited by Walter Adams, and the forthcoming *Proceedings* of the 1967 conference of the International Association for Research in Income and Wealth which was held in Ireland and which concentrated on the subject of the brain drain.

Similarly, it is impossible to classify the literature by the various *policy* questions to which the authors were, speculatively or econometrically, addressing themselves. Instead, what follows is concerned with three approaches to migration. The first part deals with the decision to migrate, referring to a set of studies not apparently consulted by many economists; the second part deals with migratory human capital, especially its measurement; and the third, with other policy questions about migration.

## THE DECISION TO MIGRATE

## A LIST OF THE DETERMINANTS

1. *Income differentials.* The pioneering study by Sjaastad concentrated on this explanation of migration, which is the one economists would think of first. Most studies and many policy documents have made much of it. The British Jones Report estimated that young graduates or Ph.D.'s in the United States might expect from two to three times the initial salary obtainable in the United Kingdom; larger ratios of course apply to differentials between less developed countries (LDC's) and western economies. Economists would naturally think that the present value of income, or permanent income, would actually be the relevant concept. A study by Grubel and Scott summarizes the possible decision rule thus:<sup>5</sup>

$$\sum_{i=1}^{N_o} \frac{Y_{o,i}}{(1+r_o)^i} + \sum_{i=1}^{N_o} \frac{P_{o,i}}{(1+r_o)^i} > \sum_{i=1}^{N_d} \frac{Y_{d,i}}{(1+r_d)^i} + \sum_{i=1}^{N_d} \frac{P_{d,i}}{(1+P_d)^i} - C$$

where

$Y$  is expected real income,

$r$  is rate of discount,

$N$  is expected life,

$P$  is psychic income,

$C$  is cost of living,

$o$  is the subscript for the country of origin, and

$d$  is the subscript for the country of destination.

If the left-hand side is exceeded by the right-hand side, migration is "rational."

As the dating and discounting of the real-income items suggest, it is not merely the initial level but the time-shape of the alternative income streams which will exercise the most leverage. Indeed, some studies have explicitly mentioned the different rates of increase of salaries in countries

<sup>5</sup> Herbert G. Grubel and Anthony D. Scott, "Determinants of Migration: The Highly Skilled," *International Migration*, 5, No. 2, 1967, p. 128. For fuller information, see M. J. Bowman and R. G. Myers, "Schooling, Experience and Gains and Losses in Human Capital Through Migration," *Journal of the American Statistical Association*, 62, September 1967, pp. 875-98.

TABLE 1

*Motivation Studies*

## I. The Wilson Study of British Scientists, 1964: Reasons for Emigrating to North America

Reason	Percentage <sup>a</sup>
Low status for scientists in United Kingdom; Science in United Kingdom is "demoralized"	14.1
Britain "frustrating and depressing"	12.5
Lack of facilities in United Kingdom	10.4
Dissatisfied with conditions (of scientific work) in United Kingdom	17.5
Greater professional opportunities in North America	38.6
Low salaries in United Kingdom	6.2
Higher salaries in North America	18.0
Higher standard of living in North America	10.6
Higher social standing of scientists in North America	6.5

## II. The Hatch-Rudd Study of Graduate Students, 1957-58: Reasons for Overseas Study

Reason	Percentage <sup>b</sup>
Desire to travel	39
To gain scientific, academic experience	26
To gain other or unspecified forms of experience	18
To work in a particular department or study a particular subject	15
Availability of better research facilities	6
Financial reasons, higher salary	22
Better opportunities; offered better job but finance not specified	23
Dissatisfaction with conditions and opportunities in Britain	19
Sent by employer	4
Other reasons	14
Reasons not stated	3

*Notes to Table 1*

SOURCE: *The Brain Drain: Report of the Working Group on Migration*, Committee on Manpower Resources for Science and Technology (London: HMSO, Cmnd. 3417, 1967), pp. 69–70. The origin of the studies embodied in the report is as follows: James A. Wilson, "The Depletion of Natural Resources of Human Talent in the United Kingdom; a Special Aspect of Migration to North America, 1952–64," doctoral dissertation, University of Pittsburgh. (The majority of Wilson's respondents were young natural scientists with a high academic background.) Stephen Hatch and Ernest Rudd, University of Essex, U. K.; survey of the employment former postgraduate students. The survey included some 3,400 graduates in 1957.

<sup>a</sup>Total of 517 respondents.

<sup>b</sup>Total of 678 students were or had at some time been graduate students overseas.

of Europe and in the United States as important determinants of migration. The higher American starting salaries are contrasted by potential migrants with slower subsequent pay increases.

The psychic income items will be dealt with as part of the discussion on living and working conditions. The rates of interest are presumably equal only if all factors are perfectly mobile and all markets are perfect. Otherwise one would expect that highly qualified potential migrants would discount future incomes at rates which reflected both their superior access to capital markets and their greater certainty about the future. Whether the formulation is realistic in ascribing to the potential migrant the imaginative capacity to discount foreign incomes at foreign rates is a matter for debate, as is the question of whether the factor of risk is small enough to justify leaving it out of the calculation.

2. *Openings and opportunities.* It is not obvious that scientists and professionals are more specialized in any technical sense than are some less educated members of the labor force. However, many of the latter are willing to start new lives in new countries by abandoning their old occupations, while the brain-drain literature suggests that highly educated manpower frequently moves in search of the precise opening to justify past training or experience.

Two other aspects of opportunity may be important for scientific manpower. First, to the extent that scientists are confined by their work



to universities or institutional laboratories, they may be very concerned about obtaining opportunities for future advancement and promotion which are missing in their country of origin. Second, for similar reasons they may wish to escape from countries in which one or a few institutions comprehend all their opportunities and to emigrate to countries offering more ample scientific facilities and in which sideways mobility makes possible escape to other hierarchies.

3. *Living conditions.* This is really an omnibus category like "psychic income." Leaving aside quests for political, religious, or racial non-discrimination and freedom, many professionals obviously move simply to obtain better living conditions for themselves, their wives, or their families. Climate, holiday facilities, schools, welfare, social attitudes, and styles of living may be magnets. Once again, manpower which customarily communicates with, or travels among, colleagues all over the world is well qualified to know of such differences.

4. *Working conditions.* The more creative is highly qualified manpower, the greater its desire for suitably equipped, secluded, or serviced facilities and premises. Obviously, rich countries can provide potential immigrants with the greatest promise of research funds, appropriate colleagues, time, space, and apparatus.

#### THE RELATIVE IMPORTANCE OF THE DETERMINANTS

It is easier to list these determinants than to discover their relative importance. A few studies, however, have been made, chiefly in the United Kingdom. (See Table 1, which is based on two of these studies.) Before presenting a summary of this evidence, the limitations of these studies should be stressed. First, they deal explicitly with emigrants from the United Kingdom. While that country is an important source of emigrant scientists, it should be noted that there is an immense number of migrants from the less developed countries. Second, as in many questionnaire-based studies, they report only the percentage of respondents mentioning one or more particular suggested motivations, and the researchers' classifications of these mentions. In particular, these frequencies are not weights or regression coefficients. The two surveys were

published separately, but the tables are taken from summaries prepared for the 1967 report of the British working group on migration, *The Brain Drain*. (See Table 1, Source.)

The Wilson study concentrates on approximately 500 scientists, while the broader Hatch-Rudd study considers the about 20 per cent of a group of 3,400 former British graduate students who had ever gone overseas. It is not surprising, therefore, that the former study appears to indicate the greatest importance for scientific and professional opportunity—"working conditions"—in our own listing. Other surveys and the opinions of experts who have dealt with scientists and Ph.D.'s also frequently assert that money is not the important factor in a migration. The point is difficult to test because most migrations do appear to bring both higher lifetime incomes and better facilities to the migrant.

There are, of course, many studies of migration, but few of them attempt to analyze data on incomes, distance, and cost of moving. One of the best known is L. Sjaastad's "Costs and Returns of Human Migration," based in part on his earlier doctoral thesis.<sup>6</sup> Attempting to study disaggregated gross internal U. S. migration, he finds an extraordinary sensitivity to distance, so that, in miles and 1947-49 dollars, it would take \$106 per year in extra income to induce a migrant already on the move to migrate an extra 150 miles. Sjaastad's explanation of this immobility is that his data neglect the uncertainty and loss of psychic income involved in the extra distance; income is not the only explanatory variable.<sup>7</sup>

Sjaastad's discovery that income differences may be overshadowed by other explanations is, of course, consistent with motivation and questionnaire studies of highly educated manpower, which tend to stress the importance of work opportunities and facilities for research and the absence of impediments of culture and language. A rather special version of this finding is set out in R. G. Myers' doctoral thesis<sup>8</sup> in which he investigates the foreign students' nonreturns from study in the United

<sup>6</sup> L. Sjaastad, "Costs and Returns of Human Migration," *Journal of Political Economy*, 70, October 1962, pp. 80-93.

<sup>7</sup> There are, of course, many recent studies of labor mobility. See the *Journal of Human Resources*, spring and summer, 1967.

<sup>8</sup> R. G. Myers, "Study Abroad and the Migration of Human Resources," (Ph.D. dissertation, University of Chicago, 1967), p. 97.

States, by country of origin. It is found that nonreturn rates are positively correlated with the level of per capita income in the sending country, though the correlation is not impressive until national levels of education, fields, and types of immigration status are also considered. However, this is a surprising finding on incomes alone: it suggests that the *smaller* the differential between parent-country and United States per capita income, the greater the tendency of nationals to remain after studies in the United States.

Myers also questioned a large sample of Peruvians studying in the United States, obtaining guesses from each respondent as to his alternative income streams in the United States and Peru. To paraphrase his summary of his very complex results, he obtained no firm answer to the question of whether expected earnings distinguished those who had decided to return home from those who planned to stay in the United States. It was found that students of low social status on grants and scholarships in the United States were planning to return to expected low incomes in Peru. Clearly, considerations other than incomes or expected earnings were influencing migration decisions.<sup>9</sup>

#### FACTORS STRENGTHENING THE DETERMINANTS

It is obvious that conditions in certain countries will create incentives to come or to leave. The literature has given much attention to these conditions because their removal would do much to reduce the brain drain. Consequently, it is enough simply to list a few of the more important suggestions.

1. *Foreign training.* In the present context, the main significance of foreign training is that it familiarizes students with incomes, opportunities, and working and living conditions elsewhere. While it is possible that study abroad simply gives would-be emigrants easy access to their new country, many writers believe that scientists and professionals leave their native countries *because of* their experiences as students abroad. Countries which lack higher education facilities, though able to supply a

<sup>9</sup> *Ibid.*, p. 242.

flow of persons at the university or professional school entrance level, are bound to see many of these students go abroad for their education and stay abroad. It is probable that, in some fields at least, starting professional schools at home will not only produce a domestic flow of qualified persons, but also reduce the loss of those who would otherwise stay abroad after training. (Obviously this assertion holds only if the local graduates do not go on to foreign postgraduate training. And even then, as a comparison of migrating physicians from Pakistan and the Philippines shows, foreign training cannot be the chief explanation of migration.)

2. *Domestic income distribution.* Each economy may, either as an interpretation of egalitarianism or in furtherance of other aims, pursue policies which point up or water down the economic structure of incomes and occupational status, thus affecting migration behavior. The incomes of scientists and engineers may be the result of government policy designed to benefit universities and the government itself by providing personnel for its own departmental organizations. As one example, the European custom of overpaying "the professor" of each subject in a university often not only places the incumbent advantageously with respect to his professional colleagues at home and even overseas, but also places him ahead of them in relation to other occupations and social groups. Senior men in such positions are therefore loath to migrate, except for political reasons; their juniors, however (perhaps as a direct financial consequence), are ill paid, of low social status, and interested in migration.

A second example is well known in the literature. Physicians in the United Kingdom, following an almost free medical education, receive low stipends as part of social policy on incomes and on welfare. It is possible that the rate of return on their own input is as high for doctors in Britain as in countries where doctors pay more for their training and get higher money incomes later. However, where the two systems coexist, it pays students to get free training in the United Kingdom and then migrate elsewhere, which is what they do.

A third example comes from India. The high status and relative salaries of a few intellectuals, civil servants, and scientists attract thousands of emulators from the same social classes, so many, in fact, that colleges are flooded by indifferent scholars and the market is flooded with

unplaceable graduates. It is said that emigration comes naturally to both good and bad products of this system, frustrated by the oversupply. Note the similarity to the European professorship system already mentioned.

Income redistribution may also be accomplished through taxation and expenditure policy. Scientists who would be highly paid in the United States may be victims of steeply progressive income tax rates elsewhere; more generally, their net fiscal position may be negative, thus driving them out of the country.

Indeed, all too little has been said about the positive (as opposed to the normative) effects of taxation on the brain drain, or on migration generally. It is frequently asserted that high tax rates drive people away, but the information comes from former migrants whose views are not completely reliable. What about a priori judgments from public finance? The literature of federal finance, for instance, is full of suggestions about migration from one province to another, because of net fiscal pressure (fiscal residuum, in Buchanan's terminology). One would want to know whether taxes and public services do have this alleged effect on the retention or repulsion of persons contemplating migration, and whether it is closely related to other alleged effects, such as the demand for leisure and other untaxed factor allocations.

In particular, debates about the brain drain make it important to know whether scientists and engineers, relative to other would-be migrants, are more heavily taxed; are more sensitive to marginal tax increments; and, are more responsive to the availability of public goods, transfers, and social services. One aspect of the welfare debate has centered on the "debt" of the emigrant to his home country—is he a debtor for the services absorbed in his youth, and is he morally bound to repay this debt? The positive aspect of this question is whether small changes in services and repayments (i.e. taxes) would alter his choice about leaving.

3. *Language and culture.* We have already noted that scientists and engineers are well informed about the advantages and opportunities elsewhere. Their education and background also help them to feel at home in a new country. On the other hand, it is conceivable that they are more sensitive than are less educated persons to the loss of their own culture, religion, or language. Such considerations may help to explain

TABLE 2

*Hatch-Rudd Survey: Reasons for Returning to Britain*

Reason	Percentage <sup>a</sup>
Family, domestic	36
Prefer "British way of life"	13
Patriotism, "obligation to this country"	6
Dislike of life overseas	7
End of temporary visit	41
Offer of a good job in Britain	19
Dissatisfaction with job or prospects overseas	11
Other reasons	7
Reasons not stated	3

SOURCE: *The Brain Drain: Report of the Working Group on Migration*, HMSO p. 71.

<sup>a</sup>The total number returning to Britain was 335.

why migration within the English-speaking world is so high, and why the much smaller migration within the French-speaking world rarely crosses over into English-speaking countries.<sup>10</sup>

#### THE TIME DIMENSION OF MIGRATION

It should not be assumed that every highly qualified person who leaves his country, even to work elsewhere, is necessarily adding to the brain drain. Far from it—the brain drain is both larger and smaller than this.

It may be larger because, in spite of its name, the brain drain is measured by the movement of people with certain occupations or educations, not by their brains or potential. For many attributes, the rankings of people vary. Thus, it is obvious that young children, geniuses or not, will not be counted as part of the brain drain when they move but only

<sup>10</sup> See Michel Olivier, "Algerians, Africans and Frenchmen," *Interplay*, 1, May 1968, pp. 20-25; and Robert Mosse, "France," *The Brain Drain*, Walter Adams (ed.), New York, 1968, pp. 157-65.

when they have acquired higher degrees or acquired academic or scientific positions. The same is true of adults classified as "managerial and administrative" personnel—the group is usually excluded because it contains many managers and owners of small businesses, some of them failures and bankrupts. Yet among them are also trained or experienced entrepreneurs, innovators, consultants, and industrialists. It is doubtful whether statisticians would have counted Andrew Carnegie in the brain drain when he moved to the United States at the age of twelve, or Albert Einstein when he entered Switzerland at seventeen.

Nevertheless, in spite of these serious exclusions, the brain drain is probably *smaller* than current statistics suggest because of the difficulty of netting out the reflux of returning nationals. They return because of (a) disappointment in their fortunes or conditions in the new country, or (b) fulfillment of a plan to return after obtaining schooling, training, experience, or simply the pleasures of living and traveling abroad. A British study (see Table 2) has attempted to discover by questionnaire why British scientific emigrants return home, although the statistical difficulties, both of locating former emigrants and of obtaining "correct" answers from them, are, of course, formidable.

It must also be pointed out that, until death makes return impossible, it must never be concluded that emigration is "permanent." All academics know colleagues who have made one or more return journeys to their homeland. They know that this process can take place at various ages and for a variety of personal reasons as well as for motives easily classified as "economic." The difficulties here are similar to those confronting the demographer estimating "average size of family" for a still fertile population. Just as parents add to their families after their first batch of children are nearly grown up, so older emigrants may begin to seek or accept positions in their homelands. Such a reflux has understandably long been visible among former European political refugees, but is also evident among those whose move was purely economic or professional. Hence, flow estimates of the brain drain must always be overestimates of permanent emigration.

However, the most important category of returning emigrants is undoubtedly the group of students and short-term appointees (often post-doctoral fellows). The accompanying panels (see Table 3) give some estimates of the Swedish, British, and Canadian reflux from this source—

TABLE 3

*Brain Drain: Sweden, United Kingdom, and Canada*

	<i>Drain</i>	<i>Reflux</i>	<i>Net</i>
<b>Sweden: Citizens with university degree</b>			
(average emigration, 1961–62)	198	(average annual re-immigration, 1958–59) 75	123
<b>United Kingdom: (a) Holders of Ph.D. in a science</b>			
(total outward movement, 1957–61)	1,548	(return of those on fellowships & temporary appointments) 910	638
<b>(b) Degrees issued by British universities in 1965 – engineering and technology and science</b>			
Engin. and Tech.	230	75	155
Science	460	345	115
Total	690	420	270
<b>(c) High degrees in engineering and science</b>			
Engin.	106	16	90
Science	477	152	325
Total	583	168	415
<b>Canada: Citizens with economics degrees</b>			
(moving to or trained in the U.S., now in Canada or U.S.)	107	(U.S. trained, now in Canada) 63	44

SOURCE: Sweden, Goran Friberg, "A First, Preliminary Report . . . Regarding the Migration of Scientists to and from Sweden," Committee on Research Economics, Swedish Research Council, Stockholm, Report No. 20, (mimeographed). United Kingdom (a), rearranged from *Emigration of Scientists from the United Kingdom*, Report of a Committee Appointed by the Council of the Royal Society, London, the Royal Society, 1963, summarized in *Minerva*, 1, Spring, 1963, pp. 358–60; (b) and (c), *The Brain Drain*, p. 24. Canada, Estimates from Anthony D. Scott, and Herbert G. Grubel, "Flux and Reflux: The International Migration of Canadian Economists" (forthcoming).



around 50 per cent of the emigration that might be recorded by statisticians who depend on official returns, such as those published by the United States Immigration Service.

WAVES: THE SOCIAL AND ECONOMIC DIMENSION OF  
MIGRATION BEHAVIOR

Some useful study has been made of the social influences on migration, quite apart from those characteristics of national economies strengthening influential determinants mentioned previously. In particular, it is worth noting that brain drains do not seem to have been steady flows, but irregular and cumulative movements. There are some obvious reasons for this, but here it may be useful to mention some unexpected aspects of the flow.

First, because in theory the brain drain is caused by a disequilibrium, we should expect it to be spasmodic, commencing in response to some change in the international economy's factor or goods markets and ending when population movements are no longer required. (However, this is a simplistic and static view. It is possible to imagine countries steadily supporting the education of their sons in preparation for occupations abroad. Scottish marine engineers, Nepalese mercenaries, French cooks, and Swiss watchmakers may be examples. But such steady flows would hardly be the subjects of brain-drain complaints.)

Furthermore, emigration or immigration may be interrupted or prevented by war. Thereafter the migration may be twice as large as the initial disequilibrium would indicate. Similarly, a potential brain drain may be delayed by shortages of people of the right age or sex. This is a "bottleneck," exogenous but otherwise similar to the endogenous bottlenecks to be mentioned later.

Second, considering the brain drain simply as an adjustment to an international factor disequilibrium, we might expect the flow to be largest at the outset, then to diminish as the gap or disequilibrium was remedied. However, factor flows are rarely as monotonic as this because the absence of communications, institutions, or transportation systems is not remedied until the first units of flow are completed. Thereafter uncertainty is reduced, communications with home are improved, and removal becomes simpler. (Marco Polo may move first, but not much time elapses before

his cousins and their mothers-in-law follow.) We expect all migrations to be cumulative, at least until the disequilibrium is adjusted.

Third, the brain drain cannot become large until supply bottlenecks have been removed. An important brain drain must depend heavily upon the products of local universities and professional schools. If the labor markets were in equilibrium before the drain began, the subsequent perceived excess demand abroad will be transformed into a large emigration only after (a) drawing down existing stocks of scientists and professionals, raising their local demand prices, reducing their incentive to move during the waiting period (when the price mechanism is attracting additional students through the necessary training and experience), and (b) expanding local education facilities, if the excess demand overseas is larger than can be supplied by these facilities at attractive incomes.

Fourth, demand bottlenecks may also have to be removed. Prior to the migrations, the countries of destination may have been "making do" with substitute skills or inputs. The actual creating of vacancies for the newly discovered sources of professional and scientific manpower may take time, as may the removal of legal, customary, trade union, or cultural barriers to their employment.

Fifth, emigrants with particular skills or national characteristics may by their presence create new roles for themselves and their kind which were foreseen neither by the original professionals or scientists nor by their employers.

Sixth, the countries of destination may be gradually building up their educational, industrial, or scientific establishments. Consequently, their excess demand for qualified persons may grow rather than be satisfied.

In addition to these microeconomic aspects of adjustment to international disequilibria in the markets for various kinds of educated persons, two particular categories of large and general flow should be picked out for special mention.

The first of these comprises refugee intellectuals. It goes without saying that the fleeing of intellectuals from Russia, Germany, Italy, China, or Hungary at various times in this century can hardly be properly classified with other categories of brain drain. The motives for removal are entirely different, and the permanence of their emigration may depend upon the permanence of the conditions which drove them abroad. Nevertheless, so different are the motivations, that the existence

of a stream of refugees ought to have created some useful opportunities for economic research on the brain drain. One interesting circumstance, for example, is that some countries of destination were merely able to offer liberty, not necessarily large schools, institutes, or research facilities. Hence, the capacity of emigré intellectuals to change the environment of technology or education should be open to study *ceteris paribus* (instead of *mutatis mutandis*, as is so often the case when a brilliant scientist is invited abroad to work in an already productive environment.) A second, symmetrical circumstance is that the country of emigration may have provided all the physical and intellectual environment and facilities necessary to hold and use the refugee productively. His expulsion, therefore, may illustrate *ceteris paribus* the effect of the departure of isolated individuals or groups on an otherwise fruitful scientific atmosphere. Indeed, it has often seemed to me that the time is ripe for a wise scholar to compare science in Stalinist Russia, from which emigration of dissatisfied scientists was impossible, with science in Nazi Germany, where emigration was, for all practical purposes, compulsory.

In any case, it is to be expected that waves of refugees have also created environments favorable to subsequent migrations. This is not so much because the potential employers will seek more scientists or engineers from the refugee's country (indeed, the refugees may prevent the employment of new generations with different beliefs), but because the refugees may have established openings or vacancies for men with certain types of ability or training found only in that country. An obvious example is the boost given to German and classical literary studies in North America by German refugees; similar remarks could be made about Chinese studies in western universities, originally strengthened by scholars unable or unwilling to return to their homeland, now perhaps awaiting a stream of younger Chinese archeologists, historians, artists, and literary specialists trained on the mainland. Similarly, it should be noted that refugee scholars are somewhat less willing to make concessions to the educational or scientific traditions of their new countries, because their migrations have not involved a voluntary surrender of their own traditions and approaches, and because they have often been forced to migrate at a later age than is usual among brain-drain migrants. Unhappy and stubborn, they may actually make a larger impact than if they expunged parts of their own past in adjusting to their host's culture.

The discipline of economics can count many such scholars, from the greatest to the most ordinary recruit of a small college or government research branch.

The second category comprises the “wave” of educated migrants accommodating to long waves of economic development, land shortage, demographic forces, and factor movements across the Atlantic and national borders. We are almost completely indebted to Brinley Thomas for this information. Summarized by Walter Adams in his recent book, it runs as follows:

Why, then, do we view the international flow of talents and skills in a different perspective from earlier observers? In the first place, as Brinley Thomas points out, the great outpouring of human capital in the 19th century from Europe to North America was complementary to an export of physical capital and unskilled labor. Flowing from the developed countries, it created an infra-structure in the developing continent and had important feedback effects on the exporting countries. It resulted, according to Thomas, in a progressive narrowing of the gap between countries in different stages of development, benefiting both sending and receiving countries.

The current wave of migration, in contrast, has moved in the opposite direction from that of physical capital.<sup>11</sup>

## THE SOCIAL VALUE OF HUMAN CAPITAL EMBODIED IN MIGRANTS

### MEASUREMENT

The study of migration generally, and that of the brain drain in particular, has made much of the “human-capital” approach. By analogy with capital theory, this approach regards each person as having attached to him an amount of wealth equal to the present value of his net future earnings. While he cannot usually realize this wealth, as he would by selling a machine or farm that he owned, he can increase its future earning power by investment in his schooling, on-the-job training, and occupational and regional mobility.

<sup>11</sup> Walter Adams, ed., *The Brain Drain*, p. 3.

The importance of the approach lies in the fact that it is the source of hypotheses about behavior: people's investment in themselves should be in forms, amounts, and periods which will maximize the value of their human capital, after making allowance for nonpecuniary types of income and for leisure. This application is clearly positive. It should lead to the prediction of decisions about schooling, location, and jobs, and in aggregate, can help to explain group behavior or attitudes to investment in educational facilities, migration, and to collective bargaining for working conditions, pensions, and retirement provisions.

At the same time, the human capital approach has been used in a *quasinormative* manner in determining rates of return to buttress claims that too little (or too much) is being spent in aggregate on certain types of educational facilities, as opposed to social spending on physical capital and other forms of public goods.

In migration studies, both these approaches are present, and they ought to be clearly distinguished. Among the positive studies, Sjaastad, Myers and a number of other writers have explained how migration is to be regarded as investment in human capital, and have attempted some measurement of its payoff or rate of return. The estimation of personal rates of return is difficult, chiefly because it is difficult to discover what migrants expect certain values to be. The aggregate rate of return, however, is just as difficult to estimate as an aggregate rate of return to schooling because of the impossibility, short of a complete (planning) model, of knowing what rates of pay would exist if all categories of educated persons were to be changed. In migration studies, it is comparatively easy to learn or guess what personal incomes are believed to be in a certain region, but it is impossible to guess what the pay levels would, in fact, become if everyone moved where his human wealth would be maximized.

Normative studies of migration suffer not only from the same difficulties (of data, and of aggregation) as the positive or behavioristic studies, but also from a perceptible tentativeness in the relevant welfare theory. As with similar problems in land and real estate appraising and valuation theory and practice, the measurement of the quantity of migrating human capital must, in a world of adjustment to disequilibrium in goods and factor markets, depend upon the purpose for which the measurement is to be used. A few examples are: (1) the value of exports of

human capital, analogous to the balance of trade or similar values of exports of machines and other capital goods; (2) the "debt" of a migrant to his homeland; (3) the "balance of indebtedness" between two countries exchanging migrants; (4) the "supply price" of a country training additional migrants for "sale"; and (5) the "demand price" of a country importing additional migrants instead of training its own people.

In the absence of human-capital markets and during disequilibrium in labor markets, the values of these concepts will differ, though impatient economists may reason that in the long-run with perfect markets the differences would disappear.

Closer examination of the differences reveals that their source is in different assumed conditions in which some hypothetical transaction is to take place. We must ask, for example, if there were a *stock* of nuclear scientists for sale, what short-run price would emerge from competition among the nations? Second, if nuclear scientists were produced for sale, what long-run price would be determined by interaction of both supply and demand? Third, if potential emigrants were to buy their right to leave from their remaining countrymen, how much would they offer, and how much would their countrymen demand?

As will be discussed later, a number of such questions can be posed and indeed have been suggested as bases for international compensation in brain drain exchanges<sup>12</sup> and as variables in explaining total community outlays on education.<sup>13</sup> When the problem of finding quantitative answers is faced, however, only four actual techniques have been suggested:

1. Cost-saving to the country of destination for the human capital received.
2. Present value of the human capital migrating.
3. The dead-weight, or consumers'-surplus, loss from migration.
4. The reduction in the flow of savings, taxes and public spending.

These techniques will be reviewed in the following section, emphasis being given to "cost-saving" estimates.<sup>14</sup>

<sup>12</sup> See Harry G. Johnson and others in Walter Adams (ed.), *The Brain Drain*.

<sup>13</sup> See Burton A. Weisbrod, *External Benefits of Public Education*, Princeton: Industrial Section, Princeton University, 1964.

<sup>14</sup> A review of (1) and (2) will be found in Bowman and Myers, *op. cit.*

1. *Cost-saving measures.* This approach can best be summarized by suggesting the question which it directly answers: if an immigrant brings a certain education and experience with him, what are the direct resource costs and foregone earnings which are avoided by his new country? The answer, obviously, requires discovering that country's costs of schooling at various levels (average or marginal costs depending on whether or not the immigrant is part of a stream); his foregone earnings (on the assumption that he might otherwise have migrated before his period of schooling and worked in his new country); or his maintenance costs (on the assumption that his new country might have sent someone to his homeland for an education); and making allowance for the degree to which he worked part-time.

In fact, such estimates follow very closely the methods pioneered by T. W. Schultz in estimating the human capital embodied in the U.S. labor force.<sup>15</sup> Difficult questions arise about whether or not to use domestic or foreign values, reflecting differences between alternative approaches to building up or importing elements of skilled local manpower. But most of the complexities of the method, which has been extensively used by Grubel and Scott, Parai, and Wilkinson,<sup>16</sup> lie in problems of data.

Grubel and Scott, basing their estimates on the gross flow of 43,000 scientists and professionals to the United States from 1949 to 1961, found that the gain to the United States was about \$1 billion, or \$23,000 per immigrant, considering both full education costs and earnings (production) foregone.

The same authors made a more detailed analysis of the influx and return of foreign students to the United States. In 1963, 75,000 students, about evenly divided between undergraduates and graduates, absorbed American educational, maintenance, and travel resources of about \$4,300 per student, or a total of \$325 million. However, after allowing for self-support for foreign students, this sum declines to about \$175 million. After further subtracting the "gain" to the United States from the 10 per

<sup>15</sup> See especially T. W. Schultz, "Capital Formation by Education," *Journal of Political Economy*, 68, December 1960, pp. 571-83; and *The Economic Value of Education*, New York, 1963.

<sup>16</sup> References are given in succeeding footnotes for Grubel and Scott, and Louis Parai. For B. W. Wilkinson, see *Studies on the Economics of Education*, Occasional Paper No. 4, Economics and Research Branch, Department of Labour, Ottawa, July 1965.

cent of foreign students who remain there, and from the studies of American students abroad, this United States contribution is converted to a *gain* of about \$16 million per year.

In another study of the economics profession in Canada and the United States, Grubel and Scott compute the contribution made by migration, training abroad, and return of students and mature economists to the stock of academics in the two countries. Here it is found that, although there are more Canadian economists in American universities than Americans in Canadian universities, the American contribution to graduate training of students who eventually returned to Canada outweighs in value the net American gain from Canadian migration.

The value of the "reflux" or return homeward of migrants and students is therefore one of the most important aspects of the brain drain question. As Swedish, British, and Canadian studies have shown, there

TABLE 4  
 "Gains" and "Losses" to Canada  
 from Professional Migration, 1953-63  
 (in millions of Canadian Dollars at 1961 prices)

	Gain	Loss
Replacement costs of education of professional manpower	532	292
Replacement cost of foregone earnings during migrants' schooling	<u>455</u>	<u>240</u>
Total	986	531
Student exchange: cost of educating net excess of 6,500 Canadians abroad over foreigners studying in Canada - @ \$1,800 per student	12	
Net Gain to Canada from migrations and study abroad (balancing item)	-	(467)
Total	<u>998</u>	<u>998</u>

SOURCE: Based on data in L. Parai, *Immigration and Emigration of Professional and Skilled Manpower During the Post-War Period*, Special Study No. 1, Economic Council of Canada, Ottawa, 1965.



may indeed be such large homeward flows (i.e., not merely flows of immigrants to offset emigration) from previous emigration as to nullify the prevailing impression that emigration amounts to a significant proportion of the home output or stock of qualified persons. Furthermore, to the extent that other persons have been students (in graduate and professional schools), undertaking postdoctoral research or on-the-job training, they may not have been registered in *any* statistical compilation as migrants. However, their return may produce a more substantial change in the stock of human capital in their native land than the better documented flow of permanent migrants.

This may be illustrated by adjusting some calculations by Louis Parai.<sup>17</sup> Confining himself to the flows to and from Canada of "professional" manpower, for the period 1953-63, he estimated the gains and losses shown in Table 4.

The extent to which emigrants eventually return home can be illustrated by a sensitivity analysis. The "loss" column in the table measures the value of emigrant professional human capital for the period 1953-63 to be \$531 million (for about 56,000 emigrants). If, as may easily be the case, the number of emigrants is overstated—through the neglect of subsequent returns to Canada—by 10 per cent, the residual calculation of Canada's net gain could also be out by more than 10 per cent.<sup>18</sup>

A striking illustration of the extent to which neglect of returning emigrants can invalidate gross cost-saving estimates is provided by Göran Friberg.<sup>19</sup> Using the Grubel-Scott technique, he first values the gross annual Swedish loss of scientists and engineers to the United States at \$1.8 million in 1960. "Re-immigration" of highly qualified Swedes

<sup>17</sup> Louis Parai, *Immigration and Emigration of Professional and Skilled Manpower During the Post-War Period*, Special Study No. 1, Economic Council of Canada, Ottawa, 1965, pp. 82-122.

<sup>18</sup> For the most part, Canadian emigration measures are residual estimates after net natural increase, and immigration have been added to census counts. Hence, *professional* emigration figures must depend on U. S. Immigration data. But these do not count immigrants as Canadian if they are recent arrivals in Canada. Furthermore, nobody counts U. S. immigrants of Canadian citizenship who return to Canada. See Parai, Technical Note 8, Table 11 and Table A-45.

<sup>19</sup> Göran Friberg, "International Movement of Scientific and Technical Personnel," Part IV of *Meddelande Nr. 27*, Kommitten för Forskningsorganisation och Forskningsekonomi, (Committee for Research Organization and Economy), Stockholm, December 1966.

TABLE 5

*Revision: "Net Gain to Canada" from Student Exchange*

Canadian Contribution to Schooling of Foreign Students in Canada		
1	Total students <sup>a</sup>	55,760
2	Graduate students	11,152
3	Undergraduates	44,608
4	Education resource costs — grad. @ \$4,143	\$ 46,200,000
5	Education resource costs — under- grad. @ \$1,800	80,300,000
6	Maintenance costs — 50 per cent of students (grad. + undergrad.) @ \$1,700	47,400,000
7	Total Canadian contribution	<u>173,900,000</u>
	(4) + (5) + (6)	\$173,900,000
Foreign Contribution to Schooling of Canadian Students Abroad		
8	Total students in U. S. and U. K. <sup>a</sup>	62,307
9	Graduate students	12,329
10	Undergraduate	49,978
11	Education resource costs — grad. @ \$4,143	\$ 51,100,000
12	Education resource costs — undergrad. @ \$1,800	90,000,000
13	Maintenance costs — 50 percent of students (grad. + undergrad.) @ \$1,700	53,100,000
14	Total foreign contribution	<u>194,200,000</u>
	(11) + (12) + (13)	\$194,200,000
Net Gain to Canada		
	(14) - (7)	\$ 20,300,000

SOURCE: Total students, L. Parai, *Immigration and Emigration of Professional and Skilled Manpower During the Post-War Period*, Special Study No. 1, Economic Council of Canada, Ottawa, 1965. Education resource costs — graduate students, A. D. Scott and H. G. Grubel, "The International Migration of Canadian Economists" (forthcoming), p. 42; undergraduate students, Parai, *op. cit.*, p. 123. Maintenance costs, Scott and Grubel, *op. cit.*, p. 52.

<sup>a</sup>Graduate/undergraduate ratio assumed similar to United States (see *Doctorate Production in U. S. Universities, 1920-62*, National Academy of Sciences, 1963, p. 204) and adjusted for nonreturns.

from the United States, however, reduces this figure by 80 per cent, to \$350,000, after making allowance for the fact that the returnees are more highly trained than the emigrants. Friberg suggests that the \$80 million per year found by Grubel-Scott for all scientific and engineering emigration to the United States may also be subject to a similar reduction to 20 per cent of its gross amount.

Obviously, what is required is a frequency distribution of the numbers of migrants returning homeward in each subsequent year. Bowman and Myers do set up a formal individual decision model for the decision to return, in which they think that the probability of return home will decline with the increase in the number of years absent.<sup>20</sup> This would mean that the distribution of returns by one year's group of emigrants would be heavily concentrated in the early years and would trail out with a large number never returning. There is, however, little evidence against which to test these hypotheses. We must be content—if a second-best can be achieved—to count the actual returners.

The importance of studies abroad by nonmigrant students requires further examination of the \$12 million figure in Table 4. Parai obtained this estimate by multiplying 6,500, the "net" number of student-years abroad (the excess of foreign student-years in Canada over Canadian student-years abroad), by \$1,800 each. This cost-saving to Canada is obviously understated. Allowance should also be made for the difference between the costs of graduate and undergraduate schooling, for maintenance costs while away, and for the degree of student self-support. In Table 5 the recalculation is shown. It assumes that students everywhere are divided in the same proportions between graduate work and undergraduate studies as they are in the United States; that 50 per cent of students are self-supporting; that maintenance cost rather than foregone earnings is the relevant concept for the calculation; that Canadians studying abroad are concentrated in the United States and the United Kingdom (i.e., not in France); and that 10 per cent of graduate students do not return.<sup>21</sup>

<sup>20</sup> Bowman and Myers, p. 893.

<sup>21</sup> The bulk of these calculations was made by Mr. L. Brown, and are merely summarized here. The chief problem was to get workable assumed proportions for students in graduate work and college. Parai assumes neither maintenance costs nor foregone earnings are relevant, saying that the latter, for the student abroad, are in effect "borne by Canada."

These student-exchange modifications nearly double Canada's gain from Parai's \$12 million to \$20 million. The most important adjustments are, of course, the inclusion of maintenance cost and the greater weight given to the higher education resource costs in graduate work. It is likely that most Canadians abroad are in graduate work, whereas many foreign students in Canada are undergraduates. If this is true, then the \$20 million represents Canada's gain or "indebtedness" on student exchange. It is also likely that, with a large number of Canadians abroad doing graduate work in the United States, the assumed 50 per cent of self-supporting students is too high. If these likelihoods are correct, then the Canadian gain is about \$22 million, or over \$1 million per year, on student exchange alone.

On the whole brain-drain calculation, after making some allowance for returning Canadians and for student exchange, Parai's \$467 million should be raised to at least \$485 million, or an average of \$44 million per year over the eleven-year period.<sup>22</sup>

2. *Present value of human-capital migrating.* The techniques of estimating the present value of the human capital embodied in migrants working, from expected future earnings, are already well examined in the M. J. Bowman and R. G. Myers article cited<sup>23</sup> and are best known in their employment by Weisbrod in his attempt to measure the gain and loss of human capital by Clayton County.<sup>24</sup> More recently, Rashi Fein has made a similar calculation for the American South,<sup>25</sup> and Myers himself has made interesting application of the technique to the decisions of Peruvian students in the United States about where to live permanently.<sup>26</sup>

As with the cost-saving approach, it is necessary to know the numbers of persons migrating and their schooling. Their age becomes particularly important, because the method attempts to measure the value of

<sup>22</sup> The returning-Canadian factor is credited above with only \$10 million. If, as suggested in the text earlier, it is really underrated, and should be \$100 million, then the total annual Canadian brain-drain gain on professionals and students would be over \$50 million per year in 1961 prices.

<sup>23</sup> Bowman and Myers.

<sup>24</sup> Burton A. Weisbrod, *op. cit.*

<sup>25</sup> Rashi Fein, "Education Patterns in Southern Migration," *Southern Economic Journal*, 32, 1965-66, pp. 106-24.

<sup>26</sup> R. G. Myers, *op. cit.*

income in the remaining working years. Obviously one of the most important questions for any particular study is the decision whether to use expected future incomes in the country of destination or the country of origin. If the aim is to estimate the incentive to migrate (as in the Grubel-Scott formulation reproduced earlier), present values in both places may be used, and increasing degrees of disaggregation (by age, sex, and profession) will then be found to increase the understanding of migratory behavior.

However, the normative or policy usefulness of present-value estimates of migrating human capital is not clear. Rashi Fein, indeed, draws no conclusions from his briefly reported valuation of southern migrations.<sup>27</sup> Bowman and Myers appear to place most stress on the capacity of the technique to weigh accurately the differing age and skill compositions of a region's inflows and outflows, thus measuring migration's contribution (in comparison to schooling) to the formation of human capital. This role can be approximated by cost-saving measures; Wilkinson and Parai, for example, both make much of the fact that Canada's net gain from immigration is not merely in differences in the numbers of skilled or professional people coming and leaving, but in the fact that the immigrants on the average embody more schooling than the emigrants.<sup>28</sup> Bowman and Myers,<sup>29</sup> and Fein, therefore, can be regarded as taking this examination one step further by turning from relatively insensitive cost-of-years-of-schooling estimates to more finely detailed expected earnings of various skills and professions. With their approach, therefore, it is possible to test the "paradox" that an equal exchange of equally schooled persons could raise the value of the stock of human capital in *both* regions; with the years-of-schooling approach it is not possible to do this. But I am not convinced that this paradox is the kind of proposition that needs rigorous confirmation, except as propaganda to convince noneconomists that specialization, the division of labor, and mobility can be beneficial generally, not simply to the "net gainer" of educated persons.

<sup>27</sup> Fein, *op. cit.* See the reference to his measurements in Bowman and Myers, p. 879.

<sup>28</sup> Wilkinson, *op. cit.*, p. 69; Parai, *op. cit.*, p. 82.

<sup>29</sup> Bowman and Myers, *passim*, especially p. 880. These authors are also rightly concerned to include remigration and with on-the-job training. The effect of the latter, of course, is much more easily dealt with by present value, than by direct cost, estimates.

3. *The dead-weight, or consumers'-surplus loss from migration.* This approach, not strictly in the human-capital stream of migration studies, is more in the tradition of the cost-of-monopoly and cost-of-tariff studies associated with A. C. Harberger and H. G. Johnson.<sup>30</sup> It does not place a value on the gross amount of human capital migrating, but only on the "loss of welfare" from a nonmarginal emigration.

Consider a simple competitive economy in which the income of a certain skill is determined by supply and by the (derived) demand. Then migration, by reducing the supply of this skill, will: raise the average and marginal revenue product of this skill; raise its price; alter total income distribution in its favor, depending on the elasticity of demand for it; and leave a small dead-weight loss of product (consumers'-surplus) which does not accrue to the migrants, to the survivors, or other factors. It is this last concept which, in principle, may be measured.

The concept itself has been fully discussed by Grubel and Scott,<sup>31</sup> Berry and Soligo,<sup>32</sup> and by H. G. Johnson.<sup>33</sup> Only Mishan has attempted to measure it for the United Kingdom. (See footnote 38.) He is responding to the brief and disappointing Chapter IV of the 1967 *Brain Drain* report on "The Cost of the Brain Drain." (See source to Table 1.) Here the working group briefly reported on the cost of training professionals and scientists and the "loss of investment" when they migrate. However, "the true measure of loss to the community is indicated by the value that might be placed on the productive career of the individual concerned. . . . The significant point is that for every young high quality engineer who emigrates to the United States, the British economy in effect presents the American economy with a gift of the magnitude indicated in these figures." The figures are that the cost of training for engineers and Ph.D.'s, respectively, are £6,000 and £16,000, but the present values of the

<sup>30</sup> A. C. Harberger, "Using the Resources at Hand More Effectively," *American Economic Review*, 49, May, 1954, pp. 134-46; and H. G. Johnson, "The Economic Theory of Customs Union," *Pakistan Economic Journal*, 10, March, 1960, pp. 14-32.

<sup>31</sup> Herbert G. Grubel and Anthony D. Scott, "Theory of Migration and Human Capital," 1967, based on 1965 version (mimeo.).

<sup>32</sup> R. A. Berry and R. Soligo, "Some Welfare Aspects of International Migration," Yale Economic Growth Center Discussion Paper No. 8, July 7, 1966, (mimeo.).

<sup>33</sup> Harry G. Johnson, "Some Economic Aspects of the Brain Drain," *Pakistan Development Review*, 7, Autumn, 1967, pp. 379-411.

value placed on the careers by employers—i.e., salaries—are £ 30,000 and £ 78,000.<sup>34</sup>

In other words, the working group valued the British “gift” at the present value of future foreign income. (This position was heavily criticized by Johnson,<sup>35</sup> with particular reference to taxes and to externalities, by Grubel and Scott,<sup>36</sup> and later by other “internationalist” writers in W. Adams’ *The Brain Drain*. (See footnote 2.) Bowman and Myers appear to accept this measure of loss, externalities aside.)<sup>37</sup>

Mishan, in a semipopular analysis, in effect rejects the gift as a measure of British loss and proposes the present value of the area under the demand curve not accruing to migrants nor survivors—the consumers’ surplus. He makes a rough estimate of this sum, assuming a unitary elasticity of derived demand.<sup>38</sup>

4. *The loss of the flow of savings and of taxes.* For completeness it is necessary to report on two proposed rough measures of national loss from emigration. The first of these is the loss of future savings, investment, or capital, and the second is the loss of transfers of public goods and expenditures from scientists to other citizens.

Consider a growing economy depending on savings and capital inflows for future per capita income growth. Such an economy may well attach more importance to the size and timing of these flows than to the dead-weight loss of current output. The brain drain will be seen as an outflow of capital which may be regarded as a “regrettable necessity,” either unpreventable or desirable for reasons irrelevant here. The drain, however, is capable of producing future capital benefits via emigrant remittances homeward. The statistical problem of the “cost” of the drain, therefore, is to estimate the difference between the flow of savings, if the emigrants had remained at home (their income minus their consumption

<sup>34</sup> *Ibid.*, p. 16. Footnotes suggest that some economic calculations had been made for the working group, but the whole discussion of “cost” is confined to one page.

<sup>35</sup> Harry G. Johnson, “The Economics of the ‘Brain Drain’: The Canadian Case,” *Minerva*, 3, Spring, 1965, pp. 299–311.

<sup>36</sup> Grubel and Scott, “The International Flow of Human Capital,” *American Economic Review*, Papers and Proceedings, 56, May, 1966, pp. 268–74.

<sup>37</sup> Bowman and Myers, pp. 892–93.

<sup>38</sup> E. J. Mishan, “The Brain Drain: Why Worry So Much?” *New Society*, 10, November 2, 1967, pp. 619–22.

and transfers) and the flow via remittances (the recipients' income minus their consumption and transfers). This has actually been attempted.<sup>39</sup> The underlying theory is also discussed by Charles Kindleberger.<sup>40</sup>

Indeed, many growth models<sup>41</sup> are, to the extent they are quantifiable, capable of measuring absolutely or comparatively the impact of an outflow of human capital on the growth path and the equilibrium growth rate.

Second, it would seem possible to undertake a study of the tax-and-transfer consequences of the brain drain for nonmigrants. Harry Johnson, in an attempt to discourage the use of the present value of future incomes as a measure of national loss, has been particularly emphatic in stressing this valid alternative.<sup>42</sup> What is required is a benefit-cost, or with-and-without-migration analysis of the tax and transfer mechanism within the economy. In static terms, the emigrant will pay certain taxes from his expected income and receive certain specific benefits (i.e., with positive marginal cost). The difference between these two expected flows is a measure of the loss or gain of the nonmigrating population. It is possible to make specific assumptions about whose taxes will increase and what benefits will be altered in the economy's post-migration adjustment; these will enable the benefit-cost analysis to determine which identifiable income groups, among the surviving population, will actually gain or lose.

In less static terms, the economist may be able to concentrate his attention on the impact of the migration on certain generations. To do

<sup>39</sup> Constantine Michalopoulos, "Labor Migration and Optimum Population," *Kyklos*, 21, 1968, Fasc. 1, pp. 130-46.

<sup>40</sup> Charles Kindleberger, "Emigration and Economic Growth," *Banca Nazionale del Lavoro Quarterly Review*, 18, September, 1965, pp. 235-54.

<sup>41</sup> See, for example, the models of H. Uzawa on economic growth with a labor force with embodied capital. Models with vintages of capital goods can shorten their assumed lives to allow for the emigration of a certain percentage of each vintage of educated people. The to-be-published paper by Berry and Soligo also has a section on a dynamic economy, using saving propensities. But it is difficult to see how it could be used to discuss future growth rates, since it is intended to elucidate the dead-weight approach above.

<sup>42</sup> H. G. Johnson, in Walter Adams (ed.), *The Brain Drain*, pp. 83-84, and his earlier contributions in *Minerva*. Johnson has, of course, also considered the general sources of loss: externalities and changes in factor proportions; see the appendix to his article in the *Pakistan Development Review*. Brinley Thomas' *Minerva* article makes much of this loss.



so, however, requires that he make assumptions about the adjustment in the tax-and-transfer mechanism to reduce or maintain the net payments to older people (and *their* adjustments in retiring later and working harder); and to reduce or maintain the flows of payments for the welfare and education of younger generations. It is difficult to know how to make such assumptions satisfactorily, yet, in the absence of the correct assumption, it is all too easy to bias such analyses to show that the burden is borne entirely by any of the three generations: old people, contemporaries, or children.<sup>43</sup>

So far, only two clear facts are known: that brain-drain migrants earn more than average taxpayers, and so presumably make a net fiscal contribution when they reside in a country with a progressive fiscal system; and that their removal carries both a tax source and an expenditure burden to a new fiscal economy.

#### POLICY QUESTIONS ABOUT MIGRATION

Behind the schemes for measuring the cost of migration lies the implicit aim of increasing and maximizing the Gross National Product, or the GNP per capita.<sup>44</sup> It is argued, for example, that a statement similar to the balance of payments or the national accounts would enable nations to adjust schooling, incomes, and migration policies so as to make the best of the brain drain.

The maximization of GNP, however, is not the only conceivable policy. Alternative aims may accompany or displace the more conventional income-per-head goal. Four such goals are briefly examined in this section. A review of the literature on marginal vs. large flow emigration,<sup>45</sup> and on long-run effects vs. short-run adjustment costs<sup>46</sup> is deemed unnecc-

<sup>43</sup> An exchange between Thomas, Johnson and myself has already utilized our respective implicit assumptions on how society would react.

<sup>44</sup> Whether income-per-head, or income, is the best variable for maximization is discussed in Grubel and Scott, "The International Flow of Human Capital." See also Berry and Soligo, and Bowman and Myers.

<sup>45</sup> Grubel and Scott, "The Theory of Migration and Human Capital"; Berry and Soligo; and Johnson, "Some Economic Aspects of the Brain Drain," make the most of the marginal-vs.-large-scale-flow distinction, and the loss of GNP to the survivors of an emigration in the latter circumstances.

<sup>46</sup> See Grubel and Scott, "The International Flow of Human Capital"; Johnson, "Some Economic Aspects . . ."; and Berry and Soligo.

essary. The goals surveyed are: (1) the "export" of brains; (2) income redistribution; (3) achieving external effects; (4) aiding economic growth.

1. *The "export" of brains.* The human-capital approach automatically leads economists to compare the brain drain to capital movements, and to frame questions about preventing or assisting it in terms similar to those applied to the gold drain or to direct investment. Furthermore, some of the literature has demonstrated that (leaving externalities out of consideration) circumstances are conceivable in which a brain drain may even benefit the average surviving nonmigrant.

None of this literature has gone so far as to recommend that, in certain circumstances, a country selfishly gear up its educational and on-the-job training systems to *assist* the highly advantageous migration of young professionals. For example, some human-capital literature on the manpower programs of less developed countries compares rates of return in education with rates on physical-capital projects, but misses the opportunity to take account of the open nature of the manpower market, under which rates of return on "exported" schooling may be still higher than any domestic alternative. Conceivably the best course for some country might even be to educate all its people to take jobs elsewhere.

This raises the general question: the brain drain is desirable for the migrants' own "Scottish" reasons,<sup>47</sup> may a brain drain not also be a desirable social policy for a whole country, either to empty the place and

<sup>47</sup> "The noblest prospect which a Scotchman ever sees is the highroad that leads him to England." James Boswell, *Life of Samuel Johnson*, Chicago, Encyclopaedia Britannica, 1955.

Underdeveloped countries may also have a ruling élite which extracts a good schooling for its children from the treasury. This policy allows such children to migrate, or escape, if domestic political, social, or economic policies should suddenly become hostile. This point is not often mentioned, although Grubel and Scott, 1966, did stress that education is provided by the older generation for the benefit of their children, however it is used. Allied points are that the scramble of able intellectuals to get ahead of "the mob" of candidates for B. A. degrees in India does create an incentive to be trained and emigrate (Dandekar, p. 227); and that political unrest is often a reason for leaving—but education of one's children is an insurance policy for middle-class people in case of the inevitable unrest in many countries (Myint, p. 237). Both these discussions are in Adams, *The Brain Drain*. But neither these nor other writers seem to recognize that the brain drain may also be part of a planned export of talent.

allow everyone to do better abroad, or to set up as a profitable, steady exporter? It is difficult to find large scale examples of assisted brains-export policies, but the world is full of migrated specialists whose education must have been provided in contemplation of their probable emigration. Scottish engineers, Norwegian sea captains, and Viennese psychoanalysts, for example, all appear to be products of schools so large that their founders could never have believed that the home labor markets would absorb all the graduates.

Of course, the conditions under which an unrequited exodus of brains could benefit the per capita income of the survivors are already well laid out in the literature. Roughly, the emigrant must carry with him less capital (human or physical) than the per person endowment of the nation as a whole. This condition is fairly easy for unskilled emigrants to meet, but it is more difficult for the brain drain; by definition, professional people embody a good deal of capital. (A separate condition under which emigrants should expect to pay a larger net fiscal contribution than survivors also works against the desirability of the brain drain as opposed to unskilled emigration.)

Even if these general static conditions weigh against brain exports as a national policy, are there not conditions under which it may be desirable? It is not good enough to rule the drain out by *assumption*, as is done by Bowman and Myers<sup>48</sup> and by Berry and Soligo.<sup>49</sup> All these authors, following the logic of other parts of their models, assert that the social return on educational outlays becomes zero when the manpower in which it is embodied moves abroad. Thus they accept Leacock's identification of migration with death.<sup>50</sup> If we reject this assumption, are there circumstances under which export would pay off socially?

In the first place, it is by no means inevitable that such export of highly qualified persons be unrequited or uncompensated. The discussions of the value of migrants in this paper suggest at least that appropriate numbers could be found for a pricing process. A number of contributors to the *Brain Drain* volume and symposium speculated on the most promising international compensation scheme; a consensus would have favored payments from the receiving country to the losing country

<sup>48</sup> Bowman and Myers, p. 892.

<sup>49</sup> Berry and Soligo, p. 21.

<sup>50</sup> Stephen B. Leacock, *Sunshine Sketches of a Little Town*, London and New York, 1912, p. 239.

rather than from the emigrant to his homeland. Either of these flows of payment could, as with the network of small colleges in New England, justify an investment in teachers and facilities to export professionals for profit.

Second, even if a swollen drain of brains is uncompensated, it may bring benefits to the home economy. Chief among these are the benefits of scientific research and discovery, expedited in the foreign environment, that will spill back to producers and consumers in the home environment to a greater extent than if the emigrant scientists had attempted to work at home. Against these benefits should be set the losses of specific discoveries about methods and products which are unlikely to be undertaken, or undertaken successfully, in foreign environments. (For example, a medical benefit might best emanate from a western economy laboratory investigating drugs; but the dispersion abroad of medical scientists, who would be instrumental in discovering such drugs, might hinder research in public health techniques, in mass treatment of disease, in population control, and so on, since these activities depend on the scientists' presence in the society itself.)

Third, a redefinition of national advantage, rejecting the "emigrants have no national payoff" assumption of Berry, Soligo, Bowman, and Myers, may implement parents' willingness to pay for children's schooling and cause them to view with complaisance their children's leaving home to prosper in the best environment available, whether overseas or in their own country. While it is difficult for economists to calculate the domestic gain from such a flow abroad, which betters not only the emigrant generation but also its descendants, with no gesture of thanks or spillover of benefit toward the old country, it is clear that many parents' behavior does require economists' agreement that some national, social benefit does exist. If educational investment is to be public, then it behooves economists to find ways in which to measure this gratification in the overseas success of children, not to deny that the gratification offsets whatever costs the drain may also produce.

This is not the place to argue these three points fully. However, they should be sufficient to indicate that, quite apart from the impact on survivors now deprived of the complementary inputs from some scientists and engineers, it is possible to conceive of circumstances in which the survivors might encourage the export of brains.

2. *Income redistribution.* Each nation has a distribution of incomes brought about by the pricing of its inputs and outputs, and most nations have government policies which alter this distribution. The redistributive policies mostly involve tax rates, transfers, and incomes in kind which differ from person to person. However, each nation can also utilize the earnings structure of organizations and corporations directly controlled by the government, and, less effectively, it can invoke government controls on wages and conditions of work.

In connection with the brain drain, for example, the government can influence the incomes paid to scientists and engineers by either of two approaches on distinct levels: It may utilize such broad policy measures as the imposing of income tax rates and exemptions, the fixing of the average burden of total taxation for real and welfare purposes, and the provision of free or cheap government services such as hospital services; or it may adopt special policies such as the manipulation of the level of incomes in universities, laboratories, and the civil service, and the level of incomes paid by private employers to scientists and engineers. As discussed in an earlier section, both approaches may have important effects on professionals' decisions to remain or leave; a social resolve to remove the incentive to migrate might therefore well begin by making sure that the incomes of potential migrants were favorably treated by these income redistribution mechanisms.

*General* redistributive policies involving some degree of progression in the total fiscal burden on successive income groups are usually not aimed at professionals and scientists but at "rentiers," those receiving "unearned incomes" or "surpluses." However, it is difficult to distinguish those inheriting intelligence from those inheriting real estate; both have had schooling and both may have similar occupations. Hence, it would be unusual to exempt scientists and professionals from the higher levels of taxation levied on entrepreneurs and capitalists of similar incomes; indeed, collection may be stricter and avoidance more difficult on their institutional incomes.

It follows that the more keenly the nation adheres to general redistribution policies of an egalitarian nature, the more probable is the migration of its scientists and engineers, given the net income alternatives abroad.

*Special* income policies may work either way. Dandekar, in an

interesting survey of India's brain drain, blames the carryover of a British policy of paying scientists, civil servants, and professors at European rather than Indian levels. This policy, he says, now attracts "mobs" of students to courses preparatory for these occupations and so eventually creates an excess supply of better men seeking jobs abroad.<sup>51</sup> In a less extreme fashion, the European custom of appointing one highly paid professor in each field at each university may well attract more students and low-rank faculty than can be absorbed. This discriminatory policy of favoring a few incumbents is bound to create a stock of young or unsuccessful aspirants available for employment abroad.

Special income policies may also work against all members of a profession and may, therefore, be even more potent as a brain-drain stimulant. Harry Johnson, in particular, has pointed out that, although two professions may yield the same rate of return on costs paid by the student (fees and employment foregone), and hence be equally attractive, special income policies may ordain that the first should have high fees and high lifetime incomes, while the second has cheap (subsidized) schooling balanced by low lifetime salaries. In a closed economy, such an income policy may succeed in allocating acceptable flows of students to both occupations; but the low lifetime incomes of the second profession may, in an open economy, drive professionals to migrate to the higher levels abroad.<sup>52</sup>

Since it is natural for an economist to suppose that migration is motivated by income differences, it is not surprising that general or specific policies which alter these differences, whatever their rationale for redistribution, should be viewed as conflicting with mobility policy and on the whole contributing to the brain drain rather than reducing it.<sup>53</sup> Such reasoning, however, should not be allowed to obscure the income differences which are simply the result of over-all national poverty. For

<sup>51</sup> V. M. Dandekar, "India," in Walter Adams (ed.), *The Brain Drain*, pp. 203-32.

<sup>52</sup> Johnson, "Some Economic Aspects. . . ." Johnson takes as his example the low fees, low incomes, and high rates of migration of British doctors.

<sup>53</sup> For example, in my own work on federal finance, without challenge, I assumed that regional income redistribution reduced interregional movement by those people who, by education and wealth, were the least mobile anyway. If such people are assumed to have less-than-average incomes, then such policies will increase the mobility of more-than-average-income persons. See "The Goals of Federal Finance," *Public Finance*, Vol. 19, No. 3, 1964, pp. 241-88.

example, it is quite likely that some poor agricultural countries have much the same income *structure* as wealthier countries. If migration were opened up by a relaxation of border restrictions, the same percentage differences would exist between occupations at all levels of each nation's income structure, presumably raising the likelihood of migration per thousand, more for the poor than for the rich.<sup>54</sup> All experience suggests, however, that upper-income, professional, academic, and skilled people will actually move more readily than low-income, low-skill people. The point of the example is simply that a brain drain may exist in the absence of any income redistribution policy in either country.

3. *Achieving external effects.* Most concern over the brain drain stems from worry about the loss (or nonrepayment) of the cost of the education embodied in the migrants, and about the effect on the general welfare of the survivors. The former is the subject of the schemes of measurement suggested in the previous section of this paper. The latter may be the "dead-weight" loss of consumers' surplus, but this is a technical, economists' concept not even intuitively obvious to laymen. The remaining explanation of the latter is that men with brains (professionals, scientists) are different in kind from other men, not just in degree. Like public goods in the theory of public expenditure, it is their nature either to exhibit powers of invention, leadership, and organization which are not diminished by their employment or application, or, more modestly, simply to produce uncompensated services (externalities).

The literature on the brain drain has analyzed pretty thoroughly the possible external diseconomies of a man's departure for economic reasons. All of them depend on his having been expected to render public services in excess of his expected income. Such externalities can be grouped into three classes. First, the economies of scale from his membership in a research team, a medical group, or small profession whose output varies in greater proportion than the change in its membership. Second, spillovers from his practice of a particular profession, such as public health medicine, agricultural engineering, or acting as judge or policeman. However, such spillover benefits are resumed as soon as he

<sup>54</sup> If marginal utility diminishes, a given percentage increase in income will be more important to poor than to rich people.

is replaced, in contrast to the third class—social benefits spilling over from the personal capacity of a particular professional or scientist of such quality that they will not be replaced by his routine replacement. This class is important, but is it likely to be significant? Why should the emigrants be more socially fertile than their replacements? The case seems to require a decline in quality from one generation to the next.

Full comments on these three cases are unnecessary in view of their discussion in the literature. Note that in all of them these external losses differ from and add to losses of consumers' surplus, taxable capacity, or embodied capital, and that the wholesale departure of many educated people may, in addition, lower the whole national average level of political, cultural, and social aspiration, discussion, adjustability, and progressiveness.

How seriously they are to be rated depends on one's point of view. A "cosmopolitan" will argue that each of them is likely to be balanced by an equal gain in the country of destination,<sup>55</sup> while a "nationalist" will be sensitive only to his own country's status in a science or art. Furthermore, a cosmopolitan will point out the increased extent to which a nation can be helped by its former scientists and innovators working in the more productive environment of the richer nations, relying on the international transmission of ideas<sup>56</sup> to send the techniques back home, while a nationalist will insist upon the extent to which less developed countries require local research and practice in domestic agricultural, industrial, medical, social, and cultural problems. Finally, a cosmopolitan will point to the gains in better or cheaper imports and from the flow of advisers and experts, while a nationalist will maintain that economic development cannot flow from improved imports but only from improved production, and that the technical assistance of uncommitted visiting experts is of value only for specific projects such as dams and canals.

The entire externalities-of-emigration literature is useful in raising questions about educational "requirements" now being studied in the educational planning of less developed countries. Otherwise, its value lies chiefly in suggesting categories for the analysis of the contribution of education to economic growth.

<sup>55</sup> Johnson, in "Some Economic Aspects . . .," investigates the extent to which the losses and gains will balance each other.

<sup>56</sup> Johnson, "The Economics of the 'Brain Drain': The Canadian Case."



4. *Aiding economic growth.* Each nation, in addition to maximizing, by allocation and combination, the amount of national output per head, seeks to grow—especially when suffering from the brain drain. A nation's concern about the emigration of highly qualified people, therefore, may not be a reflection of its static losses of consumption or of capital, but a manifestation of its belief in a slowing down of its development.

That the outflow of human capital could cause a slowing down of economic growth is not in doubt. On the one hand, statistical analyses of national growth rates have been forced to attribute part of economic growth to the "residual factor," which is presumed to be knowledge, or education. On the other hand, it is plausible to construct neoclassical growth models in which investment in human capital, at the same rate of return as investment in capital goods, produces an equilibrium growth rate which is a function of the common rate of return. At the most basic level of theory, expanding population requires more capital, even to stand still. A brain drain, by definition, spills more capital than people. All this is commonplace in growth theory and development economics.

What is less investigated is the cause. To what extent is the presence of a group of scientists and engineers a cause of growth, as opposed to being either a precondition, or a consequence, of growth? Professionals organize, adjust, apply, and innovate. Both to reach the production-possibilities frontier and to advance it require sophisticated and trained personnel. Does the drift of such personnel toward richer countries actually prevent this optimizing and shifting? Or does the drift merely symbolize a failure of energy and will in the economy, so that the trained personnel, as a group, lose interest and incentive?

We must leave this question to developmental specialists, with two observations. First, it is possible that the emigration and scarcity of professionals trained to deal with the *specific* technical problems of a country—its soils, insects, diseases, climate, and so forth—may actually slow down a growing country's growth rate. A drain of potential local experts, in other words, may create a series of bottlenecks which will impede progress for generations. Health questions apart, however, it is difficult to think of convincing illustrations.

Second, the most serious source of some countries' brain drain is the leakage of students who train abroad. If the students did not go

abroad, the country would gain no specialists at all, and growth would presumably fail. Hence, unless all training is to be undertaken at home, growth is impossible without some seepage abroad from the training program.

However, it has not yet been proved that economic growth requires *any* technical experts from the growing country. A nation determined to grow, putting more weight on growth than on having its own corps of experts, professionals, and scientists, and having the will to work and save, can import engineers and scientists, either as immigrants or as short-term consultants, in unlimited numbers. What it then may lack are middle-level technologists, nurses, midwives, high school teachers, civil servants, and entrepreneurs; but these are not the raw materials of the brain drain. Preventing the brain drain, and encouraging economic growth, are not the same policy.

#### IS THERE A BRAIN-DRAIN POLICY QUESTION DEPENDING ON HUMAN CAPITAL MEASUREMENTS?

IN these concluding paragraphs, I turn to the justification of some recent research in which, along with Herbert Grubel, Burton Weisbrod, Rashi Fein, Robert Myers, and Mary Jean Bowman, I have been involved. My general point is that the values obtained have little or no value for justifying policy about migration of highly qualified persons.

Elsewhere, Grubel and I have argued that what *should* be important to a nation is the maximization of income per capita, either of all members of the society, or of those remaining after emigration of a few. Originally, we meant merely to assert this aim against those who would claim that, regardless of population, "bigger GNP is better" in a nation's policy. We were surprised to find that some contemporaries do not agree with us, especially those who attempt some kind of decision-making calculus using as a measure of benefits the total of private incomes (for simplicity we assume there are no spillovers). Although they sometimes make little use of it, this assumption is found in the work of Weisbrod, Bowman and Myers, Holtmann, and Berry and Soligo.

In any case, an income, or income per capita, maximization is

assumed to be the chief policy aim in the brain-drain literature. My brief references to policy in the earlier parts of this paper have implied a belief that most countries and most authors accept this aim.

Now, what is gained by measuring the value of the human capital in migration? When one realizes that human-capital evaluations require full information about training, age, and other factors, it is obvious that policy-makers must already be aware of the flows involved. Little that is new can come out of the total or its parts.

For example, consider the theoretical studies referred to earlier. They conclude that the remaining population gains or loses by emigration depending on whether each emigrant has more or less human capital embodied in him than the capital (of all types) per head in the national endowment. A paper by Grubel and Scott has actually attempted some rough measurement to determine whether the United States gains or loses by immigration. But to what purpose? No one has argued that U. S. immigration policy should be such as to admit only migrants who have more than the average existing capital per head; and an abstract argument about the aims of migration policy, were it to be staged, would not be clarified by such measurement. Nor does any country's schooling or emigration policy now turn on the capital-embodied characteristic of the emigrants.

In another example, I have myself measured the balance of indebtedness in the exchange of academic economists between the United States and Canada, in an attempt to discover which country has made the greatest gift of human capital to the other in rearing costs, schooling, and foregone output. (A similar calculation could be made in terms of expected future income.) The results show that Canada owes more to the United States than the United States to Canada—an interesting and, to most brain-drain conscious Canadians, unexpected result. However, this fact has no importance; Canada will train more or fewer of its own economists for reasons other than to try to correct this imbalance. And so it goes. When the primary aim is the simple one of maximizing income per head, the net value of moving human capital is not a useful guide.

If one now considers other aims, such as achieving a favorable distribution of income before or after a migration, or avoiding undesired external effects, one comes to the same conclusion about the calculation of the amount of migrating human capital: it simply is not important.

(And nobody has yet advanced the hypothesis that the value of migrating human capital would be a better dependent variable than the number of migrants to be explained in an econometric study.)

In short, I believe that human-capital migration valuations have only two useful purposes, and these are not very urgent.

First and less important, countries which have a guilty conscience about the numbers of trained men they are receiving as “gifts” or as “loot” from poorer countries may be better able to persuade themselves to aid the sending nations if they can value the human capital in the brain drain than if they cannot. This statement is hardly open to argument—it is merely a hypothesis about what voters and statesmen find persuasive or compelling. Thus, Grubel and others have been publicizing the value of human capital embodied in foreign students who decide not to return home. It has been found that such estimates help to bring the loss of the sending countries into some kind of perspective, although this perspective must surely be inappropriate for policy formation.

Second and more important, countries which receive highly qualified emigrants from other countries may be inclined to enter into negotiations to compensate the senders for their gift or loss. The bargainers will certainly look for some standard estimates which can be easily understood and verified; the cost-of-human-capital figures meet these requirements. Thus, the sending country might argue that the capital embodied in the migrants is an estimate of the amount of capital which might have been used for other purposes and therefore is at least a rough indicator of the present value of future incomes it lost (forgetting that most of it would have been consumed by the emigrant and his children). Or the sending country might take a more grimly commercial view and offer to “export” brains and skills at average cost. Finally, on some theoretical model or other of economic growth, or of economies of scale, the sending country might argue that the absence of the embodied capital has delayed or prevented the growth of the incomes of the remaining population by a certain fraction of the estimate of the gift.

No one can deny that hard figures, available to both sides, or in an international clearinghouse, would expedite and simplify such negotiations and might also help countries of origin, not only to agree to, but also to encourage further migration. But is there any reason why the compensation *should* be made at these valuations? If we assume that the

bargaining is bilateral, and both parties agree that migration is not to be obstructed whatever the outcome of the bargaining, there is no reason why the gaining country should ever pay the full value of the embodied capital, or *any* particular fraction of it. If we assume instead that the losing country threatens to stop the migratory flow unless it is compensated, it may well be willing to accept something less than the full value of the embodied human capital, for this full value is much more than the remaining citizens (in the absence of spillovers) would expect to receive from the emigrant if he stayed at home. On the other side, the gaining country in the long run may be willing to pay whatever is needed to get "brains" cheaper than by rearing and training them itself (and in the short run to pay even more than this). Thus, the full value of embodied capital might well be the upper limit of the range within which the bargain will be struck. Only if the losing country regards itself as an "exporter" of human capital would its similar estimate (at its own prices and costs) also form the lower limit.

If the bargaining is multilateral, the different aims or problems of each country cannot easily be handled through a single clearinghouse for international human-capital compensation, and it is not very profitable to speculate on how the nations might resolve to value the flows and crossflows. Practice in a few international treaties on other subjects, however, does suggest the diplomatic attractiveness of valuations "at cost." Here again, then, one might see sums exchanged, and even see schooling and migration policies adjusted on the basis of the message of the values of human capital migrating.

These export or compensation schemes are remote and fanciful possibilities. Any other benefit-cost calculation about educational expansion or migration policy will not, in my opinion, involve human-capital valuations.

## COMMENTS

A. G. HOLTMANN

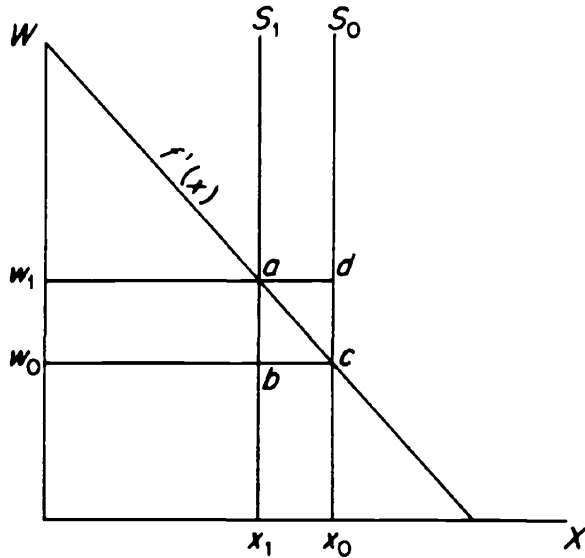
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Anthony Scott has done an exceptional job of synthesizing the elements of the human-capital approach to international migration, and, in most cases, I will merely add emphasis to points made, but not thoroughly discussed. First, with respect to the question of the determinants of the decision to migrate and the question of a subsequent return home, we may gain some insight by investigating the intentions of migrants. This technique has already been adopted by demographers to predict future population growth, and it might be a useful tool in estimating permanent migration. In one such study concerning intentions of Canadian students in the United States, it was found that approximately 30 per cent of the sample planned to remain in the United States after they completed their studies.<sup>1</sup> In this study by Ronald Pavalko, the reasons given for planning to remain in the United States were mainly associated with better job opportunities, as in the studies cited by Scott. Of course, plans may change, and there is the question of what influences a person's plans. Pavalko finds that the length of time the student is in the United States is related to his plans to remain. For all male students, 20 per cent of those who were in the United States less than one year plan to remain after their schooling, but over 50 per cent of those who were in the United States four or more years plan to remain after their schooling. When students are classified as graduate students and undergraduate students, there is still a strong relationship between length of time spent in the United States and plans to remain in the United States.

These findings seem to support the general type of model set up by Bowman and Myers which suggests that the probability of returning home decreases with the number of years spent away from home. In any case, more detailed studies of migrants' attitudes would help in reducing the

<sup>1</sup> Ronald Pavalko, "Talent Migration: American Students in the United States," *International Review of Education*, No. 3, 1968, pp. 300-24.

Figure 1. "Dead-Weight" Loss Resulting From Migration of Factor of Production.



NOTE: Loss is triangle *abc* described by (1) linear decreasing marginal physical product function  $f'(x)$ ; (2) shift in supply of factor  $x$  from  $S_0$  to  $S_1$ ,  $x_0-x_1$ ; and (3) factor payment  $w_0-w_1$ , equal to marginal product.

statistical overestimation of permanent migration, and would offer more evidence on the determinants of the decision to migrate.

The environmental factor influencing migration, mentioned by Scott, might be approached by considering the studies of intranational migration. For example, a study of new migrants to the Cape Kennedy area showed that health and climate considerations were most important after those factors associated with jobs were considered. However, better schools were given a very low rating.<sup>2</sup> One can, of course, suggest a whole host of reasons for these results, but my purpose is not to explore the study in detail. It is interesting to note that the findings might suggest that there is little in the controlled environment that influences

<sup>2</sup> Charles M. Grigg, *et al.*, *NASA Impact on Brevard County*, Tallahassee, Institute for Social Research, 1966, pp. 106-09.

migration after job opportunities have been considered. But the important point is that economists might more often consider available attitude studies in developing and testing their models concerning migration.

I should now like to turn to Scott's discussion of the theory of migration and human capital. In this discussion, and in several of the studies cited, a good deal of attention has been given to the "dead-weight loss" associated with the migration of a factor of production. Figure 1 depicts this loss assuming: two factors of production; a shift in the supply of the factor,  $X$  from  $S_0$  to  $S_1$ ; a linear decreasing marginal physical product function,  $f'(x)$ ; and a factor payment,  $W$ , equal to the marginal product. Then, the well known dead-weight loss is the triangle  $abc$ . Others have shown that diminishing returns and a nonmarginal change in supply assures the loss. My purpose is not to debate the importance of the dead-weight loss in any absolute sense, but to show that a small weight given to the income distribution effect of migration may make the dead-weight loss relatively unimportant.

In Figure 1, the income distribution of the nonmigrating owners of factor  $X$  has been increased by  $X_1\Delta W$ , and this has come at the expense of the other factor of production. Now economists are not able to determine the proper income distribution, but a country may be concerned with this shift in the income distribution from one factor to another. If we consider the ratio of the dead-weight loss to the income distribution effect, we see that the ratio is rather small, except when the marginal product function is rather elastic. Writing the dead-weight loss as  $1/2\Delta W\Delta X$  and substituting  $e$  for the elasticity, we have the ratio of the dead-weight loss to the income distribution effect,  $1/2(\Delta W/W_1)e$ . Therefore, except when  $e$  is large, the ratio is rather small. At least in some cases, then, the importance of the dead-weight loss will be swamped by the importance of the income distribution considerations. In general, this point has been ignored in the international migration literature, even though it has been considered in the general economic literature.<sup>3</sup>

Considering Figure 1 again, there is another point worth noting. If we take the marginal product before migration as the loss associated with a migrant, we underestimate the total loss by  $abc$ , but if we take the

<sup>3</sup> See: O. E. Williamson, "Economies as an Antitrust Defense," *American Economic Review*, March 1968, p. 28.



marginal product after migration as the loss associated with a migrant, we will overestimate the total loss by *adc*. While it is the underestimate that has been stressed in the literature, we may have little knowledge about the direction of the bias in our empirical estimates of the loss. Of course, either bias disappears in the limit. All of this also neglects the question of the divergence between earnings and the marginal product of a factor.

While my previous points may go beyond Scott's remarks to some extent, they are in no way in conflict with his position as I see it. However, I believe his position on the nature of external effects is somewhat different from mine. Scott seems to feel that if the external effects generated by an emigrating professional can be replaced by training another professional, there is no further problem. There may or may not be a loss to the home country when external effects are involved, but it has nothing to do with simply retraining another man. In fact, the country may refuse to train another professional.

Assume that the country increases the subsidy to a given profession until the subsidy to the last man is just equal to the marginal external benefit that he confers on the country. Then in equilibrium we have

$$K_0 = \sum_{t=1}^n \frac{EB^t}{(1+r)^t}$$

where  $K_0$  is the subsidy given in the initial period;  $EB^t$  is the marginal external benefit conferred on the country in all future periods  $t$ ; and  $r$  is the discount rate. If the individual migrates immediately after the initial period, the loss to the country is  $K_0$ . Migration, in this case, may be motivated by rewards offered by other countries to capture the external effects. Then, the home country will continue to lose subsidized individuals. However, if all countries offer rewards to attract foreign professionals, this will be part of the price that all countries must pay for a professional. In this case, individuals may be willing to pay for their own training, and countries merely buy professionals at the "market price."

The loss to the country may only be a short-run problem. As a country starts to find its trained men lured away, it will discontinue the subsidy. This, however, assumes that the problem is just one of misjudging the market mechanism at work. In fact, the problem may be political.

Through the ballot, one group may force a subsidy for their training and, then, leave the country to maximize the private return to the profession. The nonprofessionals in the home country will continue to sustain losses in the latter case. Scott's example of free training of British physicians fits either case. Nonetheless, it becomes clear that there is more than a replacement problem.

Lastly, I would like to consider Scott's prognostication about the usefulness of measures of human capital as an aid to policy concerning the brain drain. At the outset, I should indicate that having a capital-value measure of a migrant would eliminate some of the problems in measuring the brain drain that he discussed in his paper. For example, he states that children, no matter how intelligent, will not be counted as part of the brain drain. But, of course, they should be counted as some sort of drain if they embody certain capital investments in either themselves or their parents. Weisbrod has made a convincing case, in my opinion, for considering the human-capital element in migration. He has shown that the per capita capital value of a population may be a better guide to its welfare status than a per capita income measure.<sup>4</sup>

In my judgment, the emphasis at the conclusion of Scott's paper was too greatly influenced by the brain drain or manpower approach to international migration. If one considers the amount of human capital that a migrant represents, and not just the particular occupational label that we attach to the individual, we may see that the measurement of human capital is crucial. Such an approach will move us into questions concerning capital theory, aggregate production functions, and economic growth. Much of this, however, may not take us far from the question of externalities. It is my guess that investments in human capital raise the marginal product of all the factors of production. In this case, a decision to migrate based on the private return to human capital may not be optimal for society. Here, I rely on the type of theory of the production function, of the modifier, and of income distribution developed by Frankel.<sup>5</sup> Simply stated, the private return to human capital or physical capital is low because part of this return goes to labor as a sort of auto-

<sup>4</sup> Burton A. Weisbrod, "An Expected Income Measure of Economic Welfare," *Journal of Political Economy*, August 1962, pp. 355-67.

<sup>5</sup> Marvin Frankel, "The Production Function: Allocation and Growth," *American Economic Review*, December 1962, pp. 995-1022.

matic transfer payment. Without trying to develop any analytical framework here, I suggest the aggregate production function analysis of Solow, Frankel, Griliches, Nelson and Phelps, and others, will more and more introduce concepts of human capital to explain growth in output. Measures of the stock of human capital will be needed to test the theory, and the loss of human capital through migration may be found to be critical in determining the economic growth of a country. In fairness to Scott, I feel he is discussing the limited use of human-capital measures in present policy decisions, but this should not be generalized to future policy decisions as if economic theory will have no influence.

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Anthony Scott's style in his brain-drain paper is reminiscent of Lyndon Johnson's March 31 speech. Nothing in the previous fifty-one pages prepares one for the sudden conclusion that prior research on the brain-drain issue has "little or no value for justifying policy about migration of highly qualified persons." I believe that this conclusion has a great deal of merit; much of the manipulation of statistics found in the brain-drain literature has little relevance for policy, nor do the policy recommendations of Walter Adams, *et al.*, seem to be based upon hard estimates of costs and benefits. I further believe that this state of affairs derives from an overemphasis on the construction of estimates of population and human capital flows and a neglect of the identification of the real economic issues and end use for the figures by the manipulators of statistics. The issues have been laid out rather clearly by Harry Johnson and others, and Professor Scott certainly does draw attention to them, although I wish he had added some elaboration. It is in this direction that I cast this brief comment.

In the first place, data on the numbers of warm bodies and the amount of human capital involved in the international migration of professionals are largely irrelevant until one has some measure of their significance. Is a flow from Britain to the United States of one million dollars of human capital per annum small, and one of 100 million large?

I don't see how one can judge until some estimate of the true transfer is made.

There are, I believe, only two economically interesting measures of the effect of the brain drain. The first is the (largely irrelevant) direct transfer and the second involves externalities. When the state causes the private costs of acquiring an advanced degree to be less than the social costs, the ultimate effect is that earnings of persons holding those degrees will be lower than they would be if the private costs equalled the social. To the extent that social costs and the discrepancy between private and social costs of training differ among countries, incentives are set up for immigration. If, as appears to be the case, the private and social costs of training are both lower in poorer countries (due to lower alternative costs) and if, as also appears to be the case, the poorer countries indulge themselves in larger (relative) subsidies to the training of professionals than do the richer countries, one has a situation in which the poorer countries have a comparative advantage in (at least partial) training of professionals—this effect being reinforced by very high rates of public subsidization of that training—and the richer countries offer the more lucrative markets for the finished product. The resultant population flows stemming from these incentives cause alarm when they reach the high levels claimed to have accompanied the United States' great scientific leap forward since Sputnik. The alarm would appear to be a result of certain people collecting rents that the bureaucrats had not anticipated. Governments that lament the outflow of trained professionals and simultaneously ensure that an ample supply (via free education) be available at "fair" or even fixed prices require instruction to be sure, but that instruction does not require the benefit of brain-drain research. I believe that this is part of the message of Scott's last five pages.

The direct transfer, then, is not between nations, as a superficial reading of much of the brain-drain literature would lead one to believe, but rather it is a transfer from one subgroup of individuals of one nation to another subgroup of that same nation. Although public education imposes upon us the collective burden of paying for the education of our children, it does not require us to repay the costs of our own training, hence the transfer. (As this transfer is usually made quite willingly, it strains the language somewhat to refer to it as a burden.) The transfer

calls forth complaints only when the beneficiaries seek out—at home or abroad—higher rates of remuneration. In the case of immigration, which usually involves partial or total shift of political allegiance from one state to another, the transfer becomes a burden in the sense that it would not be freely made if they had it to do over again. But in any case, the transfer remains between individuals rather than between nations (except in some accounting sense). That is, the fact that British taxpayers have financed the education of a Manhattan physician need not directly enhance the welfare of the United States taxpayer. Hence a measure of the brain drain made in terms of training costs is relevant as an estimate of the transfer from taxpayers to students and does reflect to some extent an international capital flow, but does *not* reflect an international *income* flow in any economically relevant sense. A recent reading of the Preface and Foreword to Adam's *Brain Drain* moves me to state this banality.

We are left then with the externality, or rather the two externalities. First, a brain drain of any importance will presumably have as one consequence some internal redistribution of income via changes in factor prices in both the sending and the receiving countries. We know virtually nothing of the nature and magnitude of this redistribution, but perhaps we can learn something by a production-function approach of the Griliches type. This internal redistribution, however, has little to do with the glamor of the brain drain, as the sex appeal of the latter lies largely in the alleged international redistribution of income (and wealth) it promotes. The second and more interesting externality is the effect on per capita output of the changing factor proportions—the familiar triangle economics. Here we have for the first time some real possibility of international transfers of income, as a brain-drain induced decline in per capita income of nonimmigrants of the one country will tend to be matched by an induced increase in the per capita income of nonemigrants of the other. Here again our ignorance is impressive, as we have as yet neither the tools nor the numbers to make a good estimate (except possibly for the work of Mishan, which I have not seen).

In summary, I concur with Professor Scott's conclusion that brain-drain research to date has turned up little of significance, particularly for policy, but I am less pessimistic than he seems to be concerning the usefulness of potential research in this area. Estimation of the extent and magnitude of brain-drain induced international income transfers of the

type mentioned in the immediately preceding paragraph would be an interesting research undertaking, one which could be carried out independently of the nationalist-internationalist controversy, which I find to be both stale and distracting from the relevant issues. Such research will probably come as little comfort to those who emphasize the strategic importance of professionals in the growth process; my only comment in this connection is that one spin-off of the brain-drain event has been a wider recognition of the international character of the market for professionals. If professionals are indeed important to growth, then there is little to prevent the country in need from meeting its requirements in that market.

