NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

ISBN 0-315-59341-5

THE CHANGE IN HUMAN CAPITAL TRANSFERS TO CANADA FROM LESS DEVELOPED COUNTRIES: 1967-1987

by

Rosilyn G. Coulson
B.A. University of Calgary, 1986

THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS
in the Department of
Economics

SIMON FRASER UNIVERSITY

July 1989

APPROVAL

Name: Rosilyn Gaye Coulson

Degree: M.A. (Economics)

Title of Thesis: The Change in Human Capital Transfers to Canada from Less Developed Countries: 1967-1987.

Examining Committee:

Chairman: J. Chant

D. Devoretz
Associate Professor
Senior Supervisor

D. Maki
Professor

John Heaney
Assistant Professor
Business Administration
External Examiner

Date Approved: 17 July 1989

PARTIAL COPYRIGHT LICENSE

I hereby grant to Simon Fraser University the right to lend my thesis, project or extended essay (the title of which is shown below) to users of the Simon Fraser University Library, and to make partial or single copies only for such users or in response to a request from the library of any other university, or other educational institution, on its own behalf or for one of its users. I further agree that permission for multiple copying of this work for scholarly purposes may be granted by me or the Dean of Graduate Studies. It is understood that copying or publication of this work for financial gain shall not be allowed without my written permission.

Title of Thesis/Project/Extended Essay

The Change in Human Capital Transfers to Canada from Less Developed Countries: 1967-1987.

Author:

(signature)

Rosilyn G. Coulson

(name)

July 14/89

(date)

Abstract

This research accomplishes two tasks. The first is a measurement of the human capital inflows, in the form of professionals, from less developed nations to Canada, over the period of 1974-1987. The replacement cost concept, i.e., the cost to Canadians of producing a worker with an equivalent level of education of an immigrant upon arrival, is used as a measurement of the value of an immigrant's human capital.

The second task is to use the estimates of human capital inflows to test for any changes in the quality of immigrants entering Canada over the period 1967-1987. This is accomplished by combining the current research with the earlier work of D. DeVoretz and D. Maki.

The specific definition of educational attainment indicating quality of the immigrants' human capital content imposes severe limitations upon any conclusions made about immigrants over this period. Nonetheless, this method is employed for two reasons; first, to provide a comparison with the earlier study of D. DeVoretz and D. Maki, second, because of inherent data limitations.

The main finding indicates that there has been no decline in the value of human capital of immigrants from

less developed countries to Canada in the professional occupations from 1967-1987.

DEDICATION

To: Mom, Dad, Kate, Jenn, Julie

Bill and Inez

whose love and support sustained me.

ACKNOWLEDGEMENTS

In the course of this thesis there are many people whose kind word or offer to help has been appreciated. I wish to thank each and everyone of you. Employment and Immigration, Canada generously provided the data tapes for this thesis. A special thank you to Mr. Richard Carleton for his preparation of the tapes and the documentation.

There are a number of employees of Simon Fraser University who in the course of their work, made my tasks easier. The staff of the Department of Economics, Mr. Reo Audette, and the employees of the Micro Computer Lab. I am especially indebted to Mr. Walter Piovesan for his assistance in preparing the data.

If it were not for the patience and encouragement of my Senior Supervisor, Dr. Don DeVoretz this thesis would not have been completed. Thanks for the "space" to work! Dr. Dennis Maki, Dr. Bill Kerr and Dr. Carol Heim provided useful comments over the course of my work. Dr. Edwin West of Carleton University kindly provided information and data on education in Canada.

Finally, I wish to express my apprecation to Kellie Heath, Dill Morrison, Pritha Mitra, Lisa Millard, my friends and family for your help, kindness and support.

TABLE OF CONTENTS

LIST OF TABLES

Chapter 1

Introduction and Literature Survey

I. Introduction

Canada is a nation where the population base reflects successive waves of immigration. Canada's demographic and economic structures have been affected by each wave of immigration. Since Canada's immigration policy determines the type of immigrant who enters the country, it has a substantial impact upon these structures. Over the last two decades, Canada's immigration policy has undergone a number of structural changes due to policy shifts, which have presumably contributed to changes in the immigration flows. The primary objective of this paper is to estimate and examine the human capital inflows to Canada from Less Developed Countries (LDCs) in light of these changes to immigration policy.

Human capital is the education level, the work experience, and in general the skill a human being uses in the production of goods and services. Changes in the levels of human capital affect the level of output which can be generated, and the combination of factors of production which are used in the production process.

One dimension of human capital is education. It is the only component of human captial which is measured in this paper due to the difficulty of capturing all aspects of human capital. As with other forms of capital, investment in human resources can improve its quality, thus improving the productivity of the resource (Todaro, p. 109). Thus, an increase in education should improve the "quality" of human capital. In this paper, the value of human capital will be measured by the value of education. The specific question to be addressed is whether immigrant flows circa 1967-1987 have undergone a decline in the value of human capital measured only by the cost of education content.

To answer this question, we estimate the value of the education content of immigrants in nine occupational categories which require investment in human capital. Immigrants listing their country of last permanent residence as a LDC are examined because of their increasing importance in Canadian immigration flows.

The importance of human capital inflows relates primarily to their impact on production. Research measuring the changes in human capital inflows is also required because these flows are international transfers which are not formally recorded (Grubel and Scott, 1966, p. 268). This paper documents the value of these human capital inflows from the LDCs under different immigration policy

regimes. The changes in the source countries and occupations of immigrants from LDCs that have occurred under the different policy regimes are also examined.

The changes in Canadian educational costs are also documented in the process of measuring the human capital transfers. Estimation of the changes in the cost of providing Canadian education answers two questions. First from the domestic perspective, what financial resources are necessary to provide education in Canada? Second, what are the savings to Canada, in terms of investment in human capital, when trained immigrants enter the country?

The second section of this chapter reviews the relevant economic literature on immigration. This provides a basis for understanding the concern over human capital transfers and the possibility of a decline in their value. The second chapter of the paper summarizes the study of D. DeVoretz and D. Maki (1980). They estimated human capital transfers to Canada from LDCs from 1966-1973, which until this time had been omitted from the literature. The third chapter discusses the methodology and data used for the current paper. The fourth chapter provides the empirical results and the fifth and final chapter reviews the policy implications of these results for Canada.

II. Literature Survey

The term, capital flows, in this survey encompasses two types of capital; monetary and human capital. The monetary transfers of capital are captured primarily in the official balance of payments statistics. Capital flows may initially accompany the immigrant, which must be netted for remittances, financial transactions back to the country of origin. Concern over remittances arises particularly in the European literature, as a result of the temporary and guest worker situations that are prevalent in those countries. The results to date point out that remittances are an inverse function of length of stay in the country of destination (DeVoretz, 1988, p. 12). Research in Canada has primarily been directed at the capital accumulation and spending patterns of immigrants after their arrival in the country.[1]

Human Capital Inflows

The initial literature on human capital inflows was concerned with the transfer of highly trained manpower from less developed countries (LDCs) to the industrialized nations. The issue circa: 1965-1975 concerned the policies of the developed countries, in particular, Canada, Great

---

[1] See Marr and McCready (1987) and Akbari (1988).

Britain and the United States, which favoured the immigration of skilled manpower from the LDCs. These policies were viewed as detrimental to the LDCs, as the skilled manpower was needed for development. The phrase the "Brain Drain" was coined to refer to the actions of the industrialized nations. The debate surrounding the "Brain Drain" literature involved issues of compensation to the LDCs, evidence to support the Brain Drain theory and contrary evidence suggesting the brain drain was in some cases a brain release.

Grubel and Scott (1966) presented a theoretical model of the "Brain Drain" which provided the conditions under which immigration should be desirable. The model establishes two important points in considering the implications to the recipient country. First, they argue that under perfect competition (with no externalities) the immigrant will be paid a value equal to his contribution to output, i.e. his marginal product. Therefore, the immigrant should not affect the value of per capita national income of the resident population (in either the sending or the receiving country). The situations in which welfare would be effected are; (i) in the short-run adjustment costs and (ii) in the event of market failures (Grubel and Scott, 1966, p. 270).

Second, Grubel and Scott argue for measurement to adjust for the fact that the contribution to national output is

captured in the national income accounts whereas the benefit of the human capital embodied in the immigrant goes unrecorded (Grubel and Scott, 1966, p. 268).

The neoclassical framework in which the theoretical model had initially been developed has been criticized. J. Bhagwati and K. Hamada (1976) outline the limitations of the framework:

> (i) for finite, rather than infinitesimal, shifts of labour, there would still be a loss to those left behind;
> (ii) if the social marginal product exceeds the private marginal product, thanks to strong externalities, as would seem to be the case with doctors and exceptionally gifted academics about whose emigration typically the underdeveloped countries seem to worry, then again there is a loss to those left behind;
> (iii) if the State has financed the education which is embodied in the skilled worker who migrates, and if it is assumed that the State would have taxed this skilled worker... partially or wholly to 'recover' the return on this investment, then his emigration does deprive those left behind of this return and thus worsens their welfare (Bhagwati and Hamada, 1976, pp. 114-114).

The focus of much of the "Brain Drain" literature during the late 1960s and the 1970s was compensation or taxation policies which would assist the LDCs in development in light of the loss of skilled manpower.[2] The current literature has not disregarded this issue, as there have been a number of articles developing models to explain the existence of

---

[2] See Bhagwati and Hamada (1976) and DeVoretz (1988) for a detailed discussion.

the brain drain and the policies necessary to alleviate the situation.

Rivera-Batiz (1982) examined the effect of international migration upon the welfare of the sending country when there is a non-traded goods sector. This is particularly relevant to the "Brain Drain" literature since many of the highly skilled workers are from the health care, education, transportation, and construction industries. Rivera-Batiz concludes that in the event of a non-traded goods sector the welfare of the non-migrating labour force is reduced. The emigration of the skilled worker reduces the number of exchange opportunities, therefore the total production of non-traded goods. Although the model is simple, Rivera-Batiz presents one more theoretical consideration for estimating human capital. Other recent models include Kwok and Leland's (1982) model of the brain drain based on asymmetric information. Compensation policies have been examined by Webb (1985) and commercial policies in the sending nation have been examined by Berger and Webb (1987) to determine their effects on the international migration of labour.

DeVoretz and Maki (1983) use empirical analysis to examine the determinants of immigration by highly skilled workers. Using a reduced-form supply and demand model they estimated the determinants of immigration to Canada. They

found that immigration of professionals is affected by the number of previous immigrants from a country of origin, i.e. the historic ties and the institutional arrangements or information flows from previous immigrant relatives. Competition with the United States for professional manpower during the period was a very significant factor. Income in Canada was not a significant factor. The results support their argument that during the post-1967 expansionist period of immigration, Canada had an implicit world-wide quota on immigrants based upon domestic vacancy rates in skilled manpower. Thus, the period of our concern, i.e. post-1976, in which explicit quotas were announced does not contain a major policy shift. This is an important point when examining the changes in source countries.

One outgrowth of the "Brain Drain" literature was the empirical literature designed to measure the value of the human capital inflows, partially to provide estimates for the compensation or to support or refute the "Brain Drain" theory. As the developed countries became more concerned with the domestic effects of immigration over the past ten years, the focus of the relationship between immigrants and capital inflows shifted from emphasis on the "Brain Drain" to an emphasis on the "quality" of immigrants. The questions facing the recipient country became:

1. What is the skill level of the immigrants?
2. What changes in the average skill level of the

immigrants have taken place over time?

3. Do barriers exist that prevent the human capital inflows from being used effectively?
4. What policies need to be put in place to meet the country's objectives?

The third question is beyond the scope of this research, however the first, second and fourth questions will be examined in the context of changes in education levels.

Measuring "Quality" of Immigrants

There are primarily two methods of measuring human capital, the first is in terms of inputs or the cost of producing human capital. The second is in terms of income generated by immigrants once in the country. The latter method is the analysis of age-earnings profiles, which have generally been calculated using cross-sectional data.

Chiswick (1980) uses a cross-sectional age-earnings profile to examine the earning patterns of immigrants by sex, race, and ethnic groups using the United States 1970 Census data. The level of earnings following arrival is the measure of the immigrants' success in economically assimilating in the United States. The theoretical analysis of the earnings of immigrants in his paper is based upon two concepts, the international transferability of the skills acquired in the country of origin and the "self-selection"

of immigrants. If the transferability of schooling and on-the-job training is weak, the effect of these skills on future earnings and the lower the earnings will be small just after immigration. As immigrants gain skills marketable in the country of destination, their relative earnings should rise. The concept of "self-selection" states that immigrants tend to "have greater innate ability, greater motivation for personal economic advancement and are more willing to sacrifice current consumption to make investments that may increase future consumption" than the non-migrants in the country of origin and the country of destination. When these two concepts are combined, the analysis suggests the earnings of the foreign born may eventually equal and then surpass those of the native born (Chiswick, 1980, p. 22).

The findings of Chiswick's (1980) paper support the propositions that; (i) schooling and preimmigration labor-market experience i.e the "human capital" of the foreign born, have a smaller effect on their U.S. earnings than skills acquired by the native born, (ii) the effect of time in the United States on immigrant earnings is quite large, and (iii) the earnings of economic immigrants eventually equal those of the native born.[3] In Chiswick's findings

---

[3] Earnings of foreign born equal earnings of native born of the same ethnic and racial group, after 11-15 years in the United States.

immigrant groups experienced the greatest success in economically assimilating when these groups had a higher average educational attainment, and came from English-language countries (Chiswick, 1980, p. 23).

This (cross-sectional) method used by Chiswick (1980) has a major weakness which is discussed in George Borjas (1985). The use of a single cross-section of data does not allow the age and cohort effects to be identified separately.

> Thus the positive impact of the years-since-migration variable in cross-section earnings equations captures both the higher quality of earlier immigrant cohorts as well as the increase in United States specific capital hypothesized in the literature (Borjas, 1985, p. 465)

To examine this problem Borjas (1985) used cohort analysis to estimate the earnings of foreign born workers. Borjas found that cross-sectional studies of immigrants' earnings over-estimated the actual growth rate of earnings by as much as 20 percentage points for some groups. In terms of earnings growth of immigrants relative to the native cohorts, the empirical results suggest that earnings either changed very little or declined slightly. This result sharply contrasts with Chiswick's cross-section regression results which suggest rapid income growth relative to the earnings of native cohorts. Finally, Borjas' empirical results indicate that the across-cohort change in immigrants' earnings is quite significant, with

immigrants of earlier cohort groups experiencing higher earnings "at every point of their U.S. labor market career" than the more recent immigrants. These results support the hypothesis that the quality of immigrant cohorts to the U.S. "has experienced a secular decline." (Borjas, 1985, p. 485) Thus, Borjas (1985) suggests that cross-sectional studies of immigrant earnings provide misleading information on the process of economic assimilation of immigrants in the labor market.

Chiswick (1986) addresses the hypothesis that there has been a secular decline in immigrants by explicitly asking the question "Is the New Immigration Less Skilled than the Old?" Engaging a demand and supply model of immigration he finds reasons to suspect there has in fact been a decline in the skill level of immigrants. Estimating wage earnings differences for adult foreign-born men by country of origin indicated that U.S. immigration, 1951-1980, changed from primarily drawing immigrants from countries whose nationals have high relative earnings in the United States to primarily drawing immigrants from counties whose nationals do less well (Chiswick, 1986, p. 179). The earnings performance of the immigrant groups was varied. While he agrees that: "other things the same, the changes over time in the differences in earnings between immigrants and the benchmarks are indices of the changes in relative immigrant quality" he cautions that a decline in the relative position

of the foreign born relative to the native born may be an improvement for the native born as opposed to a deterioration in the "immigrant quality" (Chiswick, 1986, pp. 182-183).

In his more recent paper, Borjas (1987) examines some of the determinants of the "quality" of immigrants, utilizing a synthetic panel created from two cross-sections of data. Borjas finds that differences in earnings of immigrants, standardizing for measured skills, are attributable to variations in the various political and economic conditions in the countries of origin at the time of migration. Borjas' (1989) longitudinal study of U.S. foreign-born scientists indicates that they do not outperform all native-born scientists (Borjas, 1989, p. 36).

Borjas' work has important policy implications for two reasons. First, if cross-sectional studies are used to analyze immigrant flows, their limitations must be recognized if the analysis is to be credible. If in fact a decline in the "secular quality" of immigrants has taken place then the age-earnings profiles will over or under estimate the actual earnings of the foreign-born workers. Second, what are the implications of this "secular decline" in quality of the immigrants for the host country and to what extent is the decline anticipated or desired?

Age-earning profiles have been estimated for immigrants to Canada by Akbari (1988) and Meng (1987). Akbari (1988) found the typical immigrant surpasses the average native-born worker after ten years of residence in Canada. However, when examining the Third World stock of immigrants Akbari found that this particular group did not surpass the earnings levels of native born workers until fifteen years after arrival.[4] This indicates that Asian, African and Central American foreign born workers undergo significant income adjustment in Canada (Akbari, 1988, p.138). The basic explanation is that there exists a differential endowment of human capital and or discrimination.

Asian, African and Central American immigrants began to dominate Canadian immigration flows in the seventies. Thus, their performance and the explanation of performance differentials vis-a-vis European immigrants are of particular interest to Canadian policy makers.

Human Capital Transfers 1966-1973

DeVoretz and Maki (1980) used the replacement cost methodology to estimate the value of human capital inflows to Canada from 1966 - 1973. The costs of education in 1967 as calculated by Dodge and Stager for various degrees and

---

[4] Meng's (1987) results are consistent with Akbari's.

fields of education were multiplied by the number of immigrants for each country who were estimated to have the appropriate degree.[5]

The utilization of four replacement cost concepts: private and social direct costs, as well as private and social total costs, allowed the value of human capital transfers to be examined from different perspectives. Nine professional and technical occupational categories were selected, primarily on the basis of their importance in the flow of immigrants.

DeVoretz and Maki estimated human capital transfers of 2.3 billion in 1968 Canadian dollars for the social total cost concept.[6] From the point of view of the individual Canadian, the Canadian taxpayer and Canadian society human capital transfers were large. Canadian taxpayers benefited by approximately 1.9 years in funding for all Canadian university and college training. Canadian taxpayers benefited by 150% of an average year's tax bill for all higher education in Canada. The individual Canadian saved

---

[5] As the actual educational attainment of immigrants was not available, it had to be estimated from the intended occupation data.

[6] The occupational groups include, managers, engineers, scientists, professors, teachers, physicians, nurses, medical technicians and a group of others. (see table 4.1 for more detail.)

$189 million 1968 dollars in direct costs and $829 in foregone income.[7] Comparing the human capital transfers for 1967-1973 to earlier estimates and estimates of transfers to the United States in an earlier period, they found the transfer from LDCs to Canada to be large.

DeVoretz and Maki (1980) addressed the issue of compensation, and found that Canada's bilateral and multilateral aid had on the whole offset the human capital transfers, however the amount of education-oriented aid, technical assistance, plus scholarships fell far short of offsetting the human capital transfers. The benefit Canada received from the transfer of human capital was nevertheless a result of the open policy of 1967 which removed some of the restrictions to immigrants from LDCs.

The replacement cost method is not free of shortcomings. The assumption that quality differentials in education do not exist between various countries of origin produces severe biases in the estimates of human capital. The definition of human capital as educational attainment ignores benefits Canadian society may receive in the form of actual work experience. However, it does provide a complementary information to the age-earnings profiles,

---

[7] However, they would also forgo the return on this type of investment which ranged from 9.6% to 12.2% for B.A. and M.A. graduates.

which if nothing else indicates the direction of change in human capital estimates.

Summary

The literature on human capital has progressed from the theoretical analysis of the "Brain Drain" to the empirical analysis of immigrant performance. The literature on immigrant performance measured from age-earning profiles, employs cross-sectional data which requires long term performance to be inferred from this data. If there is any change in the qualifications of immigrants, immigrant income growth with age will be overstated since it is simply a result of the better qualified immigrant aging. In particular the work of Borjas (1985 and 1987) and the findings of Akbari (1988) have aroused the suspicion that Canada may have experienced a decline in the value of human capital embodies in immigrants.

Chapter 2

Canadian Immigration

I. Canadian Immigration Policy: Circa 1951-1987

The examination of changes in human capital flows requires a basic knowledge of recent Canadian immigration policy. Prior to 1963, under the 1951 Immigration Act immigration policy favoured immigrants from Europe and Great Britain. In 1967, a point system was adopted to allow immigrants to Canada to be chosen on the basis of suitability to Canada and the Canadian labour market needs and to mitigate any discrimination owing to religion, race or country of origin. This policy has been termed an "open policy" since the country of origin was not a criterion.

> The unit assessment or point system was formally introduced into immigration regulations in 1967 as a means of ensuring that the immigrant selection process would be non-discriminatory with respect to sex, colour, race, nationality, and religion and yet still link the admission decision to domestic labour market requirements (Marr and Percy, p. 62).

The open policy of 1967 with its point system resulted in a substantial inflow, to date, of human capital from less developed countries. See Table 2.1. This capital inflow has, with the exception of the 1966-73 period, gone undocumented. The increased percentage of immigrants from LDCs is documented in Table 2.2

In 1978 a new immigration act was implemented. In comparison to the 1967 Immigration Act, the 1978 Act could be termed a "restrictive policy". This latter policy had three major goals: Canadian demographic needs; family reunification and finally, tying immigration to the Canadian labour market needs.

The 1978 policy while maintaining the point system, linked entry into Canada under the independent class almost solely to labour market requirements. During the years 1982 through 1985, immigration to Canada under the selected worker category was prohibited, except in the event of arranged employment. Arranged employment required certification from a Canada Employment Centre, which required the employer to demonstrate that he had been unable to engage a Canadian citizen. The emphasis therefore moved from educational qualifications to explicit employment. This restriction was lifted in 1986. (See, Howith, pp.16-27). In addition, the post-1978 policy set target levels for the point driven independent category of immigrants while easing the requirements for family reunification.

The 1978 policy clearly can not be termed an open one. Rather, the policy reflected the view that scrutiny was required to insure that immigration costs did not exceed benefits (Marr and Percy, p. 58). Thus, two forces appear to change the human capital content of the post-1978

immigrant flow. First, the emphasis on job certification reduced the importance of human capital per se, i.e. education, for the independent class of immigrants. In addition, the acceleration of the family re-unification class completely precluded an education or human capital criterion for entry.

In short, these major changes from a closed (prior to 1967) to open (post-1967) and then, restrictive policy (after 1978) are strong a priori reasons to expect both a change in the country source and human capital content of Canadian immigrants.

II. Trends in Immigration

The initiation of the 1967 Open policy resulted in LDC immigrants to Canada increasing as a proportion of total Canadian immigration. This trend continued even after the restrictive policy of 1978. In 1967 total LDC immigration represented 23.0 per cent of total immigration. By 1986 this proportion had risen to 71 per cent of the total.

As Canada moved from the open policy of 1967 to the restrictive 1978 policy, total immigration began to decline. This is particularly visible in the late 1980's. In terms of absolute numbers there has been a decline in all immigrants to Canada, and professionals from LDCs. (See Table 2.2 columns 1 and 6) However, of the immigrants in

the labour force, those originating from the LDCs accounted for 67.9 per cent in 1986, a substantial increase over 16.6 per cent in 1967.

The percentage of immigrants from LDCs who stated their intended occupation as one in the professional category, has increased at a slower pace.[8] Of all immigrants intending to enter as professionals in 1967, 26.6 per cent originated in LDCs. This percentage rose to 42.6 in 1986, however it reached its peak of 51.3 per cent in 1980. Estimates of human capital flows are contained in Chapter 4.

---

[8] Professionals as categorized by DeVoretz and Maki. (see Table 4.1 for more information)

TABLE 2.1

1966-1973
The Value of Professional Human Capital Inflows
Four Cost Concepts
Holding Sending Countries Constant

(Thousands of 1968 Canadian Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[9] STC COST
Argentina	1,218	9,805	6,924	16,511	58.343
Brazil	1,149	9,305	6,266	14,378	49.924
Egypt	5,697	46,606	31,628	75,022	53.707
Greece	4,100	33,257	22,067	50,891	48.422
Hong Kong &China	29,747	241,365	162,079	376,731	50.311
India	28,580	235,192	159,273	377,032	54.032
Lebanon	3,538	28,423	19,741	46,652	54.756
Mexico	1,239	9,944	7,038	16,755	58.177
Pakistan	5,333	43,759	29,596	69,710	53.336
Portugal	1,368	10,895	7,209	16,245	45.125
Romania	433	3,602	2,404	5,666	52.953
Spain	2,182	17,647	12,101	28,617	53.791
Sri Lanka	866	7,161	4,781	11,068	48.974
Syria	629	5,137	3,523	8,315	54.704
Turkey	1,883	15,684	10,563	24,727	54.107
Yugoslavia	3,985	32,868	21,427	49,995	48.304
West Indies	25,284	200,173	132,005	304,246	45.040
Philippines	26,958	212,200	136,379	314,794	41.722
All Other	44,488	359,270	242,643	561,698	50.408
TOTAL	188,677	1,522,293	1,017,647	2,369,053	

Source. - DeVoretz and Maki, 1980.

[9] Average Social Total Cost (per immigrant in the Professional category of the study). Calculated by dividing the social total cost per country by the total number of immigrants in the professional categories from that country over the respective period of time.

TABLE 2.2

Trends in Canadian Immigration 1967-1986

(absolute #'s in 000's)

	(1)	(2)	(3)	(4)
			Immigrants in labour force	
Year	Total immi.	Total LDC immi.	Total	Total origin
1967	222	51	119	19
1968	183	49	95	19
1969	161	54	84	25
1970	147	51	77	24
1971	121	47	61	22
1972	122	43	59	22
1973	184	86	92	43
1974	218	76	106	31
1975	187	98	81	40
1976	149	83	61	30
1977	114	60	47	22
1978	86	46	35	16
1979	112	70	47	27
1980	143	91	63	38
1981	128	71	56	31
1982	121	66	55	27
1983	89	58	37	23
1984	88	66	38	26
1985	84	60	30	26
1986	99	70	48	32

TABLE 2.2
Cont'd

	(5)	(6)	(7)	(8)	(9)	(10)
	Immigrants in labour force					
			Professionals			
			Professionals as % of all		LDC as % of total	
Year	Total	LDC origin Total	Total (5/3)	LDC origin (6/4)	Total (4/3)	Prof. (6/5)
1967	27	7.4	23.4	37.6	16.6	26.6
1968	26	6.9	27.5	35.0	20.7	26.3
1969	24	7.3	29.5	29.3	29.9	29.6
1970	20	5.8	26.9	24.1	31.2	28.0
1971	15	5.0	25.8	22.0	37.3	31.9
1972	15	5.8	26.6	25.8	37.9	36.7
1973	19	8.0	20.9	18.4	47.3	41.1
1974	18	7.0	17.9	24.2	29.6	41.1
1975	23	9.2	29.5	22.9	49.5	38.3
1976	18	7.1	19.8	22.9	50.3	38.8
1977	13	4.8	28.1	21.2	47.5	35.6
1978	9	3.2	26.6	19.6	46.4	34.3
1979	10	3.8	21.8	13.8	56.6	36.4
1980	13	6.9	21.0	17.9	60.4	51.3
1981	15	5.5	28.0	17.2	55.9	34.4
1982	17	8.7	30.9	31.8	49.4	50.8
1983	8	3.9	22.8	16.8	62.4	46.0
1984	7	3.6	19.5	13.6	69.1	48.0
1985	8	3.9	21.4	15.0	68.1	47.8
1986	10	4.4	21.5	13.5	67.9	42.6

Sources: Canada, Dept. of Manpower and Immigration (later Employment and Immigration), Immigration Statistics, various issues.

Chapter 3

Methodology

This chapter provides a detailed discussion of the technique used by DeVoretz and Maki (1980). The detail is provided for two reasons. For the reader unfamiliar with Dodge and Stager (1972) and DeVoretz and Maki (1980) it provides a complete summary of the estimation of education costs. For the reader interested in the estimation of the 1980-1981 Canadian education costs the explanation of the calculations is necessary. A reader familiar with the works mentioned above may wish to omit section two of this chapter.

In order to test the hypothesis that there has been no significant change in the value of human capital transfers, estimates of the transfers must first be produced. There are a number of steps in attempting to measure the value of human capital inflows. The first is to define the term human capital, which was accomplished in Chapter 1. The second is to determine an appropriate measure of human capital and the third is to choose an appropriate set of countries. Finally, the actual estimation of the human capital can take place.

I. Measuring Human Capital

There are primarily two methods of estimating human capital. The first method measures the output of the individual in terms of income. The individual is theoretically paid a wage equal to his marginal product, therefore the income flow is a proxy for the dollar value of the stock of human capital. This method has been used extensively by Borjas (1985, 1987), Chiswick (1978, 1970) and for Canada by Akbari (1988), it is known as the age-earnings approach.

The second tactic used to measure human capital, estimates the input costs of producing the human capital. The value of human capital should be equal to the sum of the input costs used in its production. The replacement cost, i.e the cost of producing an equivalent unit of human capital in Canada, is an appropriate measure given that measurement of actual input costs for a number of countries is impossible.

The theoretical basis of the replacement cost method is the neo-classical concept of duality or the "dual". The output being produced is a unit of human capital. The unit cost for each unit of human capital equals the price of each

output produced[10]. Therefore if C is defined as the replacement cost, and Y as the stream of earnings or the price of the unit of human capital, in equilibrium:

$$C_t = \sum_{t=1}^{t} Y_{i,t}/(1+r)^t$$

where r is a constant rate of return. Given the constant rate of return, r, an increase in the earnings stream would imply an increase in the replacement cost, i.e. our human capital measure.

The continuous concern over the human capital value embodied in immigrants is a consequence of shifting immigration, which now favours family reunification and refugees. The a priori expectation is that the human capital transfers should decline.

Similar concerns have resulted from the age-earnings analysis. The results of Borjas (1985) are "consistent with the hypothesis that the quality of immigrant cohorts has experienced a secular decline" as manifested by a decline in earnings (Borjas, 1985, p. 485). Akbari (1988) also found that Canadian immigrants from LDCs had a poorer earnings

---

[10] The production of human capital is considered an investment.

performance when compared with the immigrants from European nations.

One of the major limitations of the replacement cost method, as it is used in this paper, is that only the educational component of human capital is captured. Other components, which are captured in the age-earnings approach are omitted as the result of methodological and measurement problems. Thus, it is not an alternative method to the age earnings approach.

However, to the extent that the measurement of the educational component of human capital provides information as to changes in the educational levels and confirmation of suspected changes, the analysis in this paper may aid in the determination of the types of "secular changes" occurring in immigration flows. If nothing else the replacement cost method, as it is used here, indicates the direction of change in human capital.

One rationale for this study's focus on professional occupations is that they generally require a large investment in human capital. A shift in the occupation mix of the immigrants from occupations requiring larger investments to relatively smaller investments would be consistent with the hypothesis that the value of human capital has decreased in recent years.

II. Calculating Education Costs

The existing literature on human capital transfers provides a useful framework for measuring the value of an immigration flow. Grubel and Scott (1966) argue that this transfer should be estimated as the value of the acquisition of an equivalent level of training in the country of destination.[11] This cost figure should include both direct and indirect costs of acquiring an education. This argument is based on the premise that the net savings to the immigrant receiving country is the displacement of domestic human capital formation (Marr and Percy, 1985, p. 83). It is termed the replacement cost method, as it measures the cost of replacing a foreign-born worker with a native-born and trained worker. This method also avoids the problem of estimating the cost of education in numerous countries at various institutions as well as recognizing the opportunity cost within Canada.

The human capital estimates are measured using two sets of cost data. The first set is the 1968 cost of education calculated from Dodge and Stager (1972) and Stager (1972), which was used by DeVoretz and Maki (1980). The costs are

---

[11] The alternative is to measure the educational costs to the country of origin. This measurement would be appropriate for calculating the levels of compensation required by the sending country or estimating the human capital transfers from a given country.

divided into four categories, private direct cost, social direct cost, private total cost and social total cost. The data is contained in Table 3.1. Calculation of human capital transfers for 1974-1987 using the 1968 cost concepts allows comparison of the value of human capital transfers from 1966-1973 calculated by DeVoretz and Maki (1980) with the transfer from the latter period, without incorporating increases in the relative cost of education. The second set of cost data estimated in terms of 1981 Canadian dollars is discussed below.

TABLE 3.1

Value Of Human Capital Flow At Canadian Replacement Costs Per Graduate By Occupation (1968 Canadian $)

Occupational Groups	Private Direct Costs (1)	Social Direct Costs (2)	Private Total Costs (3)	Social Total Costs (4)
1. Manager	4,137	32,477	22,709	49,551
2. Engineer	4,137	37,121	23,833	55,065
3. Scientist	4,137	37,121	23,408	54,685
4. Professor	5,653	44,690	36,105	72,680
5. Teacher	3,364	26,122	16,236	36,990
6. Physician	5,653	44,690	36,105	72,680
7. Nurse	3,364	26,122	16,236	36,990
8. Medical Technician	3,364	26,122	16,236	36,990
9. Others	3,364	26,122	16,236	36,990

Source. - DeVoretz and Maki, (1980).

Note.-*Private direct costs* = student expenditures for books, fees, and tuition. Occupations 1-4 and 6 were assumed to require the B.A. degree, plus M.A. or higher-level degrees. Thus, the tuition fees, plus the direct expenditure estimates from D. Dodge and D. Stager ("Economic Returns to Graduate Study in Science, Engineering and Business," Canadian Journal of Economics 5 [May 1972]: 182-98, see p. 186, table 2), were added to total direct expenditures from D. Stager, "Allocation of Resources in Canadian Education." in Canadian Higher Education in the Seventies, ed. Economic Council of Canada (Ottawa: Information Canada, 1972), p. 217, table 14, col. 5, for the appropriate degree level that Stager suggests for each occupation. For instance, a manager's education was calculated as 4 years at the B.A. level or (4x$841)plus($619x1.25), or $773. The addition of the B.A. Degree costs of $3,364 and $773 for the M.A. degree equaled $4,137. Occupations 2 and 3 were computed in an identical manner. Occupations 5 and 7-9 were just the B.A. Degree-level direct costs. Professors' and physicians' costs were the B.A. costs, $3,364, plus M.A. degree-level costs of $773 and (2.45x$619) for a total of $5,653. *Social direct costs* = all costs except foregone income. The social direct cost of an advanced degree was taken directly from Dodge and Stager, p. 185, table 1, col. 9, by subtracting foregone income from the total cost of an advanced degree. The social direct costs for a B.A. degree appear in Stager, p. 218, table 16, as a combination of his cols. 1, 3, and 4 times the 4 years required for the degree and a 1.5 multiple to account for the increase since 1961. For occupations 5, 7, 8, and 9 these B.A. social direct costs were used.

Private total costs = foregone earnings plus the student's direct expenditures, or the private direct costs in col. 1. For occupations 1-4 and 6, see Dodge and Stager, p. 185, table1 cols. 5 and 7. These two columns were added and multiplied by the factors 1.25 and 2.45 for the M.A. and Ph.D. degrees, respectively. This figure was then added to the private total cost for a B.A. ($16,236). The private total cost for a B.A. degree level is from Stager, p. 281, table 16, cols. 2 and 3 adjusted to 1968 prices by a factor of 1.5 and then multiplied by 4 to raise yearly costs estimates to the cost of a completed degree. *Social total costs* are the social direct costs (i.e., col.2) plus foregone income. For occupations 5, 7, 8, and 9, it is the total costs as defined in Stager, p.218, table 16 cols. 1, 2, and 3 per year multiplied by the four years to earn this degree. The 1961 dollar total was multiplied by 1.5 to inflate this figure to 1968 prices. For occupations 1-4 and 6, the B.A. total social cost estimates were added to the total costs for the appropriate advanced degree (see Dodge and Stager, p. 185, table1, col.9).

The cost of education is measured in terms of the social and private costs of obtaining the equivalent level of education in Canada. It is assumed that there are constant returns to scale in the production of human capital, i.e. education. The costs of post-secondary education to society as a whole include institutional operating expenditures; imputed costs of depreciation, foregone interest and tax exemptions, scholarships and grants, students' direct expenditures and their foregone earnings.[12] It is assumed that all educational costs are investment expenditures; to the extent that there is a consumption component the net returns will be understated (Dodge and Stager, 1972, p.184). It is also assumed that the estimated institutional costs

---

[12] It has been argued that in calculating the marginal cost of education neither foregone property taxes nor foregone interest should be included in the social cost concepts because they are sunk costs. This point is particularly important. In the context of the marginal cost of one more person's education, these costs should not be included. However, they have been included for two reasons. First they were part of the estimates done by Dodge and Stager (1972) which were used for the 1966-1973 period. Thus, they inclusion was necessary to produce consistent cost estimates.

Secondly, there has been a conscious policy of substituting graduates for immigrants in the past twenty years. By letting thousands of skilled immigrants enter the country Canadians have saved the foregone property taxes and the foregone interest of setting up new universities to train Canadians. (Every 5,000 to 10,000 immigrants with university degrees represent the equivalent of one more university.) As the flow of Canadian graduates begins to meet the demand for skilled workers in given occupations, immigrant flows in that occupational category were reduced. In this context Canadian society has saved the property taxes and interest that would have been foregone in the absence of immigration.

exclude the costs of sponsored or assisted research conducted under direct grants (Dodge and Stager, 1972, p. 184). These include the private costs of the individual in terms of tuition, books and foregone earnings.[13] The difference between social and private costs are the costs borne by the taxpayer.

To create the second set of data, these costs were calculated for the 1980-1981 academic year, as it is approximately the mid-point in the study. Calculations in Canadian dollars avoids the difficulty in comparing costs of education across countries and currencies, however it results in serious limitations to be discussed below.

The estimated components of the costs of education in 1980-1981 are given in Tables 3.2 and 3.3. The social costs of education are comprised of operating expenditures plus imputed costs, interest, depreciation and tax exemptions, foregone earnings and students direct expenditures.

---

[13] It has been argued that in the context of marginal cost, gross foregone earnings as opposed to net foregone earnings should be included in private direct costs (PDCs). The PDC was designed to appeal to the individual reader in terms of the personal opportunity cost. However, the Social direct and total concepts capture the gross foregone earnings.

Operating Costs[14]

These exclude sponsored research. They are the mean operating expenditures of universities per province weighted by the total full time enrollment in the province. Thus, as calculated they are an average per full-time student. These figure were calculated by taking the governments' contribution as a percentage of total funds used for the operating expenditures including sponsored research, and multiplying operating expenditures excluding sponsored research by governments' percentage. The average operating expenditures by province were then estimated on a per student basis by dividing by the total number of students.[15] The provincial averages per student were then used to calculate the unweighted mean for Canada.

The assumption was made that students in the sciences require more specific "capital equipment" than non-science students. Thus, the unweighted average operating

---

[14] The source for this data is Financial Statistics of Education 1980-1981, 1983-1984; Statistics Canada, Tables 16 and 25.

[15] Part-time students were treated as the equivalent of one half of one full-time student.

expenditure for Canada was adjusted using weights for science and non-science fields.[16]

Imputed interest and depreciation allowance

This component of social costs accounts for the fact that the physical capital of a university depreciates, and universities do not have to pay property taxes. Therefore these are costs to society that must be taken into account. Percentage estimates of operating expenditures were used. Dodge and Stager (1972) found that these two items were equal to forty per cent of the institutional operating expenditures in Ontario universities. Thus forty per cent of the operating expenditures calculated in this study was used as the imputed interest and depreciation costs.

Foregone Earnings

This cost concept represents one of the largest portions of the cost of education. The data were obtained from the Statistics Canada publication, Job Market Reality for Post-Secondary Graduates. The salaries were recorded for June 1978 and represent average earnings two years after

---

[16] Weights were calculated by estimating the mean expenditure per student in the Dodge and Stager (1972) study. This mean was then divided by the operating expenditures by field to determine the percentage of the average operating expenditure used in each field.

graduation.[17] For this reason increments of five per cent were not added annually as in the Dodge and Stager (1972) study. We inflate the 1978 nominal salaries to 1981 constant dollars via the consumer price index (1981=100) The figures calculated in this manner correspond closely to the average employment incomes for males aged 24-30, listed in Statistics Canada 92-931 as used by Edwin G. West (1988). The 1981 figures of Statistics Canada were not appropriate since they are not cross-classified by field of study or occupation.

In Table 3.2 social costs use gross foregone earnings less part-time earnings. The assumption that a student would forgo 66% of his yearly salary was adopted. Given that he would most likely work in the summer, a four month period in most institutions, this assumption as used by Vaillancourt and Henriques (1986) seemed more reasonable than West's assumption of pro-rating income by seventy-five per cent.

The private costs contained in Table 3.3 include net foregone earnings. This allows for the fact that if working the student would have to pay income tax. The earnings were

---

[17] The earnings corresponding to the last level of completed education, were used. For B.A. degree, the foregone earnings would be those of a high school graduate.

calculated by as follows: {(gross foregone earnings-income taxes) x .66} - grants.[18]

Grants to Students and Direct Expenditures

Grants to students are the mean value of grants or scholarships to students. Data were obtained from Statistics Canada 81-208. Students' direct expenditures were calculated using the figures from Vaillancourt and Henriques (1986) for direct expenditures on books and supplies.[19] Additional fees were obtained from Statistics Canada 81-219. Finally, following the literature only the marginal costs of obtaining professional and technical education are incorporated in our estimates.[20]

The four cost concepts, corresponding to those in the 1968 data are contained in Tables 3.4 and 3.5. The former contains the costs by occupation assuming the same level of

---

[18] The income taxes were calculated using Vaillancourt and Henriques (1986) method.

[19] Vaillancourt and Henriques, 1986, p. 451 Table 1, column 3.

[20] This arises since average educational attainment is argued to be **at least** at the secondary levels in recipient countries.

education as in the DeVoretz and Maki study,[21] whereas the latter contains the costs by occupation and degree.

[21] See the footnote in Table 3.1 for greater detail.

TABLE 3.2

Dodge and Stager Revised
Estimated Total Social Costs per Student Year, Selected Fields at Canadian Universities

(1981 Canadian Dollars)

Degree	(1) Formula Weight	(2) Operating Expenditures	(3) Imputed Costs	(4) Total Institutional Costs (2)+(3)
B.A./B.Sc.				
Arts	0.62	3327	1331	4658
Commerce	0.62	3327	1331	4658
Engineering	1.23	6600	2640	9240
Science	1.23	6600	2640	9240
Medicine	1.23	6600	2640	9240
M.A./M.Sc.				
Arts	0.62	3327	1331	4658
Commerce	0.62	3327	1331	4658
Engineering	1.23	6600	2640	9240
Science	1.23	6600	2640	9240
Medicine	1.23	6600	2640	9240
Ph.d.				
Arts	0.62	3327	1331	4658
Commerce	0.62	3327	1331	4658
Engineering	1.23	6600	2640	9240
Science	1.23	6600	2640	9240
Medicine	1.23	6600	2640	9240

TABLE 3.2 cont'd

Dodge and Stager Revised

(5) Gross Foregone Earnings	(6) Grants to Students	(7) Students Direct Expenditures	(8) Total Costs per Student (4+5+6+7)	(9) Total Cost per Degree (7*10)	(10) Years
10,806	505	432	16,401	65,603	4
10,806	505	432	16,401	65,603	4
10,806	505	432	20,983	83,933	4
10,806	505	432	20,983	83,933	4
10,806	505	432	20,983	125,898	6
12,599	505	432	18,194	88,346	1.25
13,307	505	432	18,902	89,231	1.25
16,165	505	432	26,342	116,861	1.25
11,766	505	432	21,943	111,363	1.25
14,736	505	432	24,913	157,040	1.25
15,851	505	432	21,176	135,678	2.45
19,737	505	432	25,332	146,567	2.45
19,398	505	432	29,575	182,734	2.45
15,254	505	432	25,431	168,183	2.45
14,736	505	432	24,913	218,077	2.45

[22] Cumulative Total: master's degrees include costs of Bachelor's degree. Ph.d= B.A. cost+(1*master's yearly rate) +(2.45*doctorate yearly rate)

TABLE 3.3

Estimated Private Costs per Student Year
Selected Fields at Canadian Universities
(1981 Canadian Dollars)

Degree	Tuition Fees	Direct Expenditures	Net Foregone Earnings	Total Cost p.a.	Total[23] Private Costs
B.A./B.Sc.					
Arts	727	432	9,223	10,382	41,528
Commerce	702	432	9,223	10,357	41,428
Engineering	745	732	9,223	10,400	41,600
Science	700	432	9,223	10,355	41,420
Medicine	928	432	9,223	10,583	63,498
M.A./M.Sc.					
Arts	669	432	10,790	11,891	14,864
Commerce	669	432	11,349	12,450	15,563
Engineering	669	432	13,570	14,671	18,339
Science	669	432	10,133	11,234	14,042
Ph.d					
Arts	669	432	13,119	14,220	34,839
Commerce	669	432	16,255	17,356	42,522
Engineering	669	432	16,008	17,109	41,917
Science	669	432	12,868	13,969	34,224
Medicine	669	432	12,469	13,570	33,247

[23] Per degree. Total cost per year times the number of years listed in Table 3.2, column 10.

III. Calculating Human Capital Estimates

To estimate the transfer of human capital Canada received, the number of immigrants stating a given occupation from a particular country, was totaled for the time period.[24] This assumes that the immigrant is employed in the relevant occupation. However, if after arrival the immigrants experiences vertical occupational mobility and additional training is undertaken in Canada it will not bias the estimates. This total was then multiplied by the cost of obtaining the respective degree.

For example during 1974-1979, 786 immigrants from the Philippines stated their intended occupation as nursing. Under the 1968 cost structure a nurse was assumed to have a bachelor's degree. Therefore the total number of nurses was multiplied by the cost of obtaining a bachelor's degree in science.

Private direct cost:	(786x$3,364)=	$2,644,104
Social direct cost:	(786x$26,122)=	$20,531,892
Private Total cost:	(786x$16,236)=	$12,761,496
Social Total cost:	(786x$36,990)=	$29,074,140

[24] The intended occupation was given at the time of arrival. This may have little bearing in terms of the actual occupation of employment and does not account of occupational changes that may take place after arrival.

Canada is estimated to have received a transfer of $29,074,140 in 1968 dollars from the Philippines in the form of nurses, measured in terms of the social total cost.

From 1979-1987 the actual level of education of the immigrants was available. In order to compare the cost estimates to the 1966-1973 values the specific assumptions employed above regarding the level of education were used. Then in order to gain a more accurate estimate of the human capital flows the following modification was made to our calculations. The number of immigrants stating a given occupation and obtaining a bachelor's degree were totaled. This process was repeated for the master's degree and doctorate degree level.

Example using the 1968 private direct cost concept: From 1979-1987, of the immigrants from the Philippines listing their intended occupation as nursing, 282 had a B.Sc., 8 had some post-graduate work or other degree, and 7 had a M.Sc. To calculate private direct cost the following was done.

B.Sc.:	(282x$3,364)=	$102,648
Some postgrad:	(8x$4,137)=	$33,096
M.Sc.:	(7x$4,137)=	$28,959

Thus, Canada is estimated to have received a transfer of $164,733 in 1968 dollars from the Philippines in the form of

nurses, measured in terms of the private direct cost concept.

The calculations for all occupational groups were performed and the results summed for each country to obtain the estimates of human capital transfers over the various time periods. The estimates for each time period using the 1968 costs could then be compared.

The calculation process was repeated for the immigrants entering Canada between 1974-1987 using the 1980-1981 estimates for educational costs in order to provide the reader with a more timely estimate of the capitalized values of human capital.

TABLE 3.4

Value Of Human Capital Flow At Canadian Replacement Costs Per Graduate By Occupation

(1981 Canadian $)

Occupational Groups	Private Direct Costs (1)	Social Direct Costs (2)	Private Total Costs (3)	Social Total Costs (4)
1. Manager	5,693	29,372	57,041	89,230
2. Engineer	6,134	53,430	59,989	116,861
3. Scientist	5,955	53,430	55,513	111,362
4. Professor	6,063	29,372	56,442	88,345
5. Teacher	4,636	22,379	41,528	65,603
6. Physician	9,587	73,785	64,925	157,041
7. Nurse	4,528	40,709	41,420	83,933
8. Medical Technician	4,528	40,709	41,420	83,933
9. Others	4,536	22,379	41,428	65,603

TABLE 3.5

Value Of Human Capital Flow At Canadian Replacement Costs Per Graduate By Occupation and Degree (1981 Canadian $)

Occupational Groups	Private Direct Costs (1)	Social Direct Costs (2)	Private Total Costs (3)	Social Total Costs (4)
1. Manager				
a. B.A.	4,536	22,379	41,428	65,603
b. other degree[25]	5,693	29,372	57,041	89,230
c. M.A.	5,693	29,372	57,041	89,230
d. Ph.d	12,275	41,609	96,540	146,567
2. Engineer				
a. B.Sc.	4,708	40,709	41,600	83,933
b. other degree	6,134	53,430	59,989	116,861
c. M.Sc.	6,134	53,430	59,989	116,861
d. Ph.d.	12,413	75,820	98,328	187,734
3. Scientist				
a. B.Sc.	4,528	40,709	41,420	83,933
b. other degree	5,955	53,430	55,513	111,362
c. M.Sc.	5,955	53,430	55,513	111,362
d. Ph.d.	12,088	75,820	80,018	168,182
4. Professor				
a. B.A.	4,636	22,379	41,528	65,603
b. other degree	6,063	29,372	56,442	88,345
c. M.A.	6,063	29,372	56,442	88,345
d. Ph.d.	12,283	41,681	88,398	165,677
5. Teacher				
a. B.A.	4,636	22,379	41,528	65,603
b. other degree	6,063	29,372	56,442	88,345
c. M.A.	6,063	29,372	56,442	88,345
d. Ph.d.	12,283	41,681	88,398	165,677
6. Physician				
a. Md	8,160	61,063	63,498	125,899
b. other degree	9,587	73,785	64,925	157,041
c. M.Sc.	9,587	73,785	64,925	157,041
d. Ph.d.	18,626	96,175	97,985	175,746
7. Nurse				
a. B.Sc	4,528	40,709	41,420	83,933
b. other degree	5,955	53,430	55,513	111,362
c. M.Sc.	5,955	53,430	55,513	111,362
d. Ph.d.	12,088	75,820	80,018	168,182
8. Medical Technician				
a. B.Sc	4,528	40,709	41,420	83,933

[25] This figure is lower than the social direct cost given in Table 3.6. The discrepancy is due to an increase in the importance of foregone earnings.

b. other degree	5,955	53,430	55,513	111,362
c. M.Sc	5,955	53,430	55,513	111,362
d. Ph.d	12,088	75,820	80,018	168,182
9. Others				
a. B.A.	4,536	22,379	41,428	65,603
b. other degree	5,693	29,372	57,041	89,230
c. M.A.	5,693	29,372	57,041	89,230
d. Ph.d	12,275	41,609	96,540	146,567

TABLE 3.6

Value Of Human Capital Flow At Canadian Replacement Costs Per Graduate By Occupation and Degree (1968 Canadian $)

Occupational Groups	Private Direct Costs (1)	Social Direct Costs (2)	Private Total Costs (3)	Social Total Costs (4)
1. Manager				
a. B.A.	3,364	21,976	16,236	32,796
b. other degree	4,137	29,531	22,709	45,351
c. M.A.	4,137	29,531	22,709	45,351
d. Ph.d	5,500	59,667	34,863	88,496
2. Engineer				
a. B.Sc.	3,364	21,976	16,236	32,796
b. other degree	4,137	34,265	50,895	23,609
c. M.Sc.	4,137	34,265	50,895	23,609
d. Ph.d.	5,500	63,381	38,650	100,187
3. Scientist				
a. B.Sc.	3,364	21,976	16,236	32,796
b. other degree	4,137	34,270	23,184	50,470
c. M.Sc.	4,137	34,270	23,184	50,470
d. Ph.d.	5,500	61,054	36,774	96,439
4. Professor				
a. B.A.	3,364	21,976	16,236	32,796
b. other degree	4,137	29,531	22,709	48,042
c. M.A.	4,137	29,531	22,709	48,042
d. Ph.d.	5,500	59,667	34,863	88,496
5. Teacher				
a. B.A.	3,364	21,976	16,236	32,796
b. other degree	4,137	29,531	22,709	48,042
c. M.A.	4,137	29,531	22,709	48,042
d. Ph.d.	5,500	59,667	34,863	88,496
6. Physician				
a. Md	3,364	21,976	16,236	32,796
b. other degree	4,137	34,270	23,184	50,470
c. M.Sc.	4,137	34,270	23,184	50,470
d. Ph.d.	5,500	61,054	36,774	96,439
7. Nurse				
a. B.Sc	3,364	21,976	16,236	32,796
b. other degree	4,137	34,270	23,184	50,470
c. M.Sc.	4,137	34,270	23,184	50,470
d. Ph.d.	5,500	61,054	36,774	96,439
8. Medical Technician				
a. B.Sc	3,364	21,976	16,236	32,796
b. other degree	4,137	34,270	23,184	50,470
c. M.Sc	4,137	34,270	23,184	50,470
d. Ph.d	5,500	61,054	36,774	96,439
9. Others				
a. B.A.	3,364	21,976	16,236	32,796
b. other degree	4,137	29,531	22,709	48,042

c. M.A.	4,137	29,531	22,709	48,042
d. Ph.d	5,500	59,667	34,863	88,496

IV. Data

The immigrant data was obtained from tapes made available by Employment and Immigration, Canada. These tapes are the only source of educational attainment levels for immigrants upon **entry** to Canada. Although this data source is superior to Census information, still there exist aggregation or definitional problems. For example, immigrants who entered Canada **prior** to 1978 list educational attainment as either a university degree or no degree held. Thus, assumptions regarding the level of university education attained are necessary for this group. The assumptions made are contained in the footnote to Table 3.1. For immigrants arriving after 1978, the level of post-secondary education is given in the data set, thus these assumptions are no longer necessary.[26]

The limitations imposed upon the study by this choice of data are important. The immigration data only measures the incoming immigrants, it does not account for any return migration to the country of origin, thus the transfer of human capital my be overstated. Occupations are only

---

[26] The estimates of human capital for the 1979-1987 cohort group are calculated once with the assumptions and then with distinctions between Bachelors, Masters and Doctorate degree costs. See Appendix.

intended, actual occupations upon entry to Canada can not be determined. The use of intended occupations assumes the immigrant does in fact enter the labour force, and finds work in his field. It does not allow for unemployment in that field. The transfer of human capital for that person may never be fully realized because of the difficulty in obtaining employment (see McDade).

The 1981 and 1986 Census Statistics correct this problem, as the field of actual occupation is listed, and it nets out some return migration, as it records only those who have remained in Canada, as of the day of Census. The crucial disadvantage of the Census data is the aggregation of occupations into fields, for example health services. Thus a nurse, a medical technician and a physician would be listed in the same category regardless of the differing levels of education required by the occupations. The education level is also a problem in the Census data. Education attained is given, but whether the education was obtained in Canada must be extrapolated from the date of entry, age and level of education. It is for these two reasons that the immigration data was chosen.

V. The Choice of Countries and Occupations

The relevant countries have been chosen on the basis of two criteria, qualifying as a less developed country and providing a substantial portion of the immigrants to Canada. The International Bank for Reconstruction and Development defined developing countries as those with G.N.P. per capita below 5000 1981 U.S. dollars (pp. 560-66). This study adopts this classification with two exceptions. South Africa is excluded from the study. Hong Kong is included even though its G.N.P. per capita in 1981 was $5104. This is because of the substantial proportion of immigrants to Canada who list their country of origin as Hong Kong.

Occupations were chosen on the basis of the following criteria:

(a) post-secondary education is required for the occupation.

(b) a substantial portion of the total immigrants in professional occupations list it as their intended occupation.

(c) it was included in the original study of DeVoretz and Maki.

VI. Limitations

The majority of the limitations of the study arise from the data. The immigration data only count the incoming immigrants, it does not account for any return migration to the country fo origin, thus the transfer of human capital may be overstated.

The educational replacement cost estimates provide a rough approximation of the actual value of education, however quality and absolute cost differences across countries are ignored. To the extent that the costs vary depending on the period during which the degree was obtained, any variation is also disregarded. As the costs are only calculated at two specific points in time 1968 and 1980-1981, they have no relationship to the actual period when the degree was obtained. Cost differentials within Canada are a weighted average of the costs at various institutions and neglect any quality differences across institutions and time.

VII. Testing for Quality Changes

Testing the hypothesis that there has been no change in the value of human capital transfers involves testing whether or not three groups of immigrants, three cohort groups have different estimates of human capital. The focus

is the differences between the categories, as opposed to what variables affect the value of human capital. Therefore two options exist, analysis of variance or dummy variable regression. The former was chosen primarily for it's simplicity, since the two methods are considered equivalent. Analysis of variance was conducted on both the average social total cost per immigrant and the social total costs. The use of the average social total cost per immigrant tested the hypothesis that there had been no substantial decline in the value of human capital transfers on an individual basis. The purpose was to establish that the decline in absolute transfers of human capital was due to a decline in the number of immigrants.

Chapter 4

Empirical Results

As discussed briefly in Chapter 2 the immigration policy changes have affected the value of human capital transfers. This chapter examines in detail the changes that occurred in the estimated value of human capital transfers. The changes arising from occupational and country of last permanent residence definitions are also discussed.

Tables 2.1, 4.3 and 4.4 indicate the value of human capital transfers during the 1974-1979 and 1979-1987 periods has declined in comparison to the 1967-1973 period. This decline is partially explained by the drop in the number of immigrants entering the country. (see Tables 4.1 and 4.2) However, the decline in immigrants has been accompanied by a drop in the average social total costs per immigrant which suggests there has also been a degradation in the value of human capital. The primary objective of this chapter is to determine if there is evidence to support the following hypothesis: there has been no change in the value of immigrant human capital transferred.

Table 4.1
Immigration of Professionals in Selected Occupations
from LDCs to Canada,
1974 - 1979

Occupation	County of Last Permanent Residence										
	Argentina	Brazil	Chile	China	Egypt	Greece	Haiti	Hong Kong	India	Jamaica	Kenya
Managers	20	15	34	6	19	13	19	294	153	91	27
Engineers	33	18	88	13	46	69	4	421	497	59	39
Scientists	34	13	67	16	103	46	2	202	286	31	19
Professors	10	2	42	1	7	7	2	30	62	5	6
Teachers	16	4	86	1	25	22	27	86	125	43	24
Physicians	24	4	39	3	15	11	40	45	110	41	24
Nurses	2	0	27	0	2	0	1	16	4	10	0
Medical Technicians	2	0	10	2	0	2	2	25	22	3	0
Others	40	18	114	27	72	53	27	663	374	82	53
TOTAL	181	74	506	59	289	203	124	1782	1642	365	192

	Korea	Lebanon	Malaysia	Mexico	NL	Pakistan	Philippines	Portugal	Romania	Spain	Sri Lanka
Managers	51	56	18	0	45	86	151	11	0	15	9
Engineers	14	50	34	0	112	107	29	13	56	9	15
Scientists	44	26	23	0	21	69	151	3	17	17	10
Professors	6	13	7	0	18	12	5	2	5	6	3
Teachers	27	55	10	0	49	15	212	5	21	10	5
Physicians	11	34	21	0	58	10	98	1	9	10	6
Nurses	7	3	0	0	5	0	786	0	0	3	0
Medical Technicians	7	2	1	0	1	0	347	0	0	1	1
Others	155	56	25	0	46	120	875	21	29	24	9

TOTAL

	Taiwan	Tanzania	Trinidad and Tabago	Turkey	Yugoslavia	Indies	All Others	[1] DeVoretz and Maki Total	All New Others	[2] New Total
Managers	76	13	16	15	9	0	698	1576	308	1474
Engineers	165	23	19	72	148	0	1173	2777	569	2523
Scientists	177	18	19	14	34	0	725	1769	158	1515
Professors	11	1	3	9	4	0	210	388	103	341
Teachers	24	7	13	5	9	0	557	1176	255	1081
Physicians	5	2	15	3	11	0	731	1138	463	893
Nurses	3	1	0	2	1	0	74	893	28	463
Medical Technicians	3	0	1	0	2	0	47	453	12	3725
Others	227	43	24	58	58	0	1457	3937	674	12015
TOTAL	691	108	100	276	276	0	5672	14107	3708	24030

Source: Compiled from Canada, Employment and Immigration, Immigration Statistics.

Note: The "All Other" columns exclude the countries listed in tables 4.3 and 4.5 as well as Australia, Austria, Belgium, Bermuda, Britian, Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Poland, South Africa, Sweden, Switzerland, United States, and the Soviet Union. Other occupations include: architects, draftsmen, surveyors, actuaries, economists, computer programmers, accountants, dicticians, social workers, and librarians

Note: NL is a country not listed in the country names.

[1] See Table 4.3

[2] See Table 4.5

Table 4.2
Immigration of Professionals in Selected Occupations from LDCs to Canada 1979 - 1987

Occupation	County of Last Permanent Residence										
	Argentina	Brazil	Chile	China	Egypt	Greece	Haiti	Hong Kong	India	Jamaica	Kenya
Managers	24	31	11	30	128	27	8	1252	150	45	44
Engineers	62	37	20	34	207	72	7	1002	239	22	22
Scientists	20	12	25	57	86	28	7	126	165	30	16
Professors	8	12	7	14	17	16	2	36	91	4	4
Teachers	17	13	40	39	12	25	10	137	74	16	15
Physicians	13	12	3	10	29	18	11	44	126	28	15
Nurses	0	0	8	1	3	2	4	25	9	5	1
Medical Technicians	3	6	3	1	4	0	0	24	16	5	4
Others	47	28	36	49	210	50	11	1765	268	44	44
TOTAL	193	151	153	235	696	238	60	4410	1138	196	165

	Korea	Lebanon	Malaysia	Mexico	NL	Pakistan	Philippines	Portugal	Romania	Spain	Sri Lanka
Managers	54	88	59	0	0	46	337	8	17	29	37
Engineers	21	98	89	0	0	37	96	14	397	27	60
Scientists	9	15	24	0	0	30	82	8	90	12	34
Professors	7	9	9	0	0	7	16	5	26	5	16
Teachers	30	34	12	0	0	40	132	16	129	13	20
Physicians	2	64	18	0	0	25	67	2	87	9	23
Nurses	7	1	5	0	0	0	297	0	0	2	0
Medical Technicians	1	1	0	0	0	0	35	0	5	3	1
Others	92	65	137	0	0	64	438	20	179	23	80
TOTAL	223	375	353	0	0	294	1500	73	930	123	271

	Taiwan	Tanzania	Trinidad and Tabago	Turkey	Yugoslavia	Indies	All Others	DeVoretz and Maki[1] Total	New All Others	New[2] Total
Managers	84	10	37	34	24	0	1463	3736	1411	3751
Engineers	54	18	29	233	214	0	1319	4176	1965	4176
Scientists	40	11	22	27	31	0	906	1739	987	1739
Professors	12	--	5	21	8	0	361	2253	442	689
Teachers	16	1	19	9	19	0	928	1702	1087	3187
Physicians	7	20	18	6	17	0	727	1293	823	1322
Nurses	1	1	3	1	1	0	87	430	61	433
Medical Technicians	4	2	1	1	3	0	109	212	88	193
Others	108	30	68	130	88	0	2372	5889	2390	5889
TOTAL	296	93	202	462	404	0	8312	21430	9254	21379

Source: Compiled from Canada, Employment and Immigration, Immigration Statistics.

Note: The "All Other" columns exclude the countries listed in tables 4.3 and 4.5 as well as Australia, Austria, Belgium, Bermuda, Britian, Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Poland, South Africa, Sweden, Switzerland, United States, and the Soviet Union. Other occupations include: architects, draftsmen, surveyors, actuaries, economists, computer programmers, accountants, dicticians, social workers, and librarians

Note: NL is a country not listed in the country names.

[1] See Table 4.3

[2] See Table 4.5

I. Human Capital Transfers: Replication of 1968 Estimates

The magnitude of the human capital flows after the two structural changes in Canadian immigration policy are presented in Tables 2.1, 4.3 and 4.4. It is obvious that Canada has experienced an absolute decline in the amount of human capital transfers.

The initial period examined by DeVoretz and Maki (1980) produced estimates of human capital inflows under the Social Total Cost concept of 2.3 billion Canadian (1968) dollars or 328.5 million dollars per year, which was large by a number of criteria. Over the next two periods, the aggregate value of the flow declined. The estimated value of human capital inflows for the DeVoretz-Maki grouping of LDCs (with their occupation mix) dropped to an annual average of 111.3 million Canadian (1968) dollars for the 1974 to 1979 period. Under the post-1978 policy (i.e. the 1979-1987 period), the annual average value transferred from LDCs continued to decline to 106.4 million Canadian (1968) dollars.

TABLE 4.3

1974-1979
The Value of Professional Human Capital Inflows
Four Cost Concepts
Holding Sending Countries Constant[27]

(Thousands of 1968 Canadian Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[28] STC COST
Argentina	754	6,226	4,238	9,364	51.735
Brazil	298	2,482	1,648	3,698	49.967
Egypt	1,152	9,722	6,340	14,387	49.780
Greece	90	7,511	4,917	11,124	49.883
Hong Kong &China	7,102	58,566	38,187	86,247	46.849
India	662	55,864	37,073	83,215	50.679
Lebanon	1,202	9,776	6,652	14,661	49.700
Mexico	0	0	0	0	0
Pakistan	1,662	13,843	9,104	20,532	49.002
Philippines	9,420	74,291	47,418	106,968	40.304
Portugal	216	1,766	1,160	2,605	46.523
Romania	549	4,644	3,050	6,883	50.244
Spain	388	3,162	2,148	4,740	49.895
Sri Lanka	242	2,015	1,364	3,030	52.234
Syria	120	991	671	1,489	51.347
Turkey	630	5,341	3,516	7,939	50.890
Yugoslavia	1,110	9,551	6,206	14,140	51.234
West Indies	0	0	0	0	0
All Other	232,417	191,055	129,417	286,321	50.480
TOTAL	49,640	456,807	303,109	677,341	

[27] The human capital inflows are calculated using the same assumptions as DeVoretz and Maki, regarding educational levels required for a given occupation.

[28] Average Social Total Cost (per immigrant in the Professional category of the study). Calculated by dividing the social total cost per country by the total number of immigrants in the professional categories from that country over the respective period of time.

TABLE 4.4

1979-1987
The Value of Professional Human Capital Inflows
Four Cost Concepts
Holding Sending Countries Constant

(Thousands of 1968 Canadian Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[29] STC COST
Argentina	777	6,471	4,301	9,632	49.909
Brazil	625	5,128	3,496	7,715	51.091
Egypt	2,772	23,083	15,232	34,273	49.243
Greece	977	8,124	5,462	12,158	51.084
Hong Kong &China	17,797	144,925	94,964	213,630	45.991
India	4,753	39,171	26,758	58,993	51.839
Lebanon	1,584	12,958	8,961	19,621	52.324
Mexico	0	0	0	0	0
Pakistan	998	8,133	5,473	12,135	48.737
Portugal	285	2,332	1,540	3,447	47.214
Romania	3,777	31,872	21,116	47,432	51.002
Spain	498	4,088	2,754	6,116	49.725
Sri Lanka	1,102	9,077	6,114	13,873	50.086
Syria	366	3,051	2,090	4,611	53.615
Turkey	1,843	15,653	10,221	23,174	50.161
Yugoslavia	1,622	13,852	9,040	20,524	50.802
West Indies	0	0	0	0	0
Philippines	5,634	44,869	29,502	65,881	43.921
All Other	33,303	271,275	182,559	404,704	48.689
TOTAL	78,713	644,062	429,583	957,919	

[29] Average Social Total Cost (per immigrant in the Professional category of the study). Calculated by dividing the social total cost per country by the total number of immigrants in the professional categories from that country over the respective period of time.

For our new human capital estimates (i.e., 1974-1979) the 1966 "Open Policy" was still in place. Nevertheless, over this six year period estimates of human capital, in all four cost concepts dropped by approximately 70% in real terms from the estimates reported by DeVoretz and Maki for the 1966-1973 period. In terms of the average per year, the social total cost declined by 66%. This decline continued in the post-1978 policy with human capital transfers measured by social total cost being 67% smaller than the transfers from 1966-1973.

In terms of total transfer sufficient time has elapsed after the 1978 policy was enacted to make a more valid comparison time-wise to the DeVoretz-Maki estimates for the initial period of the open immigration policy. For a comparable interval i.e. nine years versus their eight years, all of our alternative human capital measures for the 1979-1987 period fall to 40% of that transferred in the initial portion of the open policy period.

The average social total cost <u>per immigrant</u> changed slightly for most of the countries listed. Over the two policy changes there was a decline in the average for all countries from 49.11 thousands of 1968 Canadian dollars to 44.91 thousands of 1968 Canadian dollars.

II. Human Capital Estimates 1968 Costs: Source Countries

A closer examination of the human capital inflows estimated using the 1968 costs indicates that the decline in transfers occurred while a shift in source countries took place. The importance of the Asian countries is evident from an examination of Tables 4.5 and 4.6, which cover the 1974-1979 and 1979-1987 periods respectively. These tables list alphabetically the top sending countries, in terms of absolute numbers of immigrants who had post-secondary education upon arrival in Canada.[30]

Historical ties to European countries had begun to weaken after the "Open policy" was implemented. After 1974, only two of the five less developed European countries, listed in Table 2.1, remained top sending countries.[31] Although, Yugoslavia and Greece sent fewer professionals, the average social total cost per immigrant rose slightly between 1974-1979 and 1979-1987. This shift in source

---

[30] The estimates in both Table 4.3 and 4.4 use the same assumptions as DeVoretz and Maki (1980) regarding educational levels required for a given occupation.

[31] Canada has nevertheless maintained strong ties to Great Britain and the United States. These countries accounted for 12.2% and 11.8% of all Canadian immigrants, respectively from 1973-1979; distinguishing them as the top two senders. Great Britain's percentage fell to 7.9% during the 1979-1987 period, second only to the Social Democratic Republic of Vietnam which accounted for 9.8% of all immigrants. The United States percentage fell to 7.6% making it the third largest sender.

countries is consistent with the 1967 institution of the point system which removed the bias in favor of European immigrants.

TABLE 4.5

1974-1979
The Value of Professional Human Capital Inflows
Four Cost Concepts
Top LDC Sending Countries in Terms of Number of Immigrants

(thousands of Canadian 1968 Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[29] STC COST
Argentina	754	6,226	4,238	9,364	51.735
Chile	2,031	16,636	11,174	24,787	48.987
China	268	2,235	1,452	3,291	47.702
Egypt	1,152	9,722	6,340	14,387	49.780
Greece	890	7,511	4,917	11,124	49.883
Haiti	533	4,209	3,015	6,432	51.875
Hong Kong	6,875	56,702	36,973	83,506	46.861
India	6,662	55,864	37,073	83,215	50.679
Jamaica	1,473	11,964	8,100	17,907	49.059
Kenya	780	6,386	4,321	9,556	49.773
Korea	1,206	9,699	6,318	14,198	44.092
Malaysia	590	4,894	3,353	7,393	53.185
NL	1,506	12,438	8,567	18,809	52.983
Pakistan	1,662	13,843	9,104	20,532	49.002
Philippines	9,420	74,291	47,418	106,968	40.304
Taiwan	2,684	22,605	14,552	33,232	48.093
Tanzania	412	3,413	2,201	5,003	46.322
Trinidad &Tobago	453	3,729	2,528	5,595	50.867
Yugoslavia	1,110	9,551	6,206	14,140	51.234
All Other	10,741	87,645	60,422	132,243	51.456
Total	50,934	417,328	276,820	618,391	
Total[1]	50,481	413,599	274,292	612,796	

[1] Total excluding Trinidad and Tobago, which is not listed as a LDC in 1981, but was included because it was a large sender.

TABLE 4.6

1979-1987

The Value of Professional Human Capital Inflows
Four Cost Concepts
Top LDC Sending Countries in Terms of Number of Immigrants

(Thousands of Canadian 1968 Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[29] STC COST
Argentina	777	6,471	4,301	9,632	49.909
Chile	581	4,752	3,085	6,963	45.509
China	939	7,780	5,154	11,559	49.189
Egypt	2,772	23,083	15,232	34,273	49.243
Greece	977	8,184	5,462	12,158	51.084
Haiti	249	2,015	1,388	3,036	50.592
Hong Kong	16,858	137,144	89,810	202,071	45.821
India	4,753	39,171	26,758	58,993	51.839
Jamaica	801	6,520	4,432	9,784	49.919
Kenya	662	5,364	3,623	8,018	48.593
Korea	836	6,672	4,373	9,789	43.986
Malaysia	1,382	11,348	7,498	16,800	47.591
NL	0	0	0	0	0
Pakistan	998	8,133	5,473	12,135	48.767
Philippines.	5,634	44,869	29,502	65,881	43.921
Taiwan	1,154	9,329	6,209	13,837	46.747
Tanzania	389	3,185	2,188	4,801	51.629
Trinidad &Tobago	800	6,504	4,354	9,675	47.896
Yugoslavia	1,622	13,852	9,040	20,524	50.802
All Other	37,399	306,839	206,523	458,337	49.529
Total	78,643	643,373	429,250	956,708	

The countries maintaining the most consistent performance over the twenty year span are Hong Kong, the Philippines and India.[33] These three countries maintained the top three positions in terms of absolute numbers of professionals sent and the value of human capital transferred as measured by the social total replacement cost concept.[34] Hong Kong and India both experienced declines in the average social total cost per immigrant transferred over the three policy epochs. The Philippines initially had a per immigrant replacement cost of 41.7 thousands (1968) dollars over the 1967-1973 period, but then experienced a decrease followed by an absolute increase to 43.9 thousands (1968) dollars in the 1979-1987 period.

The sudden decline in performance of the West Indies from one of the top five senders in 1966-1973 to a country

---

[33] Hong Kong was initially grouped together with China, in the 1966-1973 period. To be consistent with the DeVoretz and Maki (1980) study these two countries were left together in tables 2.3 and 2.4. The reasoning behind the joint listing is that prior to 1970 Canada did not recognize the Chinese government, and there was no Canadian Embassy until 1971. Thus Chinese immigrants to Canada had to come through another country. DeVoretz and Maki (1980) found that in 1972 90.6% of Chinese citizens immigrating to Canada listed Hong Kong as the country of last residence. (p. 793) The two countries are listed separately in tables 4.1 and 4.2 as China became a top sender in its own right, particularly from 1979-1987.

[34] Hong Kong became increasingly important as a source country during 1979-87. 21.8% of all immigrants with post-secondary education, 1984-1987 listed Hong Kong as their country of last permanent residence, up from 10.1% during 1979-1983.

with no professional manpower immigrating to Canada, can be attributed to a confusion of political and geographical definitions. The geographical area defined as the West Indies includes a number of independent countries, including, Jamaica and Trinidad and Tobago. Both of these countries were part of the West Indies Federation until 1962 when they became independent. These two countries were among the top senders of professional manpower from this region from 1974-1987. Given the political and geographical history it possible that they may have been captured under the broader heading of the West Indies during 1966-1973.

The drastic decline of professional manpower from Mexico causes a problem. It would seem plausible that Mexican immigrants with professional degrees may enter Canada after residing in other developed countries. Thus, the bias introduced by using the country of last permanent residence as opposed to the country of origin definition of source, would explain this sudden drop. However, in 1981 97 per cent of the immigrants from Mexico listed their country of last permanent residence as their country of citizenship. Only 2 per cent listed developed countries including the United States as the country of last permanent residence (see Table A1). Between 1974 and 1987, 8846 Mexicans did immigrate to Canada, but none of those entering between 1974 and 1979 had a university education and between 1979 and 1987 none had post-secondary education.

III. Human Capital Estimates : Educational Attainment

The data from 1974-1979 have no direct information to reveal the actual degree an immigrant held upon entry. The result was that assumptions (outlined in the note to Table 3.1) were made regarding the degree which corresponded to each occupation. As mentioned above, the data for 1979-1987 allow a correction for this problem. However, in order to make the human capital transfers comparable across policies, the assumptions were applied to the 74-79 data and to the 79-87 data. The estimates of human capital for the post-1978 policy, which make use of actual degrees, are presented in Table 4.7. A comparison of Table 4.4 (estimates incorporating the assumptions) and Table 4.7 indicate that those estimates which use the assumptions regarding the education level overstate the value of the private and social direct costs of human capital inflows during 1979-1987, by 4.4 and 7.5 per cent respectively. Thus the estimates for the post-1968 policy may also overstate the actual value of human capital transfers received. The Canadian taxpayer benefited by 565,349 thousand (1968) dollars according to the estimates in Table 4.4. Using the estimates in Table 4.7, the taxpayer benefitted by 523,592 thousand (1968) dollars. In this case, the benefit of immigration of professionals to the Canadian taxpayers, who would pay the difference between the private and social

direct replacement costs of educating Canadians, would be overstated by approximately 8.0 per cent.

TABLE 4.7

1979-1987
The Value of Professional Human Capital Inflows
Four Cost Concepts
Holding Sending Countries Constant[35]

(Thousands of 1968 Canadian Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P I.[36] STC COST
Argentina	713	5,636	369	8,224	42.612
Brazil	587	4,691	3,152	6,954	46.054
Egypt	2,608	20,763	13,681	30,400	43.678
Greece	941	7,586	5,106	11,299	47.474
Hong Kong &China	16,751	132,035	85,458	191,317	41.141
India	4,793	37,778	26,397	57,237	51.554
Lebanon	1,423	11,382	7,512	16,747	44.660
Mexico	0	0	0.00	0	0
Pakistan	985	7,937	5,339	11,828	47.504
Philippines	5,252	41,132	26,084	58,953	39.197
Portugal	277	2,176	1,430	3,180	42.395
Rumania	3,316	26,182	16,785	37,751	40.635
Spain	477	3,742	2,508	5,538	45.829
Sri Lanka	1,054	8,397	5,647	12,466	46.000
Syria	330	2,635	1,755	3,894	45.283
Turkey	1,843	15,000	10,100	22,296	48.052
Yugoslavia	1,431	11,309	11,309	16,264	40.256
West Indies	0	0	0	0	0.000
All Other	32,740	260,612	172,890	383,784	44.517
TOTAL	75,401	598,993	395,522	878,132	

[35] This table makes use of actual education levels achieved.

[36] Average Social Total Cost (per immigrant in the Professional category of the study). Calculated by dividing the social total cost per country by the total number of immigrants in the professional categories from that country over the respective period of time.

IV. Human Capital Estimates : Occupational Shifts

The shifts in occupations were not particularly important. The nine occupational groups chosen by DeVoretz and Maki (1980) remained very important. Two occupational categories increased noticeably: computer programmers and medical technicians. The former category has been captured in all three of the policy epochs studied, in the "Other" category. The latter category had posed a slight problem. The definition of medical technicians used be DeVoretz and Maki (1980) included registered nursing assistants, physiotherapists, occupational and other therapists and nursing therapy and related assisting occupations not elsewhere classified. However, there was another category labelled medical technicians which became important over the 1974-1987 period. To avoid confusion, this occupation has been omitted from the estimates presented here.

The benefit of the immigration of professionals may be overstated in the human capital transfers, as the result of assuming the level of degree held, but they also neglect a large portion of the immigrants entering Canada. Of immigrants from LDCs, entering Canada from 1974 to 1979 with a university degree, 28 per cent listed their intended occupation as "Not Elsewhere Classified".[37] For 1979-1987

---

[37] The Canadian Classification and Dictionary of Occupations uses the four digit codes, 9998 and 9999 to

the LDC immigrants who had at least technical school education, 43 per cent gave "Not Elsewhere Classified".[38] Such a substantial proportion of the immigrant flow having some investment in human capital must also provide benefits to the Canadian society. In order to capture these transfers, the value of human capital embodied in the immigrants was re-estimated including the occupational category "Not elsewhere stated". Again because of the inherent problems in the data, it was assumed that any immigrant stating an occupational code of 9998 or 9999 must have at least obtained a bachelor degree in Arts.

When comparing Tables 4.5 and 4.8, the estimates of human capital transfers of the nine occupational categories would understate the human capital transfers of immigrants with university education by 59 per cent. This is assuming a bachelors degree of arts, the "least cost" degree from a replacement cost standpoint.

---

indicate not elsewhere classified. However, since the classification of occupations in the dictionary is very extensive it is highly unlikely that 43 per cent of immigrants had occupations which were not listed. Thus, the 9999 category represents the missing data category.

[38] Only those having a university degree were actually included in the sample.

Table 4.8

1974-1979
Human Capital transfers of the top sending countries
Including the 9999 occupational code

(Thousands of 1968 Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I. STC COST
Argentina	902	7,378	4,953	10,992	48.852
Chile	2,358	19,175	12,749	28,375	47.057
Egypt	1,870	15,301	9,768	22,234	44.027
Greece	1,096	9,107	5,907	13,380	47.114
Haiti	704	5,543	3,844	8,319	47.537
Hong Kong	10,209	82,639	53,063	120,163	43.333
India	20,047	160,002	101,676	230,398	40.989
Jamaica	1,934	15,549	10,324	22,974	45.766
Kenya	955	7,747	5,165	11,480	47.049
Korea	3,797	29,851	18,820	42,680	39.084
Malaysia	916	7,433	4,928	10,981	46.529
NL	1,987	16,181	10,888	24,089	48.390
Pakistan	4,394	35,094	22,288	50,568	41.078
Philippines	13,339	104,781	66,333	150,061	39.293
Taiwan	4,151	34,016	21,631	49,360	43.797
Tanzania	536	4,381	2,802	6,371	43.941
Trinidad &Tobago	651	5,272	3,495	7,791	46.375
Yugoslavia	1,353	11,435	7,734	16,804	48.287
All Other	18,414	147,832	99,242	219,992	48.297
Total	89,613	718,717	465,610	1,047,012	

The average value of human capital as measured by the average social total cost, declines when the 9999 occupational category is included.

V. Declines in Human Capital Transfers

One interesting aspect of the decline in total transfers of human capital was that it began during 1974-1979, as opposed to the post-1978 "Restrictive period". The immigrants entering Canada between 1974-1979 were subject to the 1967 Immigration Act.[39] DeVoretz and Maki (1983) suggest that the expansionist immigration period vis-a-vis Third World countries occurred between 1964 and 1975; the immigration acts of 1967 and 1978 simply reflected the actual practice of Employment and Immigration, Canada (DeVoretz and Maki, 1983, p. 55). The estimates in the value of human capital transferred support this hypothesis.

---

[39] 1979 is the year in which immigrants were admitted to Canada under the 1967 Immigration Act as well as the 1978 Immigration Act. The apparent overlap of the data simply reflects the fact that some immigrants who were admissible under the former act did not actually enter the country until 1979.

VI. Changes in Human Capital Transfers

The cause for this substantial decline in the total human capital inflows can be attributed to either a decline in the number of immigrants or to a decline in the quality of immigrants. The extent to which there has been a decrease in the number of immigrants allowed into Canada is shown in Table 2.2. Total immigration flows have declined by 8 percent from 1966-73 to 1979-1987. However, inflows of immigrants from LDCs in the professional categories dropped by 71% during 1974-79 and to 58% of the initial level during the restrictive post-1978 policy. In order to determine if the drop in total transfers was attributable to the decline in the number of immigrants or a decline in the educational value the following question must be addressed;

> Has there also been a change in the educational value of human capital of the highly trained LDC immigrants over this period, which contributed to the decline in total human capital inflows?

In order to test this hypothesis a simple analysis of variance test was conducted on the value of human capital as measured by the replacement cost of education. The null hypothesis simply stated is that there has been no change in the educational value of highly trained immigrants after the 1978 policy was introduced. This could be more formally

stated as:

$$Ho: \quad U^{1966-73} = U^{1974-79} = U^{1979-87}$$

or that the mean of the relevant cost concept for 1966-73 is equal to the mean values for the other two periods. Two cost concepts were tested, social total cost and the average social total cost. Social total cost is used to test if the total value of human capital transfers for the nine occupational categories have declined. Whereas the **average** social total cost is used, to adjust for unequal time periods.

The results of the analysis of variance test are stated in Table 4.9. Three separate analysis of variance tests were conducted. First, the average social total costs per immigrant over the three periods was tested, for the sending countries used in the initial study (countries listed in Table 4.7). Second, the average total social cost concept was tested allowing the sending counties to change in the 1974-1987 period to reflect the shift in source countries. In both cases the calculated F statistic was below the critical F statistic at the five percent probability level. Thus, the null hypothesis could not be rejected.

The next two tests use the social total cost estimate of human capital transfers. Again the first test was run with holding the sending countries constant and the second test was run allowing the sending countries to reflect the shift

in sending countries. The social total cost was tested over the two most comparable periods 1966-1973 and 1979-1987.[40]

The calculated F statistic is below the critical value therefore the initial hypothesis can not be rejected at both the five and one percent probability levels. Thus, there has been no significant change in the mean of the social total cost of the immigrants in the professional category. This suggests that the decline in absolute transfers of human capital in the professional category was due to a decreased number of immigrants.

---

[40] Comparable in terms of time elapsed, eight years and approximately eight and a half years due to the change in policy.

Table 4.9
Analysis of Variance Results

1. Average Social Total Costs per Immigrant in the Professional Category holding Source Countries Constant

Period of Immigration	Mean[41]	F-value	Degrees of Freedom	Ho
1966-1973	51.376			
1974-1979	44.250	1.7920	2,54	acc
1979-1987	44.497			

2. Average Social Total Costs per Immigrant in the Professional Category allowing Source Countries to change

Period of Immigration	Mean	F-value	Degrees of Freedom	Ho
1966-1973	51.376			
1974-1979	49.267	3.4876	2,54	acc
1979-1987	48.550			

3. Social Total Cost

Period of Immigration	Mean	F-value	Degrees of Freedom	Ho
1966-1973	161153	4.0209	1,36	acc
1979-1987	50404			

4. Social Total Cost

Period of Immigration	Mean	F-value	Degrees of Freedom	Ho
1966-1973	161153	3.8417	1,36	acc
1979-1987	50961			

[41] Thousands of 1968 Canadian dollars.

Critical Values

Alpha	Degrees of Freedom	F-critical
0.05	1,30	4.17
0.05	1,40	4.08
0.05	2,40	3.23
0.05	2,60	3.15

Codes: acc=can not reject; rej=reject; ?=inconclusive.

VII. Human Capital Transfers: 1981 Replacement Costs

Using the 1981 Canadian replacement costs of education the value of human capital transfers were estimated. The top sending countries are listed alphabetically in Tables 4.7 and 4.8. Canadian society received transfers, as measured by the total social cost concept worth 1.3 billion 1981 dollars from 1974-1979 and 1.8 billion 1981 Canadian dollars from 1979-1987. This would be 26 and 37 per cent of the total expenditures on university education in Canada during 1981-1982 respectively.[42]

The amount borne by the Canadian taxpayer would have would been 455,824 and 622,081 thousands of (1981) dollars during 1974-1979 and 1979-1987 respectively. Canadian individuals benefitted by 710,367 and 1,022,575 thousands (1981) dollars.

---

[42] Source: Education in Canada a Statistical Review 1985-1986. Statistics Canada. Canadians spent $6,985,022,000 on university education during 1985-86.

TABLE 4.10

1974-1979
The Value of Professional Human Capital Inflows
Four Cost Concepts
Top LDC Sending Countries in Terms of Number of Immigrants

(Thousands of 1981 Canadian Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[43] STC COST
Argentina	1,093	7,648	9,622	18,089	99.940
Chile	2,855	19,300	25,614	46,683	92.259
China	384	2,684	3,507	6,401	92.762
Egypt	1,654	12,084	15,041	28,047	97.047
Greece	1,279	9,303	11,741	21,780	97.668
Haiti	809	5,219	6,511	12,638	101.921
Hong Kong	9,810	64,555	90,657	160,222	89.911
India	9,621	69,157	87,444	162,665	99.095
Jamaica	2,151	1,390	19,125	34,639	94.901
Kenya	1,137	7,562	10,029	18,433	96.006
Korea	1,701	10,228	15,382	26,459	82.171
Malaysia	863	6,153	7,597	14,437	103.863
NL	2,213	15,606	19,427	36,877	103.878
Pakistan	2,375	16,041	22,088	39,349	93.911
Philippines	13,117	91,879	117,450	215,916	81.355
Taiwan	3,825	27,059	35,677	64,501	93.345
Tanzania	587	3,909	5,425	9,619	89.063
Trinidad &Tobago	687	4,681	6,057	11,253	98.708
Yugoslavia	1,618	12,539	15,126	28,613	106.669
All Other	21,739	150,648	190,354	358,294	100.222
Total	79,134	534,961	710,367	1,308,514	

[43] Average Social Total Cost (per immigrant in the Professional category of the study). Calculated by dividing the social total cost per country by the total number of immigrants in the professional categories from that country over the respective period of time.

TABLE 4.11

1979-1987
The Value of Professional Human Capital Inflows
Four Cost Concepts
Top Sending Countries in Terms of Number of Immigrants

(Thousands of 1981 Canadian Dollars)

COUNTRY	PRIVATE DIRECT COST	SOCIAL DIRECT COST	PRIVATE TOTAL COST	SOCIAL TOTAL COST	P.I.[44] STC COST
Argentina	1,120	7,805	10,220	18,724	97.018
China	1,325	8,943	12,092	21,746	92.536
Chile	811	5,303	7,417	13,101	85.630
Egypt	3,987	27,307	36,845	66,396	95.397
Greece	1,396	9,694	12,683	23,270	97.772
Haiti	365	2,486	3,130	5,929	98.815
Hong Kong	24,038	145,884	224,382	381,756	86.566
India	6,802	46,633	60,608	112,050	98.462
Jamaica	1,169	7,812	10,307	18,982	96.847
Kenya	957	6,071	8,575	15,278	92.594
Korea	1,168	6,598	10,762	17,882	80.189
Malaysia	1,981	12,901	18,108	32,154	91.088
NL	0	0	0	0	0
Pakistan	1,444	9,309	12,846	23,136	92.971
Philippines	7,972	51,094	72,209	127,615	85.077
Taiwan	1,629	9,734	15,074	25,633	86.599
Tanzania	585	4,135	4,971	9,647	103.732
Trinidad &Tobago	1,154	7,396	10,301	18,452	91.347
Yugoslavia	2,360	17,813	22,036	41,245	102.092
All Other	53,710	356,754	482,101	874,349	94.483
Total	112,648	734,729	1,022,575	1,825,599	

[44] Average Social Total Cost (per immigrant in the Professional category of the study). Calculated by dividing the social total cost per country by the total number of immigrants in the professional categories from that country over the respective period of time.

VIII. Summary

The human capital transfers that took place between 1974-1987, as the result of immigration from LDCs to Canada of professionals, have declined when compared to transfers from 1966-1973. This decline is partially due to a decline in the absolute number of immigrants entering Canada.

The shift away from European source countries to Asian and African source countries is consistent with the implementation of the 1967 immigration policy. What is not consistent is the decline in human capital transfers while this "open policy" was in place. The suggestion of DeVoretz and Maki (1983) that the expansionist policy vis-a-vis LDCs ended in 1975 explains this inconsistency.

The results of the analysis of variance indicate that of the immigrants entering Canada, in the nine intended occupational categories examined, there is no evidence of a decline in the value of human capital. However, it must be emphasized that educational value is the only aspect of human capital that has been measured. The estimates of human capital in terms of the 1981 replacement costs of education indicate that Canadian individuals and taxpayers continue to benefit from the immigration of professionals.

To the extent that immigration from LDCs has moved away from the nine professional categories to other occupations, the value of human capital transfers may be declining as a result of immigrants with lower educational investments entering the country.

Chapter 5

Policy Implications and Conclusion

I. Changes in the Educational Value Embodied in Immigrants

The results of the analysis of variance indicate that there has been no significant change in the value of human capital embodied in the more recent highly skilled immigrants. Contrary to the a priori expectation, the changes in immigration policy in Canada, have not caused a deline in the average human capital content of immigrants, at least in the professional category.

The a priori expectation of human capital content decline was based on the fact that Canadian immigration policy had begun to favour family reunification and Canadian demographic needs as opposed to economic immigrants. One economic implication of Chiswick's (1986) study is that if immigration policies favor or have special preferences for refugees and/or relatives of citizens and resident aliens based on humanitarian and foreign policy objectives, economic costs exist in some form. Refugees and relatives of citizens are less likely to be "self-selected" on the basis of expected high economic success in the country of origin (Chiswick, 1986, p. 173).[45]

---

[45] The fact that immigrants from the Social Republic of Vietnam did not show up in the professional categories,

Canadian immigrants from LDCs did not perform as well as immigrants from industrialized nations in terms of age-earnings profiles as reported by Akbari (1988). Thus, with immigrants from LDCs increasing as a percentage of both total immigration and professionals in the labour force, it was expected that there should be a decline in the value of human capital. The total transfers did decline. However, the average transfer per immigrant did not. This inconsistency between the results of the age-earnings approach and the results of this paper, using the replacement cost method may be explained by the less readily measured aspects of human capital such as school quality, assumed to be homogeneous in the replacement cost method. The age-earnings approach is able to capture all aspects of human capital, whereas we have only examined education.

The other factor to consider is the assimilation process may require investment in country specific skills such as learning English. This would account for the longer time required for a LDC foreign born worker to surpass the earnings of the native-born, and "should not be interpreted as a decline in quality of human capital" (Chiswick, 1986, p.182). In addition there are other explanations, the probability of discrimination or barriers to entry particularly in the professional occupations, and the period

---

despite a large number of immigrants, does indicate that refugees are less likely to have been self-selected on the basis of human capital quality.

effects on immigrants earnings. Determination of the effects of each of these factors upon immigrants earnings is beyond the scope of this work but requires more research.

The large segment of immigrants entering under the not elsewhere classified category may be an indication of a shift away from the nine professional occupational categories. In the event of this situation the educational value of human capital may be declining. Unfortunately, this can not be determined without further information as to the educational and skill levels of these immigrants.

II. Policy Implications

The results of the replacement cost measurement of human capital have important policy implications. First, the move to the open policy of 1967 did bring about large inflows of human capital. The implementation of the restrictive 1978 policy resulted in a decrease in the absolute value of human capital transfers, which was attributed to the decline in absolute numbers of immigrants as opposed to decline in the embodied human capital. If Canada is concerned about the benefits of immigration, a move to a more open policy with emphasis on economic immigrants could raise the absolute level of human capital transfers.

Second, the decline in total transfers of human capital began during 1974-1979, as opposed to the post-1978 "Restrictive period". The results therefore support the hypothesis of DeVoretz and Maki (1983) that the expansionist immigration period vis-a-vis Third World countries occurred between 1964 and 1975; the immigration acts of 1967 and 1978 simply reflected the actual practice of Employment and Immigration, Canada.

Third, in light of the relatively consistent values of average human capital in these nine occupational categories, the concern over declines in human capital transfers may be unwarranted. The effects of the policy changes upon other occupational categories is unknown. Future research in this area may be of interest since shifts in occupations, perhaps away from those requiring technical training to unskilled occupations may have caused a decline in the value of human capital.

Fourth, in light of the consistent human capital values, the use of cross-sectional age-earnings profiles for information on immigrant performance and policy decisions has not been found to be misleading, at least with respect to a decline in the educational component of human capital in the professional occupations in Canada.

III. Conclusion

This paper has provided estimates of the value human capital transfers, as measured by educational attainment, of Canadian immigrants from LDCs and an indication of the changes in average skill levels over the past twenty years, for selected occupation. The results indicate that Canadian immigrants from LDCs have not suffered a decline in the value of human capital. As a result of these immigrant flows from 1974-1987, Canadian society has benefitted by 3.1 billion (1981) Canadian dollars.[46]

It should be noted that this research and previous studies are based on the public provision of education. If the education required for the nine occupational categories were provided privately in a situation where all costs were internalized, the social benefits of immigration as measured here would not exist. The benefits would be limited to the individual.[47]

---

[46] The reader is reminded that the public provision of education is an important factor in determining the benefit to society.

[47] An example of this situation is the private education of computer programmers and systems analysts. If all computer programmers in Canada were educated at private institutions, it could be argued that the measurement of the human capital transfer using the social direct and social total cost concepts would be inappropriate. Canadian taxpayers would not benefit from the immigration of computer programmers since in the absence of immigration they would not have provided any resources to the training of such

The structural changes in the immigration policy have resulted in a shift in source countries, particularly to Asian countries. However, the policy changes have not had a negative effect upon the self-selection of immigrants in the nine professional categories, at least in terms of educational value.

Inconsistencies between the results of age-earnings profiles of immigrants and expected results of the replacement cost calculation of human capital can be explained by period effects upon immigrants earnings, discrimination, barriers to entry and unmeasured aspects of human capital such as motivation and school quality. The limitations of the replacement cost method must be emphasized. Only one dimension of human capital was measured, the educational attainment of the immigrant upon entry to Canada. Differentials in school quality were not incorporated into the calculations. If nothing else the estimates of human capital transfers indicate the direction of change. According to our estimates, immigrants to Canada continue to provide benefits to the Canadian economy.

---

individuals. In this case the marginal cost of education would consist of the private total costs, where foregone earnings were measured by gross foregone earnings.

APPENDIX

TABLE A1

Percentage Distribution of Immigrants to Canada by Country of Citizenship, by Category of Country of Last Residence, Selected LDCs 1981

Country of Citizenship	Category of Country of Last Residence: Country of Citizenship	Other LDC	DC	Total
Argentina	84	13	3	100
Brazil	86	6	8	100
Chile	97	2.6	.7	100
China	96	4	.3	100
Egypt	93	3.3	3.3	100
Greece	94.2	3.7	2.6	100
Haiti	99	.6	.2	100
India	92	2.4	6.1	100
Kenya	94.9	1.1	3.9	100
Korea	75.6	.3	23.9	100
Malaysia	89.8	1.5	8.3	100
Pakistan	71.6	19.9	8.8	100
Philippines	96.9	2.5	.9	100
Taiwan	82.3	14.2	3.4	100
Tanzania	78.2	1.9	19.8	100
Trinidad &Tobago	93.2	1.7	5	100
Yugoslavia	92	1.4	7.9	100

TABLE A2

All Immigrants by Class of Entry
Excluding Europe, Austrailasia and the United States

Year	Class of Entry: Family	Refugees	Designated	Assisted Relatives	Independent
1981[1]	33,306	671	14,169	11,248	15,202
1982	33,818	1,571	5,841	7,504	15,955

1983
Immigrants from Selected Countries by Class of Entry[2]

Family	Refugees	Designated	Assisted Relatives	Entrepren.	Independ.	
4519	66	154	618	562	1151	HongK
226	0	16	174	47	107	Taiw.
6564	8	99	12	16	342	India
3844	3	46	57	29	475	Phil.

Note: Countries: HongK= Hong Kong; Taiw.=Taiwan; Phil.=Philippines.

---

[1] Excluding all North and Central American Countries.

[2] Countries Hong Kong, China, India, Philippines and Taiwan.

REFERENCES

Akbari, Syed A. H. Some Economic Impacts of the Immigrant Population in Canada, Ph. D. Thesis, Simon Fraser University, (1988).

Berger, Mark C. and Michael A. Webb. "Commercial Policy and the Brain Drain." Applied Economics, 19 (1987), 143-153.

Bhagwati, J. and K. Hamada, Brain drain and international markets integration, in The Brain Drain and Taxation, (North-Holland publishing Company, 1976), 113-138.

Blomqvist, Ake G. "International Migration of Educated Manpower and Social Rates of Education in LDCS." International Economic Review, 27 (1986), 165-174.

Borjas, George J. "Assimilation Changes in Cohort Quality and the Earnings of Immigrants." Journal of Labour Economics, (1985), 463-89.

_____. "Immigrants, Minorities, and Labor Market Competition." Industrial and Labor Relations Review, (April, 1987), 382-92.

_____. "Immigrant and Emigrant Earnings: A Longitudinal Study," Economic Inquiry, 27(1) (1989), 21-37.

Canada, Employment and Immigration. Immigration Statistics, (Ottawa: Department of Employment and Immigration, 1981, 1982, 1985).

Canada, Employment and Immigration. Canadian Classification and Dictionary of Occupations, (Ottawa: Department of Employment and Immigration, 1986)

Chiswick, Barry R. "Immigrant Earnings Patterns by Sex, Race, and Ethnic Groupings." Monthly Labour Review, (1980), 22-25.

_____. "Immigrants in the U.S. Labour Market." Annals of the American Academy of Political and Social Science. (1982), 64-72.

_____. "Is the New Immigration Less Skilled than the Old." Journal of Labour Economics, (1986), 168-92.

DeVoretz, Don J. Economics of Immigration:An Annotated Bibliography Circa 1977-1987. (November 1988).

DeVoretz, Don J. and Dennis Maki. "The Immigration of Third World Professionals to Canada; 1968-1973." World Development, 11(1) (1983), 55-64.

_____. "The Size and Distribution of Human Capital Transfers from LDCs to Canada." Economic Development and Cultural Change, (1980), 779-800.

Dodge, David, and David Stager. "Economic Returns to Graduate Study in Science, Engineering and Business." Canadian Journal of Economics, 5 (May, 1972), 182-98.

Ghosh, B. N. "Brain Migration from Third World: An Impicative Analysis." Rivista Internazionale di Scienze Economiche e Commerciali, 31 4 (1984), 346-70.

Greenwood, Michael and John M. McDowell. "U.S. Immigration Reform: Policy Issues and Economic Analysis." Contempory Policy Issues, 3 (1985), 59-75.

Grubel, Herbert B. and Anthony D. Scott. "The International Flow of Human Capital." American Economic Review, 56 (May 1965), 277-280.

_____. "The Immigration of Scientists and Engineers to the United States 1949-1961." Journal of Political Economy, 74 (1966), 81-98.

Howith, H. G. Immigration ~~Levels~~ Planning: The First Decade, (Ottawa: Employment and Immigration Canada, March 1988).

International Bank for Reconstruction and Development. World Tables, vol. I, 3 ed., (Baltimore: The John Hopkins University Press, 1983)

Kurian, George Thomas, ed. Encyclopedia of the Third World, vol. III, 3 ed, (New York: Facts on File, 1987).

Kwok, Viem and Hayne Leland. "An Economic Model of the Brain Drain." American Economic Review, (1982), 91-100.

Marr, W.L., and D.J. McCready. The Effects of Demographic Structure on Consumptiona and Savings Patterns in Canada, (Draft March, 1988)

Marr, W.L., and M.B. Percy. "Immigration Policy and Canadian Economic Growth." Domestic Policies and International Economic Environment, Vol. 12 Royal Commision on the Economic Union and Development

Prospects for Canada. (Toronto: University of Toronto Press, 1985).

McDade, Kathryn. "Barriers to Recognition of the Credentials of Immigrants to Canada." Studies in Social Policy Institute for Research on Public Policy, November 1987.

Meng, R. "The earnings of Canadian immigrants and Native-Born Males." Applied Economics, 19(8) (1987), 1107-1109.

Rivera-Batiz Francisco L. "International Migration, Non-Traded Goods and Economic Welfare in the Source Country." Journal of Development Economics, 11 (1982), 81-90.

Stager, David. "Allocation of Resources in Canadian Education." Canadian Education in the Seventies, ed. Economic Council of Canada, Ottawa: Information Canada. (1972).

Statistics Canada. 1980-1981, 1983-1984. Financial Statistics of Education Catelogue Number 81-208.

_____. Job Market Reality for Post-Secondary Graduates, (Ottawa: Minister of Supply and Service Canada, 1981)

Statistics Canada. Education in Canada a Statistical Review 1985-1986. (Ottawa: Minister of Supply and Service Canada, 1986)

Todaro, Micheal P. Economic Development in the Third World, Third edition, (New York: Longman Inc., 1985)

Vaillancourt, Francois and Irene Henriques. "The Returns To University Schooling in Canada." Canadian Public Policy, 7 (1986), 449-458.

Webb, Michael A. "The Brain Drain and Education Opportunity in Less Developed Countries." Eastern Economic Journal, 11 (1985), 145-55.

West, Edwin G. Higher Education in Canada, Fraser Institute, (Vancouver, 1988).