

Skills Research Initiative Initiative de recherche sur les compétences

International Mobility of Highly Skilled Workers: Quo Vadis?

Don J. DeVoretz (Simon Fraser University)

Working Paper 2006 D-17

Human Resources and Social Development Canada/Ressources humaines et Développement social Canada
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Abstract

This paper identifies the types of immigrants that Canada has recruited to foster modern Canadian economic development and assesses how effective Canada has been in recruiting and retaining these required immigrants in the 21st century. Evidence from both “balance of trade” and “balance of payments” exercises indicates that it is difficult to determine if there actually exist positive net inflows of managers and professionals during the 1982-2001 period. The entry of these highly skilled immigrants resulted from a series of distinct labour market policies adopted by Citizenship and Immigration Canada and its predecessor agencies. The paper presents evidence to support that between 1976-1990 a “tap on-tap off” policy admitted skilled immigrants to Canada only if a labour vacancy was anticipated. However, after 1990 tests reveal that the previous year’s economic immigrant admissions determined the contemporary immigrant flows with a 10 month lag. Offsetting this robust admission of economic immigrants in the 1990’s was the substantial outflows of previous Canadian immigrants as part of the rising phenomenon of “brain circulation”. Of particular note is the large number of highly skilled Chinese who have returned to Hong-Kong after 1997. Given this “brain circulation” and the chronic underutilization of its highly trained immigrants I conclude that Canada’s traditional use of immigrants as an “engine of growth” is very limited in the 21st century and suggest recruitment of foreign graduate students to revitalize the role of immigrants in Canadian development.

Résumé

L’auteur recense les types d’immigrants que le Canada recrute pour favoriser un développement moderne de son économie, et il évalue la mesure dans laquelle le Canada réussit à recruter et à garder au pays ces immigrants dont il a besoin pour le XXI^e siècle. Selon certaines données concernant le « solde commercial » et la « balance des paiements », il est difficile d’établir s’il existe réellement des entrées nettes positives de gestionnaires et de professionnels durant la période de 1982 à 2001. L’entrée de ces immigrants hautement spécialisés fait suite à une série de politiques relatives au marché du travail qui ont été adoptées par Citoyenneté et Immigration Canada et ses prédécesseurs. L’auteur présente des données qui montrent qu’entre 1976 et 1990, la politique « d’ouverture et de fermeture des vannes de l’immigration » prévoyait l’admission d’immigrants spécialisés au Canada seulement si des postes vacants étaient prévus. Toutefois, des tests après 1990 ont révélé que les admissions d’immigrants économiques de l’année précédente ont déterminé les flux d’immigrants contemporains avec un décalage de dix mois. L’importante sortie d’anciens immigrants au Canada, dans le cadre du phénomène de plus en plus répandu de la « circulation des cerveaux », est venue atténuer cette admission marquée d’immigrants économiques durant les années 1990. Fait à noter, le grand nombre de Chinois hautement spécialisés qui sont retournés à Hong Kong après 1997. Compte tenu de cette « circulation des cerveaux » et de la sous-utilisation chronique des immigrants hautement

spécialisés, l'auteur conclut que le recours traditionnel du Canada aux immigrants en tant que « moteur de croissance » est très limité au XXI^e siècle, et il suggère que le Canada recrute des étudiants étrangers de cycles supérieurs pour revivifier le rôle des immigrants dans le développement du pays.

Part I. Introduction and Issues

Canada's immigration experience has been historically linked to Canada's economic development (Pomfret, 1993). This early 20th century Canadian growth narrative relies on a trilogy of forces: trade, immigration and investment in public infrastructure to produce development. This well known parable of immigrants filling Canada's west and producing the wheat to be carried to Europe via rail and ship between 1896 and 1914 has remained Canada's unchallenged paradigm of Canadian economic growth (DeVoretz, 2000). This essay asks if a new Canadian development-immigration paradigm is emerging in the 21st century. If so, what type of immigrant fosters modern Canadian development and how effective is Canada in recruiting these required immigrants in the 21st century?

The modern day role of immigrants in the development process has been explored by both Canadian government commissions and Canadian academics.¹ The late Economic Council of Canada in the early 1990's concluded that Canada needed to experience scale economies in manufacturing to enhance productivity. However, they favored increasing Canada's market size through free trade agreements rather than immigration to enjoy these scale economies since they felt that immigrants could be a drain on the treasury. DeVoretz and Laryea (1998) challenged this negative view of immigration as an engine of growth by suggesting that skilled immigration in the 1990's led to 'brain circulation' in the context of the then emerging NAFTA. From this viewpoint, immigration into Canada in the 1990's was seen as a counterweight to Canadian skilled emigration to the United States that resulted from both the Canada-United States FTA (1989) and later the NAFTA (1995) accords. In particular, DeVoretz and Coulombe (2005) argued that increased trade, foreign direct investment and the emergence of a trade related visa (i.e. TN visa) accelerated the movement of Canadian citizens in 64 skilled occupations to the United States. To compensate for this outflow and to meet the anticipated pre-2001 need for professionals and engineers Canada revamped its immigration selection system and began to recruit heavily from China (Yan Shi, 2004). In particular the Chinese decision to ease emigration restrictions in the mid 1990's completed Canada's modern day immigration cum development scenario. In short, Canada compensated for NAFTA induced Canadian skilled emigration to the United States with an aggressive recruitment of Asian skilled managers and professionals to offset this loss. Prior to September 11th, 2001 Canada's new development formula replicated Pangloss' best of all possible worlds. Namely, Canada gained its desired expanded market through the NAFTA accord and putatively raised its productivity through inducing highly skilled Asian immigration to Canada.

This growth strategy through trade and immigration opens a host of questions which this essay will address. In Part II I will develop an accounting framework to test the proposition that Canada was a net importer of highly skilled immigrants over the last twenty years. In particular, I will ask in what specific occupations did Canada gain or lose immigrants in this triangular movement of immigrants from Asia to Canada and then

¹ See A. Green and D. Green (1996) for an exposition of the historical relationship of immigration and economic growth in Canada.

on to the United States. Moreover, I will attempt to measure the economic value of these Canadian emigrants and immigrants.

In Part III I propose and test variations of a model of skilled immigrant admissions. Evidence from this model will help refute or lend credence to the proposition that Canada was more or less successful in the post-1990 era in recruiting immigrants which produced wage and employment growth in their selected occupations and hence followed the development model that I have outlined.

Part IV investigates Canada's role in the emerging 'brain circulation' process. I will pay particular attention to the triangular movement between China (PRC), Canada and the rest of the world to see if this is Pareto improving phenomenon for Canada, the immigrant sending country and the individual immigrant.

Part V confronts the broader issues inherent in the above outlined development-immigrant-trade model when I test for the necessary existence of complementarities between investment, trade and immigration in the newly settled regions of Canada, the United States, Australia and New Zealand.

Part VI concludes with observations on the efficacy of Canada's most recent immigration policy circa 2002 in enhancing Canada's growth prospects through immigration.

The sum of the findings in these separate parts will hopefully produce a picture of how Canada has historically attempted to use immigration as an "engine of growth" and how this engine has sputtered in the 21st century.

Part II. Accounting for Brains

A Balance of Trade in Brains

Central to any evaluation of the potential economic impact of immigrants is an analysis of the type and numbers of immigrants as well as the economic value embedded in them. A simple balance of trade in immigrants would involve a measurement of gross and net flows of immigrants by occupation into and out of Canada. Table 1 reports the immigration and emigration from Canada of selected permanent skilled movers from a

Table 1. Balance of Trade in Professional and Managerial Immigration: 1982-2001

	Immigration to Canada		Out-migration to the U.S.		Net Immigration to Canada	
	Professionals ^a	Managers ^b	Professionals	Managers	Professionals	Managers
1982	11,412	2,960	1,690	831	9,722	2,129
1983	5613	2,088	1,627	914	3,986	1,174
1984	4703	1,748	1,628	996	3,075	752
1985	4851	1,677	1,757	928	3,094	749
1986	6125	2,090	1,751	971	4,374	1,119
1987	10,786	4,630	1,848	1,122	8,938	3,508
1988	11,406	5,394	1,867	934	9,539	4,460
1989	12,987	5,465	1,772	1,187	11,215	4,278
1990	14,012	5,792	2,493	1,751	11,519	4,041
1991	12,994	3,913	2,080	1,327	10,914	2,586
1992	12,156	3,650	2,384	1,853	9,772	1,797
1993	15,260	3,180	2,916	2,022	12,344	1,158
1994	17,895	2,486	2,929	1,861	14,966	625
1995	22,154	1,943	2,440	1,415	19,714	528
1996	28,338	1,948	3,581	2,065	24,757	-117
1997	31,059	1,696	2,112	1,390	28,947	306
1998	25,688	1,329	1,222	1,116	24,466	213
1999	32,327	1,730	932	863	31,395	867
2000	41,794	2,508	1,855	1,407	39,939	1,101
2001	46,205	3,064	2,457	2,055	43,748	1,009
Total	367,765	59,291	41,341	27008	326,424	32,283

Sources: Immigrants to Canada: LIDS, 2004 and Out-Migration to US. NBER CPS Merged Outgoing Rotation Group (MORG) 2005.

Notes:

a. Professionals include engineers, natural scientists, university professors, teachers, nurses, physicians, medical technicians and 14 other professional groups. These are the intended occupations as stated upon arrival.

b. Managers are by self definition of immigrants upon arrival that they will be in supervisory capacity.

“Balance of Trade” prospective. In this case, immigration to Canada represents the number of permanent arrivals in the professional and managerial occupations in a particular year from all countries (including the U.S.) in columns (1) and (2) and the number of yearly leavers of Canadian-born residents to the United States in the same

occupations in columns 3 and 4.² Thus, this table mimics a triangular move (figure 3) which depicts immigrant movement into Canada from all sources with a subsequent and sometimes substantial movement of Canadian-born professionals and managers to the U.S.

The “Balance of Trade” in professionals is uniformly positive over the 1982-2001 period. Moreover, after 1986, Canada had a large “balance of trade” surplus vis a vis the U.S. in professionals. In fact, over the entire period Canada retained 87 per cent of its professional immigrants and gained 326,424 professionals during the 1982-2001 period.

The same is not true for managers since in many years in the mid 1980’s and throughout the 1990’s only small positive inflows of managers remained in Canada. In fact, Canada only retained 54 percent of its gross inflows of managers vis a vis emigration just to the United States. Moreover, Table 1 is unable to include on a yearly basis the substantial outflows of Canadian managers to Hong-Kong (see table 11) which would have made every year after 1996 a deficit year if I included these managerial émigrés to Hong Kong in table 1.³ In addition table 1 does not include any foreign-born Canadian citizens residing in the United States.⁴

In sum, table 1 presents a conservative view of Canada’s “balance of trade” in brains. Clearly, there was a substantial net inflow of professional immigrants to Canada but only a modest positive flow of managerial immigrants.⁵

Balance of Payments in Brains

But what is the economic value of the educational resources embedded in the immigrant inflows reported in table 1? Table 2 reports the information necessary to calculate a “balance of payments” concept for Canada and answer this query. Column one reports the gross inflow of permanent immigrants in these occupations circa 2001. For the nine occupational groups a total of 49,269 immigrants landed in Canada in 2001. If I follow Coulson and DeVoretz (1992) and value these immigrant inflows in terms of their educational replacement costs in Canada I can construct columns (2) to (9). In other words, assuming that Canada would have produced these graduates in the absence of

² According to Zhao et. al (2000) that 50% of permanent Canadian emigrants and 33% of all temporary Canadian emigrants from Canada circa 1991-96 went to the United States.

³ Hong-Kong return data is based on the 2000 Chinese Census and thus does not report yearly inflows but just a stock figure for 2000. At a minimum, 3,000 to 10,000 Canadian managerial émigrés left Canada for Hong-Kong in the 1990’s (see table 11).

⁴ The data source used only allowed us to ask where were you born and if you were foreign-born. Thus, if you were Chinese-born but now a Canadian citizen residing in the United States our data source would not pick you up. An independent test using an alternative data source Homeland Security Yearbook of Immigration Statistics 2004 (<http://uscis.gov/graphics/shared/statistics/yearbook/YrBko4lm.htm>) indicates that table 1 underestimates the true emigration of Canadian residents by 28% for the 1991-2000 period. In sum, using the Homeland Security Yearbook source we estimate that those Canadian emigrants to the United States who declared Canadian nationality equaled 191,987 while those who emigrants who stated they were Canadian-born equaled 137,563.

⁵ Tables A-6A and A6B in the appendix report a detailed breakdown by occupations of the yearly immigrant inflow into Canada.

these immigrants I can value the flow of these resources in terms of two Canadian educational cost concepts. Columns two and three respectively report the educational costs valued at what the Canadian student would have to pay (private total costs) and what Canadian society must pay (social total cost) for the required education to achieve the occupational status denoted in each row. In other words, the 2001 cost (in 1993 dollars) of acquiring an engineering degree for a student is \$83,256 while society (student plus taxpayer costs) invests a total of \$139,333. The difference between the social and private costs is the inherent taxpayer subsidy to achieve an engineering degree and is reported in column 4. For any one occupation in 2001, columns seven and eight respectively report the total private and social costs to educate all immigrants who arrived in 2001 in that occupation.

An inspection of table 2 also reveals several trends under this evaluation technique. First, either under the private cost concept (column 2) or the social cost concept (column 3) there is a great deal of variance in the embodied educational costs by occupation. For example, nurses and medical technicians embody less than half the private or social educational resources as found in university professors or physicians. Secondly, the taxpayer subsidies inherent in this training also varies substantially across occupations indicating that the Canadian society gains differentially from importing for example, physicians versus nurses. Nonetheless, for this one year the gross value of the educational resources embodied in these professions amounted to \$10.8 billion with a \$4.4 billion of taxpayer subsidy.

Table 2: Gross Value of Human Capital Flow in 2001 at Canadian Replacement Costs, by Occupations (1993 Canadian dollars)

Occupations	(1) Number of Immigrants ^a	(2) Private Direct Costs per Student ^b	(3) Social Direct Cost per Student ^c	(4)=(3)-(2) Taxpayers' Subsidy per Student	(5) Private Total Cost per Student ^d	(6) Social Total Cost per Student ^e	(7)=(1)*(5) Private Total Cost for All Immigrants	(8)=(1)*(6) Social Total Cost for All Immigrants	(9)=(8)-(7) Taxpayers' Subsidy for All Immigrants
Manager	3,064	\$62,445	\$139,333	\$76,888	\$102,804	\$179,692	\$314,991,456	\$550,576,288	\$235,584,832
Engineer	16,874	\$83,256	\$179,366	\$96,110	\$133,705	\$229,815	\$2,256,138,170	\$3,877,898,310	\$1,621,760,140
Natural Scientist	2,726	\$94,056	\$209,388	\$115,332	\$153,498	\$287,913	\$418,435,548	\$784,850,838	\$366,415,290
University Prof	309	\$94,056	\$247,832	\$153,776	\$170,338	\$364,523	\$52,634,442	\$112,637,607	\$60,003,165
Teacher^f	771	\$67,810	\$163,920	\$96,110	\$146,335	\$242,445	\$112,824,285	\$186,925,095	\$74,100,810
Physician	674	\$119,356	\$273,132	\$153,776	\$236,047	\$389,823	\$159,095,678	\$262,740,702	\$103,645,024
Nurse	439	\$50,056	\$126,944	\$76,888	\$90,415	\$167,303	\$39,692,185	\$73,446,017	\$33,753,832
Medical tech.	1,517	\$50,056	\$126,944	\$76,888	\$90,415	\$167,303	\$137,159,555	\$253,798,651	\$116,639,096
Other professional	22,895	\$86,856	\$163,744	\$76,888	\$127,215	\$204,103	\$2,912,587,425	\$4,672,938,185	\$1,760,350,760
TOTAL	49,269	N/A	N/A	N/A	N/A	N/A	\$6.404 billion	\$10.776 billion	\$4.372 billion

Notes:

a Citizenship and Immigration Canada Landed Immigrant Data System, annual data. Thus, these are intended occupations.

b Private direct costs include tuition plus books, fees, lodging and food. Source: Tuition and Living Accommodation, Statistics Canada #81-219.

c Social direct costs include private direct costs plus federal and provincial government expenditures per student per year.

d Private total costs per student equals direct costs plus foregone earnings for the relevant time spent in school. All occupations are four (4) years, except (5) years for engineers, six (6) years for scientists and teachers, and eight (8) years for both physicians and professors. Foregone earnings are defined as \$9,248.21 per year for those occupations requiring four years of schooling and 17,491.29 per year for those occupations that require a post B.A., B.B.A. or B.Sc. Earnings calculated from PUST 1991 Census.

e Social total costs equal direct costs plus foregone earnings.

f Based on a post-B.A. two-year education program.

Tables 3-A and 3-B report the embodied value of human capital in Canada's immigration inflows for 1980-2001 based on the social cost concept. Once again, there exists a great deal of variation across the selected occupations. Between 1980 and 1990 (table 3-A) no one profession dominated the immigrant flows in terms of the value of their educational inflows. Moreover, between 1980 and 1990 only \$26.4 billion dollars of educational resources flowed into Canada.

Table 3-A. Total Educational Values at Total Social Cost for All Immigrants to Canada by occupation, 1980-1990, in billion 1993 dollars

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Managers	\$0.47	\$0.51	\$0.53	\$0.38	\$0.31	\$0.30	\$0.38	\$0.83	\$0.97	\$0.98	\$1.04
Engineers	\$0.28	\$0.49	\$0.60	\$0.22	\$0.16	\$0.16	\$0.21	\$0.38	\$0.36	\$0.44	\$0.51
Natural Scientists	\$0.16	\$0.18	\$0.19	\$0.10	\$0.08	\$0.09	\$0.10	\$0.15	\$0.16	\$0.21	\$0.21
University Professors	\$0.18	\$0.12	\$0.12	\$0.10	\$0.09	\$0.11	\$0.12	\$0.13	\$0.10	\$0.15	\$0.15
Teachers	\$0.19	\$0.18	\$0.19	\$0.12	\$0.11	\$0.12	\$0.14	\$0.19	\$0.21	\$0.28	\$0.33
Physicians	\$0.20	\$0.22	\$0.24	\$0.18	\$0.18	\$0.18	\$0.22	\$0.22	\$0.19	\$0.26	\$0.26
Nurses	\$0.11	\$0.16	\$0.17	\$0.06	\$0.05	\$0.05	\$0.07	\$0.12	\$0.18	\$0.20	\$0.21
Medical tech.	\$0.19	\$0.16	\$0.16	\$0.10	\$0.09	\$0.09	\$0.11	\$0.18	\$0.20	\$0.26	\$0.26
Other professionals	\$0.67	\$0.83	\$0.90	\$0.43	\$0.36	\$0.37	\$0.48	\$1.04	\$1.11	\$1.11	\$1.18
TOTAL	\$2.44	\$2.85	\$3.11	\$1.68	\$1.43	\$1.45	\$1.82	\$3.25	\$3.47	\$3.87	\$4.16

Source: Author's computations. Immigrant inflows to Canada and outflows to USA used to construct this table appear in DeVoretz and Laryea (1998). In turn their numbers of Canadian émigrés to USA were provided by special tabulations provided by U.S. Dept. of Commerce, Naturalization Service.

Table 3-B illustrates dramatically different trends between 1991 and 2001. First, the total amount transferred during this period exceeded \$64 billion in educational resources with over 52% of this transfer occurring in the last four years of the study period. In addition, engineers and the collective category of 'other professionals' dominate these flows and by 2001 these two categories represent more than 80 per cent of the value of the inflow.

Table 3-b. Total Educational Values at Social Cost for All Immigrants to Canada by occupation, 1991-2001, in billion 1993 dollars

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Managers	\$0.70	\$0.66	\$0.57	\$0.45	\$0.35	\$0.35	\$0.31	\$0.24	\$0.31	\$0.45	\$0.55
Engineers	\$0.48	\$0.49	\$0.81	\$1.04	\$1.38	\$1.86	\$2.20	\$1.95	\$2.64	\$3.55	\$3.88
Natural Scientists	\$0.21	\$0.17	\$0.21	\$0.38	\$0.54	\$0.78	\$0.83	\$0.67	\$0.79	\$0.82	\$0.79
University Professors	\$0.20	\$0.18	\$0.17	\$0.11	\$0.10	\$0.09	\$0.07	\$0.08	\$0.08	\$0.10	\$0.11
Teachers	\$0.28	\$0.23	\$0.25	\$0.19	\$0.16	\$0.18	\$0.13	\$0.11	\$0.11	\$0.16	\$0.19
Physician	\$0.27	\$0.25	\$0.27	\$0.21	\$0.20	\$0.23	\$0.21	\$0.18	\$0.17	\$0.23	\$0.26
Nurses	\$0.20	\$0.17	\$0.15	\$0.14	\$0.11	\$0.07	\$0.06	\$0.04	\$0.04	\$0.06	\$0.07
Medical tech.	\$0.22	\$0.18	\$0.18	\$0.17	\$0.18	\$0.21	\$0.21	\$0.15	\$0.17	\$0.22	\$0.25
Other professionals	\$1.09	\$1.08	\$1.40	\$1.76	\$2.26	\$2.93	\$3.21	\$2.57	\$3.21	\$4.15	\$4.67
TOTAL	\$3.64	\$3.40	\$4.01	\$4.44	\$5.29	\$6.69	\$7.22	\$5.99	\$7.52	\$9.74	\$10.8

Source: See Table 3-A

In sum, although the ‘balance of trade’ portrays the dominance of the professional inflow of immigrants during this period it does not accurately portray the dominance in terms of educational resources of selected immigrant occupations, especially engineers in late 1990’s.

Table 4 completes my analysis by reproducing table 1 in value terms to report Canada’s ‘Balance of Payments in Brains’ for the 1982-2001 period.⁶ It should be noted that this table is constructed under the assumption that immigrants to Canada and Canadian emigrants are perfect substitutes. The first two columns in table 4 represent the weighted (at social total costs) of the immigrant inflows of all professionals and managers who immigrated to Canada during the 1982-2001 period. The last two columns deduct for the outflows to the U.S. of Canadian-born residents in these two occupational categories. For managers, over 45% of the embodied value of the educational content of these immigrants from the rest of the world to Canada is lost to the U.S. alone. In fact, for the 1994-1999 period the net values are close to zero or negative since I have omitted the substantial additional outflows of Canadian managers to Hong-Kong and foreign-born Canadian citizens residing in the United States. The trends in professionally trained immigrants are very different since almost 90% of the educational value embodied in these immigrants remained in Canada over the study period.

⁶ The calculations embedded in table 4 assume that immigrants and emigrants in the same profession are perfect substitutes.

Table 4. Balance of Payments in Human Capital Flows for 1982-2001 (1993 Canadian dollars)

	Gross Social Total Cost (millions)		Net Social Total Cost (millions)	
	Professionals	Managers	Professionals	Managers
1982	\$2,525.49	\$304.30	\$2,151.49	\$218.87
1983	\$1,242.17	\$214.65	\$882.11	\$120.69
1984	\$1,040.78	\$179.70	\$680.50	\$77.31
1985	\$1,073.53	\$172.40	\$684.71	\$77.00
1986	\$1,355.47	\$214.86	\$967.97	\$115.04
1987	\$2,386.96	\$475.98	\$1,977.99	\$360.64
1988	\$2,524.16	\$554.52	\$2,110.99	\$458.51
1989	\$2,874.04	\$561.82	\$2,481.90	\$439.80
1990	\$3,100.88	\$595.44	\$2,549.17	\$415.43
1991	\$2,875.59	\$402.27	\$2,415.28	\$265.85
1992	\$2,690.14	\$375.23	\$2,162.56	\$184.74
1993	\$3,377.06	\$326.92	\$2,731.75	\$119.05
1994	\$3,960.19	\$255.57	\$3,312.00	\$64.25
1995	\$4,902.71	\$199.75	\$4,362.74	\$54.28
1996	\$6,271.24	\$200.26	\$5,478.76	-\$12.03
1997	\$6,873.40	\$174.36	\$6,406.01	\$31.46
1998	\$5,684.79	\$136.63	\$5,414.36	\$21.90
1999	\$7,154.01	\$177.85	\$6,947.76	\$89.13
2000	\$9,249.07	\$257.83	\$8,838.56	\$113.19
2001	\$10,225.24	\$314.99	\$9,681.50	\$103.73
Total	\$81,386.94	\$6,095.35	\$72,238.12	\$3,318.82

Notes: a. Professionals and Managers defined per Table 1.

In sum, under either the ‘balance of trade’ or balance of payments’ concepts two overarching trends appear. Canada was a large net importer of professional skills, especially engineers in the 1990’s while managers were difficult to retain.⁷ We now turn to the underlying economic forces which rationalized Canada’s vast recruitment of professionals across a changing occupational composition.

Part III. Labour Markets and Historical Immigration Entry Criteria

‘Tap On – Tap Off’ entry criterion: 1976-1988

Canada’s historical policy of importing immigrants to foster economic growth has met with criticism from many fronts over the last ten years. Specifically many critics

⁷ Although the cited tables do not include Chinese skilled emigration from Canada to Hong Kong separate evidence reported in DeVoretz and Zhang(2004) states that less than 20 percent of 70,000 employed Canadian émigrés to Hong Kong were classified as professional in the 2000 Chinese Census. Thus, given the 324,000 net inflow of professionally trained immigrants to Canada for the 1981-2001 period as cited in Table 3 above the net inflow of professional conclusion stands. In fact this number would have been reduced at maximum by 20,000 from the post 1997 emigration of Chinese professionals from Canada.

including Jeffrey Reitz (2005) have argued that since the mid 1990's many forces including a lack of skills recognition have led to a deskilling of the imported highly skilled immigrants and resulted in a deadweight loss to the Canadian economy of 2 billion dollars annually. Other critics, including the Conference Board of Canada have echoed these concerns and the media have documented numerous cases of putatively highly skilled immigrants working at low paying unskilled jobs. In fact, Chris Worswick (2004) has analyzed the generally poor economic performance of educated immigrants in the early 21st century and concluded that a drastic change in immigration policy is needed. First, he argues that there should be a temporary halt in immigration flows and next he argues that Canada should return to the "tap on – tap off" policy of the 1980's.⁸

The purpose of this section of my essay is to argue that the 1990's represented a key watershed in Canadian immigration policy with respect to the recruitment of the highly skilled. Canada's skilled recruitment policy changed from a "tap on – tap off" policy circa 1976-1986 to a uniformly high intake level coupled with a "fifty-fifty" entry criteria between 1988 and the present (DeVoretz, 2006a). In other words, the 'fifty-fifty' immigration policy of the 1990's implied that the admission of one economic immigrant allowed the possible admission of one extended family member or refugee. This policy change from a "tap – on tap off" policy to a "fifty-fifty" admission's regime represented a fundamental shift in the viewpoint of Citizenship and Immigration Canada (CIC) on how immigrants integrate into Canada's labour market.

The "tap on – tap off" policy circa 1976-1986 was embedded in the creation of the "points system" which first appeared in 1967. It was argued by DeVoretz and Maki (1983) that the first "points system" between 1967-1978 was essentially a test for human capital attributes as opposed to a manpower policy which underlay the "tap on – tap off" policy of the 1976-1988 period (see column 1 table 1). The human capital admissions policy circa 1967-78 contained many salient features. First, the total pass mark was low during this period, namely 50 points out of a possible maximum of 100 points (see table 4). Next, all the necessary 50 marks for admission could be potentially gained without a labour market test from education, age, language and personal suitability criteria. Finally, and most importantly, there existed no yearly immigrant target level circa 1967-1976, thus, entry levels were byproducts of the number of immigrants that applied and the number that Canada could process.

After 1978 the human capital regime was replaced by a manpower vacancy criterion which implied a 'tap on – tap off' policy. At its apex in 1986 the 'tap on – tap off' policy used a labour vacancy criterion where a mixture of experience, vocational preparation, occupational demand, arranged employment and a levels control criteria accounted for 52 out of the possible 100 points (see table 5). Clearly by 1986 entry via the economic or selected worker category gateway could not occur with just human capital attributes but the applicant had to also satisfy immigration officials that a job vacancy existed and that he/she could fill it.

⁸ See D. J. DeVoretz (1995) who first argued that in the 1980's the "tap on – tap off" policy resulted in immigrant fluctuations ranging from a high of 200,000 to a low of 80,000 over the decade.

Table 5. Canada's Points System over Time: 1967-2002⁹

	1967	1974	1978	1986	1993	1996	post 1996	2002
Education	20	20	12	12	14	21	16	25
Experience			8	8	8	9	8	21
Specific vocational preparation	10	10	15	15	16		18	
Occupational demand	15	15	10	10	10		10	
Labour market balance						10		
Age	10	10	10	10	10	13	10	10
Arranged employment or designated occupation	10	10	10	10	10	4	10	10
Language	10	10	15	15	14	21	15	24
Personal suitability	15	15	10	10	10	17	10	10
Levels			10	10	8			
Demographic							8	
Relative	0/3/5+	0/3/5				5	5	
Designation	5	5						
Total	100	100	100	100	100	100	110	100
Pass mark	50	50	50	70	67	65	70	75

Source Yan Shi (2004)

Two additional screening devices were put into place in the 1980's to further ensure that the economic or independent immigrant class met Canada's manpower needs under a 'tap on – tap off' policy. Of the now 70 points required for admission in the 1980's some occupational points were a necessary, but not a sufficient condition for entry in the independent class. If the potential immigrant's designated occupation was assigned zero points for labour demand by policy makers, then, regardless of the total number of points earned by the immigrant from their human capital characteristics the immigrant would not be admitted.¹⁰ In the 1982-1985 period these labour market restrictions became even more stringent as previously certified and arranged employment was required before entry was permitted in the economic class.

⁹ Quebec has a separate selection grid.

¹⁰ The occupational groups were defined to a three digit occupational code.

Table 6. Immigrant Arrivals by Class: 1980-2001

Year of Landing	Immigrant Class			%	
	Total (1)	Refugee (2)	Family (3)	Economic (4)	Economic (4)/(1)= (5)
1980	143,134	43,860	49,180	36,670	0.256692
1981	128,641	18,588	50,204	42,977	0.334944
1982	121,177	17,518	49,859	40,048	0.332029
1983	89,188	13,998	48,701	19,408	0.21901
1984	88,273	15,377	43,818	18,605	0.213272
1985	84,333	16,770	38,528	19,532	0.235831
1986	99,329	19,198	42,236	30,169	0.309397
1987	152,002	21,468	53,568	62,018	0.414795
1988	161,502	26,737	51,165	64,922	0.409605
1989	191,502	36,857	60,630	69,011	0.366791
1990	216,402	40,233	74,069	72,903	0.342253
1991	232,750	54,053	86,894	65,247	0.284062
1992	254,816	52,350	100,668	76,225	0.304231
1993	256,728	30,632	112,579	79,725	0.316126
1994	224,373	20,455	94,093	69,908	0.317043
1995	212,866	28,544	77,325	71,914	0.342895
1996	226,050	32,193	68,296	91,543	0.411008
1997	216,030	27,662	59,893	100,162	0.480204
1998	174,172	25,375	50,799	80,162	0.490449
1999	189,921	25,415	55,248	90,733	0.494976
2000	227,312	30,532	60,541	113,801	0.511806
2001	250,346	28,104	66,641	130,034	0.526684

Source: Landed Immigrant Data System (LIDS), Citizenship and Immigration Canada.

Notes: *Refugee Class* includes: Convention Refugee Class, Designated Class, Nominated (Old Act 1952), PDRCC Class, Dependants of a CR8 Refugee, DROC Class, Source Country, Asylum Country; *Economic Class* includes: Entrepreneur Class, Self-Employed Class, Independents and Entrepreneurs (Old Act 1952), Other Independent Class (Skilled Workers), Investor Class; *Other* (not shown in the table) classes include: Retired Class, Assisted Relative Class, Live-In Caregiver Class, Child to be Adopted, Sponsored (Old Act 1952).

Finally, this “tap on – tap off” was coupled with an explicit yearly quota which by law had to be tabled in the House of Commons in the previous calendar year. This quota resulted in a bizarre restriction on the number of selected economic immigrants actually admitted. In fact, given sufficient Canadian emigration in the 1981 to 1986 period the number of selected immigrants was a residual of the total yearly quota that could result in a meager net flow of economic immigrants (see table 6 column 5).¹¹ How did this come about? First, the yearly target was set and then the number of immigrants anticipated under the family class for the next year was deducted from this target. Next, a predetermined number of refugees were deducted from this net target figure and then the

¹¹ In the 1980’s it was estimated that 50,000 or more immigrants left Canada yearly.

residual was assigned to the independent/economic immigrant class.¹² In a year when the government set the yearly target below 100,000 the number of immigrants in the residual economic class was nil if Canadian emigration was sufficiently large.¹³

In sum, it could be argued that Canada's post 1976 to pre 1990 immigration policy with respect to independent or economic immigrants implied a 'job vacancy' criterion to earn admission. And as noted this 'job vacancy' model had in fact replaced a human capital model which was active prior to 1976 according to DeVoretz and Maki (1983). This "tap on-tap-off" policy ultimately led to a near zero net economic immigrant inflows in the mid 1980's.

Post 1990 Entry Criterion: Cinquante-Cinquante

The challenge in this section is to characterize the entry criteria in the 1990's and to provide a test of the efficacy of this model since evidence cited above purports to show that Canada failed to select the quantity and quality which could successfully integrate into the labour force after 1990.

The late 1980's witnessed a resurrection in both the total number of immigrants and those who were selected as economic immigrants. Under the then Conservative government the political view of the immigrant labour market moved away from both the 'tap on – tap off' and human capital views that had prevailed under successive governments since the mid 1960's. A new entry criterion emerged in the 1990's which allowed entry to a growing absolute number of economic immigrants who possessed financial capital. After 1986, entry was not subject to a labour market vacancy test, but rather entry criteria reflected individual human capital endowments and most importantly past labour market experience (see table 5).

How these entry criteria actually were applied will be assessed in detail below. At this point, I would like to develop the overall economic philosophy which drove immigrant admissions after 1990 to the present. The Conservative government and the then Minister of Employment and Immigration Barbara McDougall in the early 1990's once again returned to Canada's historical position that economic immigrants could act as an engine of economic growth. She specifically eschewed the view that Canada's labour market consisted of a 'lump of jobs' such that one more employed immigrant implied one less job for resident Canadians. This 'lump of jobs' concept was the contentious cornerstone of the 'tap on – tap off' policy which reigned during the 1976-1988 period. It was felt by the late 1980's that if you could select economic immigrants with complementary inputs, namely financial and human capital, then economic immigrants could create jobs for both themselves and potentially for resident Canadian-born workers.

¹² The previously constant number of refugees began to fluctuate widely by the mid 1980's and made refugee forecasts unreliable. See DeVoretz and Pivnenko (2004) for a complete analysis of refugee flows during this period.

¹³ For example, in the 1983-1985 period the yearly target was less than 100,000 immigrants and the independent/economic class constituted less than 23% of the yearly target or 19,000 economic immigrants. Clearly with an historical 30% emigration rate more than 19,000 economic immigrants could have left during this period and would have negated these yearly inflows.

Akbari and DeVoretz (1988) had provided limited empirical evidence to weakly support this view when they found that immigrants on balance created as many jobs as they took in the 1980's.¹⁴

During the 1980s' both the Liberal and Conservative governments introduced a series of new entry categories for potential economic immigrants which if exploited could possibly insure a growing labour market demand with immigrant admissions. Thus, the entrepreneurial and investment immigrant entry categories were devised in the 1980's and refined in the 1990's to attract putative entrepreneurial immigrants (DeVoretz, 1996).¹⁵ In addition, particular attention was paid to recruiting through the normal 'points system' large number of managers from Hong-Kong and Taiwan. Although this group had to acquire 67-70 points for entry there was no explicit investment or employment conditions attached. It was hoped that their managerial backgrounds would result in increased employment opportunities as they integrated into existing Canadian firms. Finally, engineers were targeted for admission under the supposition that the IT boom would continue throughout the early 21st century and that an engineering 'shortfall' would occur.¹⁶ This post 1988 recruitment policy all assumed that the targeted economic immigrants would either provide financial capital (investors) or human capital (managers and engineers) such as their entrance into their respective labour market would cause a demand shift for their services. In turn, it was hoped that this would result in an increased demand for resident labour or a rise in wages or both. The object of a later section of my essay will be to test and confirm or reject this view for selected immigrant occupations.

This radical new view that immigrants could be chosen to increase Canadian employment opportunities was theoretically well grounded but faced many political and institutional difficulties. The political difficulty arose from the explicit existence of the family reunification provision in the 1976 Immigration Act which awarded substantial sponsorship entitlements to a successful economic applicant. In short, the spouse and minor children were allowed immediate entry with the successful applicant. In addition, parents and grandparents would also be granted entry after a 'means test' was applied to the original principal applicant and conditions on the use of social services were placed on the sponsored relatives.¹⁷ Given that both spouses in the initially successful economic immigrant household could sponsor their relatives, the logic of the sponsorship provision

¹⁴ Of course the details of the study were more complex. Labour substitution by immigrants occurred in immigrant intensive labour markets which contained at least 30 per cent or more foreigners in their labour market. The rest of the economy which was highly unionized at the time was largely insulated from the small number of economic immigrants which arrived in the 1980's. Hence the neutral finding on immigrant job displacement.

¹⁵ The entrepreneurial entry category required that the prospective immigrant provide employment for himself and at least, one resident Canadian to insure permanent residence status. The investor class entry gate required initially a \$350,000 investment in selected categories but required no job creation.

¹⁶ Dire predictions forecasted a software engineering shortfall in Canada of between 40 to 100 thousand engineers. This of course proved erroneous.

¹⁷ The current means test requires that the sponsoring household's income, net of any government transfers exceed the local poverty level or the Low Income Cutoff (LICO) line as reported by Statistics Canada. This is a substantial barrier since circa 2005 the required household income before sponsorship exceeded \$45,000 in Vancouver for an immigrant sponsoring family with two children.

implied that each successful economic immigrant created four or more potential family class entrants.¹⁸

This potential multiplier effect created a substantial political barrier to allow the admission of a sufficiently large portion of economic immigrants. Thus, a crucial policy restraint was added in 1995 under Sergio Marchi that, regardless of the total yearly target selected, at least fifty percent of the admissions were required to be economic immigrants. To wit, the *cinquante cinquante* provision, which allowed in any one year fifty percent economic and fifty percent family and refugee entrants was devised in 1995 and still holds circa 2005. This “*cinquante cinquante*” policy insured that two crucial conditions were met. First, that the growing family class would be capped in any one year and that potentially a sufficiently large number of economic immigrants would enter Canada to create the necessary jobs envisioned.¹⁹

There is of course one crucial restraint in this entire philosophy. In any one year Canada had to pick a realistic overall immigration target such that 50 per cent of the required economic applicants could be recruited. Moreover, the “tap on – tap off” policy of the 1980s’ could not be resorted to if the recruited economic immigrants fell since it was no longer politically feasible. In fact by the 1990’s approximately 100,000 family class members had to be admitted to respond to the requests of a growing and politically powerful immigrant class. In addition Canada had a yearly implied quota of around 25,000 refugees according to DeVoretz and Pivnenko (2004). Given this base requirement to admit 125,000 non economic immigrants then 125,000 economic immigrants had to be recruited yearly to satisfy the “*cinquante-cinquante*” criterion. This goal was not always met since appropriate economic immigrants were unavailable or difficult to process and the original overall target was not met. It also must be remembered that the government defined the economic class of immigrants to include independently assessed immigrants, investors and their spouses, thus vastly overstating the size of the economic class. In fact as table 5 shows that the economic class admissions (including immediate family) fluctuated between 25 % and 52% between 1981 and 2001. Thus, Canada in reality only loosely approached the 50 percent criterion after 1996.

In sum, the post-1990 immigrant admission policy was predicated on admitting a sufficient number of highly qualified immigrants to insure a growing excess labour demand in their particular occupation which would either raise the wage rates of resident labour market members or increase their employment opportunities. Below I present a theoretical construct in figure 2 which formalizes my main arguments and allows me to deduce a testable set of hypotheses to confirm or reject the success or failure of Canada’s

¹⁸ Actually, the number of potential sponsorships per household was potentially much larger. If sponsored parents brought any remaining minor siblings then in turn these siblings when mature could marry foreigners who, in turn, could sponsor further relatives. Thus, the long run multiplier effect under this scenario is very large but undefined.

¹⁹ The weak economic performance of the family class is documented in DeVoretz and Pivnenko (2004) and justifies the need for a large economic class.

post-1990 immigration policy of recruiting immigrants to induce excess labour demand and foster economic growth.

Model

This model will focus on Canada's demand for highly trained immigrants in selected occupations. The proposed excess demand is recursive in nature and assumes an infinitely elastic supply curve of highly skilled immigrants. I have argued elsewhere that there exists an infinite supply (or at least a large one relative to Canada's demand) of technically trained immigrants for Canada at the prevailing wage.²⁰ Hence, changes in Canada's excess labour demand in a particular labour market will determine the placement of the immigrant demand curve and determine the next period's equilibrium number of immigrants admissions.

Figure 1: Immigrant Excess Demand

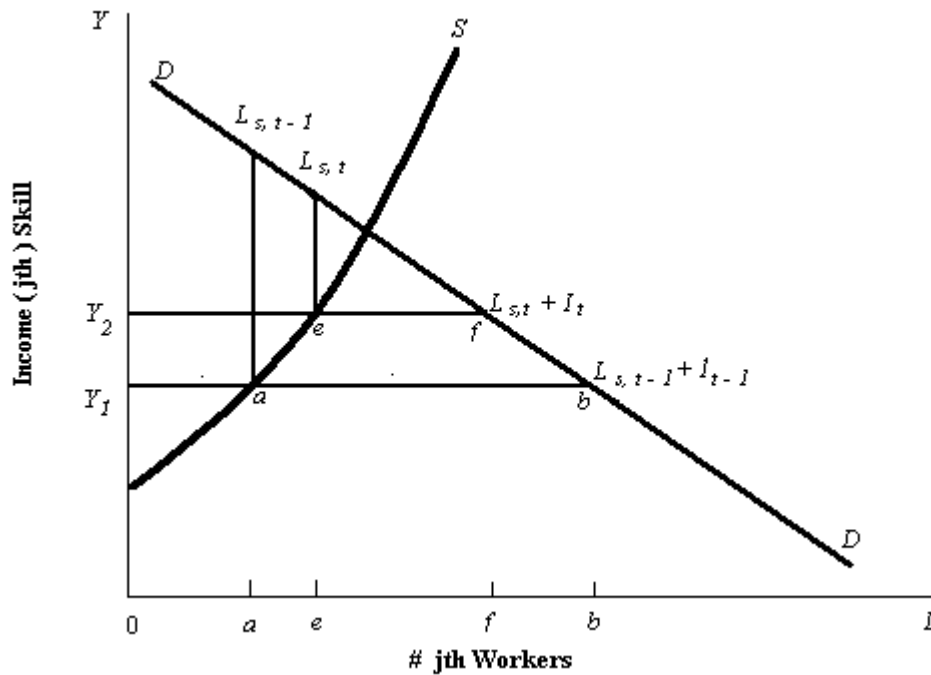


Figure 1 illustrates the comparative statics of the proposed dynamic shortages model in an immigrant demand context. In any one period ($t-1$) given a real income level of (Y_1) there exists a domestic supply of (j th) type skilled labour equal to (oa) which results in a positive excess demand for skilled labour equal to (ab). This excess demand could be filled by more domestic graduates in period (t) equal to (ae) as the (j th) occupational income rises to Y_2 and with an immigrant flow of (ef) given this income of Y_2 . On the other hand, with no increase in either the income level (Y_1) or the domestic supply of labour (oa) in the (j th) occupation, the gap could be totally filled by ($a-b$) immigrants.

²⁰ Elsewhere I have argued that this infinite supply argument held in general for Canada in this period only because China, more specifically the PRC, lifted its restriction on the emigration of highly skilled Chinese in 1995 (DeVoretz, 2003).

Further I argue that policy makers attempt to forecast the yearly excess demand (ab) at income Y_1 or (ef) at income Y_2 . My arguments above suggest that a ‘tap on – tap off’ policy would lead to a relatively large (ab) immigrant flow to maintain the prevailing income level of Y_1 . On the other hand, in the post 1990 world immigrant policy makers would admit (ef) immigrants to insure (ae) growth in domestic employment and a rise in income to Y_2 .

The above arguments lead me directly to the following Canadian immigrant demand specification for the j th highly skilled immigrant:

$$I_{ij,t} = f(G_{j,t-2}, I_{ij,t-1}, (Y_{j,t-1} - Y_{j,t-2}))$$

In short, the absolute number of immigrants admitted to Canada from an (i th) country with the (j th) type of skills in period (t) or $I_{ij,t}$ depends on three exogenous variables which I outline below.

The lagging process built into the model is crucial since as I noted earlier policy makers must by law forecast their desired immigration flows 12 to 18 months in advance of the actual dates of admission. Hence the domestic supply variable or the increased supply of highly skilled graduates in the (j th) occupation is lagged two periods (i.e. $G_{j,t-2}$) This lag would reflect the latest graduate information available to policy makers when the immigration target was set in period ($t-1$).

The income variable requires a detailed explanation. The income term is a much debated variable in immigration studies. One view suggests that the income difference over time in the destination country’s income is a proxy for the growth in excess demand in the destination country’s labour market and hence relevant to this study. We include the relevant Canadian change in occupational income under this rationale. Again we note due to legislative time lags, policy makers only have at their disposal the change in lagged income in periods ($t-1$) and ($t-2$) to measure potential excess demand for labour in the (j th) occupation. Hence, it is argued, as lagged income in the (j th) occupation rises, policy makers infer that *ceteris paribus* excess demand in that occupation has grown and immigration levels should rise.

Finally, I introduce $I_{ij,t-1}$ as a statement that if policy makers lack income or graduate supply information they will simply make contemporary immigration levels a proportion of last year’s immigrant levels.

Data

The data sources and definitions are contained in Appendix table A-1. Table 7 reports the admission trends in the selected professions that I will analyze with my proposed demand model. Several patterns emerge from an inspection of table 7. First, for these seven selected occupations, the grand total of admissions for the period 1980 to 2001 was large (313,766) with the bulk admitted after 1988. Furthermore, it is possible to

see epochal trends as Canada's policy makers switched from one occupation to another. Between 1987 and 1997 for example, 40,000 immigrants in managerial occupations were admitted which simply reflected the emigrant movement from Hong-Kong and Taiwan during this period.

Table 7. Sample of Immigrant Arrivals by Selected Occupations: 1980-2001

	Managerial and Administrative	Scientists (Natural and Life Sciences)	Engineers and Architects	Nursing, Therapy and Related Assisting Occupations	Teaching Occupations	Professional Occupations in Art and Culture	Professional Occupations in Social Science, Government Services and Religion
1980	2,599	577	1,315	1,048	1,592	853	661
1981	2,848	638	2,249	1,423	1,341	843	732
1982	2,960	704	2,795	1,425	1,421	822	805
1983	2,088	367	1,056	543	1,020	517	665
1984	1,748	289	754	474	989	466	566
1985	1,677	310	743	513	1,092	495	526
1986	2,090	353	980	643	1,159	562	668
1987	4,631	542	1,826	1,112	1,523	784	1072
1988	5,395	590	1,740	1,403	1,390	839	1082
1989	5,471	759	2,058	1,636	1,863	1069	1094
1990	5,794	773	2,410	1,807	2,216	1107	1181
1991	3,916	765	2,296	1,617	2,309	1048	1143
1992	3,652	618	2,323	1,546	1,792	971	1073
1993	3,180	780	3,746	1,413	1,896	1254	1243
1994	2,489	1,378	4,722	1,388	1,445	1330	1479
1995	1,943	1,971	6,262	1,226	1,365	1442	1738
1996	1,950	2,805	8,372	991	1,404	1846	2014
1997	1,697	2,993	9,873	1,028	1,107	1866	2004
1998	1,334	2,478	8,688	805	987	1560	1581
1999	1,732	3,011	11,726	830	1,076	1655	1837
2000	2,510	3,279	15,708	1,111	1,475	2027	2241
2001	3,065	3,292	17,161	1,303	1,689	2078	2647
Total	64,769	29,272	108,803	25,285	32,151	25,434	28,052
					Grand Total		313,766

Source: LIDS 2002

Between 1995-2001 scientists and engineers begin to dominate immigrant inflows with respectively totals of 19,829 and 77,790 immigrant arrivals. In other words, 72 (67.7%) per cent of all engineers (scientists) who arrived during the 1980-2001 period arrived in the last seven years of the study period. This again highlights the switch in occupational composition of immigrants over the decade as the presumed private sector's demand grew. What is even more interesting to note is the collapse in the immigrant admissions to the public sector in the 1990's with teacher and nursing immigrant admissions averaging around 1,000 yearly. Thus, the 1990's began with substantial managerial admissions and closed with large admissions of scientists and engineers. But, was the

policy response consistent with a growing labour demand in Canada or simply the result of supply changes in China and India?

Results

Below we report several versions of our basic model and provide interpretations of the results when appropriate.

Table 8 reports the results for my model stripped to its basic form where immigration levels today simply depend on past immigration levels. In other words, this model argues that policy makers ignored other variables and made a naïve forecast of contemporary demand for immigrants as a proportion of last years immigrant flow. This modification leads to a distributed lag version of my model which permits either an explosive, decaying or constant immigrant demand. The system is driven by λ^h which is the distributed lagged multiplier which can exceed unity if λ^h exceeds unity and under this condition lead to an explosive system where any positive $I_{ij,t-k}$ accelerates future immigration admissions by policy makers.²¹ If λ is positive, but is less than unity than the system would decay as policy makers respond less and less to changes in past immigration levels ($I_{ij,t-k}$). Of course if $\lambda^h = 0$ then no relationship would exist between immigration today and yesterday as policy makers ignore the change in the last period's immigrations levels. Finally, if $\lambda^h < 0$ then past immigration (i.e. $I_{ij,t-k}$) is perceived by policy makers as competition in the domestic labour market for in the (jth) occupation and less immigrants are admitted in the each successive period.

Table 8: Distributed lag model: $I_{ij,t} = \lambda^k (I_{ij,t-1} \dots I_{ij,t-n})$

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO	P-VALUE	STANDARD- IZED COEFF.	ELASTICITY AT MEANS
$I_{ij,t-1}$.46	.598e-01	7.6	0.0000	.4622	.45
CONSTANT	.699	95.32	7.3	0.000	0.000	0.4036

N= 119 $R^2 = .335$

Source: Author's calculations

Table 8 reports the results for this distributed lagged model. The estimated coefficient for λ equals .46 and is significant. This positive but less than unity value for λ^h indicates that the system is decaying. In other words, contemporary immigration levels ($I_{ij,t}$) are

²¹ Given the following estimating lagged estimating equation of $Y_t = \alpha + \beta_0 X_t + \beta_1 X_{t-1} + \beta_k X_{t-k} + \lambda^h$ (λ) can be derived as follows. First, assume this equation has k finite lags. Then if I make the Koyck assumption that all coefficients are of same sign (positive) and decline geometrically as: $\beta_k = \beta_0 \lambda^k$ or $\beta_k = \beta_0 (1-\lambda) \lambda^k$, where $\lambda \in (0,1)$ is the rate of decline and $(1-\lambda)$ is speed of adjustment. If we estimate λ we know rate of decline and speed of adjustment. This is derived as follows:

If $\beta_k = \beta_0 \lambda^k$ then sum of coefficients of lag terms

$\Sigma \beta_k = \beta_0 (1 + \lambda + \dots + \lambda^k + \dots)$ or $\Sigma \beta_k = \beta_0 (1-\lambda)^{-1}$.

Then $\lambda = 1 - \beta_0 / \Sigma \beta_k$

only partially conditioned (.46) on past levels of immigration ($I_{ij,t-1}$). Moreover, given the estimated value of λ^h (.46) the mean calculated lag between when policy makers set contemporary immigration and past immigration is about 10.2 months.²² This is a powerful result since it accords with the Canadian institutional requirements that immigration levels must be announced one year in advance which implies that if policy makers do partially use recent immigration levels to dictate future levels that the lag would be approximately one year.

Table 9: Naïve version of Immigrant Demand Model: $I_{ij,t}=f(I_{ij,t-1}, (Y_{ij,t-1}-Y_{ij,t-2}))$

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO	P-VALUE	STANDARD- COEFF.	ELASTICITY AT MEANS
$I_{ij,t-1}$	0.47246	0.5920E-01	7.981	0.000	0.4750	0.4679
$(Y_{ij,t-1}-Y_{ij,t-2})$	0.19926E-01	0.7152E-02	2.786	0.006	0.0801	0.0016
CONSTANT	692.61	95.42	7.259	0.000	0.0000	0.3996

N= 119 $R^2 = .66$

Source: Author's calculations

Table 9 expands on the results of table 8 by arguing that in addition to last year's immigration levels changes in the earnings ($Y_{ij,t-1}-Y_{ij,t-2}$) in the relevant occupation will dictate the demand for a particular type of professionally trained immigrant. The model proves stable and the hypothesized positive sign between immigration levels and the change in earnings and past immigration levels is maintained. Increased earnings ($Y_{ij,t-1}-Y_{ij,t-2}$) in the relevant profession leads to a modest increase (.02) in immigrant demand in that occupation. Again, this system is not explosive since lambda is less than unity (.47) and the mean period lag remains at 10.5 months.

Table 10 reports the results of the complete model which now includes a lagged (two period) graduation level variable in the relevant immigrant occupation. The inclusion of $G_{ij,t-2}$ does not yield a significant coefficient and the now insignificant income variable ($Y_{ij,t-1}-Y_{ij,t-2}$) obtains the incorrect sign. Finally lambda, the only significant value falls to .18 which implies a mean lag of 2.5 months. Thus, given this implausible result and the insignificance of the coefficients this complete model is rejected.

Table 10: Full Dynamic Shortages Immigrant Demand Model:

$$I_{ij,t}=f(G_{ij,t-2}, I_{ij,t-1}, (Y_{ij,t-1}-Y_{ij,t-2}))$$

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO	P-VALUE	STANDARD. COEFF.	ELASTICITY AT MEANS
$I_{ij,t-1}$	0.18708	0.5153E-01	3.63	0.001	0.1883	0.1842
$(Y_{ij,t-1}-Y_{ij,t-2})$	-0.12776E-01	0.9654E-02	-1.3222	0.190	-0.0507	-0.0016
$G_{ij,t-2}$.002002	.002001	.98	0.362	0.0301	0.0298
CONSTANT	0 925.1	.009542	8.0	0.676	0.000	0.5717

N= 80 $R^2 = .66$

²² $\lambda / (1 - \lambda)$ is the formula to calculate the mean period lag (assuming infinite number of time periods).

Table 11: Cinquante-Cinquante Immigrant Demand Model:

$$I_{ij,t} = \lambda^k (I_{ij,t-1}^E)$$

VARIABLE NAME	ESTIMATED COEFFICIENT	STANDARD ERROR	T-RATIO	PARTIAL P-VALUE	STANDARD. COEFF.	ELASTICITY AT MEANS
$I_{ij,t-1}^E$	0.36649	0.1763	2.079	0.042	0.252	0.1796
CONSTANT	0.16278E+06	0.1818E+05	8.956	0.000	0.746	0.0000

N= 80 $R^2 = .16$

One major policy statement of the 1990's asserted that total immigration flows were to be a multiple of the past yearly intake of economic immigrants ($I_{ij,t-1}^E$). Table 11 reports a simple test of this proposition which a strong positive relationship between past economic immigrant inflows and contemporary immigration levels. The system moreover was stable since λ^k was less than unity (.36) with a mean lag of less than a year (i.e. 6 months). This latter point indicates that policy makers were keenly aware of the need to match economic immigrants to the total flow admitted six months later.

In sum, these various tests of my model indicate that for these select occupations past immigration levels and changes in occupational wage rates condition immigrant admissions over the 1980-2001 period.²³

Part IV. Brain Circulation

I noted earlier that historically Canada was viewed as a staging ground for emigration as some Canadian immigrants left Canada to return home or move on to a third country. This movement was generally seen as a loss to Canada since it was argued that Canadian émigrés were often positively selected (DeVoretz and Laryea, 1998).

A more neutral term, "Brain Circulation", has become the favored term of the 21st century when discussing the return migration of erstwhile highly skilled Canadian immigrants. Changing mobility conditions across a variety of sending and receiving countries in the mid-1990s led to a new and more general variant of the historical brain drain-gain issue, namely the phenomenon of 'brain circulation'. The literature defines 'brain circulation' as a series of sequential movements by highly skilled workers across three or more states (DeVoretz & Ma, 2002). These states include the sending region, the initial receiving region (e.g. Canada) and the rest of world. Moreover, the movement may not be temporary. Rather substantial periods of residence may occur so that the immigrant may acquire citizenship and human capital in the receiving country before moving again (DeVoretz & Zhang, 2004).

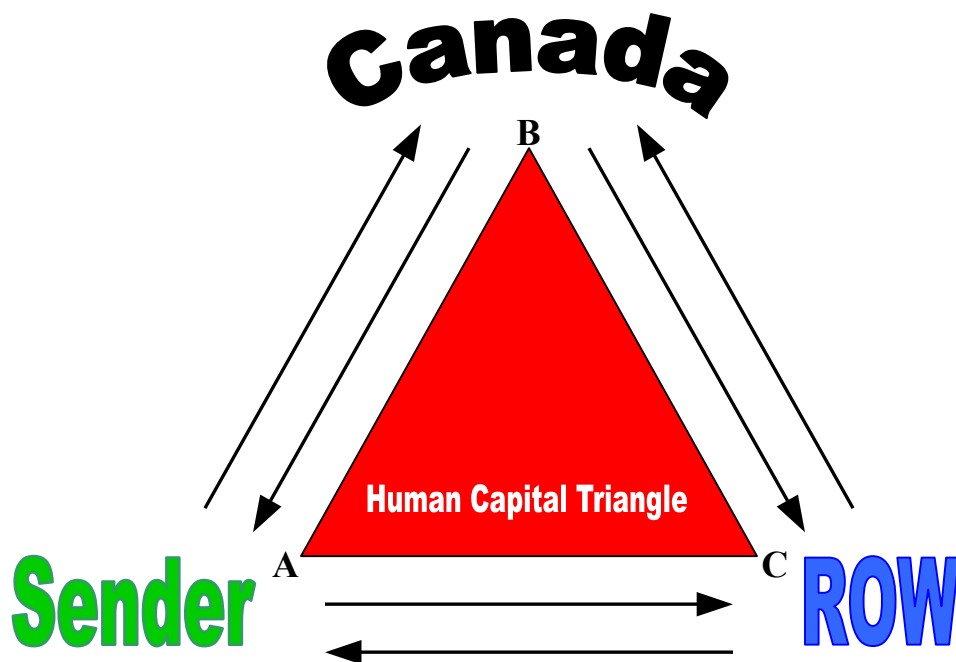
²³ Table A-4 reports the results for the complete model for the 1976-1984 which supports the existence of a 'tap on-tap off' manpower policy circa 1976-1984.

What new forces emerged in the 1990s to reconfigure the erstwhile bilateral brain drain into a multilateral brain circulation phenomenon? First, a robust economy in North America with an expanding IT sector fuelled the demand for highly skilled immigrants. This alone would have however simply led to a bilateral movement of skilled workers or a typical 'brain drain' in the absence of new institutional and legal frameworks. The first major institutional change was the proliferation of dual citizenship policies which allowed some highly skilled immigrants to move continuously between their erstwhile home country and the receiving country (DeVoretz and Pivnenko, 2006). In addition, the second citizenship often conferred even more extensive mobility rights. For example, naturalized Canadian citizens could now enter the United States under a NAFTA or TN visa created especially for trade related migration. In addition, to the traditional mode of permanent movement culminating in citizenship, temporary visas became more plentiful, especially the H1-B in the United States which accelerated the movement of highly skilled immigrants especially from India and China. These temporary visa holders were then often able to adjust to a permanent status in the United States or move on to the rest of the world.

Another major force emerged in the early 1990s to accelerate 'brain circulation' as China (PRC) relaxed its exit requirements to allow highly skilled Chinese to leave for educational purposes, with the expectation that at least one-third would return to China. Moreover, constraints in the Chinese educational system, including higher fees and increased competition for admission to the best schools, encouraged Chinese student immigration to North America and Australia. These students often converted their temporary student visas to a more permanent status especially in Australia which facilitated this conversion process. For its part, India instituted partial dual citizenship to Indian foreign citizens and this facilitated Indian 'brain circulation'.

In addition, the rise in foreign direct investment to the immigrant's home country financed by immigrant remittances often required the periodic presence of these immigrant investors, giving rise to transnational households. Thus, with one spouse investing and working in the sending country and one spouse in Canada, the periodic return of the erstwhile Canadian immigrant to Canada was assured and this movement back assured continuous 'brain circulation'.

Figure 2



In sum, both these changing supply and demand conditions altered the bi-lateral brain drain into a triangular movement as depicted in figure 2 which has now been termed 'brain circulation'. This concept of 'brain circulation' is general enough to permit the simple unilateral brain drain (A to B) or transnational movement (A to B to A), as well as true brain circulation with movement from A to B to C.

Motivations to engage in "Brain Circulation"

In the conventional brain drain literature, bilateral movements of the highly skilled were argued to result from a series of push and pull forces in the origin and destination countries. The neo-classical view that higher expected wages in the destination country constituted the main motivation to move was replaced in the 'brain circulation' literature by an explanation which appealed to forces inherent in the more modern theory of households. This literature owing to Stark and Lucas (1988) suggested in the 1980s that households in poor countries used migration as one of many strategies to survive in an uncertain environment. Hence, households invested in the individuals' education and financed their departure for further schooling and employment under the implicit private contract that the individuals would remit monies so that poor households could survive. Thus, this modern home economics literature did not view highly skilled migration as a simple result of exogenous push and/or pull forces, but as part of households' general investment strategy.

Given the above argument, then skilled immigration will increase when the return from the joint household investment in a family member's education and immigration rises.

For example, if immigrant remittances suddenly become more productive in the immigrant sending country due to exchange rate stability or low transaction costs, more immigration will be financed by the immigrant sending country households.²⁴ In addition, if family reunification is made easier in Canada then, as a consequence ‘brain circulation’ will decrease since the imperative for return migration will decrease. On the other hand, if the costs of return migration are reduced via mutually respected dual citizenship policies between the sending and receiving countries, the nature of highly skilled migration will change from a permanent move to a rotating strategy more consistent with the concept of brain circulation.

In addition, a distinction must be made between general motivations to move and the choice to move to a particular country. Immigrant selection criteria and economic and social conditions affect the immigrants’ choice of location once the decision to move has been made. If we divide immigrant-receiving regions into destinations providing subsidized general and specific human capital versus those that offer no subsidized human capital, then immigrants will self select into either country based on their taste for risk. It has been noted that the acquisition of human capital in the destination region affects the move-stay choice of the skilled immigrants. For example, Canada provides subsidized human capital (language, job skills, and certification) to risk adverse immigrant arrivals who are attracted to a more equalitarian but lower income economy. However, whether these skilled immigrants enhanced with subsidized human capital remain in Canada depends on citizenship policies which influence downstream immigration to a third country.²⁵

“Brain Circulation” also appears due to a series of cross country competing immigration policy initiatives. In a modern context this means that, even if the rate of return for the skilled immigrants’ human capital is lower in Canada, but the queuing time is certain and shorter for a move to Canada, the immigrant may choose Canada over the United States, at least in the short run. Thus, immigration motivation is now defined by more than the simple push-pull thesis between the sending and receiving countries. This motivation is now part of a complex strategy. In other words, highly skilled immigrants maximize their net income gain by moving in a sequential pattern; first to an entrepot country, Canada, which supplies subsidized human capital, and then consider returning home or moving on to the rest of the world once they became naturalized Canadians.

In the context of brain circulation the role of push and pull forces become blurred. Many traditional pull forces, such as access to subsidized education and the prospect of Canadian citizenship with a passport, initially attract immigrants, but, once acquired, act as a push force to send immigrants home or on to a third country. Thus, discrete push and pull distinctions are no longer relevant; rather, it is the highly skilled immigrants’ desire to maximize the rate of return on the acquired human capital that motivates them to stay in Canada (pull) or move on (push).

²⁴ See DeVoretz and Vadean (2005)

²⁵ See DeVoretz and Pivnenko (2006)

North American Evidence of “Brain Circulation”

We now turn to some evidence in the North American context to highlight Canada’s historical experience with ‘brain exchange’ We will conclude with more recent evidence on the alleged Chinese triangular move to shed light on a particularly important example of “brain circulation” for Canada.

As already noted DeVoretz and Laryea (1998) argue, Canada has traditionally received offshore immigrants to replace earlier Canadian-born emigrants to the United States. In other words, Canada was compensated for the loss of domestically trained emigrants to the United States by importing skilled immigrants from the rest of the world (see table 1). In the 1990s there was considerable debate about the existence of a Canadian “brain drain” to the United States. However, the loss of Canadian-born skilled immigrants appeared to be more than offset by the importation of skilled labour from the rest of the world. Nonetheless, there were important exceptions to this observation that can be revealed by devising a two-part analytical framework of managed and market-driven labour markets.²⁶

In the managed labour markets there was a Canadian ‘brain drain’ that went largely uncompensated by world imports. In the market-driven labour market foreign inflows of skilled immigrants to Canada have more than compensated for the skilled outflows, except managers, to the United States. The imbalance in these two labour markets, a positive net inflow in the market-driven sector and the deficit in the managed labour market led observers to conclude that Canada did not suffer from a brain drain. However, this conclusion may be premature. A careful evaluation of the credentials of the presumed highly skilled immigrants to Canada in either the market-driven or public sectors indicated that immigrant credentials often did not match the Canada-trained leavers (DeVoretz and Iturralde, 2000). Hence, in reality there was a substantial pre-2001 brain drain in the public sector and for managers that was not revealed by simple aggregate number counting.

What push and pull forces led to this ‘brain circulation’ to the United States in the 1990s, and are these forces still active in 2005? First, immigration policy between the United States and Canada changed with the advent of the TN-1 visa under the NAFTA accord. Canadian skilled emigration to the United States had been in a period of quiescence in the 1980s partly due to the inability of Canadians to enter the United States with a permanent visa; this changed with the TN-1 visa. Secondly a stagnant Canadian public sector pushed medical professionals to leave Canada to seek employment in the United States. Finally, higher post-tax income in the United States encouraged Canadian managers and professionals to leave in the late 1990’s.

The collapse of the knowledge sector in North America and the post-911 security climate has substantially reduced any brain circulation from Canada to the United States by

²⁶ Examples of Canadian managed labour markets are nurses, physicians, teachers, and other public sector employees whose employment depends on public sector decisions. The Canadian market driven labour market would be all other professions.

erstwhile Canadian immigrants. Also, the use of TN visas has been restricted to a subset of Canadian-born citizens since some naturalized Canadians now face complicated visa requirements.²⁷ More importantly, the major pull forces in the United States have disappeared, and there is now evidence of reverse flows as foreign graduate students choose Canada over the United States given the new visa requirements (DeVoretz, 2006).

In the future Canada will continue to send highly skilled Canadians to the United States, including naturalized Canadian citizens. However, the historic predominance of pull factors indicates that economic and political conditions in the United States will largely determine this flow in the market-driven labour sector.

Evidence of Chinese “Brain Circulation”

New research presents evidence on the emergence of a Chinese Canada-Hong-Kong “brain circulation”. Two studies conducted by this author, one quantitative and the other interview based provide a host of information on both the size and the selectivity of this 21st century example of ‘brain circulation’.²⁸

Table 12 which is drawn from Hong Kong and Canada Census data depicts the differential human capital, employment and earnings characteristics between Chinese immigrant stayers and movers.²⁹ The returning Chinese Canadians resident in Hong-Kong are much younger (62% under age 39), more educated (50.5% with a University education) and earned 2.2 times more mean monthly wages than their Hong-Kong born reference group. However, the Chinese immigrant staying population in Canada has an occupational distribution more heavily concentrated in the lower professional ranks and managers categories.

Thus, by 2001 the Canadian return migration process to Hong Kong was highly selective with the youngest (except children) and most educated Chinese emigrating from Canada leaving a less educated and less productive staying segment in Canada.

²⁷ For example, Canadian citizens born in Iran, Pakistan and other Middle Eastern countries cannot simply use a TN visa for entry into the United States.

²⁸ See DeVoretz, D. and K. Zhang, (2004) for details of the quantitative study.

²⁹ The stayers are defined as Hong-Kong-born immigrants with permanent residence status in Canada circa 2001. Hong-Kong returnees from Canada are defined as Hong-Kong residents circa 2001 who had lived in Canada in the previous five year period.

Table 12. Characteristics of Hong Kong-Born Returnees and Stayers in Canada: Circa 2001

	Returnees To Hong Kong from			Hong-Kong Born Stayers in Canada*			
	All		Canada	USA	Others		
Total	85793	100.0%	33676 (39.3%)	17778 (20.7%)	34339 (40.0%)	6955	100.0
Age:							
0-19	8236	9.6	9.4	4.4	11.1	1506	21.7
20-29	32430	37.8	37.5	39.4	37.6	1272	18.3
30-39	19990	23.3	21.5	26.1	23.8	1745	25.1
40-49	12354	14.4	14.9	14.4	14.1	1630	23.4
50-59	6263	7.3	8.5	8	6.3	413	5.9
60	6434	7.5	8.1	7.7	7.1	389	5.6
Sex:							
Female	42811	49.9	53	48	49	3519	50.6
Male	42982	50.1	47	52	51	3436	49.4
Relation to Head of Household:							
Head	29170	34.0	33.5	35.9	33.9	1966	28.3
Spouse	14756	17.2	18.2	18.0	16.3	1634	23.5
Children	32430	37.8	38.2	37.1	37.7	2741	39.4
Maid	86	0.1	0.0	0.0	0.1	n/a	n/a
Others	9351	10.9	10.1	9.1	12.0	614	8.8
Education:							
Primary School or less	9180	10.7	9.2	6.4	13.1	392	6.4
Secondary School & Diploma	31314	36.5	40.3	23.6	37.5	4201	68.2
Local Uni. Degree	12612	14.7	15.3	15.8	13.9	1571	25.5
Overseas Degree	32687	38.1	35.2	54.2	35.5		
Occupation:							
Low Skill	13509	26.7	25.8	16.9	30.2	1068	27.7
Assistant Professional	15584	30.8	33.7	29.8	29.2	951	24.7
Professional	10726	21.2	16.9	28.4	21.9	1038	26.9
Managerial	10777	21.3	23.6	25.0	18.7	796	20.7
Total	50596	100	100	100	100	3853	100.0
Earnings:							
1-5,999	2682	5.3	5.1	4.4	5.6	2382	45.7
6,000-9,999	5970	11.8	10.0	8.3	14.1	739	14.2
10,000-14,999	12345	24.4	26.7	17.6	24.7	753	14.5
15,000-19,999	7994	15.8	17.0	17.6	14.7	552	10.6
20,000-29,999	8348	16.5	18.3	17.5	14.8	525	10.1
>=30,000	13256	26.2	22.8	34.6	26.0	256	4.9
Total	50596	100.0	100.0	100.0	100.0	5207	100.0
Median (HK Dollar/month)		16520.38	16500.00	20000.00	15500.00		7091.03
Mean (HK Dollar/month)		25543.01	23314.00	33682.00	24657.00		10234.78
Gini Coefficient**		.11.	.13	.55	.15		.34

Source: 2001 census data, Department of Census and Statistics, Hong Kong SAR, PRC.

Notes:

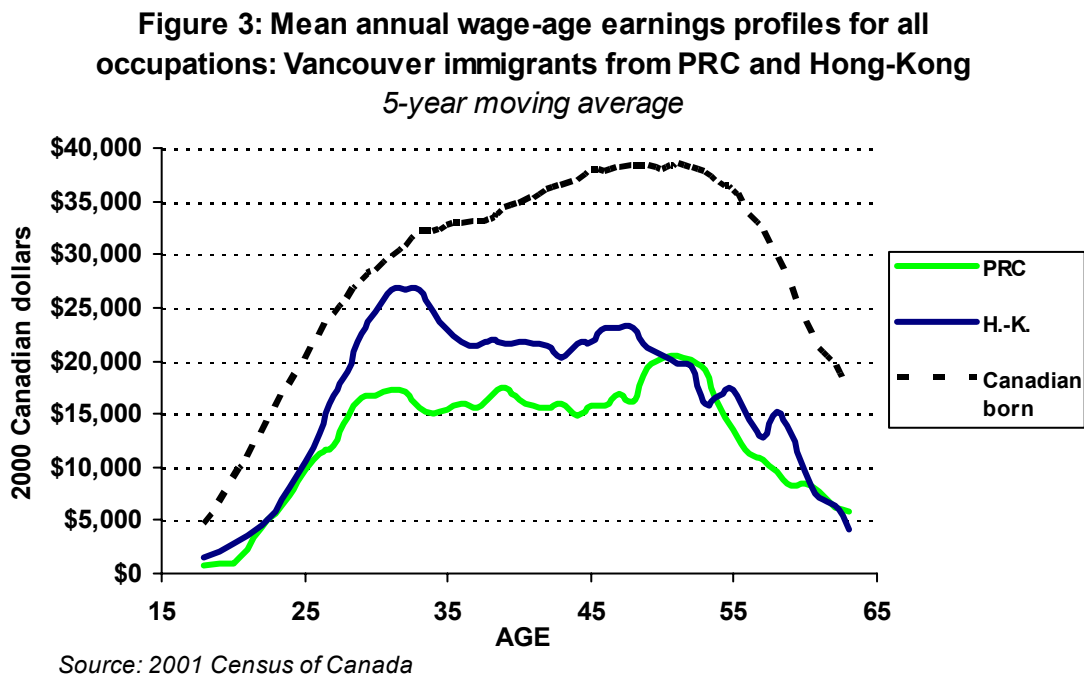
* 2001 Canadian census public use individual Microdata files, For earnings, sample selected: aged 15 and over; income > 0; adjusted to 2000 real CND dollar value; exchange rate as on Dec. 31, 2000 at CND\$1 = HK\$5.20777.

** Author's calculation.

There is one further important conclusion to be drawn from an analysis of table 12. As noted, this return movement is welfare-improving for the migrants (higher wages) in the triangle and possibly taxpayers in Hong Kong, but not the Canadian taxpayers. Elsewhere it has been estimated by DeVoretz and Itturalde (2000) that each Canadian post-secondary student who leaves Canada takes approximately \$230,000 (Cdn) in taxpayer subsidy with him/her. Thus, combining the number of returnees reported in table 12 who acquired a post-secondary education overseas (11,786) with this Canadian taxpayer subsidy yields a \$2.7 billion (Canadian) drain from Canada to Hong Kong.

One fundamental question remains. What were the reasons for this selective movement? Unfortunately census data can not reveal the motivations to return to Hong Kong and I thus conducted extensive surveys of both the Chinese stayer population in Vancouver and the mover population in Hong-Kong.³⁰ The stayer survey asked over 900 respondents the cultural, linguistic, social and political forces which determined their degree of integration in the Canadian society and economy and their prospects of moving to Hong Kong.

Figure 3 places the Vancouver's Chinese immigrant stayers in the Vancouver economic context. The stayer reported wage earnings for Chinese immigrants after age 30, are well below the wage earnings reported for Canadians in Vancouver. These poor economic prospects, especially for Hong-Kong immigrants, should motivate their return given that their income level prospects are twice as high in Hong-Kong as in Canada (see table 12).



³⁰ The interested reader may see the surveys at <http://riim.metropolis.net/research-policy/Survey/first.htm>

Given this weak economic performance our survey probed Chinese immigrants to explain the forces behind this poor economic performance and comment on their prospects of remaining in Canada. When asked in the survey what they felt were the barriers to employment the majority (65%) of the Chinese respondents, regardless of skill level, attributed their labour market problems to either a lack of credential recognition, language barriers or both. In terms of meeting their social and economic aspirations after three or more years in Canada only 25% of the Chinese respondents remaining in Canada had met any of their goals and 50% said that they never would meet these goals. When asked what social group had helped them most to integrate into society they rated family and friends first, social organizations second and government last. In terms of their future aspirations over 60 per cent planned to stay in Canada while 40 per cent were either uncertain or planned to leave once they acquired citizenship. Finally, an analysis of the motivations to stay under these dire circumstances revealed that most felt conditions would not improve for themselves but they almost universally felt (90%) that conditions for their children would improve in Canada and they would remain in Canada for that reason.

In sum, these 945 Chinese immigrants face a variety of employment barriers, but only 40% stated that they would leave after obtaining Canadian citizenship.

Implications of Return or Onward Migration

Under the old regime of permanent settlement and limited circulation, Canada's investment in immigration integration yielded social and economic rewards from the presence of immigrants which aided Canada's development and treasury. This may no longer be the case, as Canada must now share the benefits of immigrant relocation and increased education with the rest of the world.³¹ Given the size of immigrant remittances and return migration it is now possible to argue that both the immigrant sending and receiving countries share in the immigrant's prosperity.³²

This census based evidence on the economic activity of Canadian citizens who have returned to Hong-Kong documents their strong economic performance relative to the Chinese immigrants who remained in Canada. Thus, in this case, self-selection in return or onward migration is evident: the best move and the weakest remain in Canada. On balance it appears in this limited case that Canada is losing the most productive highly skilled Chinese who were trained in Canada and are now Canadian citizens residing in Hong Kong. In addition, a large financial liability may await Canadian taxpayers if these Chinese émigrés return in old age.

³¹ Remittances in particular have substantially grown in the last decade and they now surpass foreign aid as a source of development funds for many countries (Straubhaar and Vadean, 2005).

³² See DeVoretz and Vadean (2005) for estimates of Canadian immigrant remittances.

Part V. Trade, Immigration and FDI

Immigration flows are embedded in a larger international context. Globalization and the associated rise in trade, foreign direct investment and immigration have been historically analyzed to sustain or reject the proposition that trade and immigration are either substitutes or complements. In this section we specifically ask if trade and investment in the late 20th century are substitutes or complements to immigration? This question is no mere curiosum since the answer has far reaching policy implications. If Canadian trade and immigration are substitutes than growth through trade would obviate the necessity of increasing market size through immigration. Moreover, if foreign direct investment accelerates immigration than Canada may want to reconstitute its immigration investor programme of the 1980's.

Theoretical constructs

Jeffrey Williamson et al.(1999) challenged the Mundell (1957) theoretically derived thesis that trade is a substitute for immigration with evidence from the historical record of the 19th century North American.³³ Williamson argued that as surplus capital flowed from Europe and especially the United Kingdom to Canada and the United States both skilled and especially unskilled immigrants followed this capital to North America. His underlying argument stated that in North America land was abundant and capital and especially labour were scarce in the last quarter of the 19th century hence the latter two inputs were imported. Thus, as investment in infrastructure (railroads, electricity, etc) occurred the existence of these complementary inputs plus accelerating technical change raised both total factor productivity and wages as the demand for labour simultaneously increased. Mosk (2005) updated Williamson's work and found that migration and trade in the 20th century were often complements (1890-1914 and 1950-1992) but between 1915-1950 they appeared as substitutes for several new world countries including Canada. In particular for Canada Mosk reports that trade and immigration were strong complements.³⁴ However, it should be noted that Globerman (1995) sought but could not find a significant relationship between Canadian immigration and its trade patterns.³⁵ This dynamic turn of events essentially reversed Mundell's static theoretical argument, and trade, FDI and immigration were now seen historically as complements.³⁶

³³ Mundell's argument is simple in the static sense. If you import labour intensive goods from a country with a comparative abundance in labour you will not need to import that labour to produce those goods at home.

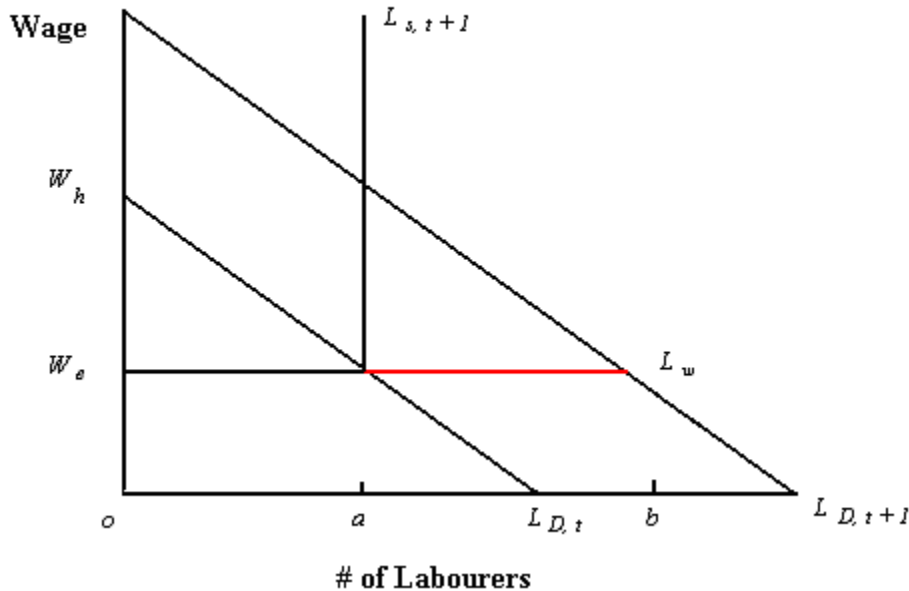
³⁴ For the 1926-1989 period Mosk reports no relation for trade on migration or vice-versa under a Granger causality test.(Mosk 2005, p. 219).

³⁵ Globerman specifically was testing if immigration altered trade patterns by shifting trade to immigrant sending regions in Canada and the United States. This is not the relationship I am looking for in this paper.

³⁶ Markusen (1983) presented a dynamic version of Mundell's static argument and theoretically reversed Mundell's results and showed that given technical change or capital imports, immigration could be complementary to growth in trade.

Can the same situation hold in 21st century Canada such that trade and FDI are complements to immigration? Figures 4 A and B below which are variants of figure 2 in Part III illustrate how factor complementarities could arise to shift the demand curve for labour and increase immigrant demand.

Figure 4a



In figure 4a labour demand ($L_{D,t}$) for the (jth) type occupation equals (oa) and domestic labour supply equals (oa) in period (t). Thus, an equilibrium wage (W_e) prevails with no immigration. Now a shift in labour occurs and $L_{D,t+1}$ results as foreign direct investment increases output and the demand for the (jth) skill. Since this is the short-run, i.e. only one period elapses, no net new domestic labour appears in the short-run. Thus the labour supply curve is vertical ($L_{S,t+1}$) beyond (oa) and either the equilibrium wage rises to W_h or immigrants equal to (ab) are admitted to maintain the wage at W_e . This is the case in which foreign direct investment (FDI) and immigration appear to be complements.

³⁷ It is of course possible that the globalization process by definition eased immigration restrictions and decreased tariffs thus, the expansion of trade and increased immigration appear to be complements when in fact there is no causality between trade and immigration. Rather the results of growing trade and immigration are spurious and are owing to a third unobservable, namely globalization.

Figure 4b

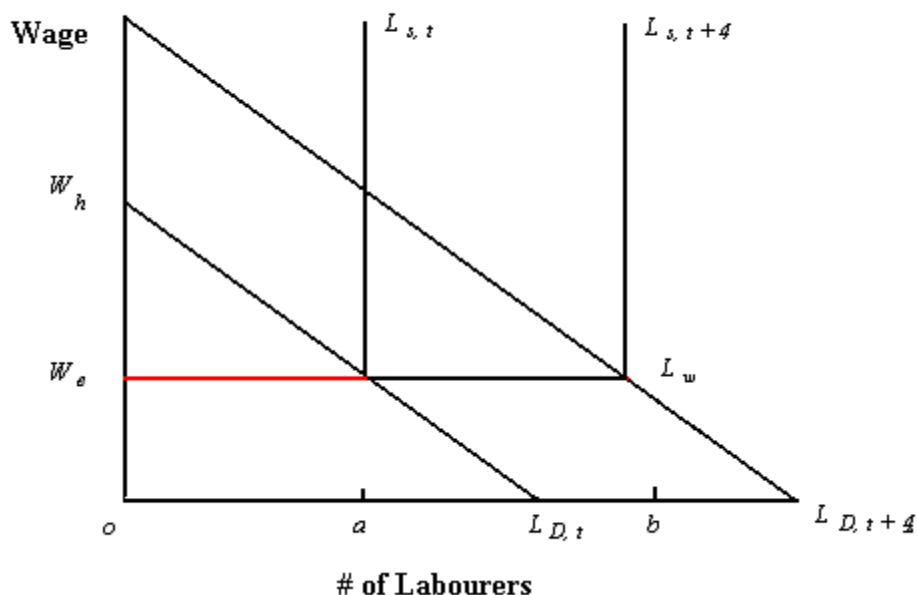


Figure 4b illustrates the long-run case in which an increase in FDI is followed by a long run shift in labour demand ($L_{D,t+n}$) over n periods or more. However, in this longer run period, the domestic labour supply curve is able to shift to the right ($L_{S,t+4n}$) since enough time (e.g. 4 periods) has expired to permit additional domestic labour to enter the labour force to maintain the wage at W_E with no immigration. Hence, FDI and immigration levels would be unrelated as domestic graduates substitute for potential immigrants. Similar short or long-run outcomes would occur in the labour market if exports increased and thus the export case will not be reviewed in detail.³⁸

Finally, if imports reduce the demand for the (j th) skill in figures 4a or 4b then the demand for immigrants would drop to maintain the wage level and immigration and imports would be substitutes.

Empirical Evidence

Given that FDI and various components of trade could be substitutes, complements or have a nil relationship with modern immigration levels we turn to some empirical tests to sort through the most appropriate case for modern Canada circa 1980 to 2001.

³⁸ It is of course possible that the globalization process by definition eased immigration restrictions and decreased tariffs thus, the expansion of trade and increased immigration appear to be complements when in fact there is no causality between trade and immigration. Rather the results of growing trade and immigration are spurious and are owing to a third unobservable, namely globalization.

We offer the following distributed lag model to characterize our outlined model.

$$\text{Eq. 2 } I_{j,t} = \alpha(1-\lambda) + \lambda I_{j,t-1} + (\beta_0 X_{t-n} + \beta_1 \text{FDI}_{t-n} + \beta_2 \text{IM}_{t-n})$$

Where X_{t-n} (IM_{t-n}) equals exports (imports) in merchandise and services in period (t-n) and FDI_{t-n} is foreign direct investment in period (t-n).

The system is driven by λ which is the distributed lagged multiplier which can be explosive if λ exceeds unity. In this explosive case greater FDI or X_{t-n} accelerates immigration demand and in turn policy makers overact to these expansionary pressures as they appeared to have done during the IT bubble by accelerating the demand for immigrant engineers in later periods.

Of course if $\lambda = 0$ then no relationship would exist between contemporary immigration levels and past immigration levels set by policy makers. Next, if $\lambda < 0$ then changes in trade and FDI which could induce a rise in immigration which would subsequently lead to lower immigration levels as policy makers fear outsourcing of jobs and a decline in labour demand in the (jth) occupation. Finally, the mean lag in terms of the number of periods expired between an observed immigration level and target immigration level set by the policy maker is equal to $\lambda / (1 - \lambda)$.³⁹

As noted above exports, imports and foreign direct investment can have their own independent effects on the contemporary demand for immigrants. As exports or FDI increase then the demand for labour should rise and contemporary immigration levels should increase as policy makers respond to the short run pressure on wages. On the other hand, as imports rise then the demand for labour should decline and policy makers should reduce their immigration levels as wages or employment in these industries decline.

To add sophistication to these arguments I will disaggregate both exports and imports into their merchandise and service components. The expectation here is that services should possibly be a greater complement (substitute) for immigration since service exports (or imports) are more labour intensive.

Data

I choose the newly settled regions of Canada, the United States, Australia and New Zealand to test my model. Given their relatively open immigration policies these newly settled regions would be the most likely source to detect any relationships between trade, FDI and immigration. The study period was terminated in 2001 since post 9/11 events and the collapse in the IT bubble were felt to have been a sign of structural

³⁹ See footnote 18.

change. Canada's fluctuating immigration policy has been outlined above however the other sampled countries during this twenty year period also experienced major changes in their immigration policies (Table A-5). In particular, Australia's (country 1) total gross immigration levels rose from 128,100 in 1982 to 157,000 in 1989 and then collapsed by 1994 (30,000) to later recover in 2001 (88,900). New Zealand (country 3) had for the most part a rising gross immigrant total starting at 45,000 in 1982 and reaching 76,600 in 2001. The United States had substantial absolute totals which fluctuated between 544,000 (1984) to over 1.8 million during the 1991 amnesty period.

Foreign direct investment as would be expected fluctuated over time and across countries. Australia's foreign direct investment fluctuated even more than its gross immigration totals during the study period, reaching a nadir in 1984 while peaking in 2000. Canada foreign direct investment, also fluctuated being virtually nil in 1982 rising to \$66.1 billion U.S. in 2000. On the other hand, New Zealand's foreign direct investment was relatively constant after 1984 with a substantial rise and then fall in the mid 1990's. Finally, the United States had a phenomenal rise in FDI over the period from 1982 (\$ 12.4 billion) to 2000 (\$321 billion). In sum, there appears no superficial correspondence between gross immigration flows and foreign direct investment inflows for any of my selected countries but the sample period is characterized by substantial fluctuations in both immigration and FDI levels.

Finally, globalization in terms of an absolute increasing imports and exports both in terms of merchandise and services is readily apparent in all four countries. For example in both Australia and Canada merchandise imports and exports tripled (or more) in value over the study period. Exports in services had even a more pronounced growth in both countries with a four fold increase in Australia and a five fold increase over the study period in Canada. New Zealand experienced more modest rises in imports and exports with approximately a doubling in unit values while the United States had even more impressive increases with three to five fold increases in imports and exports.

Results

Table 13 reports the results of equation 2 under a globalization specification. It presents a version of the model which I will term globalization in its most aggregated version. In sum, if all the terms on the R.H.S. are significant than contemporary immigration levels to the selected countries would increase as a function of growing past immigration levels, exports, imports and foreign direct investment. The results reported in Table 13 are significant for many of the arguments and weakly conform to the theoretical predictions of a globalization model. Lagged immigration is significant and suggests that the system will converge since λ is less than unity (.75). In this context, the admitted level of immigrants is seventy five percent of last year's admissions given fixed trade and foreign direct investment (FDI) levels.

Moreover, foreign direct investment also positively influences immigration levels. A one period lag in foreign direct investment (FDI_{t-1}) raises immigration levels. In fact, a one percent increase in foreign direct investment will lead to a one-tenth percent rise in next

year's immigration levels which indicates that foreign direct investment and immigration are complements. Exports yield no clear pattern and imports have no significant relation with contemporary immigration levels. Overall the regression has a high explanatory power ($R^2 = .85$) especially given the limited number of observations ($n=80$).

Table 13: Globalization Model of Trade and Immigration:

IMM= f(IMM _{t-1} , EXP _t , EXP _{t-1} , IMP _t , IMP _{t-1} , FDI _t , FDI _{t-1})				
Variables	OLS Coefficients	T-values	Elasticity	
IMM_{t-1}	0.75284	9.026	0.7322	
EXP_t	1.7216	2.628	1.323	
EXP_{t-1}	-2.0206	-2.878	-1.4573	
IMP_t	-0.52211	-0.8992	-0.4704	
IMP_{t-1}	0.89014	1.359	0.7461	
FDI_t	-0.46495	-0.8499	-0.0439	
FDI_{t-1}	1.2149	2.078	0.1051	
Buse R ² = .85	DF=68			

Table 14: Correlation matrix of variables

	IMM	FDI	SEREX	SERIM	MEREX	MERIM
IMM	1					
FDI	0.48658	1				
SEREX	0.75032	0.8431	1			
SERIM	0.75319	0.8631	0.99129	1		
MEREX	0.74931	0.82154	0.97842	0.98655	1	
MERIM	0.74031	0.8697	0.98979	0.99753	0.98587	1

Notes: IMM= absolute immigration, FDI= Absolute Foreign Direct Investment, SERX=Service exports, SERIM=Service imports, MEREX=Merchandise exports and MERIM=Merchandise imports

Finally, an analysis of the correlation matrix of variables in Table 14 suggests the presence of substantial multicollinearity between FDI and trade components, whereas the correlation between FDI and immigration levels is relatively low. Under our globalization hypothesis strong and positive pair-wise correlations between exports, imports and foreign direct investment suggests the complementary relationship between these factors. Furthermore, if there existed an approximate linear relationship among these variables (e.g. "globalization index") then the estimation problem could be converted into a simultaneous equation framework.

In sum, I have found some evidence to support the globalization hypothesis and limited evidence to suggest a direct relationship between exports, foreign direct investment and later immigration levels for Australia, the United States, Canada and New Zealand circa 1982-2001. These results in general agree with Mosk's (2005) findings for a similar set of countries when he notes that: "*Trade openness is positively associated with demographic openness*" Mosk (2005, p. 194). However, Globerman (1999) from a smaller North American sample dissents from this view when he concludes that trade

liberalization under NAFTA had little impact on Canadian permanent immigration to the United States.

Part VI. Conclusions

This essay explored the role of Canadian immigration policy in meeting Canada's historical role of aiding Canadian economic development. In the modern setting of the 1980's through the opening of the 21st century Canadian immigration policy has been substantially revamped. First, in terms of number of immigrant arrivals or the value of their embodied capital the occupational distribution of Canadian immigrant inflows changed dramatically from the 1980's until 2001. The supply driven entry of Hong-Kong and other managers and investors was supplanted by the emergence of engineering and associated professionals after 1995. These trends were an outgrowth of two explicit immigrant demand philosophies including the cautious 'tap on-tap off' policy of the 1980's and expansionist 'cinquante-cinquante' policy of the 1990's. In addition, Canada moved from a 'brain gain' immigrant receiving country in the 1980's to a 'brain circulation' participant in the late 1990's as some highly talented Canadian immigrants became émigrés. Finally, Canada's expansionary immigration policy of the 1990's complemented its increased globalization position of the 1990's as exports, foreign direct investment and immigration expanded.

This flexible and modern Canadian immigration policy however has not been a robust 'engine of growth' as in the past. First, many of the recruited managers of the 1980's left in the 1990's for the United States or returned to Hong Kong. Next, the heavy recruitment of engineers was less than selective as a 'credential crisis' emerged in the 21st century along with an oversupply. Unfortunately immigration decisions are asymmetrical since you can admit permanent immigrants but can not send them home if the economic situation changes as it did after 2001. The expansionary immigration policy of the 1990's has left Canada with a legacy of highly trained immigrants whose credentials are either not recognized or do not match Canadian standards. Thus, unlike the past these new Canadians do not experience earnings assimilation and this lowers Canada's per capita income.

What future policy directions are available to make immigration a handmaiden of growth? In the short run Canada can revamp its immigration policy to more closely align itself with Australia's policy by recruiting Canada's highly skilled immigrants from its foreign student population. Recent policy initiatives (May, 2005) indicate that Canada may be partially moving in this direction as it grants more generous work permits to foreign student graduates.⁴⁰ This recruitment of foreign students would alleviate the credential recognition problem and minimize the reported linguistic and cultural impediments that current overseas recruited immigrants face (DeVoretz, 2005) If Canada does not become more competitive in the immigrant recruitment process it faces long run challenges. Canada can only hope that second generation immigrants

⁴⁰ Foreign students circa 2005 can be granted two year work permits if they find a job outside of Vancouver, Toronto or Montreal. During this two year period they can apply for permanent immigration status and earn the all important Canadian job experience to hasten economic assimilation.

produce the results that it expected from first generation immigrants. As Canada waits this long-run positive outcome, selective out migration of productive first generation immigrants will occur further undermining immigration as a handmaiden of economic growth.

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APPENDIX A

Table A-1. Variable definitions

(1) Variables	(2) Operational definitions	(3) Sources
1. Immigrants	Teachers, professors, physicians and nurses entering Canada during 1975-86 under immigrant visas from 16 countries.	Canada, <i>LIDS</i>
2. Earnings		
(a) Teachers	Median real annual salaries for all public secondary and elementary school teachers.	Canada, <i>Salaries and Qualifications of Teachers in Public Elementary and Secondary Schools</i> (various issues).
(b) Professors	Median real salaries of full-time university teachers.	Canada, <i>Education in Canada</i> (Various issues).
(c) Physicians	Net annual real earnings of self-employed physicians and surgeons.	Canada (various issues).
(d) Nurses	Mean real salaries of graduate nurses employed in Canada.	Canada (various issues).
3. Lagged Canadian graduates		
(a) Teachers	Bachelor and Master of Education degrees granted in Canadian universities and colleges.	For all categories used: Canada, <i>Degrees, Diplomas, Certificates Awarded by Degree Granting Institutions</i> (various issues).
(b) Professors	All earned doctorates granted in all fields in Canada.	
(c) Physicians	MD and Master of Medicine degrees granted in Canadian universities and colleges.	
(d) Nurses	Bachelor of Nursing degrees granted in Canadian universities and colleges.	
4. Immigration to United States	Immigration levels to the United States in each occupational category: professional, technical and managerial.	US INS (various years).

Table A-2 . Trends in Canadian Immigration
1980-2001 (absolute numbers in 000s)

Year	(1) Total Immigration	Immigrants Professionals*	
		(2) Total	(3) as % of All
1980	142,856	11,067	7.75%
1981	128,311	13,369	10.42%
1982	120,616	14,404	11.94%
1983	88,617	7,766	8.76%
1984	87,236	6,560	7.52%
1985	82,822	6,643	8.02%
1986	97,509	8,245	8.46%
1987	149,515	15,290	10.23%
1988	158,499	16,503	10.41%
1989	188,148	18,154	9.65%
1990	213,009	19,517	9.16%
1991	229,693	16,870	7.34%
1992	250,550	15,868	6.33%
1993	252,194	18,836	7.47%
1994	220,500	20,945	9.50%
1995	209,726	24,646	11.75%
1996	222,728	31,099	13.96%
1997	208,582	33,507	16.06%
1998	163,446	27,770	16.99%
1999	183,308	34,870	19.02%
2000	222,352	45,282	20.37%
2001	246,892	50,206	20.34%

*All managerial and professional occupations

Source: LIDS

Table A-3 Real annual wage earnings of immigrants by occupation, one year after arrival,
1992 Canadian dollars

Year	Managerial and Administrative	Scientists (Natural and Life Sciences)	Engineers and Architects	Nursing, Therapy and Related Assisting Occupations	Teaching Occupations	Professional Occupations in Art and Culture	Professional Occupations in Social Science, Government Services and Religion
1981	\$46,560	\$38,053	\$48,222	\$24,248	\$21,576	\$19,098	\$24,290
1982	\$44,505	\$33,968	\$46,890	\$25,810	\$24,652	\$16,726	\$23,906
1983	\$42,026	\$28,279	\$36,234	\$24,790	\$24,213	\$13,991	\$21,950
1984	\$44,214	\$29,845	\$29,949	\$25,341	\$19,441	\$13,336	\$20,886
1985	\$44,229	\$29,107	\$29,983	\$25,321	\$19,671	\$13,207	\$22,447
1986	\$45,708	\$31,328	\$30,155	\$25,029	\$19,108	\$15,798	\$20,548
1987	\$41,066	\$27,779	\$29,179	\$25,293	\$19,583	\$16,704	\$20,177
1988	\$35,022	\$26,446	\$30,505	\$24,130	\$21,070	\$18,165	\$22,149
1989	\$32,511	\$24,674	\$31,498	\$22,510	\$21,939	\$17,740	\$20,517
1990	\$30,780	\$23,678	\$28,345	\$23,210	\$22,026	\$17,912	\$20,851
1991	\$24,241	\$21,372	\$24,218	\$20,147	\$22,028	\$13,699	\$17,636
1992	\$27,368	\$24,110	\$23,342	\$21,483	\$21,259	\$13,270	\$20,092
1993	\$29,315	\$26,512	\$21,823	\$25,879	\$23,006	\$13,054	\$21,280
1994	\$28,878	\$23,501	\$22,107	\$23,259	\$19,047	\$13,687	\$19,214
1995	\$29,957	\$18,810	\$21,580	\$22,364	\$16,005	\$13,406	\$17,981
1996	\$23,400	\$19,196	\$21,064	\$19,965	\$13,706	\$12,505	\$16,110
1997	\$20,926	\$17,331	\$20,855	\$16,629	\$12,095	\$12,944	\$15,147

Table A-4. Parameter estimates for Canadian lagged endogenous immigrant demand function : 1975-86

	Independent Variable	Regression coefficient	T-value	
Panel A :				
Model I: Log-linear OLS*				
	Constant	- 2.52	-1.66	
$Y_{j,t-1}$	Income	0.20	1.99	
$G_{j,t-1}$	Grad Lag	- 0.91	-1.91	
$G_{j,t-2}$	Grad Lag	1.03	2.16	
$I_{ij,t-1}^{US}$	Mig US	0.01	0.23	
$I_{ij,t-1}$	Mig Lag	0.65	14.4	
S.E.E. = 0.685 $R^2 = 0.52$ Number of observations = 269				
Panel B:				
Model II: Log-linear GLS*				
	Constant	- 0.251	-1.66	
$Y_{j,t-1}$	Income	0.21	1.75	
$G_{j,t-1}$	Grad Lag	- 1.11	-2.03	
$G_{j,t-2}$	Grad Lag	1.22	2.253	
$I_{ij,t-1}^{US}$	Mig US	0.01	0.21	
$I_{ij,t-1}$	Mig Lag	0.65	9.4	
S.E.E. = 0.666 $R^2 = 0.53$ Number of observations = 269				

* Source: DeVoretz and Maki (1983)

Table A-5. Trade and Immigration Data: 1982-2001 (values in millions of US dollars)

Year	Country	MerchIm	ServiceIm	MerchEx	ServiceEx	FDI	Immigration
1982	1	26667	7296	21360	4122	2363.1	128100
1983	1	21458	6735	20113	3954	2985.1	73300
1984	1	25919	7962	23111	4300	374.6	49100
1985	1	25889	7428	22604	4007	2062.6	73700
1986	1	26104	7409	22569	4554	5336	100400
1987	1	29318	8496	26621	5889	5263.5	125700
1988	1	36095	10491	33233	8151	7376.9	149300
1989	1	44933	12818	37125	8515	7259.4	157400
1990	1	41985	13388	39752	9833	8110.9	124600
1991	1	41648	13076	41854	10644	4312.4	86400
1992	1	43807	13361	42824	10854	5699.1	68600
1993	1	45577	13031	42723	11611	4318.4	30000
1994	1	53425	15064	47528	13767	5000.7	46500
1995	1	61283	16691	53111	15741	12026.4	80100
1996	1	65427	18197	60301	18106	6181.4	104100
1997	1	65892	18427	62910	18057	7631.3	87100
1998	1	64630	16880	55893	15830	6046.2	86400
1999	1	69158	17938	56080	17051	4733.4	85100
2000	1	71529	18009	63870	18195	12883.9	92270
2001	1	63888	16617	63387	16295	4667.2	88900
1982	2	58128	10957	71234	7638	90	120616
1983	2	64789	11869	76749	8284	1999.5	88617
1984	2	77789	12399	90272	8801	4753.7	87236
1985	2	80640	13137	90950	9356	1356.7	82822
1986	2	85494	15163	90329	11224	2848.5	97509
1987	2	92593	16946	98168	12425	8114.7	149515
1988	2	112711	20337	117105	14963	6071.1	158499
1989	2	119792	23692	121832	16776	6026.7	188148
1990	2	123244	27479	127629	18350	7580.6	213009
1991	2	124782	29434	127163	19550	2874.4	229693
1992	2	129262	30080	134435	20030	4776.8	250550
1993	2	139035	31873	145178	21211	4748.9	252194
1994	2	155072	32088	165376	23210	8223.8	220500
1995	2	168426	32985	192197	25425	9319.1	209726
1996	2	175158	35422	201633	28601	9635.1	222728
1997	2	200873	37528	214422	30724	11522.8	208582
1998	2	206066	37671	214327	33040	22742.5	163446
1999	2	220183	40060	238446	35228	24788.8	183308
2000	2	244786	43597	276635	39271	66129.8	222352
2001	2	227291	43340	259858	38280	28770	246892
1982	3	5782	1927	5571	1215	327.6	45000
1983	3	5333	1749	5414	1315	174.9	46000
1984	3	6203	1747	5518	1432	1262.8	41000
1985	3	5992	1712	5720	1423	1265.5	36000
1986	3	6063	2028	5880	1680	1213.7	36000
1987	3	7276	2518	7195	2156	1284.1	44000

1988	3	7342	3015	8784	2479	1717.4	48000
1989	3	8784	3078	8875	2342	1627.1	46000
1990	3	9501	3251	9394	2415	1735.1	52000
1991	3	8381	3351	9619	2509	1289.8	57000
1992	3	9201	3514	9785	2580	2095.2	55330
1993	3	9636	3455	10542	2804	2349.9	53660
1994	3	11913	4034	12185	3599	2542.5	62930
1995	3	13957	4601	13645	4400	3658.5	76030
1996	3	14724	4803	14360	4575	2230.6	79680
1997	3	14519	4817	14221	4180	2623.5	70390
1998	3	12495	4427	12070	3700	1191.3	58810
1999	3	14299	4510	12455	4326	1411.6	57580
2000	3	13906	4482	13272	4363	3347.4	63320
2001	3	13308	4225	13730	4318	1910.6	76700
1982	4	254884	37130	216442	50850	12474	594000
1983	4	269878	39590	205639	51040	10470	560000
1984	4	346364	52870	223976	60414	24760	544000
1985	4	352463	57180	218815	63493	20010	570000
1986	4	382295	64642	227158	74152	35419	602000
1987	4	424442	73805	254122	83588	58471	602000
1988	4	459542	80917	322427	97400	57736	643000
1989	4	492922	84970	363812	113750	68250	1091000
1990	4	516987	97950	393592	132880	48490	1536000
1991	4	508363	99960	421730	147750	23180	1827000
1992	4	553923	103734	448163	159135	19810	1247085
1993	4	603438	109679	464773	166359	51380	667169
1994	4	689215	120654	512627	181277	46130	584521
1995	4	770852	129108	584743	198501	57800	514993
1996	4	822025	139186	625073	216653	86520	669814
1997	4	899020	152369	688697	233049	105590	586830
1998	4	944353	166734	682138	238846	179030	479349
1999	4	1059440	184035	692784	259608	289443	646568
2000	4	1259300	209049	781125	278468	321274	849807
2001	4	1179180	206131	730803	268417	151581	1064317

Notes:

Definitions are as follows;

Country: 1=Australia, 2=Canada, 3=NZ, 4=USA.

MerchIm= Merchandise imports, ServIm= Services Imports, MerchEx= merchandise exports, ServEx= services exports, FDI= foreign direct investment, Immigration= annual gross immigration

Sources:

For trade data: UN Commodity Trade Statistics Database (UN Comtrade, <http://unstats.un.org/unsd/comtrade/default.aspx>)

For FDI data: UNCTAD, World Investment Report, various years.

For Immigration: CIC, The Monitor, Spring 2005 (for Canada); Migration Policy Institute, Migration Information Source, Global Data Centre, (<http://www.migrationinformation.org/>) (for all other countries)

Table A-6A. Immigration to Canada by occupation, 1980-1990

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	TOTAL
Managerial	2,599	2,848	2,960	2,088	1,748	1,677	2,090	4,630	5,394	5,465	5,792	37,291
Engineers	1,236	2,133	2,630	965	693	679	896	1,647	1,563	1,895	2215	16,552
Natural Scientists	559	617	674	341	279	298	336	518	560	729	730	5,641
University Professors	482	334	339	262	246	291	341	349	284	397	413	3,738
Teachers	766	751	775	501	459	496	563	798	859	1,144	1,368	8,480
Physician	510	555	607	451	449	449	553	567	483	654	668	5,946
Nurses	660	983	1,006	362	303	283	392	741	1,045	1,185	1,277	8,237
Medical tech.	1,124	925	961	619	512	559	679	1,064	1,188	1,526	1,558	10,715
Other professionals	3,290	4,087	4,420	2,112	1,762	1,796	2,365	5,102	5,424	5,457	5,783	41,598
TOTAL	11,226	13,233	14,372	7,701	6,451	6,528	8,215	15,416	16,800	18,452	19,804	138,198

Source: Landed Immigrants Data System (LIDS), Citizenship and Immigration Canada

Table A-6B. Immigration to Canada by occupation, 1991-2001

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	TOTAL
Managerial	3,913	3,650	3,180	2,486	1,943	1,948	1,696	1,329	1,730	2,508	3,064	27,447
Engineers	2,095	2,143	3,535	4,504	6,012	8,094	9,574	8,473	11,505	15,447	16,874	88,256
Natural Scientists	736	600	743	1,307	1,882	2,698	2,877	2,328	2,727	2,842	2,726	21,466
University Professors	541	493	453	312	267	248	192	210	222	273	309	3,520
Teachers	1,140	940	1,027	778	660	721	539	470	457	675	771	8,178
Physician	686	631	688	546	520	592	537	451	436	592	674	6,353
Nurses	1,165	1,027	877	831	634	421	351	249	243	327	439	6,564
Medical tech.	1,285	1,048	1,088	1,001	1,087	1,235	1,256	915	992	1,299	1,517	12,723
Other professionals	5,346	5,274	6,849	8,616	11,092	14,329	15,733	12,592	15,745	20,339	22,895	138,810
TOTAL	16,907	15,806	18,440	20,381	24,097	30,286	32,755	27,017	34,057	44,302	49,269	313,317

Source: Landed Immigrants Data System (LIDS), Citizenship and Immigration Canada