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An Analysis of Turn-of-the-Century Canadian Immigration: 1891–1914

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AN ANALYSIS OF TURN-OF-THE-CENTURY CANADIAN IMMIGRATION: 1891-1914

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Introduction

Any additional economic analysis of the century (1891-1914) Canadian Immigration must be justified since the amount of qualitative literature on this topic is extensive, if not exhaustive.[i] In fact, the reader is confronted with many conflicting interpretations about the timing and size of the push and pull forces which influenced Canadian immigrants.[ii] Beyond the obvious need to sort out the relative merits of these conflicting hypotheses lie serious questions about the validity of fundamental axioms used by model builders to interpret the role of immigration in the wheat-boom period (1896-1913) of Canadian development.[iii]

This paper will present evidence on U.S., U.K., German, and Eastern European immigration into Canada to clarify the major issues surrounding the size of Canadian immigration push and pull forces. It will also consider the structural impact of Canadian immigration on the wheat boom.

Literature Review

A review of the Canadian literature yields two common themes. The first suggests that, after 1896, European push factors played a minor role in explaining European-Canadian immigration (see Table1) while Canadian pull forces were dominant.[iv] The second view states that U.S. push and pull forces were affecting Canadian immigration, regardless of origin, throughout the 1891-1914 period. The large U.S. immigration to Canada (see Table1), it has been argued, was a result of U.S. immigrants being pushed off their land (Bicha 1965). Other authors (Norrie 1974; Studness 1964) suggest that Canadian land was a pull force for U.S.–Canadian immigrants.[v] Furthermore, the pull force of U.S. manufacturing wages has been cited as the primary attraction of Canadian-bound Europeans who later planned to immigrate to the U.S.[vi]

Table 1: Number of Immigrant Arrivals in Canada from the United Kingdom, The United States and other Countries, Calendar or Fiscal Years ended 1896-1916

Calendar or Fiscal Year	Immigrant Arrivals from (1) U.K.	(2) U.S.	(3) Other	(4) Total
1896 [1]	12,384	-	4,451	16,835
1897 [1]	11,383	2,412	7,921	21,716
1898 [1]	11,173	9,119	11,608	31,900
1899 [1]	10,660	11,945	21,938	44,548
1900 [1]	5,141	8,543	10,211	23,895
1901 [2]	11,810	17,987	19,352	49,149
1902	17,259	26,388	23,732	67,379
1903	41,792	49,473	37,099	128,364
1904	50,374	45,171	34,786	130,331
1905	65,359	43,543	37,364	146,266
1906	86,796	57,796	44,472	189,064
1907 [3]	55,791	34,659	34,216	124,667
1908	120,182	58,312	83,975	262,469
1909	52,901	59,832	34,175	146,908
1910	59,790	103,798	45,206	208,794
1911	123,013	121,451	66,620	311,084
1912	138,121	133,710	82,406	354,237
1913	150,542	139,009	112,881	402,432
1914	142,622	107,530	134,726	384,878
1915	43,276	59,779	41,734	144,789
1916	8,664	36,937	2,936	48,537

Source: Canada, *Canada Yearbook 1932* (Ottawa 1932, 148)

Notes: (1) Calendar Year

(2) Six months, January to June, inclusive

(3) 9 months ended March 31.

This literature suggests that any economic model of Canada immigration must test the effect of the following variables: (1) Canadian wages and farm income; (2) country of origin wages and (3) the employment and output conditions in Canada, the country of origin and the U.S. Also, the possibility of a lagged response to economic variables must be explored. [vii]

Models of Canadian Immigration

Recent empirical studies (Kelley 1965; Wilkinson 1972; Gallaway and Vedder 1971) on 19th century immigration to the New World have found relatively simple single-equation immigrant-supply models satisfactory.[viii] The present study will follow in this tradition by offering three alternative single-equation models. The first model will present the neoclassical arguments for international movement while the latter two models will attempt to introduce the complexities of domestic labor market adjustments and lagged immigrant responses.

The simple neoclassical model is specified in equation (1.1).

$$(1.1) \quad \frac{M^{*}_{i,t}}{P_{i,t}} = G\,[\, O_{c,t}\,;\, O_{i,t}\,;\, W^{1}_{D,t}\,;\, W^{2}_{D,t}\,;\, D_{t}\,]$$

with the variable definitions found in the Appendix in Table1-A. The economic argument states that the gross equilibrium rate of immigration $\frac{M^{*}_{i}}{P_{i}}$ from the (i^{th}) country to Canada is responsive to (1) output level changes in Canada (O_c) and the country of origin (O_i), (2) the differences in yearly manufacturing wages (W^1_D) or farm income (W^2_D) and (3) the disequilibrium shocks of financial crises in Canada captured by the dummy variable (D). The theoretical expectations of the parameter signs are; $G_1>0$, $G_3>0$, and $G_4>0$ while the value of G_5 is <0 and G_2 is uncertain. The job vacancy hypothesis is imbedded in the (O_c) and (O_i) variables while (W^1_D) and (W^2_D) represent the wage or farm income differential hypothesis respectively. The ability to finance the move as well as the push force of the origin country's (un)employment opportunities are captured in (O_i).[ix] Epochal differences

in the migrant supply equation under extreme economic conditions (i.e., panles) will be reflected by the parameter values for the dummy variable (D).[x]

A second model is in equation (1.2):

$$(1.2) \quad \frac{M^{*}_{i,t}}{P_{i,t}} = \mathrm{H}\,[\; O_{c,t};\; O_{i,t};\; D_t;\; (M/P_c)_{t-1};\; W^{1}_{D,t};\; W^{2}_{D,t}\;]$$

The Wilkinson argument (1972, p. 273) that the receiving country's labor supply curve shifts as the net number of non-ith country immigrants (M) increases relative to the home population (P_c) is found in the additional term $(M/P_c)_{t-1}$.[xi] The expected parameter sign for H_4 is less than 0.

The rationale for this variable, $(M/P_c)_{t-1}$ is particularly well-founded in the Canadian case. The distribution of immigrants by country of origin was such that large competing groups of immigrants from other countries were always present (see Table 1). For example, an immigrant from the U.K. or (i^{th}) country would face competition from previous U.S. or European immigrants.

The great distance to Canada and general ignorance of Canadian economic and physical conditions as well as lack of assets to finance travel are all *a priori* arguments to lag either functions (1.1) or (1.2).[xii] One widely used lagged function is offered (1.3):

$$(1.3) \quad \frac{M_{i,t}}{P_{i,t}} = \mathrm{H}\,[\; O_{c,t};\; O_{i,t};\; W^{1}_{D,t};\; (M/P_c)_{t-1};\; W^{2}_{D,t};\; D_t;\; M_{i,t-1}]$$

Equation (1.3) which includes a migrant stock variable ($M_{i,t-1}$) argues that a constant geometrically decreasing lagged relationship holds between contemporary migration and past levels of the included economic variables.[xiii]

Finally, a simple alternative to the migrant stock equation (1.3) will be tested. The two unlagged models, equations (1.1) and (1.2), will have their independent variables lagged by one period. This assumes that the immigrants' response to the proceeding period's variables is limited to just one period.

Table 2: Estimates of Three Alternative Immigration Supply Functions to Canada 1891-1914 from Four Areas of Origin

		United Kingdom			United States [d]			Germany [b]			Eastern Europe		
Variables	Equation #	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)
(1) Constant		92,468	81,567	91,000	1,503	1,141	3,528	2,680	1,800	2,160	171	126	119
		(.37)	(.68)	(.51)	(.016)	(.52)	(.007)	(3.1) [a]	(2.7)	(2.9) [a]	(3.4) [a]	(3.9) [a]	(4.7) [a]
(2) $O_{c,t}$		341	281	110	1,411	2,160	682	99	118	128	70	37	41
		(.41)	(.57)	(.68)	(.81)	(.96)	(1.4)	(2.7)	(2.1)	(.78)	(1.8)	(.71)	(.68)
(3) $O_{i,t}$		-3,840	-2,650	-1,508	1,227	1,326	818	-216	-481	-136	81	110	51
		(3.9) [a]	(4.2) [a]	(2.1)	(1.6)	(2.1)	(1.3)	(.36)	(.51)	(.69)	(.41)	(.81)	(1.61)
(4) $W^1_{D,t}$		1,151	137	15	218	279	186	361	158	196	---	---	---
		(5.9) [a]	(1.1)	(.8)	(1.2)	(.8)	(.07)	(3.1) [a]	(3.3) [a]	(4.1) [a]			
(5) $W^2_{D,t}$		847	685	264	2,168	1,826	261	268	161	187	---	---	---
		(5.7) [a]	(6.9) [a]	(3.7) [a]	(4.7) [a]	(4.3) [a]	(1.31)	(1.9)	(3.1) [a]	(2.1)			
(6) D_{93-96}		-581	-411	-261	141	261	421	-818	-2,160	1,341	-88	-118	-96
		(3.7) [a]	(3.7) [a]	(1.6)	(1.1)	(1.6)	(3.6) [a]	(5.9) [a]	(5.7) [a]	(6.8) [a]	(.41)	(1.14)	(2.08)
(7) $D_{1907-08}$		-1,526	-1,327	-1,842	381	426	261	36	129	119	181	27	51
		(2.9) [a]	(1.86)	(1.42)	(.71)	(.93)	(.71)	(.61)	(.71)	(.91)	(.51)	(.07)	(.36)
(8) $M_{i,t-1}$		---	---	4,126	---	---	421	---	---	129	---	---	-81
				(6.9) [a]			(3.6) [a]			(3.7) [a]			(2.99) [a]
(9) $(M / P_c)_{t-1}$		141	267	111	384	286	161	-1,246	-318	-1,421	241	118	78
		(4.9) [a]	(3.8) [a]	(3.2) [a]	(1.1)	(.59)	(.71)	(5.7) [a]	(6.1) [a]	(4.9) [a]	(1.9)	(1.7)	(1.3)
(10) $\bar{R}^2$		.61	.59	.87	.86	.71	.77	.51	.49	.61	.31	.19	.42
(11) D.W.		3.2 [c]	1.93	1.84	2.01	2.07	1.97	1.51	1.91	1.27	1.66	3.2 [c]	1.6
(12) Mean Lag		N.A.	N.A.	1.3	N.A.	N.A.	.86	N.A.	N.A.	2.1	N.A.	N.A.	2.6

Continued…/

Table 2 (continued)

One Period Lag Variables[e]												
(13) $O_{c,t-1}$	1,216	912	---	141	86	---	16	38	---	-127	-309	---
	(3.7)[a]	(2.4)[a]		(.81)	(.96)		(.06)	(.09)		(.71)	(.89)	
(14) $O_{i,t-1}$	325	411	---	18	26	---	58	94	---	-41	-74	---
	(.36)	(.71)		(.29)	(.37)		(1.7)	(.8)		(.13)	(.13)	
(15) $W^1_{D,t-1}$	826	27	---	181	119	---	87	114	---	---	---	---
	(.41)	(1.3)		(2.6)	(.81)		(.51)	(.86)				
(16) $W^2_{D,t-1}$	241	117	---	1,800	1,596	---	91	80	---	---	---	---
	(.36)	(1.7)		(2.4)	(3.1)[a]		(.71)	(1.7)				
(17) $M_{i,t-2}$	---	---	---	---	---	---	---	---	---	---	---	---
(18)	86	51	---	286	115	---	-741	-111	---	111	27	---
$(M / P_c)_{t-2}$	(1.32)	(1.61)		(1.6)	(.51)		(3.7)[a]	(3.1)[a]		(2.1)	(1.9)	
(19) $\bar{R}^2$	.39	.40	---	.31	.29	---	.40	.41	---	.21	.18	---

Notes:

T-values in parentheses.
Mean Lag equals B' + 2B'' - (1 - B' - B'') when a geometric lag for a model such as equation (1.3 holds)
$\bar{R}^2$ = corrected square of multiple correlation
[a] indicates parameter estimate is significant at 95 percent confidence level for 1 tailed test except for the Canadian output variable when a 2 tailed test was used.
[b] per capita income was a wage proxy for Germany.
[c] negative serial correlative appeared in this test at a significant level.
[d] U.S. results are for 1897-1914.
[e] As was noted in the text, a one-period lag of each independent variable has been used successfully in immigration functions. Hence, equations (1.1) and (1.2) had their independent variables lagged one period and the results are reported in rows 13-18.

Model Adaptations

Three serious problems remain outstanding in the immigration theory presented. First, the job vacancy model of movement suggests that the unemployment rate or its reciprocal may better approximate market conditions than the output levels (Kelley 1965; Gallaway and Vedder 1971; and Pope 1968) hypothesized in equations (1.1) to (1.3). Second, in the Canadian context in particular, previous investment has been argued to be the appropriate job vacancy proxy variable (Richardson 1972). Finally, MacDougall's work (1961) suggests that the U.S. employment and income variables actually attracted European-Canadian immigrants who hoped to immigrate to the U.S. at a later date. These arguments will be taken into account by a later substitution of these alternative variables for their original counterparts in each of the three equations presented.[xiv]

The Results

The results will be presented at two levels of aggregation. First, the immigrant supply function estimates for each of the four major origin areas – U.K., U.S., Germany, and Eastern Europe (Poland and Russia) – will be presented in Table 2. Second, an aggregate immigrant supply function for two distinct periods, 1891-1901 and 1902-1914, will be offered. Each of the equation sets was estimated by ordinary least squares since serial correlation was not a serious problem.[xv] The data sources and an evaluation of their accuracy are contained in the Appendix.

Push Variables

One purpose of this paper was to estimate the size and significance of the various push and pull variables that have been presented in the literature. The push variables that appear in the basic model equations (1.1) to (1.3) are contemporary origin output ($O_{i,t}$) and its lagged value ($O_{i,t-1}$). Lagged origin output was never significant. For the U.K., contemporary values

of the origin output level ($O_{i,t}$) significantly pushed immigrants to Canada. Moreover, the alternative specifications of the push variables – absolute unemployment and its reciprocal – only held for the U.K. (see Table 2-A). The parameter sign for the reciprocal of unemployment was negative for the U.K.-Canadian case.[xvi]

Pull and Partial Pull Variables

The major specified pull variables were Canadian output levels and reductions in the Canadian labor supply. Net income gain in terms of wages or farm income and their lagged values are a combination of push and pull forces.

The labor supply shift variable (M / P_c) had, as predicted, a significant inverse relationship with the migration rate in only one case. When the Canadian population emigrated or the absolute number of immigrants fell from all non-ith countries, (M), Germany sent significantly more immigrants. The United Kingdom reacted significantly to this variable, but with a direct relationship.[xvii]

The pull effect of Canadian output on immigration was insignificant for all countries. Moreover, Richardson's (1972) alternative pull variable, i.e., previous U.K. investment to Canada (see Table 2-A), was positive and significant only for United Kingdom immigrants. To obtain the positive response of U.K. immigrants, however, required a new function; a variant of equation (1.1) with a new dependent variable (i.e., absolute immigrants) and caused serious auto-correlation.

Two income-difference variables were tested. Table 2 shows that the origin wage-Canadian farm income difference variable ($W^2_{D,t}$), was significant for both the U.K. and U.S. cases. In the German case, the manufacturing wage difference variable, ($W^1_{D,t}$), proved significant. For Eastern Europe no specification of the wage variable was available.

The previous migrant flow from the (i^{th}) country under consideration, ($M_{i,t-1}$) may also be viewed as a combination of both previous push and pull forces.[xviii] However, if the variable is interpreted as a proxy for information or previous friends' influence (Greenwood

1970), then the pull factor is dominant. The importance of this variable is obvious. For all countries under model specification (1.3) this variable's coefficient had the predicted sign and was significant.

The alternative destination income variable offered by other authors – the U.S. manufacturing wage – proved significant for only U.K. immigrants (Table 2-A). However, severe positive multicollinearity (.89) existed between the U.S.–Canadian wage variables and the labor supply shift variable.[xix]

Lagged results

The strong results for the lagged equation (1.3) model support the historical findings in other countries (Kelley 1965; Greenwood 1970). The one-period lagged migrant stock model equation (1.3), which assumed that the weights attached to previous economic variables declined at a constant geometric rate, proved superior to other unreported lagged specifications and the one-period lagged independent variable versions of equations (1.1) and (1.2).[xx] The mean lag under equation (1.3) varied from less than a year for U.S. immigrants to over two years for European immigrants. Immigrants from the U.K. waited an average of 1.3 years before responding to the various economic variables.[xxi]

Epochs and Structural Changes

The final variable reported (D_t) measured the effects of periodic panics or crises on immigration. The panics of the mid-1890's and 1907-1908 significantly deterred immigrants from the U.K. The earlier depression also thwarted immigrants from Germany. Thus, a substantial simultaneous downturn in many Canadian economic variables (e.g., investment, land values, wages and employment), or a panic, caused a shift in the level of U.K. and German immigration.

Immigration and the Wheat Boom

The post-1986 wheat boom has been argued by many to have caused a structural shift in the Canadian immigrant supply function. To test this hypothesis, a Chow test (Chow 1960) was

performed. Thus, the first equation (1.3) had to be estimated for a pooled set of countries for the entire 1891-1914 period. The pooled results are found in Table 3, column 1, and indicate that for the entire period, the income difference and previous migrant flow variables were significant. Next, the pooled data was truncated for the pre- and post-1986 periods and separate regressions run for each period with the results reported in columns 2 and 3 of Table 3. Then a Chow test was performed to detect any significant differences between the parameter estimates of any one variable or the intercept term over the two periods. The Chow test indicated that only the wage-farm income variable differed significantly between the time periods.

Table 3: An Aggregate Canadian Immigrant Supply Functionfor Three Periods: 1891-1914, 1891-1896, and 1897-1914[a]

	Periods		
	(1)	(2)	(3)
Variables[c]	1891-1914	1891-1896	1897-1914
Equation[b]	(1.3)	(1.4)	(1.5)
1. $D_{1893-1896}$	86	127	74
	(.09)[d]	(.17)	N.A.
2. $\overline{O}_{i,t}$ [e]	396	141	526
	(1.1)	(1.7)	(.9)
3. $\overline{W}_t^1$ [e]	181	126	206
	(.9)	(.75)	(1.7)
4. $\overline{W}_t^2$ [e]	261	151	486
	(3.7)[g]	(1.8)	(4.2)[g]
5. $M_{i,t-1}$ [f]	860	286	1,286
	(5.7)[g]	(4.1)[g]	(3.7)[g]
6. Constant	36,000	1,400	26,000
	(1.6)	(.8)	(1.7)
7. $\overline{R}^2$	.71	.51	.83
8. D - W	2.5[h]	2.0[h]	2.1[h]

Notes:

[a] The countries used were the U.K., Germany and Eastern Europe. The U.S. was excluded for lack of data.

[b] The estimating equation was a modified version of equation (1.3) in the text or

$$\frac{M^*}{P} = \mathrm{H}\,[\; O_{i,t}\,;\; D_{\bar{v}} M_{i,t-1}\; W^1_{D,t}\,;\; W^2_{D,t}\;].$$

[c] Variables, which were found insignificant in the unpooled results of equation (1.3), are not reported in the pooled equations for the entire period or sub-periods.

[d] t-values appear in parenthesis.

[e] This output or income measure was calculated as the weighted value (by country population) for national income or income differences converted to pounds sterling in current terms.

[f] The all other migrant shift variable (*M/P*) had to be deleted to prevent multicollineality and only the migrant stock of all countries, (M_i), remained.

[g] Indicates a significant coefficient at 90% or better confidence level.

[h] Indicates insignificant serial correlation.

Table 4: Elasticity of Immigrant Response for U.K., U.S. and Germany with Respect to Four Significant Variables[a]

		(1)	(2)	(3)	(4)
Country	Variables	$W^1_{D,t}$	$W^2_{D,t}$	$O_{i,t}$	$(M/P_c)_{t-1}$
(1) U.K.		[b]	.061	-.03	.41
(2) U.S.		[b]	.057	[c]	[c]
(3) Germany		.261	[c]	[c]	-.19

Notes:
[a] The elasticity of the rate of immigration w.r.t. the independent variables is at their respective means. Equation (1.3) or the migrant stock model was used to calculate these elasticities.
[b] Indicates that variable was insignificant in the original test.
[c] Elasticity value was very close to zero.

Elasticity of Immigrant Supply

An infinite or high elasticity of supply of immigrants for Canada is essential to the staple theory mold presented by several Canadian historians (Chambers and Gordon, p.878). The results in Table 4 indicate that, given the data and the countries surveyed, a very low supply elasticity is the norm. The familiar findings (Wilkinson, 1972: Williamson, 1975) that the degree if elasticity is an inverse function of the stage if development of the sending country is also confirmed in the Canadian case. Germany has a higher elasticity of response to wage differences than the U.K. and the U.S. The elasticity if repines to labor supply shifts $(M/P_c)_{t-1}$ was generally higher than the wage elasticity in all countries, but no clear trends emerge by level of development.

Conclusions

The conclusions will first focus on questions of alternative model specifications and their implications. Second, the historical significance of the results will be analyzed. Model (1.3) indicated that the income gain or wage differences argument was dominant during this period. However, contrary to other historical studies on Canada and the U.S. (Pope 1968; Wilkinson 1972: and Williamson 1975) rural farm earnings and not urban manufacturing wages was the more significant income proxy. The push variable of origin output change only applied to the

U.K. The job vacancy hypothesis, as defined as the effect of Canadian output on immigration, was generally insignificant for this period. Finally, Richardson's (1972) investment pull variable is insignificant when the Canadian immigration rate from the U.K. or other countries is to be explained by a lagged economic structure.[xxii] Moreover, Richardson's untested conclusion that a wage-differences model does not apply in Canada is not born out by our model and empirical findings.[xxiii]

Two additional finds must qualify our results. The general significance of the labor supply variable, (M / P_c), in model (1.3) indicates that the system might suffer from simultaneous equation bias. To the extent this is lurch, no jurist about the relative impact of push or pull forces is possible from the estimates made in this paper (Williams 1975).[xxiv] Also, the largest and most significant variable, Canadian farm income, minus origin wages proved unstable when large structural changes occurred after 1896. This indicates that Canada may have received two separate immigrant populations with distinct economic characteristics over the period. The limited information on changing occupational qualifications of Canadian immigrants tends to confirm this point. After 1906 the intended occupational distribution of immigrants switched from farm to predominately non-farm occupations.[xxv] Thus, future tests of immigrants by occupational groups would prove fruitful.

Given these admitted model weaknesses, certain historical interpretations seem valid. The premise of MacDougall (1961) that U.S. conditions affected Canadian immigration is partially supported.[xxvi] However, it is unclear if U.S. wages attracted U.K. –Canadian immigrants or native-born Canadians since the labor supply shift variable (M / P_c) is unable to distinguish between these two components. Also, the staple theory model, as well as Dales' (1964) development model are suspect since they both require elastic immigrant supply functions. The results of this paper indicate a low supply elasticity with respect to all the significant variables during this period.[xxvii] Finally, Canadian immigration policy after 1910 was essentially correct. The recognition that Eastern Europeans were an untapped and highly responsive group to farm income gain is partially supported by our elasticity results.[xxviii]

APPENDIX

Sources

All the major data sources are listed below by the variable used. Several major should be noted. First, in all cases, except Russia and Canada, net national income was used as the proxy for total output changes. Prior to 1910, only a composite index of steel output was available for Canada as a proxy for total output. This steel output index was spliced directly to the 1910-14 total manufacturing output estimates for an 1891-1910 index of Canadian output. Only Russian industrial output indices were available for Eastern Europe and were used as a proxy for the whole area. Canadian manufacturing wages were a weighted average of six skilled and unskilled building trades in Toronto and Ottawa for 1891-1900 and between 1901-1914 a nationwide urban wage index was used. For the U.S., Lebergott's 1891-1900 estimates of non-farm nominal earnings were used as a proxy for manufacturing wages. For 1900-1914, Lebergott's nominal annual earnings were used. Canadian farm earnings were those developed by the author in an earlier work (DeVoretz, 1973). These farm income estimates only measure the average gross value of output per farm at Census (i.e. ten year) intervals. Thus, we fit a time trend equation to estimate intervening yearly average gross values of farm output. Manufacturing wages or farm income are not available for either Eastern Europe or Russia. The U.K. manufacturing wage was taken directly from B. Mitchell (1962). The indicators of depression and panic in Canada are from Rosenbluth (1956) and a panic was arbitrarily defined as a cycle with a downward amplitude of ten percent or more.

1. Immigration to Canada from All Origin Countries:

   M. C. Urquhart and K.A H. Buckley, *Historical Statistics of Canada.* (Toronto: MacMillan, Co.), 1965, p.49.

2. National Income:

   a. Canada: Manufacturing Output. Urquhart and Buckley, *op.cit.* p. 84 and p. 111.

   a. U.K.: Net National Income. B.R. Mitchell and P. Deane, *Abstract of British Historical Statistics,* (Cambridge University Press), 1962, p.367.

   b. U.S.: Net National. Product. S. Kuznets, *Capital in the American Economy,* (November) 1961, p. 561.

c. Russia: Industrial Output Index. R. Goldsmith, *The Economic Growth of Tzarist Russia*.

d. Germany: Net National Income. W. Hoffman and J. H. Muller, *Das Deutsche Volkneinkommen*, (1959), Table 2, p. 14.

3. Wages:

a. U.S. Non-farm Earnings. S. Lebergott, *Manpower in Economic Growth.* (McGraw-Hill), 1964, p. 523 and p. 528.

b. U.K. B.R. Mitchell and P. Deane, *Abstract of British Historical Statistics,* (Cambridge University Press), 1962, p. 341.

c. Canada: Sample of Skilled and Unskilled Nominal Wages. Urquhart and Buckley, *op.cit.*, p. 84 and p. 111. Income Per Farm. D. DeVoretz, *Internal Migration in Canada*, (Mimeo), 1973, p.36.

d. Germany: G. Bry, *Wages in Germany* (New York: N.B.E.R.), 1960, p. 329.

4. Population:

a. Canada: Urquhart and Buckley, o*p. cit.*, p. 54.

b. U.S.: U.S. Bureau of the Census, Statistical Abstract of the United States: 1962, *passim*.

c. U.K.: R. Mitchell and P. Deane, o*p. cit.*, p. 29-32, 34-35.

d. Germany: H. G. Hoffman and J. H. Muller, *op. cit.*, Table 14, p. 39-40.

e. European Russia: F. Lorimer, The Population of the Soviet Union, (Geneva, 1946), Table 15, p. 35.

5. Cycles:

Canada: G. Rosenbluth, Changes in Canadian Sensitivity to U.S. Fluctuations, *Canadian Journal of Economics and Political Science,* (November) 1951, p. 480-503.

6. Unemployment:

a. U.S.: S. Lebergott, *op. cit.*, p. 522(1890-1990) and p. 512 (1900-1910).

b. U.K.: Union Unemployment - R. Mitchell and P. Deane, *op. cit.*, p. 64-65.

7. U.K. Investment to Canada:

M. Simon. New British Investments in Canada, 1865-1914, *Canadian Journal of Economics*, 3 (May) 1970, p. 241. Table I, Column 2.

Table 1-A: Conceptual and Operational Definitions of Variables

Conceptual Variable	Symbol	Operational Definition
1. Gross immigration from (i^{th}) country in period (t)	$M^{*}_{i,t}$	Absolute number of arrivals who intend to stay in Canada according to Canada Yearbook definition.
2. Absolute population in (i^{th}) country in period (t)	$P_{i,t}$	Census population and intercensal estimates
3. Canadian manufacturing output changes in period (t)	$O_{c,t}$	M. Urqhart and K. Buckley (1965, p. 141) for 1910-1914 definition. Prior to 1910, index of steel output was used.
4. National income of (i^{th}) country in period (t)	$O_{i,t}$	See Appendix sources for individual definitions by country
5. Real yearly wage differences between Canada and country of origin in period (t)	$W^{1}_{D,t}$	Composite of central Canadian yearly real wages minus origin yearly wages as defined in Appendix sources for skilled and unskilled groups.
6. Income differences between wage earnings in (i^{th}) country and farm income in Canada	$W^{2}_{D,t}$	Value of all Canadian gross farm output minus yearly real wages in origin as defined in Appendix sources.
7. Business cycle panics with a negative amplitude of 10% or more	D_t	Dummy variables, which assume a zero value for 1893-96 and 1907-08. Other yeas value of unity.
8. Ratio of all other immigrants to Canada in (t-1), except immigrants from (i^{th}) country, over Canadian population	$(M / P_c)_{t-1}$	Canadian population defined in census and intercensal estimates. Immigrants defined as in (1).
9. Previous flow of immigrants from (i^{th}) country	$M_{i,t-1}$	Previous number of immigrants from (i^{th}) country as defined under (1) for 1891-1913 except, for U.S. which is 1897-1913.
10.Reciprocal and absolute level of unemployment for sending country	$\frac{1}{U_{i,t}}$; $U_{i,t}$	As defined in country source.
11. Gross investment from the U.K. to Canada	I_t	Gross flow of private and public investments from the U.K.

Table 2-A: Alternative Specifications of the Three Models (1.1)-(1.3) and their Parameter Estimates for the U.K. and U.S.[a]

		U.K.			U.S.		
Variables	Equations	(1.1)	(1.2)	(1.3)	(1.1)	(1.2)	(1.3)
1. U_i [b]		48.1	51.3	28.6	14.1	31.6	28.5
		(1.9)	(2.6)[d]	(2.1)	(.8)	(1.2)	(1.6)
2. $\frac{1}{U_i}$ [b]		-51.6	-87.5	-112	-21.7	-51.9	-31.6
		(3.2)[d]	(3.3)[d]	(3.5)[d]	(1.2)	(1.4)	(.7)
3. I_{t-1} [c]		1126	981	261	12	27	15
		(2.9)[d]	(1.7)	(.8)	(.7)	(1.3)	(4.7)
4. $W_{i,t}^3$ [e]		261	186	117	N.A.	---	---
		(2.7)[d]	(2.9)[d]	(3.1)[d]			
5. $U_{us,t}$ [f]		213	141	286	N.A.	---	---
		(2.6)[d]	(2.7)[d]	(3.4)[d]			

Notes:

a. The basic equations in the text were maintained, except, that one variable was replaced in a sequential fashion for its counterpart appearing here. For example, lagged Canadian investment (I_{t-1}) was placed into equations (1.1) to (1.3) and Canadian output (O_c) removed. In one regression, row 3, with lagged investment, I_{t-1}, the dependent variable was redefined to absolute U.K. immigrants to Canada.

b. Unemployment rate and reciprocal of the unemployment rate in the (i^{th}) country and replaces origin output, (O_i).

c. Variable is gross flow of all private plus public investments from the U.K. and replaces Canadian output variable (O_c).

d. Indicates significance at a 90% level or better for a two-tailed test with t-value in parenthesis.

e. $W_{i,t}^3$ is the difference between the U.K. and U.S. manufacturing wage variables and replaces wage differences between U.K. and Canada.

f. Unemployment rate in the U.S. as defined by Lebergott (1964).

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Endnotes:

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[i] Three bodies of literature have emerged. The demographic history or documentation and evaluation of the immigration statistics are presented in Picket (1965), McDougall (1961), and Keyfitz (1950). The best of the qualitative historical literature, which contains many hypotheses but limited economic analysis, is found in Corbett (1951, 1957) and Timlin (1960). Also, J. Dales' work (1964, 1967) contains a complex, but weakly specified and untested model of Canadian immigration and growth under a tariff barrier. The quantitative historical research is found in the articles of Pope (1968) and Richardson (1972). However, Pope covers a different period from ours, 1910-1929, and only U.K. immigrants; he thus misses the bulk of Canadian immigration (post-1896) and the effect of the wheat boom. Richardson again only considers U.K. immigrants and does not test an income difference model. His argument that wage or farm income data do not exist for the period 1891-1914 is not valid. From 1891 on, yearly wage rates were reported by major ports of entry by Canadian immigration officials. Between 1901-1914 a nation-wide urban wage index is available. Notwithstanding reporting errors these wage surveys seem most appropriate for immigrants. Also, farm income and farm wage can be calculated after 1891 and the omission of these variables is not explained. Richardson later contradicts himself (p. 104) by saying that Canadian urban wages were available, but his tests proved them insignificant.

ii In addition, the existence and causes for the displacement to the U.S. of native Canadian is an unsettled issue (Hurd 1939; Corbett, 1951; and Gallaway and Vedder, 1970), which will be discussed in this paper.

iii One view suggests that partially due to immigration, Canada experienced an elastic supply curve for labor. Thus, labor could be transferred to the western agricultural sector during the post-1896 expansion period (E. Chalmers and D. Gorden, 1966) with a limited rise in labor's real wage.

iv The summary work of W. T. Easterbrook and H. Aitken (1956) emphasizes these points. They argue that only after cheaper U.S. lands in the Plains became settled (1897-1900) and a rise in Canadian wheat prices (1901-1910) occurred could Canada compete for European immigrants and reverse the tide of Canadian-U.S. emigration (Easterbrook and Aitken, pp. 395-401). J. Dales' (1964, 1967) work is the most comprehensive on this issue. He argues that a three-region model (i.e., Europe, Canada, and the U.S.) with an assumed infinite elasticity of supply of European immigrants at a fixed wage will rationalize Canada's historical immigration patterns (1964, pp. 29-35). Thus, European-Canadian immigration is argued to be solely determined by available Canadian job vacancies, which were created by the national tariff and resulting labor substitution (Dales 1967, p. 4). D. C. Corbett (1957, p. 132) contradicts Dales' thesis by appealing to the income differential argument. He states that low Canadian land costs and higher farm income pulled both U.S. and European immigrants to Canada after 1890. For a later period, (1910-1929), D. Pope (1968, p. 81) partially agrees with Dales when he concludes that U.K. immigrants to Canada were pulled by the inverse of the Canadian unemployment rate.

v The arguments of K. Bicha (1965), D. Corbett (1951, 1957) N. MacDonald (1970), C. Steadiness (1964), and D. MacDougall (1961) lead to a series of testable hypotheses about U.S. immigrant flows during this period. K. Bicha concentrates on U.S.-Canadian immigration and suggests that push factors in the U.S. determined the flow, but these forces were very selective during 1897-1914. He concludes that poor tenant farmers or young sons of upper Midwest farmers were pushed to Saskatchewan and Alberta with few Canadian pull forces in evidence. C. Steadiness (1964, p. 583) also concentrates on U.S. - Canada immigration and asserts that the post-1890 Canadian prairie immigration was a result of the end of free homestead land in the U.S. even though Canada, in particular Manitoba, had a pull force in the form of a higher net revenue per acre prior to 1890. K. Norrie (1974), still granting the importance of U.S. forces, suggests that the Canadian pull factor was absent until well after 1890 and that both prospects of a higher expected farm revenue and free lands in the U.S. pulled European and

Canadian immigrants south until the late 1890's.

vi D. McDougall's (1961, p. 166-170) systematic attempt to reconstruct viable Canadian immigration statistics assumes that the pull force of the U.S. economy acts even more generally on Canadian immigration. In fact, his estimates of Canadian immigration are premised on the unproven hypothesis that European immigrants to Canada were just a smaller percentage of the European - U.S. inflow, but occurred with the same timing and degree as U.S. economic fluctuations. Also D. Pope (1968, p. 177) argues that the U.S. was an alternative pulling force for Canadian immigrants in the 1910-1930 era. His statistical results, however, do not support this assertion.

vii The arguments of Greenwood (1970) and large distances suggest a lagged response.

viii A recent exception is J. G. Williamson (1975) who argues that to understand many issues including the determinants and size of the push and pull factors requires a multiple equation system to capture the effects of immigration on wages and vice-versa. These problems are referred to and analyzed in a later section.

ix Kelly (1965) and others have noted that with high unemployment in the origin country, the potential émigré may be pushed by lower opportunity costs, but his ability to finance his movement now is limited by unemployment.

x This argument asserts that the level of migration is effected by business fluctuations while short-run variations around this given trend level are due to other arguments in the equation.

xi This point is particularly cogent in Canada where post-1900 immigration was large (3.5 million) relative to the small population base (4 million) and long-term Canadian fertility had been falling (DeVoretz 1974) for at least fifty years. Of course (M / P_c) may be misspecified since the variable's effect on gross immigration may not be unidirectional and stable native labor force participation rates may not prevail.

xii General ignorance of Canadian physical conditions cannot be understated. The government propaganda was more confusing than revealing since it attempted to conceal such things as weather reports (e.g., January temperatures at Winnipeg), rather than reveal the cold facts (M. Timlin, 1960, p. 519).

xiii Wilkinson (1972) and Kelley (1972) found this formulation to be superior for the U.S. and Australia respectively. However, this formulation contains one strong assumption. The assumed positive or negative definiteness of the reaction parameter prevents immigrants from changing their mind over time. Clearly, immigrants may have over a time period positive, and then negative reactions to the same variable (e.g., domestic unemployment conditions) while they wait to move.

xiv The parameters' signs for these three cases are unambiguous. The lagged Canadian investment and U.S. employment and income variables are both positive. For origin unemployment the parameter estimate is to be on balance positive (Kelley 1965, p. 341). It should also be noted that using Kelley's and Pope's reciprocal of unemployment implies that the parameter value for this variable is now negative.

xv As is well know, time series data - especially immigrant supply estimates - are subject to severe serial correlation in the residuals (Williamson, 1975; Kelley 1965; Gallaway and Vedder 1971). Thus, OLS estimates could yield biased standard errors for the parameter estimates. Also, a distributed lag system will yield inconsistent estimates if an OLS technique is employed when the level of migration is correlated with the error term (Gallaway and Vedder, 1971).

xvi This has been confirmed for the U.K. - Canada case in the later period 1911-1921 (D. Pope, 1968) and for alternative destinations for U.K. émigrés (Kelley 1965).

xvii This is easily rationalized. The United Kingdom sent from 30 to 60 percent of the immigrants during this period (see Table 1). These immigrants often eventually went to the U.S. Thus, former U.K. - Canadian immigrants who left for the U.S. later lowered (Pc) in the denominator and raised the whole fraction $(M / P_c)_{t-1}$. The positive response of U.K. immigrants to this increase in $(M / P_c)_{t-1}$ in the next period is a continuation of the two-stage journey process of their previous countrymen. In short,

this points to Wilkinson's weak specification of this variable.

xviii M. Greenwood (1970) covers this point in detail.

xix One interpretation would suggest that U.K. immigrants enter Canada to replace the outflow of the Canadian population, which was attracted by higher U.S. manufacturing wages. This would be consistent with positive parameter estimates for the Canadian labor supply shift and U.S. wage variables and their high degree of multicollinearity, in the U.K.-Canadian immigration function.

xx Experimentation with distributed lag structures with several other polynomial forms did not alter this result. Moreover, since the coefficients of equation (1.3) were smaller than alternative distributed lag forms a more complicated lag structure would be inappropriate (M. Greenwood, p. 318). Finally, the Durbin-Watson statistic indicated an absence of serial correlation under equation (1.3).

xxi The difference between the U.S. and U.K. response may just reflect the additional traveling time involved.

xxii Several reasons account for the divergent findings of this paper and that of Richardson (1972, p. 103). First, Richardson covers a different period (1900-1914). Second, out preferred model, (eq. 1.3), has an explicit lag structure and Richardson does not. Finally, we are measuring two different dependent variables. Richardson uses the absolute level of U.K. out migration, (Mi), while we use a rate (M_i^* / P_i) to avoid the obvious spurious correlation. We conducted a directly comparable test to Richardson's in terms of his dependent variable definition and with no lags, but retained all our variables, plus, his investment term. Both the investment and U.K. was -Canadian rural income variables were significant with little multicollinearity. However, significant negative serial correlation appeared, no doubt due to the dependent variable definition, and undermined the significance of Richardson's investment model.

xxiii It would seem that, at a maximum, Richardson's model has shown that the absolute level of U.K. immigration is correlated with investment. No doubt, other variables (e.g. wage differences), in addition to investment, are also correlated with absolute migration levels. Thus, at this point, it would seem that both the job vacancy and income gain variables are associated with the level of U.K.-Canadian immigration. However, as out tests of Richardson's model indicate, his specification of an absolute dependent variable causes serious autocorrelation and weakens his results.

xxiv At this point, data restrictions preclude the estimation of a three-country (i.e., U.K., U.S., and Canada) multi-equation model that may be required in the Canadian context.

xxv See Canada Yearbook 1932, p. 154 for intended occupational groupings during this period.

xxvi At this point Pickett's (1965) methodological reasons for attacking MacDougall's (1961) immigrant estimates seem germane. MacDougall's estimation premise that Canadian immigrants are a function of U.S. economic conditions only holds for U.K. immigrants.

xxvii The implications of dropping the infinite immigrant supply elasticity assumptions are obvious. The modest rental share or the contribution of the wheat boom estimated by Chambers and Gordon (1966) can be further diminished by rising wages under an inelastic labor supply curve. Also, the major assumptions of Dales' model are seriously challenged. His required non-response of European immigrants to U.S. wages is in doubt since U.K immigrants were responsive to U.S. economic forces. Also, the assumption of infinite supply elasticity for U.K. and European immigrants is invalid. Hence, continued immigration came forth only under rising real wages and probably helped to stem, and not encourage, the flow of native-born Canadians to the U.S.

xxviii In 1901, C. Sifton, who formulated Canadian immigration policy wrote:

> Our desire is to promote the immigration of farmers and farm laborers. We have not been disposed to exclude foreigners of any nationality who seemed likely to become successful agriculturists … (As quoted in M. Timlin 1960, p. 518).

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