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FINANCIAL INTERMEDIATION, CAPITAL ACCUMULATION  
AND GROWTH: EVIDENCE FROM CANADA

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# **Financial Intermediation, Capital Accumulation and Growth: Evidence from Canada**

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PRELIMINARY, PLEASE DO NOT QUOTE  
COMMENTS WELCOME

There has been a renewed interest in the nature of the links between the development of financial systems and economic growth. Many theoretical models have been proposed that show how financial markets and intermediary activity promote growth. Empirically, financial indicators have been shown to be robustly and positively correlated with economic growth. Establishing causality, on the other hand, has been difficult. The development of the US and the UK financial systems were found to cause increases in per capita income and investment over 1870-1929. I use a cointegration approach for Canada to show that developments in the Canadian financial sector were driven by increases in national income over 1875-1967, and not vice-versa. Financial development in Canada, however, had a significant positive influence on the rate of capital formation and domestic savings in per capita terms, as intermediaries channeled surplus funds into capital investment.

*Keywords:* Cointegration; financial intermediation; capital accumulation; migration.

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## Introduction

Canada has experienced a long-run increase in the domestic savings rate, and the gross domestic capital formation rate, since 1870, as indicated in Figure 1. The domestic savings rate, calculated as the residual of gross domestic capital formation less foreign capital inflows (plus the current account), rose from below ten percent in the 1870s, to over fifteen percent before WWI, and stabilized around twenty percent in the post-WWII period. As a result of this long-run increase, the demand for foreign capital to meet investment requirements decreased. This period was also one where the population grew rapidly through immigration surges before and after WWI and after WWII, and one of extensive development in the domestic financial system. Other work has examined the role of migration on savings and investment in Canada since 1870. What effect did financial development in Canada have on investment, savings, and growth during this period when Canada emerged as a developed economy?

In the United States, the savings rate rose from 16 percent in 1830 to 22 percent in 1900, and has since exhibited no long-run trend. Much work has attempted to explain the shift in savings in the nineteenth century. Davis and Gallman (1972) contend that the increase in the number of financial intermediaries and the change in the age structure of the US population (towards an increasing proportion aged 45 and older) facilitated the increase in savings and investment. Subsequent work by James and Skinner (1987), and a review of the literature and the debate by Davis and Gallman (1994) have reaffirmed the importance of increasing intermediation in facilitating the rise in the domestic savings rate.

Using time series techniques, Rousseau and Wachtel (1998) examined income growth and financial development in several countries during the 1870-1929 period. They found the direction of causality ran from the financial sector to the real sector in the United States, however, the results for Canada were mixed and inconclusive. What role did the development of the Canadian financial sector play during this period of industrialization and financial innovation? Did Canadian intermediaries influence the rate of capital accumulation or domestic savings in Canada?

The purpose of this paper is to estimate the nature of the links between the financial and real sectors in Canada, and to allow for an effect of demographic change on these sectors. The contribution of this paper to the existing literature is in extending previous work which examined

the links between income and financial systems, or investment and financial systems, or the real sector and immigration only. A multivariate cointegration model is used to identify significant long-run equilibrium relationships between income and the monetary base, between income and the level of intermediary assets, between income, investment and immigrant arrivals, and between income, domestic savings and immigrant arrivals, in real per capita terms. The results indicate that developments in the financial sector had a significant influence on investment and domestic savings in Canada. Developments in the Canadian financial sector appear to have been driven by income growth, but not vice-versa. Migration patterns had a significant impact on investment and savings. The results indicated that migration had a stronger influence on investment compared to domestic savings. Migrants were typically young, of working age, and net savers and wealth holders. However, foreign capital was necessary to satisfy the demand for investment to equip them for production, and to satisfy social overhead needs.

## **Financial Systems and Economic Growth: Evidence**

While development economists have tended to ignore the role of finance, other work has challenged the traditional view that financial intermediaries passively link household savings to businesses in need of investment capital.<sup>1</sup> Schumpeter (1934) contended that an innovative financial sector can be a source of growth by choosing to fund those productive activities with the highest chance of success. Bagehot (1873) indicated that Britain enjoyed economic growth greater than that of other countries due to a strong financial system that identified and funded profitable ventures, both home and abroad. The industrial revolution required large amounts of capital to be committed to projects for the long term, and as such, required financial innovation to mobilize savings and provide liquidity for investors to have access to their savings in the short term. “The industrial revolution therefore had to wait for the financial revolution” (Bencivenga, Smith and Starr, 1995: 243).

Work by Raymond Goldsmith, and King and Levine and others have concluded that the growth of a domestic financial system is an important determinant of economic development. The international experience supports the view that financial structure matters in explaining

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<sup>1</sup> Chandavarkar (1992) looks at the issue of financial contributions to growth in the development literature. Robinson (1952:86) also writes that the financial system is reactive rather than proactive in the economy.

growth. Goldsmith (1969) examined data on 35 countries over the 1860-1963 period and found that the pace of financial development, proxied by the value of intermediary assets as a proportion of GNP, was correlated with economic growth. Goldsmith also wrote, “modern economic growth has been accompanied in all market economies in the early and intermediate stages of their development by a substantially more than proportionate expansion of their financial structure,” Goldsmith (1985:2). Taking Goldsmith’s work even further, King and Levine (1993a, 1993b, and 1993c) examined in more detail the relationship between the level of financial development and growth. They found that contemporaneous financial indicators were statistically important determinants of growth over 1960-1989 in a cross-section of 77 countries. They also found a significant and large relationship between the initial level of financial development in 1960, and subsequent rates of long-run growth and capital accumulation. However, causality was not established.

In the US during the nineteenth century, substantial financial development, growth, and an increase in the rate of capital accumulation and domestic savings occurred simultaneously. The US savings rate rose from 16 percent in 1830 to 22 percent in 1900, and much work has attempted to explain this shift. Davis and Gallman (1972) support the notion that the increase in the number of financial intermediaries and the change in the age structure of the US population (towards an increasing proportion aged 45 and older) were of primary importance. Over 1830-1880, the US population tripled and the median age rose from 17 to 21 years. The proportion of males in the forty to sixty years of age group increased from nine percent to fifteen percent, and it is this group that is thought to have the highest rates of saving. During this time, the assets of banks increased by a factor of seven, and the assets of mutual life insurance companies grew from nil to equal more than half the assets of mutual savings banks by 1880, which themselves had grown more than a hundredfold (Davis and Gallman, 1972: 450-1).

In examining other supply-side factors to explain the increase in savings, Davis and Gallman concluded that there were no significant structural shifts in the US economy, aside from demographic changes and financial innovation that moved the savings schedule. Manufacturing firms saved little, and farmers became net borrowers instead of net savers near the end of nineteenth century. On the demand side, they contended that the primary source of increasing investment rates was increases in the capital to output ratio and capital deepening in all sectors of the economy. However, since the evidence points to declining real interest rates during the

period in question, Davis and Gallman concluded that the supply-side factors dominated those on the demand-side. The increase in the domestic savings rate must have been the result of demographic change towards an older population (with immigration and declining fertility rates), and institutional changes in capital markets and intermediation (Davis and Gallman (1994: 204-208). This view has been challenged by David (1977) and Williamson (1974, 1991), yet evidence presented by Edelstein (1982), and James and Skinner (1987) are supportive of the Davis and Gallman viewpoint and have reaffirmed the importance of increasing intermediation in facilitating the rise in the domestic savings rate.<sup>2</sup>

In Canada, the domestic savings rate rose from an average of eight percent over 1870-1896, to over twenty percent in the 1960s (see Figure 1). At the same time, the financial system in Canada expanded rapidly, with the assets of Canadian intermediaries increasing from thirty percent of GNP in 1870, to over one hundred percent (see Figure 2). In Canada, the role of domestic financial intermediaries during the emergence of Canada as an industrialized nation has also been debated. The discussion over the role of financial intermediation during this period has been driven at various times by Buckley, Naylor, Drummond, and Davis and Gallman. Buckley (1955) and Naylor (1997) contend that the Canadian capital market was weak in the years leading to WWI and intermediaries played no significant role in the mobilization of domestic savings. However, research by Drummond (1959, 1962) points to a developing domestic market.

In the seminal work by Buckley, he wrote, “in view of the weakness of the domestic capital market, in which large gaps were long to remain, one might safely guess that a very large share of the domestic net savings was channeled directly into investment without the benefit of market intermediaries” (Buckley 1955: 104). It was deemed common policy for firms to direct earnings into investment in plant and equipment. Naylor contended Canadian financial institutions were deficient in supplying funds for long-term financing. The chartered banks favored short-term loans, primarily for commodity movements and in advances to merchants. Other financial intermediaries that developed to serve the long-term sectors of the capital market were predisposed towards mortgage loans. Thus, debt and equity markets for investment in plant and equipment were weak (Naylor, 1997: 70-110).

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<sup>2</sup> The reader may refer to Davis and Gallman (1994) for a more thorough treatment of the debate and the other participants involved in this debate.

Wachtel and Rousseau (1995) present some evidence that development in the domestic financial sector (proxied by the ratio of intermediary assets to GNP and other financial measures as a proportion of GNP) had a statistically significant impact on per capita real incomes in the US, the UK, and Canada prior to the Great Depression, using time series techniques. Less conclusive evidence was found to support the positive role of finance on the ratio of investment to GNP during this time period. Rousseau (1995: Ch.4) examines the relationships between per capita real incomes, per capita investment, and measures of financial intensity (for example, per capita intermediary assets in real quantities) for the US, the UK, Japan, Germany, and Canada. The results indicate interactions between the financial and real sectors in these economies over the 1870-1929 period. The results are strongest for the US, with evidence that financial sector development caused growth in income and investment. The results for the UK suggest strong bi-directional causality between the real and financial sectors. The results for Canada, on the other hand, are weak and mixed. There are some indications of bi-directional causality between income and measures of financial intensity.

An investigation of finance and growth in Sweden from 1834 to 1991 by Hansson and Jonung (1997) revealed no stable and conclusive finance-led growth relationship in the long run. Their estimates suggest complex interactions amongst the variables used in their analysis, not unidirectional causality.

Rousseau and Wachtel (1998) examines the interactions between income, the monetary base, and measures of financial intensity over 1870-1929 for the US, the UK, Canada, Norway and Sweden. Again, the results are strongest for the US and the UK, and indicate that increasing financial intensity caused income growth, but that income growth did not cause growth in the financial sector. The support, however, is again mixed for Canada. The results suggest that increases in per capita income caused increases in the monetary base, as well as increases in intermediary assets using difference vector autoregressive models with error correction terms, and not vice-versa. However, results using levels VAR causality testing suggest developments in the financial sector had significant positive effects on income, and not vice-versa. The appropriateness of the levels VAR causality tests rest on the research of Sims, Stock and Watson (1990) that supports the use of levels VARs in three-variable systems where a cointegrating vector exists. The support for cointegration provided by Rousseau and Wachtel (1998) amongst income, the monetary base, and measures of financial intensity for Canada is weak.

Cointegration only exists between income, the monetary base, and the difference between the stock of money and the base (a measure of the creation of credit by banks), one of the five measures of financial sector intensity examined over 1870-1929. No other measure of financial intensity is cointegrated with income and the base at significance levels of 0.10 or less. Overall, the support for financial development affecting the real sector is strongest in the United States, and inconclusive for Canada.

The impact of population changes and migration on domestic savings and capital formation in Canada has been examined in detail. McLean (1994) concluded that the increase in the ratio of older workers (those 45 to 64 years of age, thought to be those with the highest personal savings rate) to the total population, caused an increase in the domestic savings rate in the long run. Results in Wilson (2000), using a cointegration approach, suggest that the increase in the Canadian savings rate since 1870 was the result of increases in income and in the working age population. Green and Sparks (1999) found that increased immigration was a significant factor in explaining the increased rate of Canadian investment in the years prior to WWI. Focusing on the 1870-1913 period, Wilson (2001) presents evidence, using an overlapping generations general equilibrium model, that increased immigration in Canada at the beginning of the twentieth century resulted in both an increase in domestic savings and foreign capital inflows. Migrants were predominantly young workers, net savers and wealth holders in the economy, but Canada still required foreign capital inflows to meet the increased capital requirements during this period.

The purpose of this paper is to examine the effect of the domestic financial system on the accumulation of capital, and the domestic savings rate over the ten decades since Confederation in 1867, and to further explore the interactions between the real and financial sectors in Canada. The analysis builds on previous work to investigate changes in migration patterns, financial intermediation, capital accumulation, domestic savings, and income growth in Canada, in a multivariate framework.

## **Cointegration Analysis**

A multivariate vector autoregressive model will be used to identify the interaction between migration, and real and financial sector development. The analysis includes the



following annual series in natural logarithms: per capita real income ( $y$ ); per capita real investment ( $i$ ); per capita real domestic savings ( $s$ ); per capita private intermediary assets in real terms ( $a$ ); per capita monetary base in real terms ( $m$ ); and the ratio of immigrant arrivals to the total population ( $im$ ).<sup>3</sup>

The time period for the analysis is 1871 to 1967. The financial intermediary data is taken from Neufeld (1972). This data is not easily reproduced after 1968 due to the variety and availability of sources. The figures for the monetary base are from the series presented in Metcalf, Redish and Shearer (1996). The data for income, domestic savings, investment, and the GNP deflator (1981 prices) are taken from Urquhart (1988). Investment is gross domestic fixed capital formation, which includes the replacement of depreciated capital. Domestic savings are calculated as gross domestic capital formation plus the current account balance (*i.e.* gross investment less foreign capital inflows). The population and number of immigrant arrivals are from Urquhart and Buckley (1983). While it would be useful to extend these series to the present, the chosen time period includes three relatively stable decades for the start of the study period before the dramatic inflow of migrants in the early 1900s. The study period also ends with a relatively stable period of growth following the Second World War.

All series were identified as I(1) processes. The Augmented Dickey-Fuller test statistics are presented in Table 1. The relationship between these series is explored using the following multivariate autoregressive model that allows for cointegrated processes:

$$\Delta z_t = \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \Pi z_{t-k} + \varepsilon_t, \quad \varepsilon_t \sim Niid(0, \Omega), \quad (1)$$

with  $z = [y \ m \ a \ i \ s \ im]^T$ , and  $\Pi = \alpha\beta^T$ . Here,  $\beta$  is a  $6 \times r$  matrix of parameters denoting the  $r$  cointegrating relationships amongst variables in  $z$ , and  $\alpha$  is a  $6 \times r$  matrix of parameters denoting the speed of adjustment of a dependent variable towards a cointegrating relationship. The unrestricted VAR analysis, using the full information maximum likelihood procedure pioneered by Johansen (1991) indicated that a value of  $k$  set to three generated satisfactory residuals.<sup>4</sup> The value for  $r$  was set to 4 as indicated by the L-max statistics in Table 2.

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<sup>3</sup> The difference between the money stock and the base, a measure of the creation of credit by intermediaries was also used as a measure of financial intensity (in place of private intermediary assets), with similar results.

<sup>4</sup> See also Johansen and Juselius (1994), and Juselius (1991) for further explanation of the estimation framework.

The variables  $y$  and  $im$  were found to be weakly exogenous. The  $\chi^2(4)$  test statistics for the null hypothesis of weak exogeneity of  $y$  and  $im$  were 4.74 and 4.47, insignificant at the 0.10 significance level. The values for  $\alpha$  in the equations describing  $\Delta y$  and  $\Delta im$  were insignificant. The coefficients on the lagged values of other explanatory variables were also insignificant. The multivariate model was reduced to the following to reflect the weak exogeneity of  $y$  and  $im$ :

$$\Delta v_t = \Gamma_0 \Delta x_t + \sum_{i=1}^{k-1} \Gamma_i \Delta z_{t-i} + \Pi z_{t-k} + \varepsilon_t, \quad \varepsilon_t \sim Niid(0, \Omega), \quad (2)$$

with  $v = [m \ a \ i \ s]^T$ ,  $x = [y \ im]^T$ , and  $\Pi = \alpha \beta^T$ . Now,  $\beta$  is a  $6 \times 4$  matrix of parameters denoting the 4 cointegrating relationships amongst variables in  $z$ , and  $\alpha$  is a  $4 \times 4$  matrix of parameters denoting the speed of adjustment of the dependent variables in  $v$ , towards the long-run equilibrium relationships.

### Long-run Relationships

The restricted estimates of  $\beta$  are presented in Table 3. These estimates indicate that there exist cointegrating relationships between income and the monetary base, between income and the level of private intermediary assets, between investment, income and immigration, and between savings, income and immigration (in real per capita terms), over the study period. These relationships are:

$$\hat{\beta}_1^T z_{t-3} = m_{t-3} - 1.316 y_{t-3}; \quad (3)$$

$$\hat{\beta}_2^T z_{t-3} = a_{t-3} - 1.256 y_{t-3}; \quad (4)$$

$$\hat{\beta}_3^T z_{t-3} = i_{t-3} - 1.318 y_{t-3} - 0.249 im_{t-3}; \quad (5)$$

$$\hat{\beta}_4^T z_{t-3} = s_{t-3} - 1.519 y_{t-3} - 0.112 im_{t-3}.^5 \quad (6)$$

The long-run income elasticities were 1.316, 1.256, 1.318, and 1.519 for the monetary base, private intermediary assets, investment, and savings respectively.

The proportion of immigrant arrivals was a significant factor in the cointegrating relationship between income and investment, and between income and savings. This result is

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<sup>5</sup> This is not to say that investment and savings were not cointegrated. A simple rearrangement of the third and fourth vectors gives the vector  $\hat{\beta}_4^T z_{t-3} = s_{t-3} - 1.153 i_{t-3} - 0.175 im_{t-3}$ , which can be substituted for the fourth vector.

consistent with previous work that indicated investment and domestic savings were increased during times of high immigration (Green and Sparks (1999); Wilson (2000 and 2001)). It is important to note that the proportion of immigrant arrivals had much more impact on investment when compared to the impact on domestic savings. Wilson (2001) shows the different impact of an immigration surge on investment and savings in a dynamic overlapping generations open economy general equilibrium model. Immigrants are generally younger working-age migrants who don't hold enough capital to fully equip themselves for production. Foreign capital flows into the economy to satisfy the increased demand for capital investment.

The corresponding estimates for  $\alpha$  in (2) are presented in Table 4. These estimates indicate the sensitivity of the dependent variables to deviations from the long-run relationships as indicated by the cointegrating vectors in (3-6). The growth rate of the monetary base is affected by deviations between income and the base, and not deviations in the other cointegrating relationships. The speed of adjustment parameter is negative as expected, indicating that when the base is lower than the level implied by the long-run relationship between income and the base, the growth rate of the monetary base is increased in an attempt to move back towards the long-run equilibrium. The growth rate of private Canadian intermediary assets is affected by deviations from the long-run relationship between income and the monetary base, and by deviations from the long-run relationship between income and the level of intermediary assets. In both cases, when income is at a level greater than that implied by the long-run relationship between income and the base or intermediary assets, the growth rate of intermediary assets is increased. Increases in income had a strong positive impact on the Canadian financial sector.

The growth rate of investment is influenced by deviations from the long-run relationship between investment, income and migration only. When migration or income is at a level higher than that implied by the long-run equilibrium, the growth rate of investment is increased. Similarly, when migration or income is at a level higher than that implied by the long-run relationship between savings, income and migration, the growth rate of savings is increased. However, unlike investment, savings are also influenced by deviations from the long-run relationships between income and the monetary base, and between income and the level of intermediary assets. When either the monetary base or the level of intermediary assets is greater than that implied by the cointegrating relationships, the growth rate of savings is increased. This indicates that savings are positively influenced by developments in the domestic financial sector,

and suggests Canadian intermediaries channeled surplus funds into fixed capital investment. Investment is the sum of domestic savings and foreign capital flows, and as such, is not sensitive to developments in the domestic financial sector in the long run, but by the international market supplying capital. However, increases in domestic savings as a result of increasing financial intensity may crowd-out foreign capital, as is suggested by the long-run results.

### **The Short Run Parameters**

The restricted estimates of the short-run parameters are presented in Table 5, along with the adjusted estimates of the speed of adjustment parameters,  $\alpha$ , with the cointegrating relationships from Table 3 imposed. The estimates for all four dependent variables indicate the strong influence of increasing income on the financial sector, and on capital accumulation in the Canadian economy. Increases in the growth rate of income caused increases in the growth rate of the monetary base, of asset accumulation of Canadian private intermediaries, of investment, and of domestic savings.

Immigration had a positive short-run impact on investment and domestic savings. The increase in immigrants contributed to increases in domestic savings as immigrants brought wealth into the economy and also were net savers in the economy, since the majority of migrants were of working age. However, the impact of immigration was stronger on investment. The increase in domestic savings was not enough to equip migrants in production, and foreign capital inflows satisfied increased investment demand. Immigration proved to have no statistically significant effect on the financial sector in per capita terms.

It was noted in the discussion of the long-run parameters that the financial sector had a positive impact on domestic savings, but not investment. The short-run parameters suggest that increases in the growth rate of asset accumulation of private intermediaries caused increases in the growth rates of both investment and domestic savings. So, gross investment was influenced by developments in the Canadian financial sector, at least in the short-run, but the impact of the domestic financial sector was stronger on domestic savings than on investment. This suggests there was a short-run partial crowding-out of foreign investment by increased domestic savings.

Income per capita was found to be weakly exogenous over the sample period. This could be the result of several factors that are not taken into account in the analysis. For instance, data

on capacity utilization and labour force statistics are not available for the time period. These would be expected to play a significant role in the determination of output. Labour is much more susceptible to business cycles than either population or immigration. Technological progress or total factor productivity also influences income. These are also expected to play a role in explaining income variation. Estimates of total factor productivity growth by Green (1999) suggest periods of uneven growth in TFP over 1891-1970.

Overall, during the 1875-1967 period in Canadian development, the domestic financial sector played a significant role in channeling funds into capital investment. The estimates indicate that financial sector growth caused growth in investment in the short run, and caused growth in domestic savings in the long run and in the short run, in real per capita terms. Domestic financial development and income growth contributed to the rise in the domestic savings rate, and the reduced dependence on foreign capital in Canada over 1875-1967. Meanwhile, as immigration surges caused increases in domestic savings, immigration also increased foreign capital dependence, as the demand for investment to equip migrants for work and life in Canada outpaced the supply of domestic funds.

## **Conclusion**

Over the ten decades after Confederation in 1867, Canada went from being a country with a low savings rate, below ten percent of aggregate output, to a country with a savings rate characteristic of a developed economy, in excess of twenty percent. This period is also characterized by surges in immigration, and by the extensive development of the financial system. Previous work on Canada has examined the impact of increasing income and mass immigration on the savings rate, but has assumed individuals had a stable and mature financial system.

In the United States, the savings rate rose from 16 percent in 1830 to 22 percent in 1900. Much work has attempted to explain this shift. Davis and Gallman (1972) support the notion that the increase in the number of financial intermediaries and the change in the age structure of the US population (towards an increasing proportion aged 45 and older) were of primary importance. Rousseau and Wachtel (1998) found that increasing financial intensity Granger-caused income growth in the US over 1870-1929.

Using a multivariate cointegration framework, the results for Canada suggest that the developments in the domestic financial sector had a significant positive impact on both capital formation and domestic savings. Increases in national income caused increases in investment, savings, the monetary base, and in asset accumulation by Canadian intermediaries in real per capita terms. Migration patterns had a significant impact on investment and savings. The results indicated that migration had a stronger influence on investment compared to domestic savings. Migrants were typically young, of working age, and net savers and wealth holders. However, foreign capital was necessary to satisfy the demand for investment to equip them for production, and to satisfy social overhead needs. During the period of study, income was found to be weakly exogenous, and not statistically dependent on developments in the financial sector. Over 1875-1967, developments in the domestic financial sector and increases in per capita income increased the savings rate and decreased foreign capital dependency in Canada, while immigration surges increased both the domestic savings rate and foreign capital dependency.

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**Table 1: Augmented Dickey-Fuller Tests**

Variable	ADF(2) Test Statistic	Variable	ADF(2) Test Statistic
<i>y</i>	-3.27	$\Delta y$	<b><u>-5.52</u></b>
<i>m</i>	-2.45	$\Delta m$	<b><u>-3.79</u></b>
<i>a</i>	-2.54	$\Delta a$	<b><u>-6.33</u></b>
<i>i</i>	-2.63	$\Delta i$	<b><u>-5.39</u></b>
<i>s</i>	-3.25	$\Delta s$	<b><u>-6.67</u></b>
<i>im</i>	<b><u>-2.65</u></b>	$\Delta im$	<b><u>-4.83</u></b>

Notes: Boldface indicates significance at the 95% confidence level. Underline denotes ADF(4) test statistic.

**Table 2: Johansen Rank Tests**

Test	L-max Test Statistic	Trace Test Statistic
$H_0: r=0$	<b>41.43</b>	<b>107.80</b>
$H_0: r=1$	<b>24.46</b>	<b>66.37</b>
$H_0: r=2$	<b>20.76</b>	41.92
$H_0: r=3$	<b>13.48</b>	21.16
$H_0: r=4$	7.64	7.68
$H_0: r=5$	0.04	0.04

Note: Boldface indicates significance at the 90% confidence level.

**Table 3: Restricted Estimates for  $\beta$** 

Cointegrating Vector	$m$	$a$	$i$	$s$	$y$	$im$
$cv_1$	1	0	0	0	-1.316 (0.073)	0
$cv_2$	0	1	0	0	-1.256 (0.087)	0
$cv_3$	0	0	1	0	-1.318 (0.050)	-0.249 (0.027)
$cv_4$	0	0	0	1	-1.519 (0.075)	-0.112 (0.039)

Notes: Standard errors in parentheses. LR test statistic for restrictions,  $\chi^2(2) = 5.61$ , p-value=0.06.

**Table 4: Estimates for  $\alpha$** 

Dependent Variable	$\Delta m$	$\Delta a$	$\Delta i$	$\Delta s$
<i>Regressor</i>				
$cv_1$	<b>-0.111</b> <b>(-2.763)</b>	<b>-0.135</b> <b>(-3.981)</b>	-0.018 (-0.320)	<b>0.228</b> <b>(2.251)</b>
$cv_2$	0.058 (1.434)	<b>-0.074</b> <b>(-2.151)</b>	0.064 (1.137)	<b>0.285</b> <b>(2.774)</b>
$cv_3$	0.013 (0.205)	-0.105 (-1.994)	<b>-0.264</b> <b>(-3.079)</b>	0.155 (0.991)
$cv_4$	-0.043 (-0.911)	0.014 (0.355)	-0.063 (-0.969)	<b>-0.488</b> <b>(-4.097)</b>

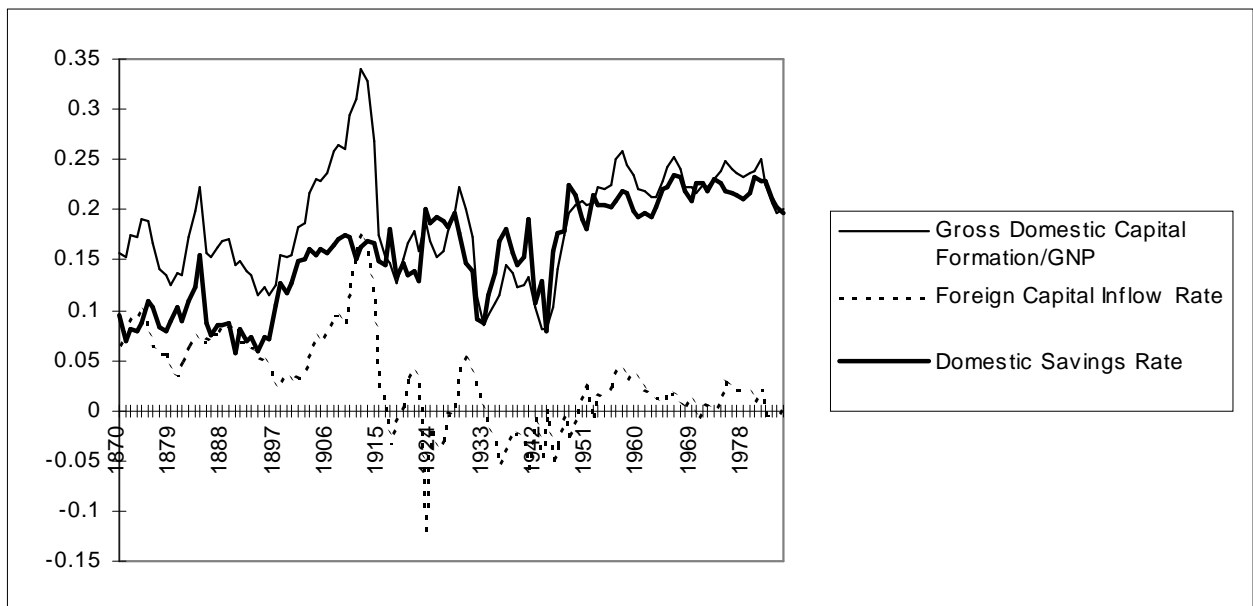
Note: Boldface indicates significance at the 95% confidence level, t-values in parentheses.

**Table 5: Reduced Form Restricted Estimates of the Short-run Parameters  $\Gamma$  and  $\alpha$**

Dependent Variable:	$\Delta m_t$	$\Delta a_t$	$\Delta i_t$	$\Delta s_t$
<i>Regressor/Statistic</i>				
$\Delta m_{t-1}$	<b>0.367</b> (0.002)	0.011 (0.914)		0.088 (0.773)
$\Delta m_{t-2}$	0.054 (0.635)	-0.073 (0.432)		-0.297 (0.325)
$\Delta a_{t-1}$	<b>-0.596</b> (0.000)	-0.213 (0.076)	0.083 (0.600)	-0.045 (0.902)
$\Delta a_{t-2}$	-0.288 (0.064)	-0.176 (0.174)	<b>0.543</b> (0.001)	<b>1.334</b> (0.001)
$\Delta i_{t-1}$			-0.150 (0.120)	
$\Delta i_{t-2}$			<b>-0.295</b> (0.001)	
$\Delta s_{t-1}$				<b>-0.579</b> (0.000)
$\Delta s_{t-2}$				<b>-0.352</b> (0.003)
$\Delta y_t$	<b>0.371</b> (0.000)	<b>0.340</b> (0.000)	<b>1.311</b> (0.000)	<b>1.400</b> (0.000)
$\Delta y_{t-1}$	0.074 (0.512)	0.090 (0.338)	<b>0.483</b> (0.012)	<b>1.146</b> (0.001)
$\Delta y_{t-2}$	<b>0.303</b> (0.006)	0.132 (0.149)	-0.216 (0.242)	-0.354 (0.338)
$\Delta im_t$			<b>0.125</b> (0.000)	<b>0.100</b> (0.021)
$\Delta im_{t-1}$			<b>0.116</b> (0.000)	<b>0.087</b> (0.046)
$\Delta im_{t-2}$			<b>0.163</b> (0.000)	<b>0.150</b> (0.000)
$cv_{1t-3}$	<b>-0.136</b> (0.000)	<b>-0.116</b> (0.000)		<b>0.203</b> (0.033)
$cv_{2t-3}$		-0.060 (0.053)		<b>0.273</b> (0.008)
$cv_{3t-3}$			<b>-0.292</b> (0.000)	
$cv_{4t-3}$				<b>-0.464</b> (0.000)
<i>constant</i>	<b>-0.297</b> (0.000)	<b>-0.240</b> (0.000)	<b>-0.091</b> (0.000)	1.001 (0.651)
$R^2$	0.512	0.443	0.790	0.586
F test of exclusion (Significance level)	0.953 (0.491)	0.552 (0.831)	0.307 (0.949)	0.906 (0.443)

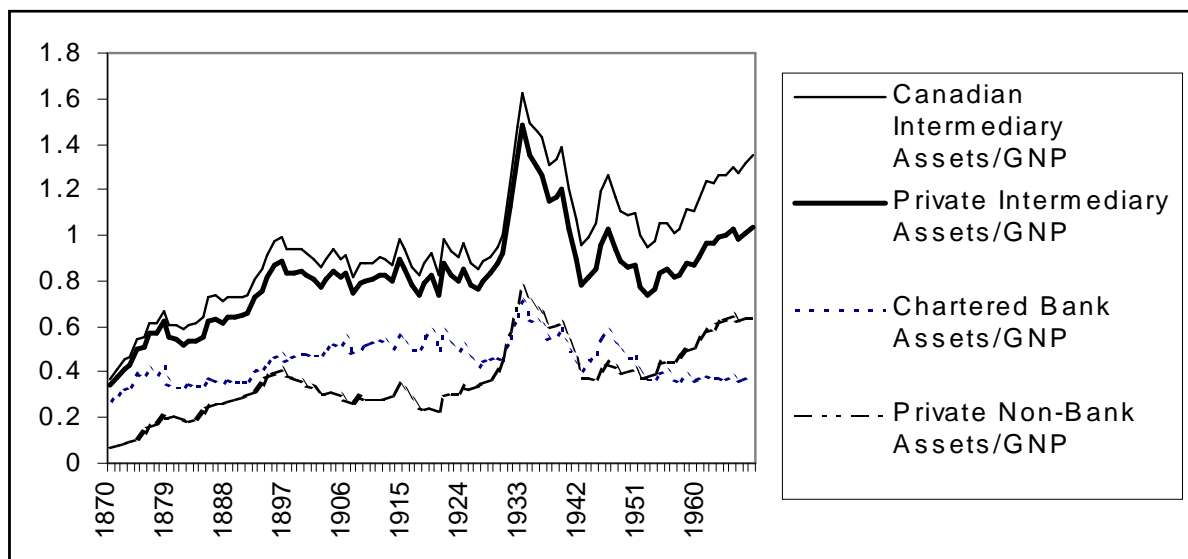
Notes: Boldface indicates significance at the 95% confidence level, significance level in parentheses. The F test of exclusion tests the validity of omitting the regressors with no estimated coefficient in the table.

**Figure 1: Gross Domestic Capital Formation, Domestic Savings and Foreign Capital Inflow Rates, Canada 1870-1985**



Source: Urquhart (1988).

**Figure 2: Financial Intermediary Assets as a Proportion of GNP, Canada 1870-1968**



Sources: Neufeld (1972) for financial data, Urquhart (1988) for GNP data.