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AUSTRALIAN AND NORTH AMERICAN
COMPARISONS**

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Working Paper 91-7

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More than twenty years ago Kuznets reported that in a number of the advanced economies the ratio of gross savings to gross national product at least doubled over the century prior to 1960, typically from around 10 per cent to 20 per cent or more.¹ In the United States aggregate savings rose from less than 10 per cent of gross national product in the decade to 1848 to almost 20 per cent in the 1890s. Since that time the U.S. saving rate has not shown any long run tendency to rise or fall.² Drawing on recent estimates of the Australian and Canadian saving rates since the nineteenth century, this paper reports that the pattern of saving in both countries differs from that observed in the U.S. However, Australia and Canada are remarkably similar with respect both to the levels of, as well as the timing of changes in, their respective savings rates since 1870.

This evidence suggests that comparative analysis may be fruitful in identifying the determinants of changes in long run saving behaviour in all three countries³. Though differing most obviously in the size of their domestic economies, they share other characteristics pertinent to the examination of savings such as high levels of per capita income, a phase of vigorous extensive development in the nineteenth century, and population growth rates consistently above those of other advanced economies. Since there has been more analysis of the historical pattern of saving in the U.S. than in Australia or Canada, the suggestions in that literature offer a relevant starting point for analysis of the determinants of saving in the latter two, though most attention will here be given the Australian case.

Whereas investment has occupied a central place in Australian economic historiography,⁴ relatively limited attention has been given to historical aspects of saving. This would be less surprising if conditions in Australia had approximated those of a closed economy, or had deficits on the current account of the balance of payments typically been short-lived and small relative to GDP or domestic investment. The aggregate saving rate could then be proxied by the investment rate. But deficits on current account have been persistent and frequently large. Especially before 1914,

capital inflow (foreign saving) accounts for a significant proportion of the financing of domestic capital formation.

Where it occurs, historical discussion of Australian saving has typically been a by-product of the exploration of a related topic, as in Bentick's (1969) analysis of the Victorian economy at the end of the nineteenth century, or in Kelley's (1968) investigation of long swings in Australian economic and demographic time series between 1861 and 1911. In a comparative study of international trade and factor movements, Green and Urquhart (1976, Table 9) provide estimates of Australian saving, but only at decade intervals from 1870 to 1920, and the Australian evidence receives little attention in an inquiry which covers eight countries. Some analysis of saving in Australia is explicitly undertaken by Edelstein (1982, chapter 11), but this occurs in the context of an examination of British overseas investment between 1860 and 1914.

In this paper I first compare recently derived estimates of aggregate saving rates for Australia with those available for Canada and the United States (Section I), and attempt to account for the historical trends in Australian and Canadian saving rates in terms of consumption smoothing and life cycle effects (Section II). I then extend the analysis to examine the influence of foreign investment on domestic saving in both countries (Section III). Especially before 1914, Australia and Canada were not only major destinations for British savings, but foreign capital inflow contributed significantly to domestic investment. Thus a closer examination is undertaken of the determinants of Australian saving before 1914 (Section IV).

I. AUSTRALIAN AND COMPARATIVE EVIDENCE⁵

It was possible to derive annual estimates of (implied) gross aggregate savings for Australia from 1861 by adopting an indirect approach using the national accounting identity $\text{Saving} = \text{Investment} + (\text{Exports} - \text{Imports})$, and drawing on available series for

gross domestic fixed capital formation, changes in the value of stocks, and the current account of the balance of payments. The measure of aggregate saving so obtained is conventional in that no allowance has been made for expenditures on consumer durables or on human capital accumulation.⁶

The very long run trend has been for the Australian saving rate to rise markedly as is evident from Table 1 and Figure 1.⁷ This rise did not occur smoothly but in a number of jumps separated by long periods marked by short-run fluctuations but no clear trend increase. There have been three such 'plateau' periods since 1861. The first lasts until the end of the century with an average saving rate of 9.8 per cent, despite marked variation between decades.⁸ There is evidence of a break in the underlying saving rate near the turn of the century. From less than 10 per cent, it rises to 16.5 per cent for the period 1904 to 1929 (excluding the war).⁹ Following the second world war, the average saving rate again does more than simply recover previous levels: between 1946 and 1989 it has averaged 24 per cent of GDP.¹⁰

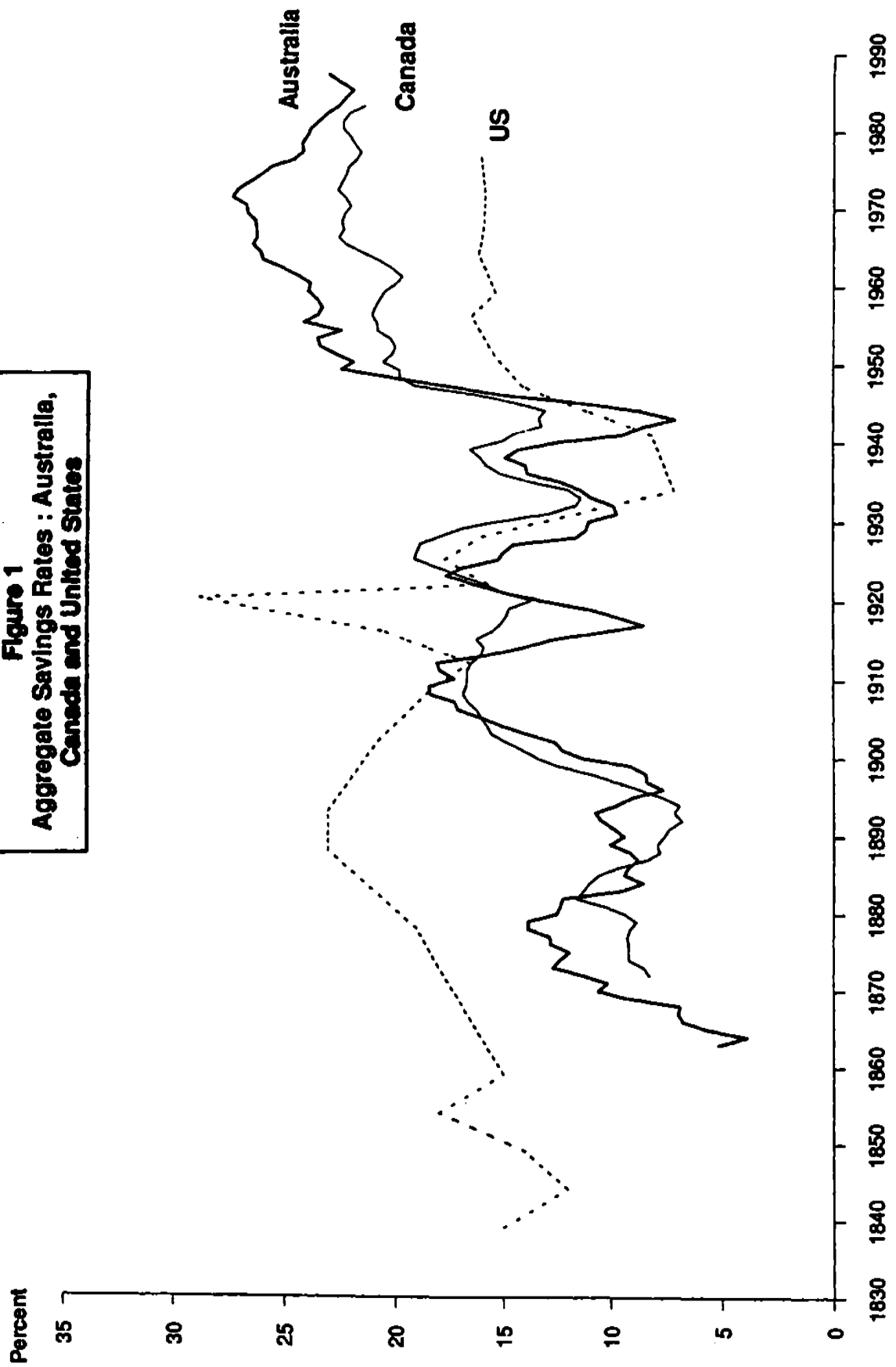
By comparison with Australian experience, the American saving rate has been relatively stable during this century if periods of war and depression are excepted. This is clear from Figure 1, which reports the ratio of gross national saving to GNP from 1900 as reported by Edelstein (1989, Table 1).¹¹ For the nineteenth century, the evidence points to an increase in the American saving rate, as noted previously.¹² This increase predated that in Australia, and may have occurred less abruptly.

Historical trends in the Canadian saving ratio more closely resemble those for Australia (Figure 1 and Table 1). The recent estimates of Urquhart (1988) were obtained by the same approach adopted here for Australia, thus are gross aggregate savings.¹³ In the three decades before 1900, savings averaged nine per cent of Canadian GNP. The rate rose to around 16 per cent in the period covering the years immediately prior to and following the first world war; and rose again to over 20 per cent after 1950. Ignoring

Table 1**Australia and Canada : Gross Aggregate Savings Rate
Selected Period Averages
(per cent of GDP or GNP)**

	Australia	Canada
1861 to 1869	5.5	n.a.
1870 to 1899	10.6	9.0
(a) 1870 to 1889	11.3	9.4
(b) 1890 to 1899	9.4	8.3
1900 to 1914; 1920 to 1929	15.7	16.5
(a) 1900 to 1914	15.9	15.9
(b) 1920 to 1929	15.4	17.3
1950 to 1985	24.5	21.3
(a) 1950 to 1974	25.0	21.1
(b) 1975 to 1985	23.5	21.6

Figure 1
Aggregate Savings Rates : Australia,
Canada and United States



periods of recession or war, the saving rate in Canada thus traces out the same (rising) step and plateau pattern observed for Australia. Both the timing of the steps, and the average saving rate within each of the three 'normal' period plateaux, are broadly comparable in the two countries.

II. DEMOGRAPHIC AND INCOME EFFECTS

The two principal influences on household and private saving behaviour consistently identified by macroeconomists are changes in real income (permanent income hypothesis) and in the age distribution (life cycle hypothesis). If Ricardian equivalence is accepted, public sector saving may not be independent of that in the private sector. Hence theories of household saving behaviour are an appropriate point of departure in the explanation of aggregate savings, especially as for much of the period covered here the government sector was less important in the economy than it has become since the second world war.

Additional determinants of saving have been canvassed in the literature dealing with the explanation of the rise in the U.S. saving rate in the nineteenth century. Life-cycle influences may include variations in the fertility rate (Lewis 1983) or the strength of the bequest motive (Ransom and Sutch 1986). Other putative influences include an increase in inequality, the growth of financial intermediation, the decline in the price of investment goods relative to consumer goods, and the better recording of investment levels with the decline in importance of on-farm improvements to land.¹⁴ The approach adopted here is to begin with an assessment of the roles of income variation and demographic change, while deferring to later Sections consideration of the possible relevance to Australian or Canadian experience of other influences.

In settler economies such as Australia and Canada, population growth has typically been high, and highly variable, with large-scale immigration an important reason for

this. These characteristics resulted both in a skewed age distribution and in greater short-run variation to the age structure than would otherwise have occurred. The importance of the age structure to the explanation of saving rates in less developed countries with high population growth rates is well established.¹⁵ It is possible that saving in the settler economies was also powerfully effected by similar demographic changes.

During the late nineteenth century the Australian economy exhibited a peculiar age distribution resulting from the scale and composition of immigration during the gold rushes in the 1850s. A 'kink' in the age structure subsequently moved through higher age brackets with an 'echo' effect one generation later (Hall 1963a). A possible connection with saving behaviour has been suggested by Edelstein: "the upward trend in Australian domestic saving was nicely paralleled by the falling dependency rate of the young and the elderly" (1982, p.264).¹⁶ One summary indicator of the age distribution is the proportion of the population between ages 45 and 64. In the context of the life-cycle hypothesis this age group is believed to have the highest savings ratio. The proportion of the Australian population between 45 and 64 rises from less than 10 per cent to a peak of almost 22 per cent in 1947 after which it stabilises. The proportions of the Canadian and American populations in the same age group also rise over the same period and by about the same magnitude, although with less short-run variability in the late nineteenth century than in Australia.¹⁷

To assess the significance of both life-cycle and consumption-smoothing motives in accounting for the historical trends in saving, a simple model of saving behaviour is tested against Australian data for the period 1862 to 1989 and Canadian data for 1871 to 1985.¹⁸ The results are reported in Table 2, Regressions 1 and 2. The dependent variable is the ratio of gross aggregate saving to gross domestic product (gross national product in the case of Canada), both measured in current prices. The first two explanatory variables are the annual change in real income, denoted RY_{Growth} , and the proportion

Table 2
Savings Regressions : Full Period
Australia (1862-1989) and Canada (1871-1985)

	Aust 1	Can 2	Aust 3	Can 2
Constant	-0.0473 (-3.14)	-0.0407 (-2.81)	-0.0035 (-0.28)	-0.0152 (-0.67)
RYGrowth	0.1273 (2.22)	0.0205 (0.54)	0.1763 (3.98)	0.0145 (0.38)
Age	0.0079 (6.02)	0.0063 (4.47)	0.0060 (5.91)	0.0044 (2.34)
Dum WW1	-0.0382 (-2.68)	-0.0026 (-0.30)	-0.0312 (-2.85)	-0.0072 (-0.80)
Dum WW2	-0.0813 (-4.83)	-0.0269 (-2.67)	-0.0903 (-6.98)	-0.0268 (-2.67)
Dum Depr	-0.0592 (-3.26)	-0.0366 (-3.19)	-0.0506 (-3.62)	-0.0351 (-3.06)
SFor Ratio			-0.5486 (-9.28)	-0.0938 (-1.45)
Lag Dep Var	0.5098 (7.73)	0.6466 (9.74)	0.4909 (9.70)	0.6910 (9.48)
Adj R ²	78.9	85.4	87.6	85.6
Durbin's h	-2.04	-2.75	0.14	-2.84

Note : Numbers in parentheses represent t-statistics

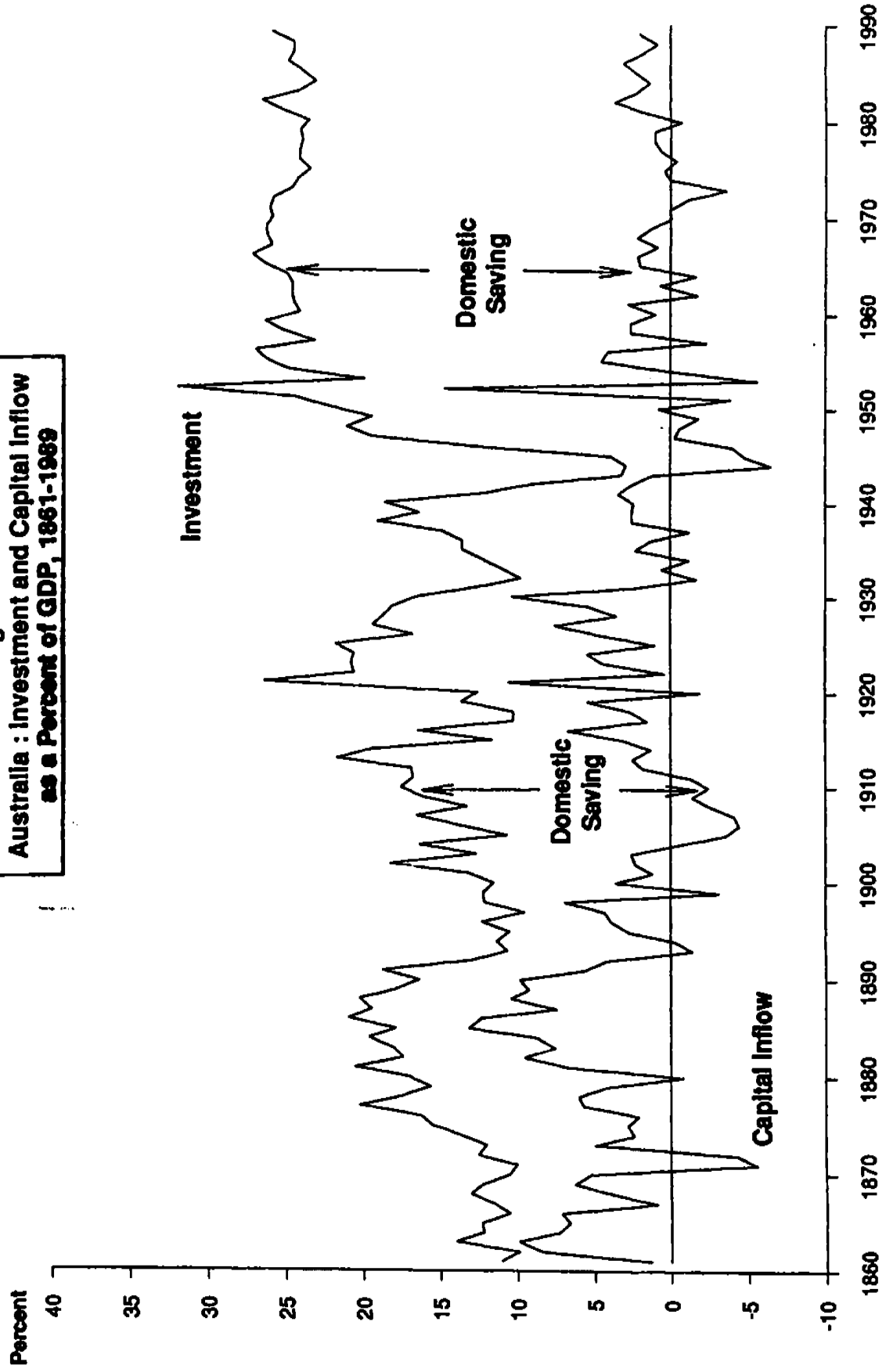
of the total population aged 45 to 64, denoted Age. A positive sign is predicted on the coefficients on RYGrowth and Age. From the initial tests of the model it became clear that there were three periods in which actual and predicted values of the saving rate most clearly diverged: the two world wars and the depression of the early 1930s. As these may be regarded as exogenous shocks to 'normal' saving behaviour, dummy variables were included for each of these episodes. In the case of Australia, the coefficients on all three dummy variables are negative (saving temporarily falls below the predicted level); and the inclusion of the dummy variable is in each case warranted (the coefficient is significant). The same results apply for Canada with respect to the depression and the second world war, but not the first world war, where the coefficient on Dum WW1 is not significantly different from zero.

The coefficients on the income and age variables have the predicted (positive) signs, and are always significantly different from zero except in the case of RYGrowth for Canada. The influence of changes in income and the age structure are both important in determining the level of gross aggregate saving in Australia, while in Canada the changes in age structure have been more influential. One way in which this model could be improved is to test the assumption that the determinants of saving behaviour did not change over the very long run and hence are appropriately captured by a single model applied to the entire period. We return to this in Section IV, but first focus on the possibility that in these two settler economies there also existed a systematic relationship between domestic saving behaviour and capital inflow.

III. FOREIGN SAVING

Australia has typically depended on the savings of foreigners to finance part of its domestic capital formation - an unsurprising feature of a small economy in which rapid rates of population growth resulted in high levels of investment demand. This reliance was especially marked before 1890 and in the 1920s. In Figure 2 annual estimates of

Figure 2
Australia : Investment and Capital Inflow
as a Percent of GDP, 1861-1989



gross domestic capital formation and of net foreign capital inflow (foreign saving) are both shown as a proportion of GDP. The difference between the two series is (implied) gross domestic saving - also expressed as a percent of GDP. Whereas the historical patterns of investment and capital inflow have been examined by others, of particular interest here is the relationship between these two and domestic savings.¹⁹

The most striking feature of this Figure is that the secular rise in the investment ratio (I/GDP) has been less pronounced than the rise in the savings rate. Before the second world war investment represented 15 to 20 per cent of GDP, with the exception of the 1860s, 1890s and early 1930s. Since 1950 it has hovered around 25 per cent of GDP. Thus the investment share shows a single major break in trend after the second world war, whereas we previously noted two breaks in trend in the aggregate savings rate - at the turn of the century and around 1950. The Canadian experience is similar in that the average investment rate rose above 20 percent following the second world war (Figure 3). However, the timing of the pre-1914 investment boom in Canada follows that in Australia, has a much higher peak rate of investment never again reached, and is coincident with a rise in the domestic saving ratio.

The more pronounced rise in the saving than in the investment rate over the very long run is (definitionally) due to 'foreign saving' playing a smaller role in the Australian and Canadian economies in recent decades than before 1914. This can be seen from Figure 4 which indicates that there were wide and sustained gaps between saving and investment prior to the first world war. It is for this reason that estimates of Australian investment since 1861 are unsuitable proxy indicators of trends in domestic saving, and thus why explanations of the variation in investment activity in Australia (for example, the analysis of Butlin 1964) cannot also serve as a reliable guide to the influences determining trends in domestic saving.

Figure 3
Canada : Investment and Capital Inflow as a
Percent of GNP, 1870-1985

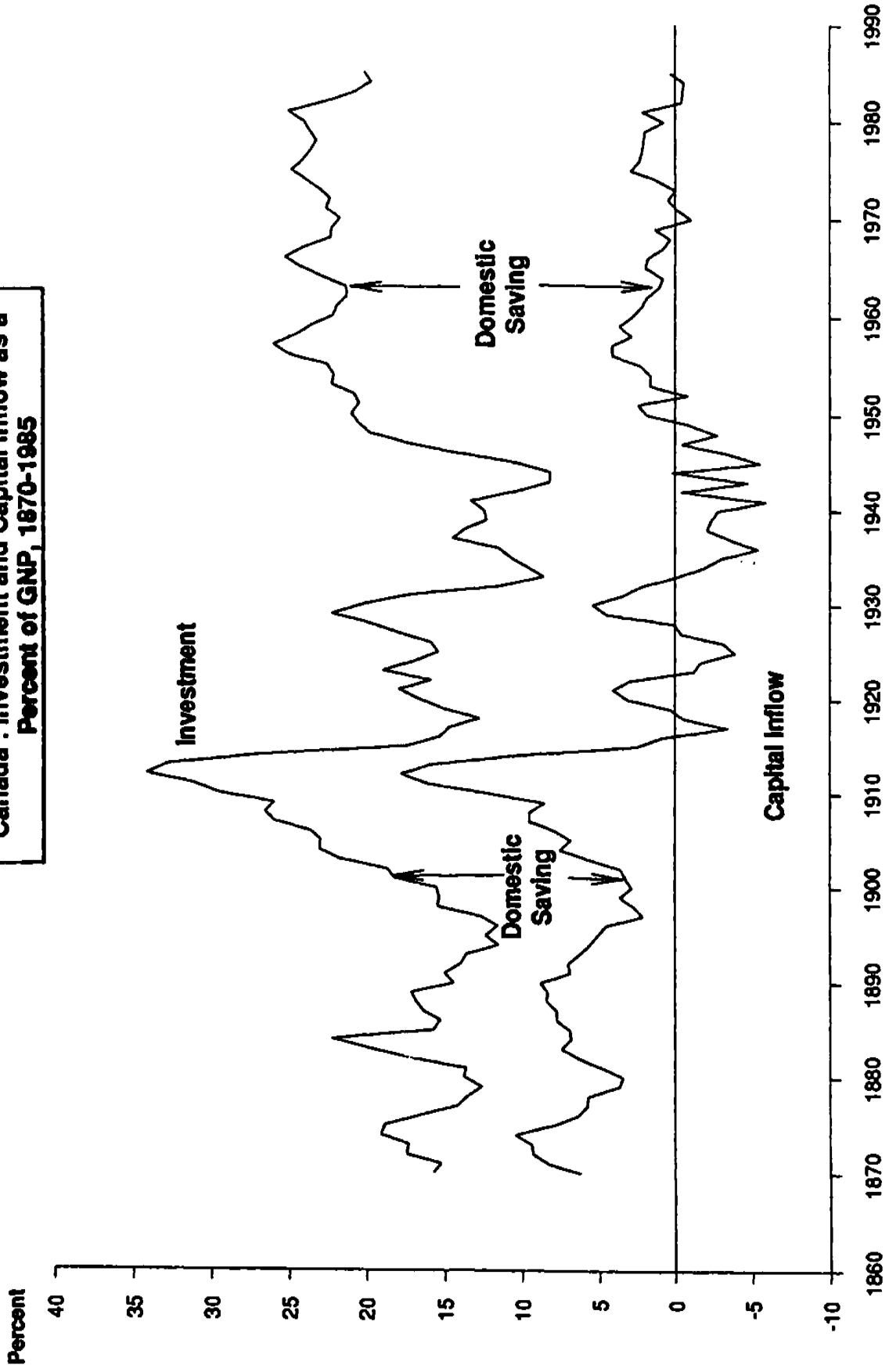
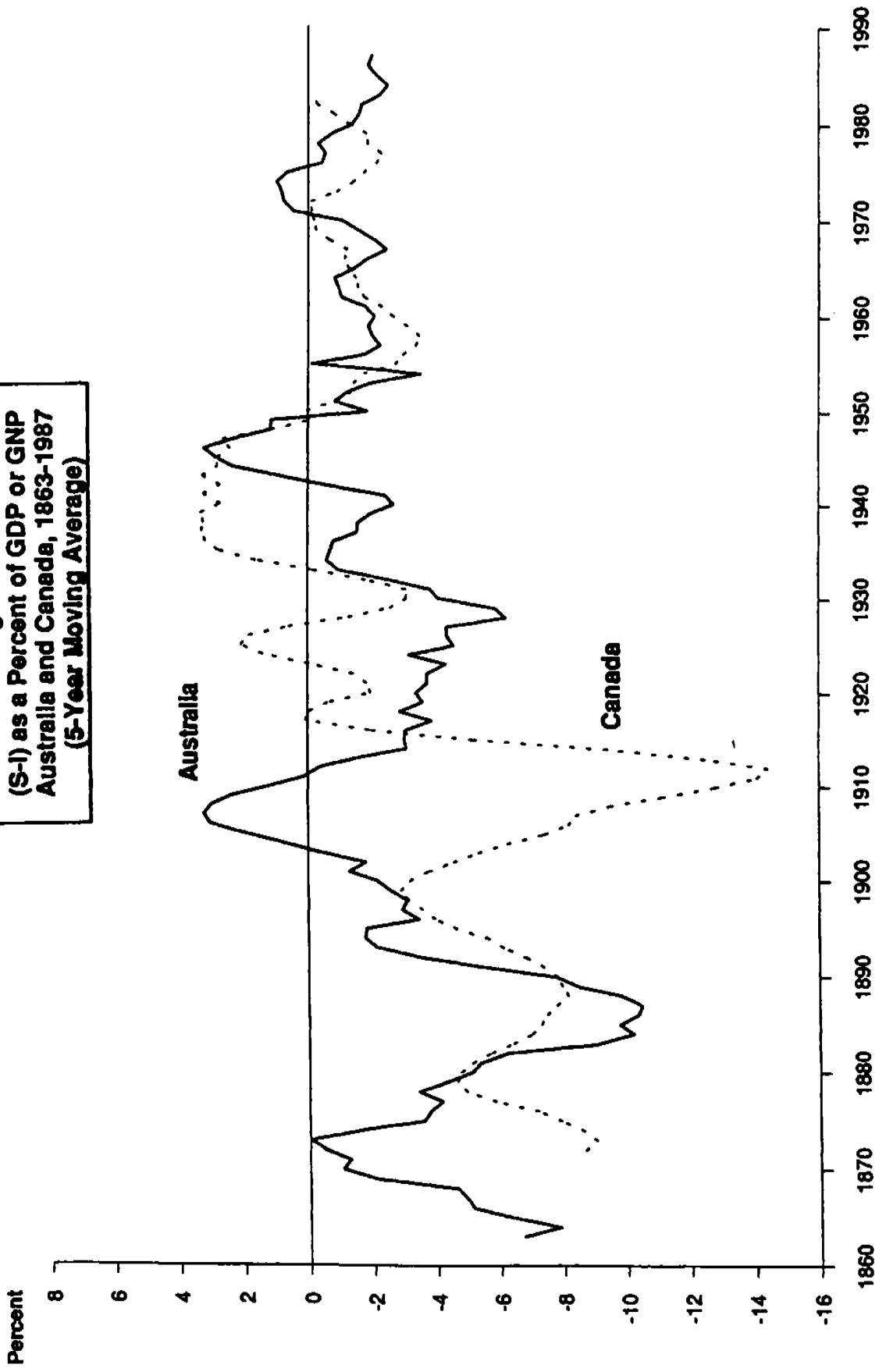


Figure 4
(S-I) as a Percent of GDP or GNP
Australia and Canada, 1863-1987
(5-Year Moving Average)



For Australia it appears that the domestic and foreign saving ratios tended to move inversely, especially prior to 1914. In the decades of the 1860s and 1880s the ratios of foreign saving to GDP were higher than in any subsequent period, while the ratios of domestic saving to GDP were at historically very low levels. Conversely, in the 1870s when foreign saving declined by more than a half compared to the 1860s, the domestic savings ratio more than doubled. The result was that domestic saving financed only half the domestic investment made during the 1860s and again in the 1880s, but accounted for 90 per cent of investment during the 1870s.

In the decade of economic prosperity that preceded the first world war, foreign savings played no (direct) role. Other periods of economic expansion in Australia have seen growth assisted by net capital inflow, augmenting domestic savings. In the period immediately prior to 1914, however, domestic savings rose to levels not previously recorded, sufficient to fund not only a revival of domestic investment activity following the years of depression and drought, but also to reduce net foreign indebtedness - a sizable surplus on the current account was sustained for the best part of a decade.

The relationship between domestic and foreign savings in a world where capital is internationally mobile has been the subject of recent controversy. Feldstein and Horioka (1980) observed a close and positive relationship between domestic savings and investment ratios across countries in the period 1960-1974, when they had anticipated that intercountry variations in savings rates would have led to international capital flows seeking out differences in rates of return. Their findings spawned a number of possible explanations which are surveyed in Dooley, Frankel and Mathieson (1987). But these are of limited relevance here as marked divergencies between domestic savings and investment are evident in both the Australian and Canadian historical record, as seen in Figure 4. Especially for the period before the first world war, this is but a part of the process whereby a substantial portion of British savings were invested abroad, with Australia and Canada major beneficiaries (Edelstein 1982; Zevin 1989). More persuasive

is the view that both the level of domestic saving and of investment are determined endogenously, so that the explanation of saving behaviour requires a detailed articulation of macroeconomic relationships. Since historical data are limited, what follows is an examination of only part of a complex relationship between domestic and foreign saving and investment.

As noted, the evidence for Australia (especially before the first world war) indicates an inversivity between the shares in GDP of domestic and foreign savings. Does this reflect the fact that at least in some periods foreign savings substituted for domestic saving?²⁰ To address this possibility, the savings model employed in Section II was extended to include the ratio of foreign saving to GDP as an additional explanatory variable. For Australia (Table 2, Regression 3), the hypothesis is supported as the coefficient on foreign saving has the predicted (negative) sign and is highly significant. Further, in a comparison with earlier results (Regression 1) the model appears stable following the inclusion of foreign saving, and there is a rise in the adjusted R-squared.

The Canadian evidence (Table 2, Regression 4) is less clear. Although the sign of the coefficient on foreign saving has the predicted negative sign, the relationship is not significant at conventional levels. And whereas the saving rate is positively related to both changes in income and the age distribution, only the coefficient on the Age variable is significantly different from zero. This suggests the need for further analysis of the Canadian case. For example, the surge in saving rates at the turn of the century occurred under economic conditions somewhat different from those in Australia. Whereas Australia was coming out of recession and repaying overseas debt (negative foreign saving), the Canadians were enjoying an economic boom associated with the settlement of the prairie provinces, rapid growth in wheat exports, and a level of capital inflow which was a larger proportion of GNP than it had been during the three decades prior to 1900 (Cairncross 1968; Urquhart 1986). There is thus a contrasting relationship between domestic and foreign saving in the two countries at this time.

Table 3**Australian Savings Regressions : Sub Periods**

	1915-1989		1862-1914		1876-1914		
	1	2	3	4	5	6	7
Constant	-0.1477 (-1.90)	0.0453 (0.72)	-0.1082 (-3.56)	-0.1244 (-3.60)	-0.1077 (-2.01)	-0.1314 (-2.45)	-0.1233 (-2.36)
RY Growth	0.0973 (1.19)	0.2062 (3.31)	0.1168 (2.33)	0.1400 (2.60)	0.1407 (2.29)	0.1606 (2.51)	0.1303 (2.19)
Age	0.0122 (2.93)	0.0019 (0.57)	0.0192 (8.11)	0.0201 (7.76)	0.0190 (4.66)	0.0204 (5.11)	0.0202 (5.07)
Dum WW1	-0.0134 (-0.70)	-0.0231 (-1.63)					
Dum WW2	-0.0741 (-4.35)	-0.0708 (-5.61)					
Dum Depr	-0.0459 (-2.55)	-0.0343 (-2.56)					
SFor Ratio		-0.6630 (-7.55)	-0.5807 (-8.55)	-0.5809 (-8.57)	-0.5221 (-6.16)	-0.5336 (-6.55)	-0.5133 (-6.11)
Lag Dep Var	0.5870 (7.82)	0.6394 (11.41)					
RInt Rate-1				0.1132 (1.43)		0.0950 (0.95)	
RShareP-1							-0.0457 (-0.81)
Adj R ²	80.3	89.2	80.4	79.2	73.4	76.1	75.9
DW or h	-2.17	0.50	1.72	1.79	1.72	1.88	1.83

Note : Numbers in parentheses represent t-statistics

IV. AUSTRALIAN SAVING BEFORE 1914

Rather than exploring additional determinants of saving behaviour over the period as a whole, a narrower temporal focus is now adopted and attention confined to the Australian story. This choice was based on evidence that for Australia saving behaviour is more appropriately modelled in shorter periods than reported in Table 2. The data for both Australia and Canada were divided at 1914 and the two variants of the model reported in Table 2 were re-estimated on each sub-period.²¹ For Canada, the Chow test indicated that the hypothesis of a structural break at 1914 could be rejected. This result applied whether or not foreign savings and/or the lagged dependent variable were included in the model. For Australia, however, the hypothesis that the regression coefficients were the same when estimated on data before and after 1914 was rejected. Whereas there exist a number of studies of saving covering the period since the second world war,²² the period before 1914 has received less attention yet reveals more dramatic swings in domestic saving and in the importance of foreign saving. The earlier period was thus chosen for further analysis.

For completeness it is appropriate to report the result of re-estimating the model of saving employed in Table 2 on the two periods 1862 to 1914 and 1915 to 1989. From Table 3, Regressions 1 and 2, it is evident that in the post-1914 period changes in real income and in foreign saving were both significantly related to domestic saving, as reported for the full period. However the coefficient on the Age variable is not significantly different from zero. For the earlier period (Regression 3) all three explanatory variables - real income growth, the age ratio, and the foreign saving ratio - have the predicted sign and are significant at conventional levels. There is no evidence that serial correlation is a problem, so the lagged dependent variable has not been included. The closer relationship between saving and the age structure of the population in the nineteenth rather than the twentieth century is unsurprising given the larger demographic shocks in the former. Overall, Australian saving behaviour before the first

world war is reasonably well explained by this variant of the model - approximately four-fifths of the variation in the aggregate saving rate being accounted for by the three explanatory variables.

One possible additional influence on the saving rate which has been omitted is that of interest rate changes. A rise in the interest rate, *ceteris paribus*, would decrease the attractiveness of present consumption relative to saving. This has been allowed for by the inclusion of a real interest rate variable: on condition the substitution effect outweighs the income effect, a positive relationship was anticipated between the saving rate and the real interest rate.²³ As shown in Table 3 (Regression 5) the coefficient on the interest rate has the correct (positive) sign but is not statistically significant at conventional levels. Varying the lag did not improve the fit. The explanation for this weak relationship may be that although movements in real interest rates played some role in accounting for variations in either private or household saving at the time, this is attenuated where the dependent variable is the ratio of aggregate savings to GDP.

A second omitted influence on pre-1914 Australian saving behaviour may be fluctuations in private wealth not captured by movements in real income. In an analysis of the colony of Victoria during the boom of the 1870s and 1880s and subsequent recession, Bentick (1969) suggested that the role of inflation and changing levels of household wealth may have been important in determining personal saving. His view is that the asset price inflation during the boom resulted in marked capital gains in housing and other forms of property, increasing private wealth and resulting in turn in a fall in the rate of personal saving. Correspondingly, the decline in asset values which accompanied the recession of the 1890s represented capital losses. Actual wealth by households would then be less than desired wealth, and a (subsequent) rise in personal savings would be predicted. Some assessment of these influences on saving in Australia as a whole in this period thus seems warranted, especially in view of the importance of boom and bust cycles generally in settler economies.

In an effort to capture the influence of the asset price boom of the 1870s and 1880s and the subsequent collapse, a measure was sought of the (relative) prices of those assets which attracted most speculative attention at the time. These included especially urban property and the stock market. Suitable Australia-wide data on median residential or commercial property values across these decades do not exist. However, the property and stock markets were closely linked, not just in that they rode the boom together, but through the listings of property and financial institutions. Between 1879 and its peak in 1889 share prices rose by 150 percent, then declined by 31 percent by 1894.²⁴ A rise in the real value of stocks represents an increase in wealth, leading to a subsequent decline in the desired level of saving out of current income. An inverse relation was thus predicted between the saving rate and this instrument for capital gains and losses.

As the index of share prices is available only from the mid-1870s, it was possible to estimate the model only over the years 1876 to 1914. To permit comparison with the existing variants of the model, we re-estimate the earlier models for this shorter period (Table 3, Regressions 5 and 6). The models appear stable, with no changes to either the signs or levels of significance of the coefficients on real income, age, foreign saving or the real interest rate. The inclusion of the real share price (Regression 7) again does not alter the signs or significance of the other explanatory variables, further confirming the general stability of the model. Although the coefficient on the share price has the predicted (negative) sign, it is not significantly different from zero.²⁵ No independent effect on saving behaviour is discernible.

Perhaps the wealth effect on saving for Australia as a whole during these decades was less pronounced than that observed for Victoria by Bentick. The economic boom of the eighties and collapse which followed in the nineties were each more evident in Victoria (Boehm 1971, Chapter 3)). Further, this colony accounted for only about one third of the population of that of the six Australian colonies at the time. It is also possible that the failure to detect a stronger influence on aggregate saving from the asset price boom and

collapse resides in the choice of instrument, the all-ordinaries index imperfectly reflecting the changing wealth position of Australian households during this turbulent period. Finally, a stronger connection may have been established had estimates of household or private sector saving been available.

Taking a broader view, it is possible that the relative importance of the determinants of saving behaviour may have changed more than once within the pre-1914 period. In the 1870s strong income growth but relatively low levels of foreign capital inflow were associated with domestic saving levels above those of either the 1860s or those that were to be recorded in the 1880s and 1890s. The 1880s witnessed both a sharp rise in foreign investment in Australia, and an asset price boom (during a period of decline in the general level of traded goods prices), both of which operated to depress the level of saving. Unsurprisingly, the level of saving fell compared to that of the 1870s.

In the 1890s the boom ended. The ensuing recession not only lowered income but also brought a cessation of capital inflow and an end to the asset speculation with substantial capital losses, especially in Victoria. On the one hand lower incomes encouraged a fall in domestic saving, while on the other the reduction in wealth from the collapse in the financial and property markets and the drying up of the inflow of foreign capital encouraged a rise in domestic saving. These two effects approximately offset each other across the period 1891-1903 with the saving to GDP ratio rising by a little over 1 percentage point between 1882-1890 and 1891-1903.

The recovery in the economy in the closing years of the 1890s was interrupted by a major drought, adversely effecting activity levels in a small trading economy highly dependent on farm exports. Sustained growth and prosperity may be dated from 1904. Thereafter, all the influences discussed here worked to raise the saving rate: higher income, the absence of significant capital inflow (Canada being now the more attractive overseas outlet for British savings), and the opportunity to recover desired levels of

wealth which had been eroded in the collapse of asset values and of financial institutions during the 1890s. It is perhaps unsurprising, therefore, that the rise in the aggregate saving rate at this time does more than restore levels to those observed in the 1870s. A conjunction of events whose origins may be traced over the previous quarter century thus account for the unprecedented and sudden rise in the aggregate saving rate in Australia after the turn of the century.

V. CONCLUSION

The gross aggregate savings rate in Australia has risen since the 1860s from less than 10 per cent to more than 20 per cent of GDP. Ignoring the years of war and depression, and abstracting from short-run variations, there were two short periods during which the underlying savings rate rose markedly - around the turn of the century and immediately following the second world war. This very-long run pattern of saving behaviour is surprisingly close (in both level and timing) to that observed for Canada since 1870. However, it contrasts with the relative stability of the United States saving rate across 'normal' periods since the late nineteenth century. A transition to higher levels of saving occurred earlier in the United States, and less abruptly.

Canada and Australia share characteristics of settler economies that are pertinent to saving behaviour. These include an unusual age ratio in the population compared to more established societies, and major economic (and demographic) shocks associated with resource booms and surges in immigration. In addition, Canada and Australia relied on foreign capital to augment domestic saving to a greater degree than is true of the United States.²⁶ Using regression analysis, variations in the savings rates of both Canada and Australia across the entire period are positively and significantly related to the age structure of their populations. The consumption-smoothing motive for saving receives stronger support from Australian than Canadian evidence. The influence of 'foreign saving' on domestic saving was also examined, the results clearly indicating a

negative relationship between the two in the case of Australia, but a less consistent relationship for Canada.

Closer examination of the Australian experience before 1914 confirmed the results obtained over the full period, but yielded only weak evidence in support of an independent role for real interest rates or for changes in wealth holding as additional influences on aggregate saving. The marked rise in the long-run saving rate which occurred in Australia at the turn of the century most likely results from the conjunction of several forces: a recovery in incomes following the recession of the 1890s; a cessation of foreign capital inflow; a rise in the proportion of the population in the 45-64 age group; and a reaction to the capital losses associated with earlier collapses in the property and financial sectors. The concurrent rise in the Canadian saving rate may have resulted in part from like causes - a rise (comparable to that in Australia) in the proportion of the population in the high-saving age group, and a surge in incomes. But capital inflow grew strongly, and there had been no prior financial collapse as in Australia.²⁷ Further analysis of this episode is clearly required to better account for the similar pattern of saving we have observed in these two economies.

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Footnotes

1 Kuznets (1966), Table 5.3. His analysis of saving was based on investment ratios and the assumption that, for most countries, there was little divergence between domestic saving and investment: see pp.243 and Table 5.4. line 1. The principal exceptions were Britain, where gross national savings tended to be greater than gross domestic capital formation; and Australia and Canada where savings were less than investment (Table 5.5).

2 The estimates for the nineteenth century are reported by Davis and Gallman (1973, 1978) and Gallman (1966), with the magnitude and timing of the rise before 1890 dependent on the definition of saving adopted. For the period since the 1890s, see the estimates of Edelstein (1989).

3 Carroll and Summers (1987) also use a comparative approach in their analysis of Canadian and United States savings rates between 1961 and 1985.

4 The principal inquiry into the nexus between capital formation and growth in the Australian economy in the nineteenth century is Butlin (1964). For the twentieth century, see Sinclair (1970).

5 The discussion in this and the next Section draws on material in McLean (1991).

6 A detailed description and evaluation of the data is provided in McLean (1991). Note that the implied savings obtained by this residual estimation procedure contains all errors in the underlying estimates of investment and current account items.

7 The Australian and Canadian savings rates reported in Chart 1 are five-year centered moving averages; the American saving rates are averages for varying periods - the form in which they are reported in Davis and Gallman (1978) and Edelstein (1989).

8 The saving rate in the 1860s appears remarkably low; lacking evidence for the 1850s it is unclear whether or not this is a transitory episode associated with the end of the gold rush.

9 Again, this figure is not very sensitive to variation in the end year; even extending the period through the depression to 1940 leaves the average saving rate at 15.0 per cent over a 32 year interval. Shortening the period to the mid-twenties, or to end in 1914, slightly increases average savings during this second period.

10 The postwar savings ratio has not only been higher on average than at any previous time, but has shown less short-run volatility. However, it is possible that differences in the methods of estimating the national accounts impart lower variability to the savings ratio after the war, as suggested by studies of United States macroeconomic time series (Romer 1986).

11 The relative stability of the private saving rate in the twentieth century has been investigated by David and Scadding (1974).

12 The most cited published series are the estimates of Davis and Gallman (1973, 1978) and Gallman (1966). Analysis of the transition to a higher saving rate in the U.S. in the nineteenth century is undertaken by (among others) Williamson (1974) and David (1977).

13 For Canada, historical national accounts estimates begin with 1870, and a major new set of estimates has been published by Urquhart (1986). He has derived aggregate savings for Canada by the same method employed here: he calls his estimates, appropriately, "implied" savings. His data end in 1926 when the official series begin, and in a more recent exercise (Urquhart 1988) he has linked the two, providing a continuous set of aggregate annual savings estimates for 1870 to 1985.

14 These views are surveyed in James and Skinner (1987), pp.255-258.

15 A seminal study is Leff (1969). For a survey of writings on this topic, see Gersovitz (1988).

16 Some of the economic consequences of the same demographic shock, including the impact of immigration on saving behaviour, were also explored by Kelley (1965, 1968). However, he did not estimate actual saving rates for the period. Rather, he simulated

the impact of immigration on a model of the age structure of the population, using age-specific savings ratios obtained from the twentieth century (Kelley 1968, pp.256-260).

17 The ratio of the total population aged 45 to 64, in Australia, Canada and the United States at census dates is reported in McLean (1991, Table 3).

18 Sources of Canadian data were Urquhart (1988) for gross national product at market prices, the GNP implicit price index (Table 2), and the implied savings ratio (Table 4). The proportion of the population in the 45-64 age group at census dates was calculated from information in Leacy (1983), Series A78-93 for 1871 to 1976, and in *Canada Year Book 1988* (Ottawa: Statistics Canada 1987), Table 2.11 for 1981 and 1986. The Australian data are from McLean (1991). For both countries, intercensal estimates of the share of the 45-64 age group in the total population were obtained by linear interpolation.

19 The major historical studies of domestic investment and capital inflow in Australia include Wilson (1931), Hall (1963b), Butlin (1964), Sinclair (1970) and Edelstein (1982, Chapter 11).

20 In a summary of his research on the economy of Victoria during the 1870s and 1880s, Bentick (1971, p.90) notes that "foreign saving in effect became a substitute for domestic saving". See also Edelstein (1982) Chapter 11.

21 In order formally to test for structural breaks, the model had to be identical in both sub-periods; hence the war and depression years were dropped from the post-1914 data.

22 See, for example, the Economic Planning Advisory Council's *Trends in Private Saving* (Canberra: Australian Government Publishing Service, 1988).

23 The interest rate was proxied by the savings bank deposit rate deflated by the implicit GDP deflator, and lagged one period. The sources of data were as follows: for the interest rate, Vamplew (1987), Series PF-1; for the implicit GDP deflator, McLean and Pincus (1982), Appendix Table, Column 2.

24 The reference is to the all-ordinaries index as reported in Vamplew (1987), Series PF-8.

25 The same result was obtained without the lag. It should also be noted that there is no evidence of multicollinearity between any of the independent variables.

26 During the nineteenth century, of course, the western United States experienced a similar process of development. However, American saving behaviour as revealed in national series would possibly obscure a temporal pattern of saving in the western regions similar to that observed in Australia and Canada. At least for California, Kerry Odell (1989, p.300) reports contrary evidence, namely that between 1880 and 1920 the saving rate was above the national average, and that the state was a capital exporter.

27 With respect to the higher Canadian domestic savings from the turn of the century, Urquhart (1986, p.42) notes: "Our data are not adequate to explain why savings rates increased, but whatever the cause it must be associated with developments after 1900".