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ABSTRACT

Why did international capital flows rise to such heights in the late 19th century, the years between 1907 and 1913 in particular? Britain placed half of her annual savings abroad during those seven years, and 76 percent of it went to the New World countries of Canada, Australia, the USA, Argentina and the rest of Latin America. The resource abundant New World was endowed with dual scarcity, labor and capital. The labor supply response to labor scarcity took the form of both immigration and high fertility. This served to create much higher child dependency burdens in the New World than in the Old. Econometric analysis shows that these dependency burdens served to choke off domestic savings in the New World, thus creating an external demand for savings. The influence was very large. Indeed, it appears that the vast majority of those international capital flows from Old World to New can be explained by those dependency rate gaps. As a consequence, it is appropriate to view those large international capital flows as an intergenerational transfer.

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I. The Problem

After 1492, the central problem for Old World Europe was to exploit the cheap natural resources in the New World. Since the resources were immobile, the exploitation could only take the form of imports of resource-intensive commodities. That trade, in turn, was only economically feasible with the introduction of the investment and technologies which lowered freight rates on such low value, high bulk products. By the late 19th century, freight rates had fallen far enough to have created a partial convergence of resource-intensive commodity prices between the two sides of the Atlantic. The problem for the New World was to augment its capacity to supply more resource-intensive exports so as to exploit the gains from trade. The economies of the New World were characterized by dual scarcity—dear labor, dear capital, and cheap resources. The problem was to augment the supplies of labor and capital which combined with the abundant resources. The Old World helped the process along with emigration and capital export, and this process reached a crescendo between 1870 and 1913 (Green and Urquhart 1976; Schedvin 1990).

Capital chased after the European migrants, but we've never been clear just why, and whether the correlation was spurious (Nurkse 1954). In the simple two-factor trade models, capital will not chase after labor. If labor was abundant in the Old World, capital must have been scarce. Thus, emigration from the Old World would have gone hand in hand with capital imports, not capital exports. The ahistorical prediction of the simple model is repaired when we add the key third factor, natural resources. The resulting dual scarcity in the New World now makes it possible for Old World capital to chase after the emigrants.

But how, exactly, did it work? And why did those capital and labor flows reach such heights at the turn of the century, the years between 1907 and 1913 in particular? According to Paish (1914; cited in Kennedy 1987, p. 184), Britain placed £1,127 abroad during those seven years, 61 percent of it, or £689, in the New World regions of Canada, Australasia,

Argentina, and the USA (Table 1 and Appendix Figure 1). Adding the rest of Latin America pushes those numbers up still further to £857, or 76 percent.

For some time now, economic historians have debated two questions: first, whether the "world" capital market was well integrated; and second, how much of the massive capital flows to the New World were pulled by an economic boom in the New World, and how much by an economic bust in Britain. This paper does not deal with the first question, although we note that the evidence certainly seems to confirm the well-integrated view. Indeed, the evidence suggests that world capital markets were at least as well integrated in the 1890s as they were in the 1980s and probably better (Zevin forthcoming), and that they were probably well integrated as early as the 18th century (Neal 1985). This paper assumes as much and focuses on the second question.

Having dual scarcity, the New World needed both capital and labor to exploit fully their abundant natural resources. The problem, however, was that any effort to increase New World labor supplies served to augment still further their capital requirements. And they certainly did increase their labor supplies relative to the Old World. Figure 1 reports the simple correlation between population growth rates (the change in log N(t) on the vertical axis) and the initial real wages in 1870 (log real wage on the horizontal axis) for the period 1870-1913. Four New World countries are clustered to the right (Argentina, Australia, Canada, and the USA), the poorest Old World countries are clustered to the left (Italy, Sweden, Spain, Norway, the Netherlands, and Denmark), while the remaining richer Old World countries are clustered in the middle (France, Ireland, Belgium, Germany and the UK). Labor scarcity produced the predictable labor supply response among these fifteen countries, and the correlation is strong (slope coefficient 0.0112, t-statistic 2.754).

Fast population and labor force growth in the New World implied high investment rates to equip the new workers. This view has become conventional wisdom, so much so that we now have come to talk about the importance of booms in population-sensitive investment demand in pulling capital from the Old World to the New (e.g., Green and Urquhart 1976;

Edelstein 1982, pp. 198-208). Not only were investment booms in the New World driven in large part by population and labor force growth, but they tended to be centered on social overhead activities which, being very capital intensive, tended to augment investment requirements even further (Lewis 1977; Williamson 1979). Thus, labor force growth in the New World, responding to labor scarcity, raised capital scarcity, augmented investment requirements, and pulled in even more capital from the Old World. All of this is well-known, although what role labor force growth and associated investment booms played in accounting for the massive capital flows to the New World remains an open question.

Rapid population and labor force growth in the New World was achieved, of course, in two ways. First, the immigrants augmented labor supplies in the New World (while depleting them in the Old). In the USA, for example, immigrants accounted for 40.5 percent of the population increase between 1870 and 1913 (US Bureau of the Census 1975, pp. 8 and 104-5). Second, New World residents augmented the labor supply by high fertility and low infant mortality rates. Non-immigrants, after all, accounted for 59.5 percent of the US population increase between 1870 and 1913.

Such demographic forces had implications for labor participation and dependency rates (the share of the population dependent on adult workers), and it is the latter which is the focus of this paper. According to the life-cycle model, economies full of very young households burdened with high dependency rates should save smaller shares of their income. The next section will elaborate on the argument and survey the relevant literature; we are certainly not the first to suggest that high dependency rates were likely to have choked off domestic savings rates in the New World full of younger generations, increasing their dependence on the Old World (full of older generations) to satisfy their investment requirements (e.g., Green and Urquhart 1976, p. 219). But no one to our knowledge has taken a close look at the size of the dependency-rate gaps between Old World and New, and tried to assess the role that those gaps might have made in contributing to the massive capital transfer just prior to World War I.[1]

The paper poses the following counterfactual: what would New World domestic savings rates have been like prior to World War I had they been favored by the lower dependency rates then prevailing in Britain, the key capital exporter in the Old World? The answer is found in four steps. First, we estimate econometrically the impact of dependency rates on domestic savings rates in the New World. Second, using those econometric results, we explore the impact on New World domestic savings rates had lower counterfactual dependency burdens prevailed there. Finally, the higher counterfactual domestic savings rates are converted into additional New World domestic savings, and we then ask by how much foreign capital requirements in the New World would have declined, and, thus, how much of Britain's capital exports can be explained by demographic forces.

The bottom line is this. It appears that dependency-rate gaps can account for a large share (roughly three-quarters) of late 19th century capital flows to the New World and, as a consequence, it is appropriate to view them as an intergenerational transfer.

II. Dependency-rate Gaps and the Life Cycle Model

First, we must establish whether there were dependency-rate gaps between the Old World and the New, and whether they were big enough to have mattered. For this discussion we take the Old World to be the United Kingdom, which, after all, was the main source of capital exports. The New World includes Argentina, Australia, Canada, and the USA, a group which accounted for the vast majority of the New World capital imports from the UK, and which includes those countries whose data base makes it possible to implement a quantitative assessment. Appendix Table 1 reports age distribution information in detail, but the summary in Figures 2 and 3 should suffice to motivate the discussion. Figure 2 plots the dependency rate (D15 = share of the population less than age 15) from the mid 19th century to the present. With the exception of Australia's unusual migrant-dominated gold rush experience (Kelley 1968), all of the New World countries start with enormous dependency

rates: the USA in 1850, 0.415; Canada in 1851, 0.560; and Argentina in 1869, 0.452 (Appendix Table 1). These dependency rates are very high even by the standards of the Third World in 1989 (low-income economies, 0.355; middle-income economies, 0.362; both from World Bank 1991, p. 254), where fertility and population growth have been so high, and where the dependency rate debate, as we shall see, had its origin. They did not stay that high, declining steadily to 1900 as these New World countries matured. Yet even in the 1890s, the dependency rates were still high by the standards of the contemporary Third World, and they were equally high in New Zealand (0.397) and in Latin America generally (0.414). The important point, however, is the size of the dependency-rate gap between the New World and the UK. Between 1900 and 1913, they were still positive, even for Australia. Around 1900, the gap was 7.7 percentage points for Argentina, 2.7 for Australia, 2 for Canada, and 1.8 for the USA.[2] The issue now is whether these dependency-rate gaps were big enough to matter, and the answer hinges on their estimated impact on New World savings.

High dependency rates imply low savings rates. This follows directly from the dependency hypotheses. This hypothesis—associated with Ansley Coale, Edgar Hoover, and Paul Demeny (see the summary in Bilsborrow 1980)—asserts that high dependency rates increase consumption requirements at the expense of saving, and it was a centerpiece in the economic-demographic literature for about two decades following the appearance of Coale and Hoover's highly influential *Population Growth and Economic Development in Low-Income Countries* (1958). The dependency hypothesis reached its apex in 1969 with Nathaniel Leff's paper which offered very strong empirical support based on a cross section of 74 countries. Across the 1970s, however, better data and more careful analysis yielded more ambiguous results, and it looked like the dependency hypothesis was about to be shelved as another plausible theory with no strong evidence to support it. In the 1980s, new life was breathed into the hypothesis by Andrew Mason (1981, 1987, 1988), Maxwell Fry (1984) and the two in collaboration (1982). The new version recognized the importance of the growth environment in the form of what they called the variable rate-of-growth effect. Mason has

shown that it should apply with special strength in fast-growing environments—like the New World between 1870 and 1913, and Paul Schultz (1987) has shown how powerfully it can work through the educational delivery system.

The basic idea behind both the old and the new version is the life-cycle model popularized by Franco Modigliani (1965, 1966; Ando and Modigliani 1957; Modigliani and Brumberg 1954). The brief exposition which follows relies heavily on Mason's (1987, pp. 530-39) extension of the model. Figure 4, plots the familiar household income and consumption patterns across the life-cycle. The household is characterized as accumulating no wealth over its lifetime, with saving in mid-life exactly offsetting dis-saving in early and later life. Even so, economy-wide saving can vary considerably if the economy is growing fast, either due to population growth or per capita income growth, conditions which certainly prevailed in the New World. In early stages of high fertility and rapid population growth, the average household is likely to be very young, and therefore able to obtain only low or even negative saving rates. In middle stages of declining fertility and maturing populations, the average household is likely to be middle-aged, and therefore able to obtain high and positive saving rates. In late stages, older households may dominate and therefore low saving rates may again characterize the economy. If, in addition, per capita income is growing fast, young households command a much greater lifetime income than do older ones, and thus young households' consumption will increase, generating less aggregate saving. When the microeconomics is fully explored, Mason emerges with his variable-rate-of-growth estimation equation, and his results using national panel data from 1965 to 1980 strongly support the model, namely: "a higher dependency ratio leads to lower saving, *particularly among countries with moderate to high rates of income growth* (Mason 1987, pp. 549-50, emphasis added)."

It should be stressed that the dependency rate need not just influence household saving. Its influence can also be felt indirectly through government saving. High dependency rates are likely to increase the load on poor relief and other current public expenditures, thus diminishing the funds available for capital expenditures. It may also raise the tax burden, thus

lowering the disposable incomes of potential savers and contributing to lower household saving.

Some economic historians have already found the dependency rate model useful for exploring various problems in the past. Although Allen Kelley (1968) did not estimate a model, he used one to illustrate how important demographic effects might have been in late 19th century Australian experience. Frank Lewis (1983) applied the life-cycle model to identify successfully the role of the American dependency rate decline between 1830 and 1900. He estimated that it could have accounted for perhaps a quarter of the marked rise in the aggregate domestic savings rate, a rise of which so much has been made by American economic historians (Gallman 1966; David 1977; Williamson 1979; Ransom and Sutch 1983), and a rise which helped wean America away from foreign capital as the late 19th century unfolded. One of the present authors applied the same reasoning to account for the higher savings rates in England's cities (compared with the countryside) during the First Industrial Revolution. Immigration from countryside to city tended to favor greatly those between the ages 15 to 25, and the dependency rate implications of this young adult influx was a lower relief burden in the city. A lower dependency rate also served to raise city savings rates perhaps as much as 3 percentage points above those of the countryside, thus diminishing the rural-urban capital flows necessary to finance the urban-based industrial revolution (Williamson 1990, pp. 34-39).

The most recent application in economic history was offered by Ian McLean (1991) who successfully applied a simple version of the dependency rate hypothesis to Australian and Canadian experience from the 1860s to the present. McLean's research has stimulated our own, but we have extended it in three directions: Argentina has been added to the analysis; McLean's version of the dependency rate hypothesis has been replaced by one which draws on Mason and Leff; and, most importantly, the results are used to explore the underlying sources of those massive capital flows from Old World to New just prior to World War One.

III. Estimating the Impact of Dependency Rates on Domestic Savings

The demographic analysis of savings has been a common, if controversial, element of the empirical development literature since Leff's seminal work in the late sixties. Leff (1969) analyzed savings rates in a large cross-section sample, including both developed and less-developed countries, and found that high dependency rates had a significant negative impact on savings rates. The savings equations estimated by Leff typically took the following form:

$$\ln s_i = \beta_0 + \beta_1 \ln g_i + \beta_2 \ln Y/N_i + \beta_3 D_{1i} + \beta_4 D_{2i} + \varepsilon_i \qquad (1)$$

where g denotes the rate of growth of real per capita income, Y/N the level of real income per capita, D_1 and D_2 the young (ages 0–15) and old (ages 65 and older) dependency rates, and s the aggregate savings rate.

Leff's study generated much criticism based on its sample choice and omitted variables, and subsequent work revealed a great disparity in the magnitude and significance of the effect.[3] As Jeffrey Hammer (1986) points out, many variables in the development process are highly correlated, and, consequently, cross-country studies will generally suffer from collinearity problems and a lack of robustness with respect to alternative specifications. A better approach would be to use individual country time series data which "would control for the country-specific variables which determine savings. However, since age distributions change slowly and population censuses are conducted relatively infrequently, data restrictions for such studies are severe" (Hammer 1986, p. 583).

In more recent efforts to explore the link between savings and dependency rates , panel data has been. Mason (1987) exploited a three-period panel data set for a large group of post-World War Two countries, including the growth-rate interaction term in his savings functions. His typical regression takes the form:

$$\ln c_{it} = \beta_0 + \beta_1 \alpha_{it} g_{it} + \beta_2 \alpha_{it} g_{it} \ln D_{it} + \beta_3 g_{it} + e_{it} \quad (2)$$

where c denotes the aggregate consumption share (net or gross) in income, g the rate of aggregate real income growth, D the young dependency rate (a proxy for the quantity of child-rearing activities), and α a derived measure of the difference between mean ages of child-rearing and other activities. The Mason model bears the stamp of Leff's pioneering approach, yet reflects the subtleties of a full-blown micro-analysis of household saving and child-rearing decisions, as noted above.

Given the eclectic nature of the literature, a hybrid model has been used in this paper to incorporate both direct effects of the dependency rate on savings, in the manner of Leff and his critics, and indirect effects operating via the growth rate, following Mason. Although data limitations preclude a time-series analysis for most of today's less-developed countries, we were not similarly hampered when dealing with the New World economies, whose documented macroeconomic experience stretches back to the turn of the century and beyond. National saving can be calculated from investment and the current-account identity; and savings rates can then be derived using an estimate of national income. Time series for real national income provide estimates of growth rates, and frequent population censuses allow the calculation of dependency rates using interpolation as necessary. In this way a complete time-series database was built up for four New World economies, comprising national aggregate savings rates (s), young dependency rates (D), and growth rates of aggregate real income (g).[4] The following hybrid savings equation was estimated for Argentina, Australia, Canada and the United States with dummy variables included to account for wartime effects:

$$s_t = \beta_0 + \beta_1 g_t + \beta_2 D_t + \beta_3 D_t g_t + \beta_4 (Dummy\ WW1)_t + \beta_5 (Dummy\ WW2)_t + \varepsilon_t \quad (3)$$

This approach was inspired by Ian McLean (1991), who estimated savings functions for Australia and Canada. He used the proportion of the population aged 45 to 64 years as an explanatory variable, and embedded it in a somewhat different interpretation of the life-cycle hypothesis. In an effort to make our results comparable with the development literature, our model differs by using the dependency rate as an explanatory variable and admitting interactions with the growth rate. Furthermore, we prefer to use the autoregressive AR1 specification: although a lagged-dependent-variable (LDV) model could not be rejected using standard tests, it was found that the AR1 specification dealt more convincingly with serial correlation problems, particularly with the Australian data. Nonetheless, the conclusions of this paper apply with equal force if the LDV specification is adopted.[5]

The results are presented in Table 2A for various sample choices, and in the three New World countries where dependency rates mattered: Argentina, Australia and Canada. Columns 1 to 3 contain the basic results on individual-country time-series. In Column 4, panel data results are shown for the three-country sample with corrections for autocorrelation and heteroscedasticity.[6] The results do not offer much support to the growth-rate interaction theories, since neither g nor $D \times g$ enters with a significant coefficient. The key finding is that the direct dependency-rate impact on savings rates is large and highly significant in all three cases, with an estimated coefficient of between -0.61 and -1.53 on the dependency rate, corresponding to the partial derivative $\hat{\beta}_D = \partial s/\partial D$. Using sample averages, we obtain an estimate of the elasticity of the savings rate with respect to the dependency rate, $(D/s)(\partial s/\partial D)$, which ranges between -1.24 and -3.90. The panel data estimates fit somewhere within these bounds, as expected, but in all cases the elasticity estimates are large in the context of recent studies. For example, these figures are much larger on the whole than the estimates from contemporary international cross-section analysis reviewed in Appendix Table 3.

Broadly speaking, the analysis of saving in the three New World economies offer strong support to the original Leff hypothesis that high dependency rates tend to depress aggregate saving. The exception to this rule is case of the United States; Table 2B reports poor results

for this case. Although this is surprising, we should note that just before World War One the United States was the most demographically mature of the four New World countries, and had the smallest dependency-rate gap relative to Britain.

The results in Table 2A suggest that the impact of dependency rates in these three New World countries was highly significant and large in comparison to contemporary estimates: typically, a one percentage-point rise in the dependency rate led approximately to a one percentage-point fall in the aggregate savings rate. Given what we already know about the large dependency-rate gaps between the Old and New World around the turn of the century, the results suggest that dependency rate differentials, reflecting a predominance of young in the New World, may help explain excess investment demand and, thus, capital inflows at the periphery in terms of domestic savings shortfall. In the following counterfactual exercises, we demonstrate that such demographically induced pull in the international capital market may explain a large share of the massive international capital movements just prior to World War One. Accordingly, we argue that the capital flows can be seen as reflecting an international market for assets where mature life-cycle savers in the Old World were able to lend to young life-cycle borrowers in the New; British foreign investment may be viewed, therefore, as an intergenerational transfer to the New World.

IV. Capital Flows to the New World as an Intergenerational Transfer

What is the counterfactual?

What fraction of the capital flows were pulled from Britain by demographically-induced savings shortfall in the receiving regions? In an attempt to answer this question, a natural counterfactual suggests itself. As we have seen, the New World tended to have much higher dependency rates than Britain over the period. A relatively large quantity of child-rearing activities at the periphery depressed national savings, augmented the excess demand of

investment, and so contributed to capital inflow. Yet what would national savings rates have looked like at the periphery had the demographic burden been absent? Would the New World have been self-sufficient in terms of accumulation given enough mature savers (or sufficiently few children)? Couched in these terms, we claim that the natural counterfactual is as follows. First, start with the imposition of the British age distribution on all New World regions receiving capital flows from the Old World, and calculate the implied decline in the dependency rate in each country. Second, use the savings function parameters estimated in Table 2A to estimate the counterfactual rise in New World savings rates. Third, use New World national income to estimate the rise in their aggregate national savings. Finally, assume a fixed investment demand to infer the crowding-out of foreign capital that would ensue by exploiting the current account identity. The method is essentially a means to measure how much "demographic crowding-out" would be entailed by eliminating the dependency-rate gaps between sending and receiving regions in the world capital market.

Measuring "demographic crowding-out"

Let Dj denote the young dependency rate in country j, and ΔDj denote the dependency-rate gap in country j relative to Britain, written $\Delta Dj = Dj - D^{UK}$. The calculation of such dependency-rate gaps is relatively straightforward, and Figure 3 summarizes the trends over time in the New World economies. The underlying data from population censuses is given in Appendix Table 1, and linear interpolation is used in intervening years.

Table 2 has already provided us with estimates of the impact of changes in the dependency rate on savings rates through the partial derivative $\beta_D = \partial s/\partial D$. Let $\hat{\beta}_D j$ denote the parameter estimate for country j. The current account identity expresses the relation between national savings (Sj), investment (Ij) and net foreign investment ($NFIj$) in each country: $NFIj = Ij - Sj$. Assuming invariant levels of domestic investment under

counterfactual conditions, any increase in the domestic savings level spills over into a one-for-one decrease in the current account balance, crowding-out foreign investment:

$$\Delta NFIj = -\Delta Sj \tag{4}$$

To estimate the change in savings due to "demographic crowding-out," we first observe that the counterfactual change in the savings rate is given by:

$$\Delta sj = \Delta(S/Y)j = \hat{\beta}_D j \, \Delta Dj \tag{5}$$

Therefore, using (5), the change in the level of aggregate savings may be imputed using an estimate of country *j*'s national income *Yj*, and the spill-over into the balance of payments immediately inferred:

$$\text{"demographic crowding-out"} = \Delta NFIj = -\Delta Sj = -\,Yj\,\Delta sj = -\,\hat{\beta}_D j \; Yj\,\Delta Dj \tag{6}$$

This crowding-out may be expressed in terms of its impact in either the sending or receiving region. With respect to Britain, we may calculate the share of the demographic crowding-out in total British net foreign investment ($NFI = \Sigma_j NFIj$); in the receiving region we may calculate the share of the demographic crowding-out in total British net foreign investment *in that region alone* ($NFIj$):

share of total British NFI crowded out in country *j* $= \dfrac{-\Delta Sj}{\Sigma_j NFIj}$

share of British NFI in country *j* crowded out in country *j* $= \dfrac{-\Delta Sj}{NFIj}$

If these measures are limited to only the three New World countries for which a dependency rate effect has been identified, then we have established a *lower bound* or minimum impact level for such demographic counterfactuals, since they assume no changes in the rest of the world capital market. If instead we assume that the rest of the world economy behaved exactly like one or all of our three New World countries, then we have established an *upper bound* or maximal impact associated with demographic influences (for example, "so goes Argentina, so goes everybody else in Latin America"). In this way the analysis offers a variety of bounds for the analysis and, hence, some measure of sensitivity.

In what follows, four separate cases are explored, yielding a lower bound (MIN), two mid-range estimates (MID1 and MID2), and an upper bound (MAX). Two different groups of receiving regions are used: the three New World economies (Argentina, Australia and Canada) and a wider New World group (the former plus Brazil, Mexico and Chile—three Latin economies for which we have national income estimates). Each group's demographic crowding-out is examined from the point of view of both the sending and receiving region. The results are presented in Tables 3 and 4.

Counterfactual 1: How much of total British NFI would have been crowded out in the three New World economies alone? (MIN estimate)

Table 3 shows counterfactual demographic crowding-out in Argentina, Australia and Canada during four periods between 1884 and 1913. The figures are cumulated and compared to Feinstein-Edelstein estimates of total British capital outflows (Feinstein 1972; Edelstein 1982, Appendix 1). The levels of crowding-out suggest that demographic influences at their peak between 1901 and 1906 may have pulled as much as 47% of British capital to these three countries; the figure was 27.5% for 1907–13. Before 1891 the impact was small, not because dependency-rate gaps were small (they were larger), nor because elasticities were lower (they are assumed constant), but because national incomes and, thus,

savings shortfalls were modest from the point of view of Britain. Thereafter, demographic crowding-out in the three New World economies always amounted to at least 25% of total British NFI. To repeat, the small impact in the earlier period is entirely due to the initial small size of the three economies compared to Britain. (However, it is possible that the crowding-out was still large compared to the size of the receiving regions themselves, as we shall see shortly.)

Table 4 uses a different set of NFI estimates, comparing demographic crowding-out to Paish's (1914) figures for British overseas investment in the great surge just prior to the First World War. Paish classifies British investment by destination over the period 1907-13, and, despite recent revisions, his estimates are still considered robust (Platt 1986, Feinstein 1990). This counterfactual implies that about 31% of capital flows to the three New World economies would have been displaced by demographic crowding-out, just 6% in the Empire regions, but a massive 25% in Argentina. This figure of 31% is the MIN estimate for the impact of demographic crowding-out.

Counterfactual 2: How much of the three New World economies' NFI would have been crowded out? (MID1 estimate)

Table 4 also explores the implications for the receiving regions of a reduced dependency burden. Had they had counterfactual British dependency rates the three New World economies would have greatly reduced their dependence on foreign capital: Canada by 18%, Australia by 40%, and Argentina by an enormous 234%. In a dramatic illustration of the potential drag of the dependency burden, this latter figure suggests that, with a British dependency rate, Argentina would have been a net exporter of capital around 1910. The average share of crowding-out in NFI in the three New World economies would have been 80%, our MID1 estimate.

Counterfactual 3: How much of total British NFI would be crowded out in the six New World economies alone? (MID2 estimate)

To extend our analysis to other countries, we now use the panel-data estimate of the parameter β_D as a basis for estimating demographic crowding-out in other parts of Latin America (\O(β_D, ^) j = -0.89). We could just as easily have used the Argentine parameter estimate ($\hat{\beta}_D^{ARG}$ = -1.53) but that would have implied even larger effects. Table 4 exploits crude estimates of national income and dependency-rate gaps for Brazil, Mexico and Chile around 1910, and compares the implied demographic crowding-out to actual British NFI. Once again the effects are seen to be large in Latin countries: the Brazilian counterfactual alone displaces 21% of British NFI, and Mexico and Chile add another 19%. Added to the already large Argentine figure, demographic pull effects in the four Latin American countries may have accounted for about two-thirds of all British overseas investment in the period 1907–13. For the sample of six (Australia, Canada, and the four Latin economies), demographic crowding-out would have displaced about 71% of total British NFI, our MID2 estimate.

Counterfactual 4: How much of the six New World economies' NFI would have been crowded out? (MAX estimate)

As a corollary to the above calculations, we now examine the impact of demographic crowding-out on foreign capital from the point of view of the six receiving New World countries. Table 4 confirms that from a receiving region perspective the impacts were immense. With small dependency-rate gaps and large capital inflows (relative to the size of the economy), the Empire pair would have reduced their foreign capital dependence by 23%. In Latin America, the influence was an order of magnitude higher: larger dependency-rate gaps and smaller borrowing requirements offered a potential for massive crowding-out. All

four Latin economies would have become self-sufficient in capital accumulation had they enjoyed the smaller counterfactual dependency burden. On average 137% of British NFI would have been crowded out by augmented domestic savings in the six countries, our MAX estimate.

V. Summary

The above results appear to indicate that a sizeable share of British overseas investment before World War One took the form of an intergenerational transfer. Consideration of a number of counterfactual scenarios has provided us with a range of estimates, including some plausible guesses about upper and lower bounds. Of course, the question still remains whether our estimates may be in some way biased, either due to flaws in the modelling or in the econometrics. We can think of two potential biases exist—but they operate in different directions.

On the one hand, since we estimate saving as investment plus the current account, we will have problems if investment is correlated with the dependency rate and the current account constraint binds. An obvious example would be the population-sensitive investment categories noted earlier. In this conditions, higher dependency rates are associated with augmented investment demand and diminished savings supply. If the economy is in any way savings constrained, these forces will tend to counteract each other, diminishing the dependency rate impact on aggregate saving. Such a correlation would tend to bias our estimate of the direct dependency-rate impact on saving towards zero, since we are trying to estimate the direct impact of D on s with I held fixed. If, instead, demographic forces crowded-in investment, then we have underestimated the influence of dependency rates on savings rates, and, hence, we have understated the potential for demographic crowding-out of foreign investment in our counterfactual.

On the other hand, by assuming a full pass-through of surplus savings into the current account, our analysis represents only a partial equilibrium approach. What would have been the impact of counterfactual increases in New World savings in the World capital market? Presumably, an excess supply of world capital would have lowered interest rates and, in general equilibrium, crowded-in investment and crowded-out saving in all countries. In the general equilibrium framework, the demographic impact on savings would be muted compared to partial equilibrium: the counterfactually augmented world supply of savings would entail a price of capital adjustment that would have crowded out some of the counterfactual rise in savings observed under the assumption of *ceteris paribus.* For example, if all supply and demand schedules in the capital market had elasticities of equal magnitude, our counterfactual estimates of demographic crowding-out would be reduced by half in the general equilibrium framework. By this line of reasoning, we may have an overestimate of the dependency-rate impact on savings, and an overstatement of the potential for demographic crowding-out of foreign investment.

Notwithstanding these caveats, there seems to be ample evidence that the dependency-rate hypothesis was alive and well in the three New World economies. It has been shown to have had especially potent force in the late nineteenth and early twentieth centuries, when the New World was burdened with a very high dependency-rate. Furthermore, relatively low New World saving capacities implied large capital inflows from mature savers in the Old World—so much so, that between 31% and 137% of the observed inflows of net foreign investment may have been attributable to such demographic effects. In the middle of this range, two of our counterfactual results suggest that about three-quarters of British overseas investment could be accounted for by dependency-induced pull at the periphery. We consider this persuasive evidence that foreign investment in the New World just prior to World War One should be viewed, in large part, as an intergenerational transfer.

Notes

[1] An exception is the paper by one of the present authors which explores the retreat of British capital from Argentina around World War One (Taylor 1991).

[2] These gaps are smaller than those between the OECD countries and the Third World in 1989 (15 to 16 percentage points: World Bank, 1991), but between the 1850s and the 1870s Canada and Argentina fell in that range (10 to 20 percentage points).

[3] See Appendix Table 3.

[4] The records begin in 1900 for Argentina, in 1862 for Australia, and in 1871 for Canada. See Appendix.

[5] On testing LDV versus AR1 models, see Maddala (1977: 141–48) and Griliches (1967).

[6] For the panel-data estimation the individual country time-series are ρ-differenced, and a residual variance series constructed. The equation is then estimated by applying weighted least squares to the ρ-differenced series, a procedure outlined by Pindyck and Rubinfeld (1981: 258–59). We are grateful to Ken Kang for suggesting this approach.

Appendix: Data Sources

Dependency Rates

Based on linear interpolation between sample years. The dependency rate is defined as population aged less than fifteen years divided by the total population. See Appendix Table A1.

Argentina

1869, 1895: Mitchell, *International Historical Statistics,* pp. 51, 70.

1915, 1920, 1925, 1930, 1935, 1940: Vázquez-Presedo, *Estadísticas,* part 2, pp. 38–39.

1947, 1960, 1970: Mitchell, *International Historical Statistics,* pp. 51, 70.

1980: United Nations, *Demographic Yearbook 1981,* pp. 218–219.

1988: United Nations, *Demographic Yearbook 1989,* pp. 178–179.

Australia

1861, 1871, 1881, 1891, 1901, 1911, 1921, 1933, 1947, 1954, 1961, 1971: Mitchell, *International Historical Statistics,* pp. 53, 77.

1979: United Nations, *Demographic Yearbook 1981,* pp. 232–233.

1988: United Nations, *Demographic Yearbook 1989,* pp. 196–197.

Canada

1851, 1861, 1871, 1881, 1891, 1901, 1911, 1921, 1931, 1941, 1951, 1961, 1971: Mitchell, *International Historical Statistics,* pp. 47, 57.

1980: United Nations, *Demographic Yearbook 1981,* pp. 214–215.

1989: United Nations, *Demographic Yearbook 1989,* pp. 174–175.

United Kingdom

1851, 1861, 1871, 1881, 1891, 1901, 1911, 1921, 1931, 1951, 1961, 1971: Mitchell, *European Historical Statistics,* pp. 34, 62. England and Wales.

1980: United Nations, *Demographic Yearbook 1981,* pp. 230–231. England and Wales.

1988: United Nations, *Demographic Yearbook 1989,* pp. 194–195.

United States

1850, 1860, 1870, 1880, 1890, 1900, 1910, 1920, 1930, 1940, 1950, 1960, 1970: Mitchell, *International Historical Statistics,* pp. 50, 66–69. Whites only in 1880.

1981: United Nations, *Demographic Yearbook 1981,* pp. 218–219.

1989: United Nations, *Demographic Yearbook 1989,* pp. 178–179.

Savings Rates

National saving is calculated residually as investment plus the current account in all cases (except as indicated). The current account equals exports minus imports plus the service account. In some cases the service account is included in the export or import figures. The savings rate is defined as national saving divided by national income. See Appendix Table A2.

Argentina

1900–13: Investment in nominal terms derived from real investment and the price level; from ECLA, "El Desarrollo," vol. 5, p. 81, and Della Paolera, "Argentine Economy," p. 186, column 4. Exports and imports in nominal terms from Della Paolera, "Argentine Economy," p. 186, columns 8 and 10. National income in nominal terms derived from real income and the price level; ibid., columns 4 and 6. All the above were normalized to the IEERAL 1913 nominal benchmarks given below.

1913–84: Investment (including change in stocks), exports, imports and national income (GDP at market prices) in nominal terms taken from IEERAL, "Estadísticas," pp. 136–37.

1985–88: Investment, exports, imports and national income (GDP at market prices) in nominal terms taken from The World Bank, *World Tables 1989–90,* pp. 92–93.

Australia

1861–1900: Investment, current account and national income (GDP at market prices) in nominal terms taken from N. Butlin, *Australian Domestic Product,* pp. 6, 16, 22 and 410–11.

1901–60: Investment (including change in stocks), current account and national income (GDP at market prices) in nominal terms taken from M. Butlin, "Preliminary Database," Tables IV.1 and IV.17.

1961–88: Investment, current account and national income (GDP at market prices) in nominal terms taken from the Australian National Accounts, and provided by McLean as a supporting document to "Savings in Settler Economies."

Canada

1870–1984: Implied savings ratio (calculated residually as described above) and taken directly from Urquhart, "Canadian Economic Growth," pp.18–21.

1985–1988: Gross Domestic Saving plus Net Factor Income from Abroad all divided by GDP at market prices, from The World Bank, *World Tables 1989–90,* p. 161.

United States

1890–1928: Based on ratio of gross saving to GNP, from United States Bureau of the Census, *Historical Statistics,* Part 2, pp. 224 and 262, Series F1 and F541 (the savings estimates are due to Goldsmith). Implementing a hedonic regression technique, this series was projected on the *National Income and Product Accounts* series (see below) for the overlap period 1929–45 and a constant term.

The fitted values are used. This was an attempt to overcome the different coverage of the Goldsmith series.

1929–82: Ratio of gross saving to GNP, from United States Department of Commerce, *National Income and Product Accounts*, Tables 1.1 and 5.1.

1983–1988: Ratio of gross saving to GNP, from United States Bureau of the Census, *Statistical Abstract of the United States 1990*, pp. 425 and 432.

Growth Rates

The growth rate is defined to be the first difference of the natural logarithm of real national income. See Appendix Table A2.

Argentina

1900–13: Real national income from Della Paolera, "Argentine Economy," p. 186.

1913–84: GDP at market prices, constant 1960 prices, from IEERAL, "Estadísticas," pp. 114–15.

1984–88: GDP at factor cost , constant 1980 prices, from The World Bank, *World Tables 1989–90*, pp. 92–93.

Australia

1861–1901: GDP at market prices, constant 1910/11 prices, from N. Butlin, *Australian Domestic Product*, pp. 460–61.

1901–74: GDP at market prices, constant 1966/67 prices, from M. Butlin, "Preliminary Database," Table IV.3.

1974–88: GDP at factor cost , constant 1980 prices, from The World Bank, *World Tables 1989–90*, pp. 96–7.

Canada

1870–1985: GDP at market prices, constant 1981 prices, from Urquhart, "Canadian Economic Growth," pp.8–11.

1985–1988: GDP at factor cost , constant 1980 prices, from The World Bank, *World Tables 1989–90*, p. 161.

United States

1890–1929: Real GNP in 1958 prices, from United States Bureau of the Census, *Historical Statistics*, Part 2, p. 224, Series F3.

1929–82: Real GNP in 1982 prices, from United States Department of Commerce, *National Income and Product Accounts*, Tables 1.2.

1982–1988: Real GNP in 1982 prices, from United States Bureau of the Census, *Statistical Abstract of the United States 1990*, p. 425.

TABLE 1
BRITISH OVERSEAS INVESTMENT 1907–13

Area		Amount (£ million)	Share (%)
New World Empire		318	28%
Canada and Newfoundland	(254)		
Australasia	(65)		
United States		164	15%
Latin America		268	24%
Argentina	(118)		
Brazil	(88)		
Mexico	(34)		
Chile	(28)		
Other Empire		163	14%
China and Japan		50	4%
Europe		49	4%
Russia		46	4%
Miscellaneous Foreign		68	6%
Total		1,126	

Source: Kennedy (1987, p. 184); based on Paish (1914, p. 81).

TABLE 2A
SAVINGS FUNCTION ESTIMATES FOR THREE NEW WORLD ECONOMIES

	(1)	(2)	(3)	(4)
	A: Regression Results			
Coefficients	Argentina 1900–1988 AR1	Australia 1862–1988 AR1	Canada 1871–1988 AR1	Panel All observations Weighted Least Squares using ρ-differenced series
Constant	0.620[a]	0.433[a]	0.360[a]	0.432[a]
	(6.50)	(4.06)	(4.64)	(7.81)
g	0.857	-0.598	-0.224	-0.005
	(0.98)	(1.23)	(0.76)	(0.02)
D	-1.53[a]	-0.882[a]	-0.613[a]	-0.895[a]
	(5.22)	(2.51)	(2.51)	(5.16)
$D \times g$	-2.17	2.35	0.607	0.179
	(0.85)	(1.58)	(0.71)	(0.253)
Dummy WW1	0.0805[a]	-0.00648	-0.00926	—
	(2.28)	(0.24)	(0.58)	
Dummy WW2	0.0380	-0.0645[a]	-0.0177	—
	(1.27)	(2.42)	(1.12)	
ρ	0.416[a]	0.767[a]	0.838[a]	—
	(4.08)	(13.74)	(15.80)	
Degrees of freedom	81	119	110	327
R^2	0.603	0.745	0.836	0.091
SEE	0.052	0.036	0.021	1.04
Durbin-Watson	1.96	2.35	2.26	2.13
	B: Statistics for the Data Series			
s Mean	0.129	0.161	0.159	0.152
s Standard deviation	0.080	0.070	0.052	0.068
D Mean	0.329	0.302	0.323	0.316
D Standard deviation	0.038	0.035	0.047	0.042
	C: Implied Long-Run Coefficients			
Partial derivative: $\frac{\partial s}{\partial D}$	-1.53	-0.88	-0.61	-0.89
Elasticity: $\frac{D}{s}\frac{\partial s}{\partial D}$	-3.90	-1.65	-1.24	-1.87

[a] denotes significant at the 1% level (one-tail test).
Notes: The dependent variable is the savings rate s. Absolute t-statistics appear in parentheses. The AR1 estimations utilize the Cochrane-Orcutt procedure. In the panel regressions all variables are transformed by ρ-differencing, and a residual variance series for each country allows use of weighted least squares to correct for heteroskedasticity; but the statistics in panel B of the table still refer to the untransformed data.
Sources: See Appendix and Taylor (1991).

TABLE 2B
SAVINGS FUNCTION ESTIMATE FOR THE UNITED STATES

A: Regression Results

Coefficients	United States 1898–1988 AR1
Constant	0.122
	(1.58)
g	0.508
	(1.16)
D	0.0679
	(0.25)
$D \times g$	-1.43
	(0.97)
Dummy WW1	-0.0142
	(0.71)
Dummy WW2	-0.0823[a]
	(3.85)
ρ	0.696
	(8.86)
Degrees of freedom	84
R^2	0.601
SEE	0.027
Durbin-Watson	1.75

[a] denotes significant at the 1% level (one-tail test).
Notes: See notes to Table 2A.
Sources: See Appendix.

TABLE 3
"DEMOGRAPHIC CROWDING-OUT" IN THREE NEW WORLD ECONOMIES, 1884–1913

Year	Counterfactual "Demographic Crowding-Out" (£ million, annual average)				Actual British NFI (£ million, annual average)	Total "Demographic Crowding-Out" as a share of British NFI
	Argentina (1)	Australia (2)	Canada (3)	Total (4) = (1)+(2)+(3)	(5)	(6) = (4) / (5)
1884–1890	5.018	-0.607	1.276	5.687	82.714	7%
1891–1900	12.388	1.734	1.468	15.590	49.800	31%
1901-1906	19.516	4.390	3.211	27.117	57.833	47%
1907-1913	39.533	3.736	6.656	49.925	181.286	28%

Notes: See text.
Sources: British NFI from Edelstein (1982, Appendix 1).

TABLE 4
"DEMOGRAPHIC CROWDING-OUT" IN SIX NEW WORLD ECONOMIES, 1907–1913

	Counterfactual "Demographic Crowding-Out" (£ million, annual average)	Actual British NFI (£ million, annual average)	Total "Demographic Crowding-Out" as a share of British NFI in that region	Total "Demographic Crowding-Out" as a share of total British NFI in all countries
Canada	6.656	36.218	18%	4%
Australia	3.736	9.257	40%	2%
Argentina	39.533	16.906	234%	25%
Brazil	33.729	12.604	268%	21%
Chile	5.058	3.938	128%	3%
Mexico	26.131	4.832	541%	16%
First Three	49.925	62.380	80%	31%
Empire Pair	10.392	45.475	23%	6%
Latin Four	104.450	38.279	273%	65%
All six	114.842	83.753	137%	71%
All countries		161.062		

Notes: See text and Table 3.
Sources: Nominal national income estimates are obtained for Brazil, Chile and Mexico using Maddsion's (1989, p.113) estimates of the real GDP rankings (in US$ of 1980) of these countries relative to the UK in 1913 and Mitchell's (1983) estimate of nominal national income in the UK. Dependency rates are also from Mitchell (1983) taking the nearest census and working out the dependency-rate gap relative to the UK in that year. See Appendix for UK dependency rate sources. Census dates are: New Brazil, 1920; Chile, 1907; Mexico, 1910.

APPENDIX TABLE A1
DEPENDENCY RATES IN FIVE COUNTRIES

Argentina

Year	*D*
1869	0.452
1895	0.401
1915	0.380
1920	0.370
1925	0.345
1930	0.339
1935	0.343
1940	0.331
1947	0.306
1960	0.296
1970	0.293
1980	0.282
1988	0.303

Australia

Year	*D*
1861	0.278
1871	0.338
1881	0.316
1891	0.369
1901	0.351
1911	0.316
1921	0.318
1933	0.275
1947	0.251
1954	0.285
1961	0.302
1971	0.288
1979	0.257
1988	0.223

Canada

Year	*D*
1851	0.560
1861	0.424
1871	0.416
1881	0.387
1891	0.364
1901	0.344
1911	0.330
1921	0.344
1931	0.316
1941	0.278
1951	0.303
1961	0.340
1971	0.296
1980	0.230
1989	0.210

United Kingdom

Year	*D*
1851	0.357
1861	0.356
1871	0.361
1881	0.365
1891	0.351
1901	0.324
1911	0.306
1921	0.277
1931	0.238
1951	0.221
1961	0.230
1971	0.237
1980	0.209
1988	0.189

United States

Year	*D*
1850	0.415
1860	0.404
1870	0.379
1880	0.371
1890	0.351
1900	0.342
1910	0.319
1920	0.317
1930	0.292
1940	0.249
1950	0.267
1960	0.308
1970	0.280
1981	0.223
1989	0.217

Notes: D is the share of the population aged 0–15 years.
Sources: See text.

APPENDIX TABLE A2
SAVINGS RATES AND REAL INCOME IN FOUR COUNTRIES

Year	Argentina Savings Rate	Argentina Real Income	Australia Savings Rate	Australia Real Income	Canada Savings Rate	Canada Real Income	USA Savings Rate	USA Real Income
1861			0.096	53				
1862			0.023	53				
1863			0.048	54				
1864			0.073	60				
1865			0.060	60				
1866			0.040	64				
1867			0.133	72				
1868			0.116	75				
1869			0.060	76				
1870			0.089	82	0.095	49		
1871			0.144	79	0.070	51		
1872			0.206	87	0.082	51		
1873			0.127	96	0.080	56		
1874			0.143	99	0.087	57		
1875			0.177	110	0.109	55		
1876			0.156	110	0.103	52		
1877			0.121	114	0.084	55		
1878			0.141	125	0.078	53		
1879			0.147	127	0.089	59		
1880			0.208	134	0.103	61		
1881			0.168	144	0.088	70		
1882			0.070	135	0.109	73		
1883			0.124	155	0.124	72		
1884			0.082	156	0.154	79		
1885			0.061	166	0.088	74		
1886			0.094	168	0.075	74		
1887			0.159	186	0.086	77		
1888			0.103	187	0.084	82		
1889			0.106	203	0.088	82		
1890			0.101	196	0.056	87		184
1891			0.165	212	0.081	90		192
1892			0.095	185	0.069	90		211
1893			0.122	175	0.074	88		200
1894			0.124	181	0.059	93		195
1895			0.053	171	0.073	93		218
1896			0.080	184	0.070	90		214
1897			0.019	174	0.105	100	0.106	234
1898			0.033	201	0.127	104	0.132	239
1899		118	0.122	201	0.117	114	0.164	261
1900	0.011	115	0.058	213	0.126	120	0.136	268
1901	0.049	125	0.119	204	0.149	131	0.131	299
1902	0.114	122	0.160	224	0.151	142	0.176	301
1903	0.079	140	0.100	210	0.160	148	0.139	316
1904	0.044	155	0.167	234	0.155	150	0.121	313
1905	0.128	175	0.142	230	0.161	166	0.169	336
1906	-0.029	184	0.180	240	0.158	183	0.151	375
1907	-0.018	188	0.206	274	0.164	193	0.127	381
1908	0.081	207	0.159	253	0.170	186	0.125	349

APPENDIX TABLE A2
SAVINGS RATES AND REAL INCOME IN FOUR COUNTRIES
(CONTINUED)

Year	Argentina Savings Rate	Argentina Real Income	Australia Savings Rate	Australia Real Income	Canada Savings Rate	Canada Real Income	USA Savings Rate	USA Real Income
1909	0.087	217	0.175	263	0.174	202	0.132	407
1910	0.029	232	0.199	278	0.174	220	0.144	419
1911	-0.033	237	0.180	303	0.150	235	0.117	429
1912	0.066	256	0.150	299	0.164	253	0.147	454
1913	0.026	259	0.191	328	0.170	263	0.130	458
1914	0.193	232	0.181	331	0.166	244	0.126	438
1915	0.244	233	0.084	291	0.149	261	0.165	434
1916	0.101	226	0.097	325	0.145	290	0.183	468
1917	0.060	208	0.087	315	0.181	301	0.166	471
1918	0.074	246	0.075	310	0.133	284	0.088	529
1919	0.127	255	0.082	317	0.147	265	0.117	510
1920	-0.029	274	0.144	299	0.135	264	0.136	488
1921	-0.097	281	0.158	340	0.138	239	0.096	445
1922	0.004	303	0.201	358	0.128	273	0.131	516
1923	-0.041	337	0.162	370	0.202	291	0.155	578
1924	0.056	363	0.151	385	0.186	293	0.147	577
1925	-0.045	361	0.207	410	0.192	325	0.157	625
1926	-0.044	379	0.120	398	0.189	347	0.156	662
1927	0.000	406	0.119	414	0.183	379	0.150	662
1928	0.113	431	0.151	411	0.198	414	0.131	665
1929	0.083	451	0.127	403	0.177	416	0.153	710
1930	0.038	432	0.061	409	0.147	398	0.124	643
1931	0.138	402	0.096	370	0.138	347	0.062	588
1932	0.167	389	0.113	376	0.091	311	0.007	509
1933	0.088	407	0.103	399	0.087	291	0.011	499
1934	0.146	439	0.134	414	0.114	326	0.044	537
1935	0.153	458	0.112	423	0.137	351	0.087	580
1936	0.171	462	0.121	445	0.168	367	0.083	662
1937	0.167	495	0.160	459	0.180	404	0.129	695
1938	0.106	497	0.164	488	0.157	407	0.081	664
1939	0.139	516	0.137	469	0.146	437	0.097	717
1940	0.137	524	0.161	495	0.152	499	0.135	773
1941	0.159	552	0.090	532	0.191	571	0.150	909
1942	0.179	558	0.064	610	0.107	676	0.069	1080
1943	0.219	554	0.020	663	0.129	704	0.030	1276
1944	0.184	616	0.095	655	0.080	732	0.014	1381
1945	0.196	597	0.087	617	0.159	715	0.028	1355
1946	0.206	650	0.169	592	0.177	696	0.168	1097
1947	0.172	722	0.198	574	0.179	726	0.181	1067
1948	0.135	762	0.215	620	0.225	744	0.194	1109
1949	0.119	752	0.212	651	0.214	772	0.140	1109
1950	0.149	755	0.211	703	0.191	831	0.182	1204
1951	0.171	785	0.282	744	0.180	872	0.176	1328
1952	0.147	745	0.171	766	0.215	950	0.149	1380
1953	0.190	785	0.255	760	0.205	999	0.137	1435
1954	0.160	817	0.247	808	0.205	987	0.139	1416
1955	0.151	875	0.217	856	0.203	1080	0.169	1495

APPENDIX TABLE A2
SAVINGS RATES AND REAL INCOME IN FOUR COUNTRIES
(CONTINUED)

Year	Argentina Savings Rate	Argentina Real Income	Australia Savings Rate	Australia Real Income	Canada Savings Rate	Canada Real Income	USA Savings Rate	USA Real Income
1956	0.141	899	0.228	899	0.209	1171	0.180	1526
1957	0.140	946	0.255	916	0.218	1198	0.171	1551
1958	0.146	1003	0.225	936	0.217	1226	0.141	1539
1959	0.168	938	0.237	1005	0.198	1273	0.162	1629
1960	0.203	1012	0.229	1059	0.193	1309	0.163	1665
1961	0.180	1084	0.249	1094	0.196	1345	0.155	1709
1962	0.186	1067	0.250	1105	0.194	1441	0.159	1799
1963	0.187	1042	0.254	1179	0.202	1515	0.163	1873
1964	0.201	1149	0.272	1260	0.220	1616	0.167	1973
1965	0.210	1254	0.271	1349	0.222	1723	0.175	2088
1966	0.192	1262	0.255	1372	0.234	1840	0.169	2208
1967	0.192	1296	0.266	1459	0.232	1888	0.159	2271
1968	0.188	1352	0.245	1512	0.219	1998	0.156	2366
1969	0.196	1467	0.274	1648	0.209	2108	0.165	2424
1970	0.203	1544	0.273	1742	0.227	2162	0.152	2416
1971	0.206	1604	0.272	1820	0.227	2285	0.156	2485
1972	0.224	1635	0.269	1892	0.218	2421	0.165	2609
1973	0.222	1691	0.275	1980	0.230	2608	0.185	2744
1974	0.193	1787	0.263	2093	0.227	2719	0.168	2729
1975	0.195	1780	0.246	2124	0.219	2790	0.149	2695
1976	0.262	1772	0.247	2186	0.217	2953	0.159	2827
1977	0.275	1885	0.247	2217	0.214	3050	0.169	2959
1978	0.062	1822	0.223	2305	0.211	3177	0.182	3115
1979	0.193	1944	0.242	2386	0.216	3296	0.183	3192
1980	0.169	1958	0.249	2433	0.232	3347	0.163	3187
1981	0.156	1836	0.237	2519	0.228	3447	0.171	3249
1982	0.209	1740	0.239	2502	0.229	3326	0.141	3166
1983	0.200	1794	0.205	2499	0.211	3445	0.136	3406
1984	0.203	1830	0.224	2672	0.202	3628	0.151	3772
1985	0.152	1748	0.221	2797	0.198	3774	0.133	4015
1986	0.111	1849	0.223	2884	0.193	3854	0.124	4232
1987	0.101	1879	0.220	2985	0.193	4036	0.122	4524
1988	0.182	1826	0.234	3083	0.198	4236	0.132	4881

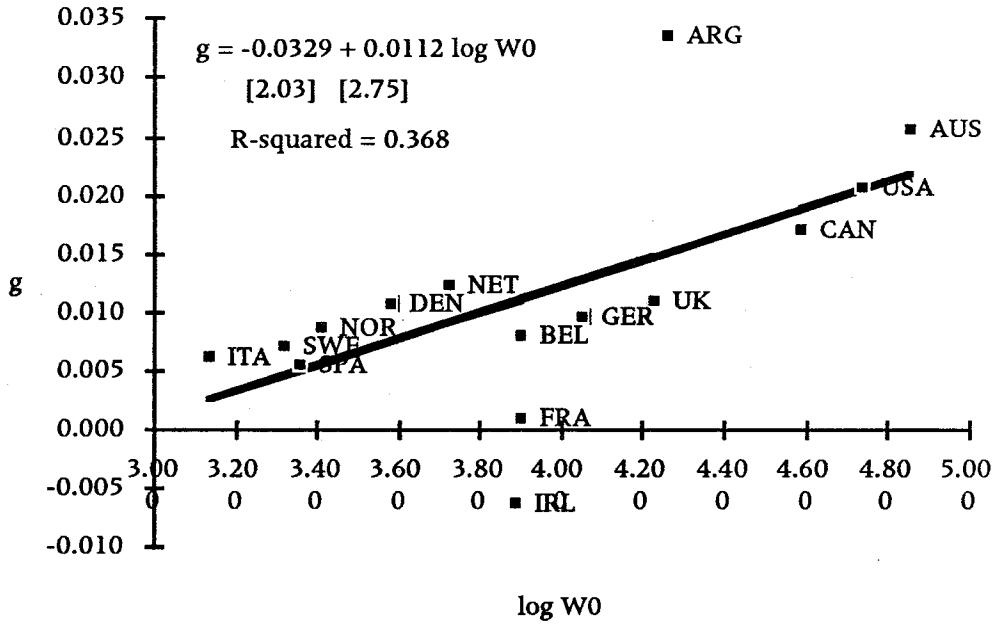
Notes & Sources: See text.

APPENDIX TABLE A3
ELASTICITIES OF SAVINGS RATES WITH RESPECT TO DEPENDENCY RATES: EVIDENCE FROM CROSS-SECTION STUDIES

Study	Sample	Elasticity
Leff (1969)	74 countries	-1.35[a]
	47 less-developed countries	-1.23[a]
Gupta (1971)	Poor countries	-0.77
	Middle countries	-0.62
	Rich countries	-2.70[a]
	Total sample	-1.84[a]
Adams (1971)	47 less-developed countries	-0.46
Leff (1971)	74 countries	-0.97[a]
	67 countries	-0.99[a]
Gupta (1975)	40 less-developed countries	-0.63[a]
Ram (1982)	110 countries	-0.004
	66 less-developed countries	1.32
	31 developed countries	-1.08
	70 less-developed countries	0.08

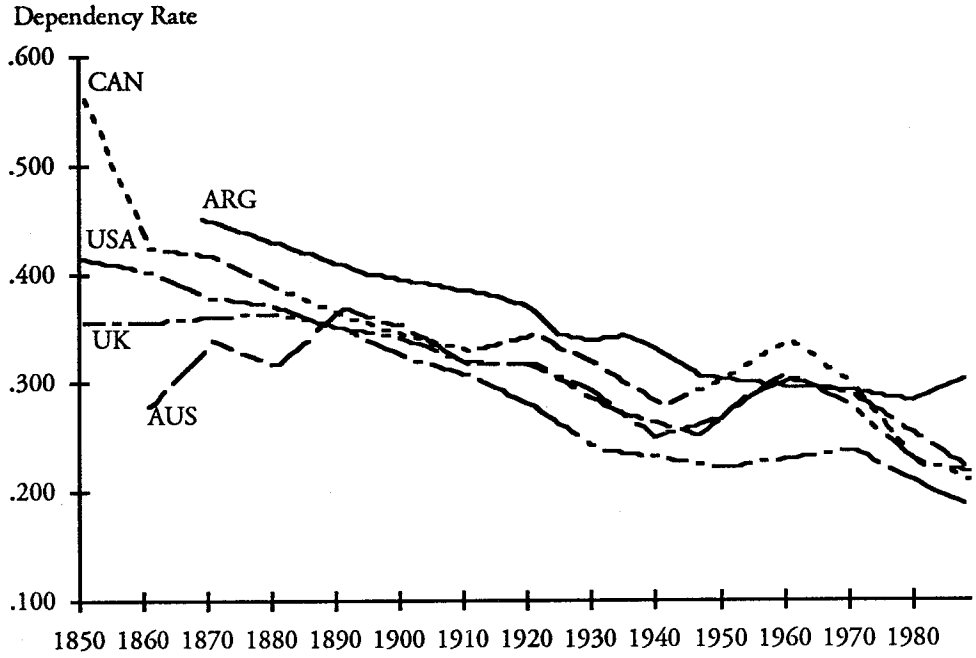
Notes: [a] indicates significance of coefficient at the 10% level. The dependency rate used is the proportion of the population aged under 15 years. The proportion of the population aged over 65 years is used in all studies as an additional explanatory variable, except Adams (1971) and Gupta (1975). Gupta (1975) uses a simultaneous equations method with both saving and dependency rates endogenous.
Source: Hammer (1986, p. 584).

FIGURE 1
REAL WAGES AND POPULATION GROWTH, 1870–1913



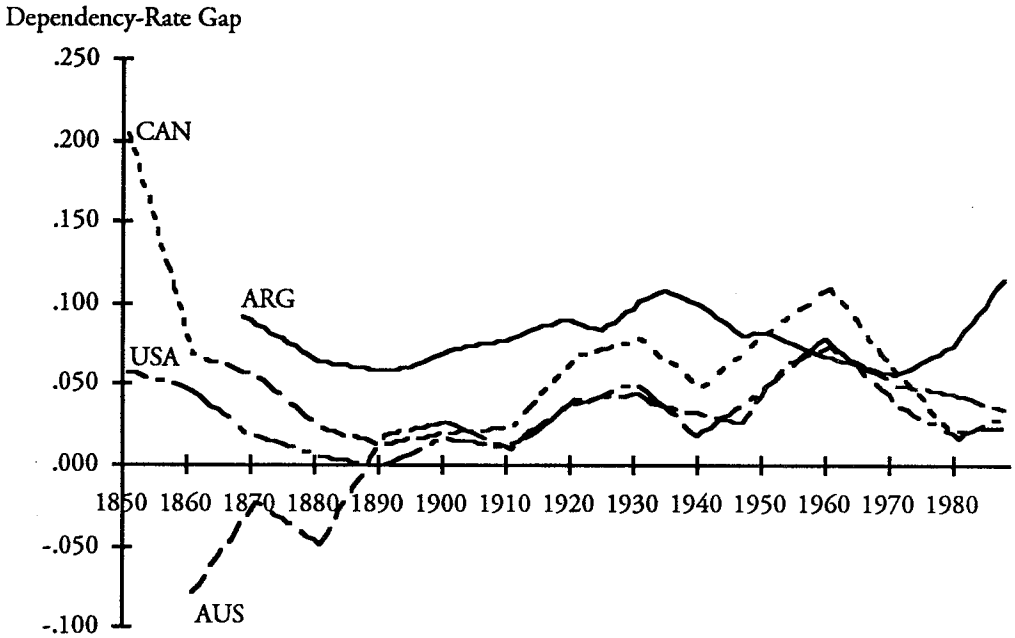
Notes: g is the growth rate of population, W0 is the real wage in 1870.
Source: Williamson (1991).

FIGURE 2
DEPENDENCY RATES, 1850–1988



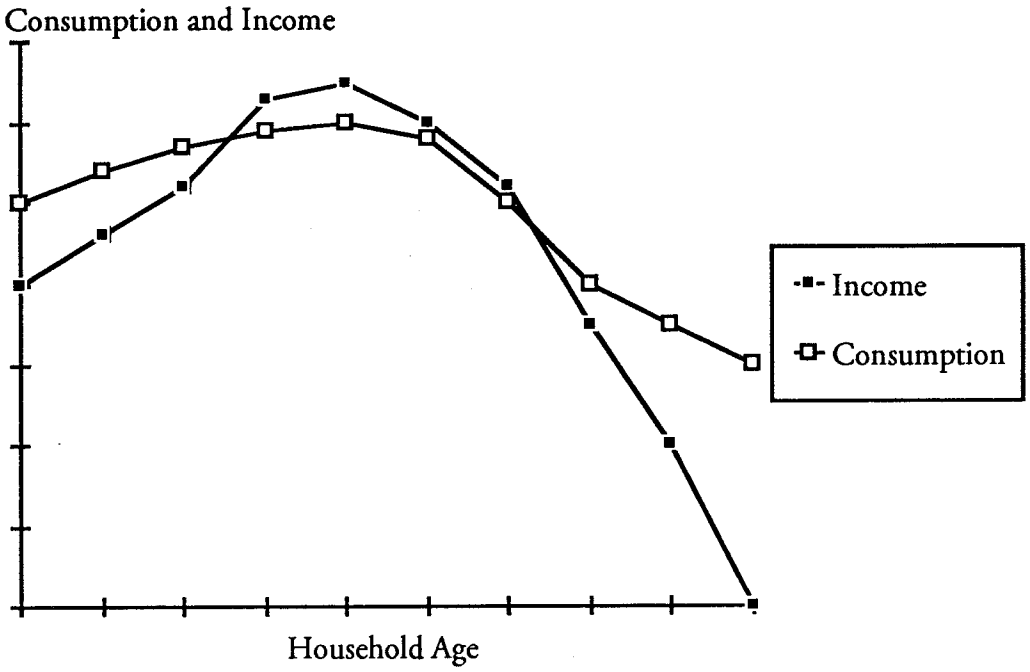
Notes: The dependency rate is the share of the population aged 0–15 years.
Sources: See Appendix.

FIGURE 3
DEPENDENCY-RATE GAPS RELATIVE TO BRITAIN, 1850–1988



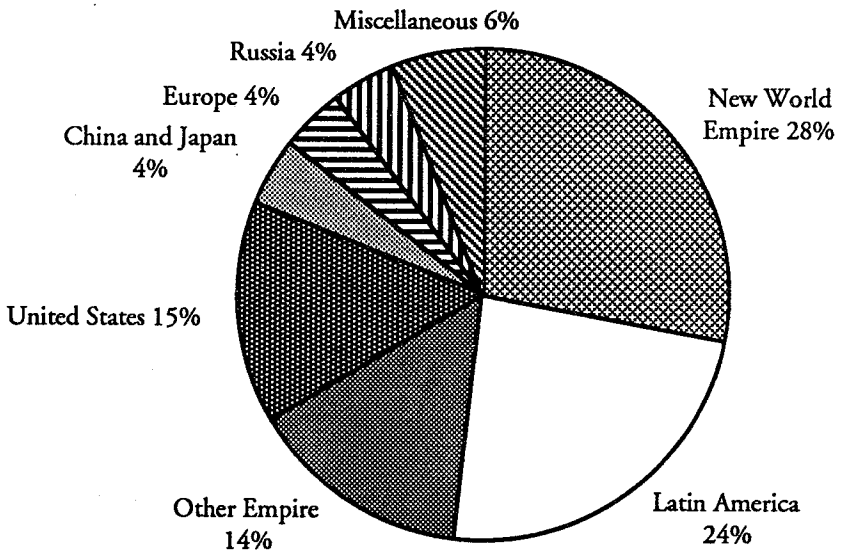
Notes: The dependency rate is the share of the population aged 0–15 years. The dependency-rate gap is the difference between each country's dependency rate and that in Britain.
Sources: See Appendix.

FIGURE 4
THE LIFE-CYCLE HOUSEHOLD



Notes: The household accumulates no wealth over the life-cycle, so that permanent income exactly equals permanent consumption,
Source: Compare with Mason (1987, p. 531)

APPENDIX FIGURE A1
BRITISH OVERSEAS INVESTMENT 1907–13



Source: Table 1.

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