Capital Flows to the New World as an Intergenerational Transfer

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The late nineteenth century saw international mass migrations of capital and labor from the Old World to the New. Factors chased each other and the abundant resources at the frontier. Demographic structure also contributed to the massive capital flows from Britain to the New World. The dependency hypothesis is confirmed by estimation of savings functions in three New World economies (Argentina, Australia, and Canada) in which high dependency rates may have significantly depressed domestic savings rates and pulled in foreign investment: in effect an intergenerational transfer from old savers in the Old World to young savers in the New.

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 take the form of only imports

of resource-intensive commodities. That trade, in turn, was economically feasible only with the introduction of the investment and technologies that lowered freight rates on such low-value, high-bulk products. By the late nineteenth 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 that 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 the reason has never been clear, and the correlation may have been 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 million abroad during those seven years, 61 percent of it, or £689 million, in the New World regions of Canada, Australasia, Argentina, and the United States (table 1). Adding the rest of Latin America pushes those numbers up still further to £857 million, 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 1992), and that they were probably well integrated as early as the eighteenth century (Neal 1985). This paper assumes as much and focuses on the second question.

TABLE 1

BRITISH OVERSEAS INVESTMENT, 1907–13

Area	Amount (£ Million)	Share (%)
New World Empire	319	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	1,127	100

SOURCE.—Kennedy (1987, p. 184); based on Paish (1914, p. 81).

Having dual scarcity, the New World countries 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 those of the Old World. Figure 1 reports the simple correlation between population growth rates (the rate of change of log $N(t)$ on the vertical axis) and the initial real wages in 1870 (log $W_0(t)$ on the horizontal axis) for the period 1870–1913. Four New World countries are clustered to the right (Argentina, Australia, Canada, and the United States), the poorest Old World countries are clustered to the left (Italy, Sweden, Spain, Norway, the Netherlands, and Denmark), and the remaining richer Old World countries are clustered in the middle (France, Ireland, Belgium, Germany, and the United Kingdom). Labor scarcity produced the predictable labor supply response among these 15 countries, and the correlation is strong (slope coefficient 0.011, t-statistic 2.75).

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 (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
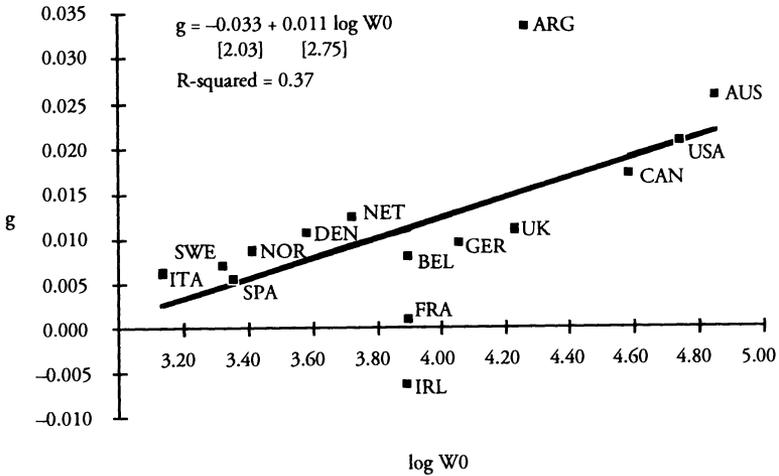
FIG. 1.—Real wages and population growth, 1870–1913; g is the growth rate of the population, and W_0 is the real wage in 1870. (Source: Williamson 1994.)

overhead activities, which, being very capital intensive, tended to augment investment requirements even further (Lewis 1978; 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 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 United States, for example, immigrants accounted for 40.5 percent of the population increase between 1870 and 1913 (U.S. Bureau of the Census 1975, 1:8, 104–5). Second, New World residents augmented the labor supply by high fertility and low infant mortality rates. Such demographic forces had implications for labor participation and dependency rates (the share of the population dependent on adult workers); in this paper we focus on the latter. According to the life cycle model, economies full of very young households burdened with high dependency rates should save smaller shares of their income. Section II 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 (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 the Old World and the 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? 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 nineteenth 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 United States, a group that accounted for the vast majority of the New World capital imports from the United Kingdom and that includes those countries whose database makes it possible to implement a quantitative assessment.[2] Figure 2 should suffice to motivate the discussion. Figure 2a plots the dependency rate (D_{15}, equal to the share of the population aged under 15 years) from the mid-nineteenth century to the present. All the New World countries start with enormous dependency rates: the United States, in 1850, .415; Canada, in 1851, .560; Australia, in 1861, .367 (rising to .422 in 1871); and Argentina, in 1869, .452.[3] 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

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[1] An exception is Taylor (1992), which explores the retreat of British capital from Argentina around World War I.

[2] A statistical appendix is available from the authors on request.

[3] These dependency rates are very high even by the standards of the Third World in 1989—low-income economies, .355; the middle-income economies, .362 (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.

a

Dependency Rate

b

Dependency-Rate Gap
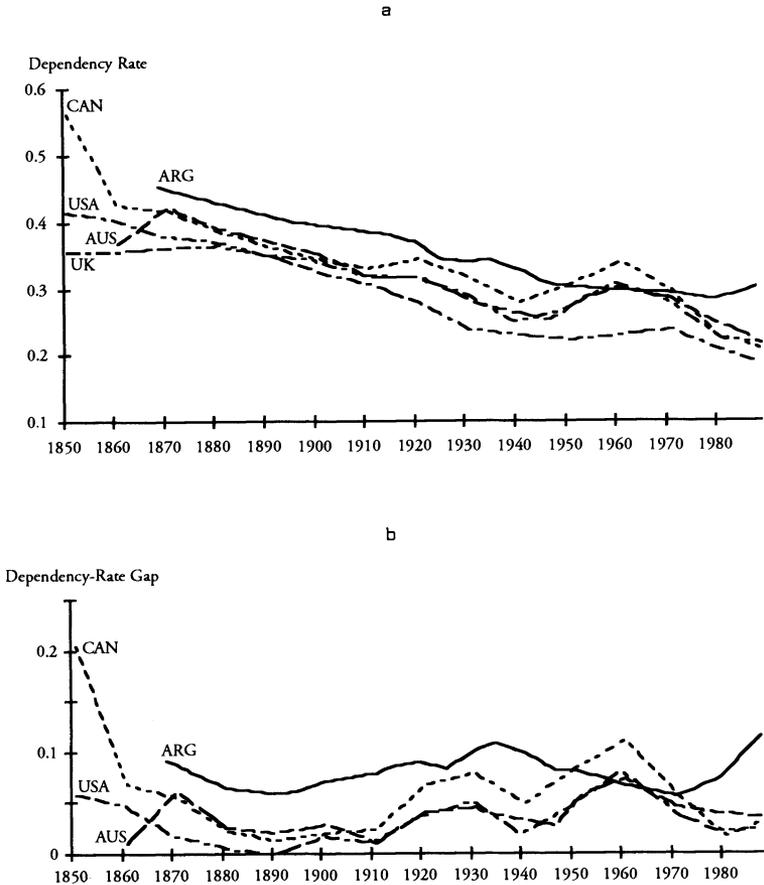
FIG. 2.—*a*, Dependency rates, 1850–1988. *b*, Dependency rate gaps relative to Britain, 1850–1988. The dependency rate is the share of the population aged 0–15 years. The dependency rate gap is the difference between each country's dependency rate and that in Britain. (Source: See our unpublished appendix.)

standards of the contemporary Third World, and they were equally high in New Zealand (.397) and in Latin America generally (.414). The important point, however, is the size of the dependency rate gap between the New World and the United Kingdom (fig. 2*b*). Between 1900 and 1913, they were still positive. Around 1900, the gap was 7.7 percentage points for Argentina, 2.7 for Australia, 2.0 for Canada, and 1.8 for the United States.[4] The issue now is whether these

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

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, 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).[5] The dependency hypothesis reached its apex with Leff's (1969) 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 as though 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 Mason (1981, 1987, 1988), Fry (1984), and Fry and Mason (1982). The new version recognized the importance of the growth environment in the form of what they called the variable rate-of-growth effect.[6]

The basic idea behind both the old and the new versions is the life cycle model popularized by Modigliani (1966) (see also Modigliani and Brumberg 1954; Modigliani and Ando 1957; Ando and Modigliani 1963).[7] The household is characterized as accumulating no wealth over its lifetime, with saving in midlife exactly offsetting dissaving in early and later life. Even so, economywide saving can vary considerably if the economy is growing fast, because of either population growth or per capita income growth. 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 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: "a higher dependency ratio

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[5] For a survey of this literature, see Bilsborrow (1980).

[6] Mason has shown that it should apply with special strength in fast-growing environments—such as the New World between 1870 and 1913—and Schultz (1987) has shown how powerfully it can work through the educational delivery system.

[7] The brief exposition that follows relies heavily on Mason's (1987, pp. 530–39) extension of the model.

leads to lower saving, *particularly among countries with moderate to high rates of income growth*" (Mason 1987, pp. 549–50; emphasis added).[8]

Some economic historians have already found the dependency rate model useful for exploring various problems in the past. Although Kelley (1968) did not estimate a model for Australia, he used one to illustrate how important demographic effects might have been in late nineteenth century experience of that country. Lewis (1983) applied the life cycle model to identify successfully the role of the decline in the American dependency rate between 1830 and 1900. He approached the problem using child rearing costs implied by various household surveys from 1889–90, 1900, and 1935–36. He then estimated that the decline in the dependency rate could have accounted for perhaps a quarter of the marked rise in the aggregate domestic savings rate, a rise that so much has been made of by American economic historians (Gallman 1966; David 1977; Williamson 1979; Ransom and Sutch 1983), and a rise that helped wean America away from foreign capital as the late nineteenth century unfolded. Williamson (1990, pp. 34–39) applied the same dependency rate reasoning to help account for the higher savings rates in England's cities (compared with the countryside) during the Industrial Revolution. A lower dependency rate also raised city savings rates perhaps as much as three percentage points above those of the countryside, thus diminishing the rural-urban capital flows necessary to finance the urban-based industrial revolution.

The most recent application in economic history was offered by 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 that draws on Mason and Leff; and, most important, the results are used to explore the underlying sources of those massive capital flows from the Old World to the New just prior to World War I.

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

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[8] 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. They may also raise the tax burden, thus lowering the disposable incomes of potential savers and contributing to lower household saving.

seminal work in the late 1960s. 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 form

$$\ln s_i = \beta_0 + \beta_1 \ln g_i + \beta_2 \ln\left(\frac{Y}{N}\right)_i + \beta_3 D_{1i} + \beta_4 D_{2i} + \epsilon_i,$$

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.[9]

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

$$\ln c_{it} = \beta_0 + \beta_1 \alpha_{it} g_{it} + \beta_2 \alpha_{it} g_{it} \ln D_{it} + \beta_3 g_{it} + \epsilon_{it},$$

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 thorough microanalysis 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

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[9] As 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 that "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).

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).[10] The following hybrid savings equation was estimated for Argentina, Australia, Canada, and the United States with dummy variables included to account for wartime effects:[11]

$$s_t = \beta_0 + \beta_1 g_t + \beta_2 D_t + \beta_3 D_t g_t$$
$$+ \beta_4 (\text{dummy WW1})_t + \beta_5 (\text{dummy WW2})_t + \epsilon_t.$$

The results are presented in table 2 for various sample choices and for three New World countries in which dependency rates mattered: Argentina, Australia, and Canada. Columns 1–3 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.[12] 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 $\beta_D = \partial s / \partial D$. Using sample averages, we obtain

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[10] The records begin in 1897 for the United States, in 1900 for Argentina, in 1862 for Australia, and in 1871 for Canada. See our unpublished appendix.

[11] This approach was inspired by McLean (1991), who estimated savings functions for Australia and Canada. He used the proportion of the population aged 45–64 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. On testing LDV versus AR1 models, see Griliches (1967) and Maddala (1977, pp. 141–48).

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

TABLE 2

SAVINGS FUNCTION ESTIMATES FOR THE NEW WORLD ECONOMIES

	Argentina, 1900–1988 (1)	Australia, 1862–1988 (2)	Canada, 1871–1988 (3)	Panel of Three, 1900–1988 (4)	United States, 1898–1988 (5)
			A. Regression Results		
Estimation method	AR1	AR1	AR1	Weighted least squares	AR1
Coefficients:					
Constant	.620*	.381*	.360*	.416*	.122
	(6.50)	(5.05)	(4.64)	(8.01)	(1.58)
g	.857	-.534	-.224	-.246	.508
	(.98)	(1.47)	(.76)	(1.10)	(1.16)
D	-1.53*	-.685*	-.613	-.834*	.0679
	(5.22)	(2.89)	(2.51)	(5.18)	(.25)
$D \times g$	-2.17	2.05	.607	.887	-1.43
	(.85)	(1.95)	(.71)	(1.37)	(.97)
Dummy WW1	.0805*	-.0105	-.00926	...	-.0142
	(2.28)	(.39)	(.58)		(.71)
Dummy WW2	.0380	-.0657*	-.0177	...	-.0823*
	(1.27)	(2.51)	(1.12)		(3.85)
ρ	.416*	.755*	.838*	...	.696
	(4.08)	(12.78)	(15.80)		(8.86)

Degrees of freedom	81	119	110	84
R^2	.603	.749	.836	.601
Standard error	.052	.036	.021	.027
Durbin-Watson	1.96	2.33	2.26	1.75

B. Statistics for the Data Series

s:				
Mean	.129	.161	.159	.152
Standard deviation	.080	.070	.052	.068
g:				
Mean	.031	.032	.038	.034
Standard deviation	.052	.053	.053	.053
D:				
Mean	.329	.317	.323	.322
Standard deviation	.038	.054	.047	.042

C. Implied Long-Run Coefficients

Partial derivative: $\partial s/\partial D$	−1.60	−.62	−.59	−.80
Elasticity: $(D/s)(\partial s/\partial D)$	−4.08	−1.21	−1.20	−1.70

SOURCE.—See our unpublished appendix.

NOTE.—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 still refer to the untransformed data.

* Significant at the 1 percent level (one-tail test).

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 by Hammer (1986, p. 584).

Broadly speaking, the analysis of saving in these three New World economies offers strong support for the dependency hypothesis. The exception to this rule is the United States, the New World country that, on the basis of previous microeconomic analysis, has the most supportive dependency rate and life cycle literature. Table 2 reports these unexpected findings: definitive support for the hypothesis that the changing U.S. age distribution has affected the macroeconomic aggregates has proven elusive.[13]

Of course, it is tempting to expect too much of the model. In the short to medium term, however, a dependency rate theory of saving is clearly unable to track long-swing and Kuznets cycle phenomena. Such phenomena include the typical long-wave, boom-and-bust variations in macroeconomic aggregates so clearly evident over this period. The dependency rate theory is much better suited to analysis over the medium to long term where such variations wash out: a sound motivation for the long time-series analysis pursued here.[14]

On a more positive note, table 2 suggests that the impact of dependency rates in the other three New World countries was highly sig-

[13] In some very recent work, Fair and Dominguez (1991) explored a time-series approach for the period 1954–88 and found that the age distribution enters as a significant determinant of U.S. aggregate saving. Their results have little to say, however, about dependency rates and savings rates in the late nineteenth and early twentieth centuries, a link that appears weak for the United States in our own tests. The ambiguity surrounding the link was highlighted in a recent discussion by Edelstein (1991), who found that the impact of declining dependency rates in the United States from 1890 to 1910 could translate into increases in the savings rate of 0.44, 1.69, or 4.08 percentage points, depending on whose estimates are used. Edelstein contrasted the large impact on savings rates arising from a Leff-type calculation with more modest figures derived from a Modigliani-Sterling (1983) formula.

[14] We return to this point in our concluding remarks, but it suffices to say that those wishing to test the life cycle or dependency rate theories of saving with macroeconomic data face frustration. The use of multicountry cross sections for short periods (or even a single year) raises the possibility of omitted variable bias, a typical criticism of Leff's original study. The use of long time series for a few countries (or only one country) raises the question of the structural stability of the savings equation and inclines the model to track poorly over the short to medium term. It may be that a panel of medium-length time series for groups of sufficiently similar countries offers the best compromise. For the United States at least, it will certainly require further research to reconcile the differences in the array of estimates arising from variations in the quality of the data, the length and scope of the time series, and the sensitivity of the hypotheses to alternative model specifications.

nificant 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.

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 a 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. 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)? We claim that the natural counterfactual, couched in these terms, 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 2 to estimate the counterfactual rise in New World savings rates (excluding the United States, naturally). 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. The appropriate measure is[15]

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[15] Let D^j denote the young dependency rate in country j, and ΔD^j denote the dependency rate gap in country j relative to Britain, written $\Delta D^j = D^j - D^{UK}$. The impact of changes in the dependency rate on savings rates for three New World capital importers operates 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 (S^j), investment (I^j), and net foreign investment (NFI^j) in each country: NFI$^j = I^j - S^j$. With invariant levels of domestic investment under counterfactual conditions, any increase in the total domestic savings level spills over into a one-for-one decrease in the current-account balance, crowding out foreign investment: ΔNFI$^j = -\Delta S^j$. To estimate the change in total domestic savings due to "demographic crowding-out," we first observe that the counterfactual change in the savings rate is given by $\Delta s^j = \Delta(S/Y)^j = -\hat{\beta}_{D^j}\Delta D^j$. The implied change in the level of total domestic savings may be imputed using an estimate of country j's national income Y^j, and hence the implied spillover into the balance of payments, and thus the net foreign investment crowded out, is given by the formula that follows.

$$\text{demographic crowding-out} = -\Delta\text{NFI}^j = \Delta S^j$$
$$= Y^j\Delta s^j = -Y^j\hat{\beta}_{Dj}\Delta D^j.$$

This crowding-out may be expressed in terms of its impact in either the sending or receiving region. For any receiving region j (a country or a group of countries), we may calculate the share of demographic crowding-out in total worldwide British net foreign investment (NFI $= \Sigma_j \text{NFI}^j$), or we may calculate the share of the demographic crowding-out in total British net foreign investment *in that region alone* (NFI^j):

$$\text{share of total British NFI crowded out in country } j = \frac{-\Delta\text{NFI}^j}{\sum_j \text{NFI}^j},$$

$$\text{share of British NFI in country } j \text{ crowded out in country } j = \frac{-\Delta\text{NFI}^j}{\text{NFI}^j}.$$

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 New World behaved exactly like one or all of the three countries, then we have established an *upper bound* or maximal impact associated with demographic influences (e.g., "so goes Argentina, so goes 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 midrange 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 and dependency rate estimates). Each group's demographic crowding-out is examined from the point of view of both the sending and receiving regions. The results are presented in table 3.

Counterfactual 1: How Much of Total British Net
Foreign Investment Would Have Been Crowded out in
the Three New World Economies Alone (MIN Estimate)?

Part A of 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's (1972) and Edelstein's (1982, app. 1) estimates of total British capital outflows. The levels of crowding-out suggest that demographic influences at their peak may have been responsible for pulling as much as 46 percent of total British capital exports to these three countries alone between 1901 and 1906; the figure was 28 percent for 1907–13. The impact was much smaller before 1891, not because dependency rate gaps were smaller (they were larger), nor because elasticities were lower (they are assumed constant), but because national incomes and, thus, savings shortfalls in those three countries were modest in relation to total British capital export potential. Thereafter, demographic crowding-out in the three New World economies always amounted to at least 25 percent of total British NFI.

Part B of table 3 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.[16] This counterfactual implies that about 31 percent of total British capital exports would have been displaced by demographic crowding-out in the three New World economies alone (compared with 28 percent in part A of table 3); just 6 percent would have been displaced in the two Empire regions, Argentina itself being responsible for a massive 26 percent. The 31 percent figure is taken as our MIN estimate for the impact of demographic crowding-out.

Counterfactual 2: How Much of the Three New World Economies' Net Foreign Investment Would Have Been Crowded Out (MID1 Estimate)?

Part B of table 3 also explores the implications of a reduced dependency burden for the receiving regions. Had they had counterfactual British dependency rates, the three New World economies would have greatly reduced their dependence on foreign capital: Canada by 18 percent, Australia by 31 percent, and Argentina by an enormous 245 percent. In a dramatic illustration of the potential influence of the dependency burden, this latter figure suggests that, with a British dependency rate, Argentina would have been a net capital exporter around 1910. The average share of NFI crowded out in the three New World economies combined is estimated to have been 81 percent, our MID1 estimate.

[16] 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).

TABLE 3

A. 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 of Cols. 1–3 (4)	(5)	(Col. 4/Col. 5) (6)
1884–90	5.3	1.3	1.2	7.8	82.7	9%
1891–1900	13.0	1.3	1.4	15.7	49.8	31%
1901–6	20.4	3.2	3.1	26.7	57.8	46%
1907–13	41.4	2.8	6.4	50.6	181.3	28%

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B. DEMOGRAPHIC CROWDING-OUT IN SIX NEW WORLD ECONOMIES, 1907–13

	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	6.4	36.2	18%	4%
Australia	2.8	9.3	31%	2%
Argentina	41.4	16.9	245%	26%
Brazil	30.1	12.6	239%	19%
Chile	4.5	3.9	115%	3%
Mexico	23.4	4.8	483%	15%
First three	50.6	62.4	81%	31%
Empire pair	9.2	45.5	20%	6%
Latin four	99.4	38.3	260%	62%
All six	108.6	83.8	130%	67%
All countries		161.1		

SOURCE.—Panel A: British NFI from Edelstein (1982, app. 1). Panel B: Nominal national income estimates are obtained for Brazil, Chile, and Mexico using Maddison's (1989, p. 113) estimates of the real rankings of gross domestic product (in 1980 U.S. dollars) of these countries relative to those of the United Kingdom in 1913 and Mitchell's (1983) estimate of nominal national income in the United Kingdom. Dependency rates are also taken from Mitchell, by taking the nearest census and working out the dependency rate gap relative to that in the United Kingdom in that year. See our unpublished appendix for U.K. dependency rate sources. Census dates are 1920 for Brazil, 1907 for Chile, and 1910 for Mexico.

Counterfactual 3: How Much of Total British Net
Foreign Investment Would Have Been Crowded out in
the Six New World Economies Alone (MID2 Estimate)?

To extend our analysis to other New World countries (but, to repeat, *not* the United States), 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 ($\hat{\beta}_{Dj} = -0.80$).[17] Part B of table 3 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 large in Latin countries: the Brazilian counterfactual alone displaces 19 percent of British NFI, and Mexico and Chile add another 18 percent. Added to the already large Argentine figure, demographic pull effects in the four Latin American countries may have accounted for more than 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 percent of total British NFI, our MID2 estimate.

Counterfactual 4: How Much of the Six New World
Economies' Net Foreign Investment Would Have Been
Crowded Out (MAX Estimate)?

As a corollary to the calculations above, we now examine the impact of demographic crowding-out on foreign capital from the point of view of the six receiving New World countries. Part B of table 3 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 20 percent. 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, 130 percent of British NFI would have been crowded out by augmented domestic savings in the six countries, our MAX estimate.

V. Conclusion

What prompted the huge capital export from Britain around the turn of the century? The scarcity of capital abroad, of course. But

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[17] We could just as easily have used the Argentine parameter estimate ($\hat{\beta}_D^{ARG} = -1.60$), but that would have implied even larger effects.

was this scarcity induced by a buoyant investment demand boom or by a savings shortfall at the periphery? In some sense, both mattered. Yet the results above appear to favor the latter as a key difference between capital markets in the Old and New Worlds, and indicate that a sizable share of British overseas investment before World War I took the form of an intergenerational transfer. Consideration of a number of counterfactual alternatives 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 in some way be biased, because of flaws either in the modeling or in the econometrics. We can think of two potential biases, but they operate in different directions.

On the one hand, since we estimate saving as investment plus the current account, our results may be biased if investment was correlated with the dependency rate and if the current account was a binding constraint. An obvious example is offered by the population-sensitive investment categories noted earlier. In this case, higher dependency rates would have been associated with augmented investment demand and diminished savings supply. If the New World economies were in any way savings constrained, these forces would have tended to offset each other, diminishing the measured dependency rate impact on aggregate saving. Such influences would tend to bias toward zero our estimate of the direct dependency rate impact on saving, since we are trying to estimate the direct impact of D on s with I held fixed. If 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 general equilibrium, 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 rise in savings observed in the counterfactual. 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 if we were to allow general equilibrium to operate. 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.

Since we do not wish to oversell the accuracy or completeness of the analysis, some words of caution are in order. The paper does not present a theory nor offer any explanation of Kuznets cycles or long swings, the pronounced yet enigmatic long waves observable in macroeconomic aggregates in New World and Old, and most markedly evident in the late nineteenth and early twentieth centuries. The interested reader is directed to the resurgent literature on this topic (Solomou 1987; Rowthorn and Solomou 1991). Our savings function estimates include no long-swing variables except the growth rate of real income, and this enters the equation insignificantly all the same. Thus our model was not designed to track savings booms and busts in the short to medium term.

Notwithstanding these caveats, there seems to be ample evidence that the dependency rate hypothesis was alive and well in 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 from one-third to all 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 I should be viewed as an intergenerational transfer.

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