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Debt, Dependence and the Demographic Transition: Latin America in to the Next Century

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Summary. — In the decades ahead, world demographic trends indicate that our planet's share of the population of working age will be gradually diminishing. The regional incidence of the trends, however, shows a marked bias. Thus, the general equilibrium of the world saving-investment nexus may be fundamentally realigned in the years to come via dependency effects. For example, favorable demographic prospects in Latin America (and elsewhere in the developing world) offer poorer countries the chance to use the potential of their own demographic transitions to propel financial transitions to domestically financed accumulation, even capital export.

1. INTRODUCTION

When the world capital market of the late 20th and early 21st centuries is discussed in historical perspective, what are likely to be the most profound changes which will attract the attention of tomorrow's scholars?

Looking back over the last 30 or so years, some would claim that the massive expansion in international finance, and, in particular, the growth of lending from the developed world to the less-developed world, constitutes the most significant long-run development in international financial markets. As a corollary, one might identify the emergence of the Third World debt crisis in the early 1980s its most controversial legacy for the decades ahead. The origins of the debt crisis have been debated elsewhere, and the impact of the crisis in the debtor countries needs little elaboration: rising levels of debt relative to national income and export earnings, an ever-diminishing capacity to repay, and the never-ending circus of renegotiation and rescheduling (Sachs, 1989). The crisis was felt nowhere more acutely than in Latin America, where notorious defaulters such as Mexico and Brazil repeatedly made the financial headlines. In this predicament, the debtor countries needed to borrow yet more financial capital to repay what they already owed. Suspensions of both principal and interest payments left these countries still in need of net capital-imports from outside. In a group of 11 large Latin American countries, only one — Venezuela, an oil exporter — had a net current-account surplus during the 1980s (Figure 1).

Looking forward to the next 30 years, some economic soothsayers cast a pessimistic glance at rising dependency rates in the developed world, as our population of elderly people grows ever larger thanks to the developments in modern medicine and health care. They conclude, in accord with the dependency-rate hypothesis of saving, that financial capital will get only more scarce as these cohorts of dependents place an ever greater demographic burden on the capacity of developed countries to save and invest, whether at home or abroad. The pessimist case has been eloquently argued of late by Deepak Lal, who not only calculates the implications of higher dependency rates on saving, but goes on to derive the effects on rates of growth. Lal concludes that the future looks bleak:

> Output growth slows to about 1.5% p.a. in OECD and to 3.4% in developing countries. With population growing at roughly 2.2% p.a. in LDCs and at 0.8% in industrial

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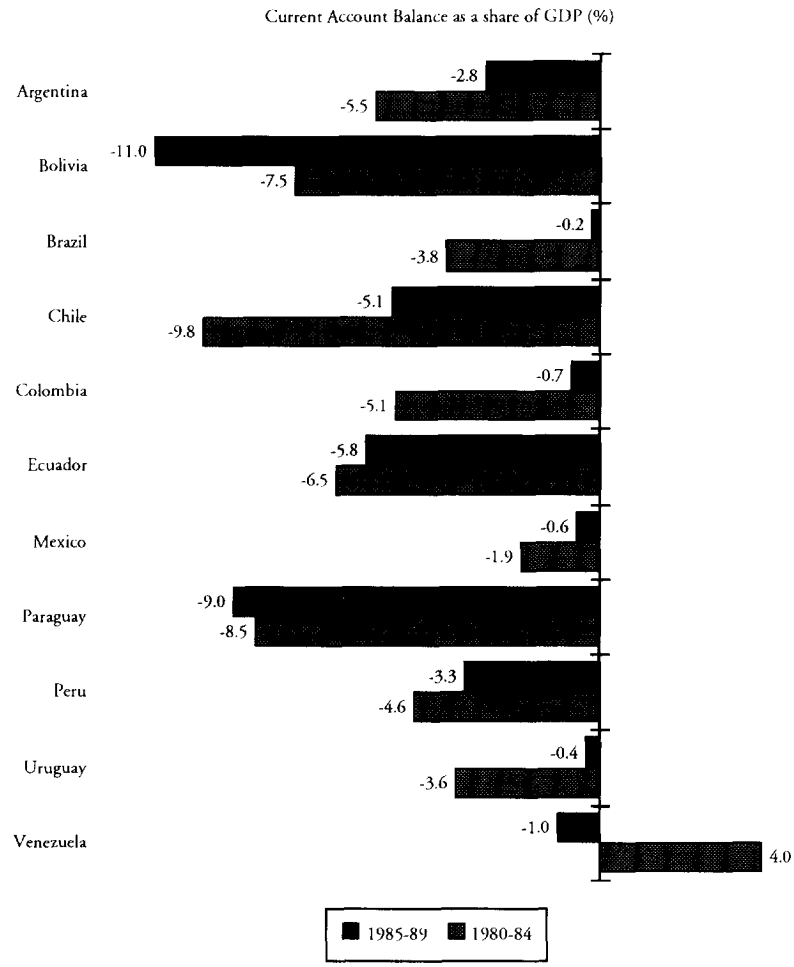

Figure 1. *Current account balances as a share of GDP: 11 Latin American countries 1980–89. Source: The World Bank (1991).*

> economies,...these results imply very modest per capita growth rates of income in both regions...The picture thus appears fairly gloomy (Lal, 1991).

Of course, these two crises in international capital markets, past and future, are not unrelated, and some disturbing questions arise. Will increasingly scarce capital in world markets diminish international capital flows? How would this affect borrower nations in the Third World, many of them already mired in a debt crisis and heavily dependent on external finance? Are the gloomy prospects offered by the pessimists for world saving and economic growth a disaster for the developing countries? The pessimist case applies by extension to the less-developed world: if savings are scarce worldwide, then the developed countries will have even less excess financial capital to export. Required rates of return will have to rise, choking off capital formation in the Third World. Economic growth everywhere, not just in the rich countries, will experience massive reduction, and for this reason the scarcity of capital is a concern to all.

This essay takes a different, more optimistic, view of the future prospects for saving, investment and economic growth in the Third World. Its emphasis will be on one region, Latin America — a region where the consequences of external dependence in capital markets have had a deep and lasting impact on the course of development. One might expect that scarce capital in world markets would have grave consequences for the Latin countries, given their acute and seemingly chronic need for capital inflows. I argue that the pessimist case, in analyzing world capital markets from a partial-equilibrium perspective, neglects a crucial escape route that presents itself to dependent developing countries like those in Latin America. In fact, the very dependency-rate hypothesis which forms the basis of the pessimist case offers these countries the

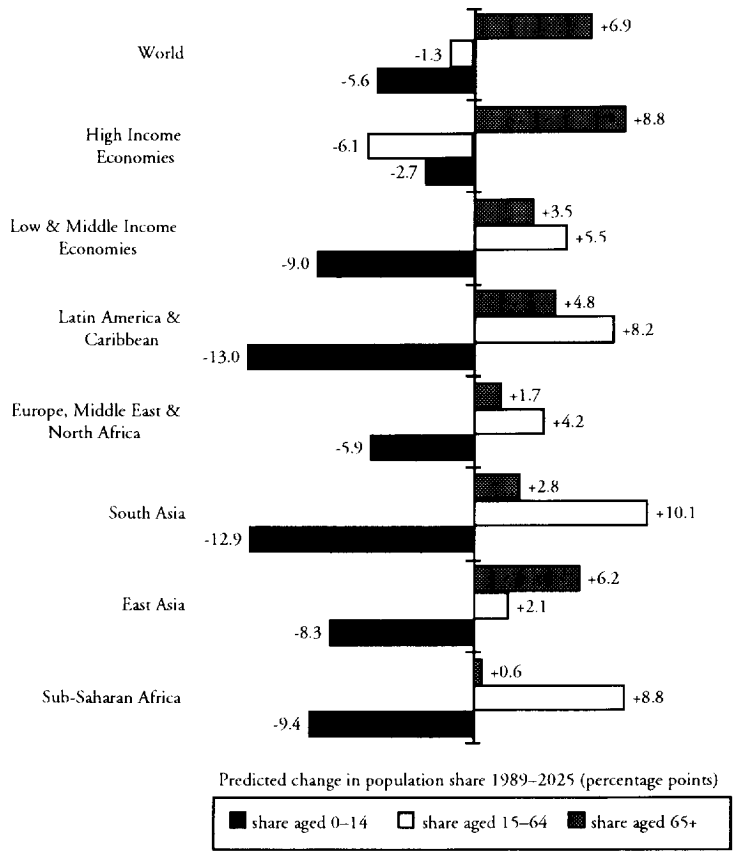

Figure 2. *World demographic predictions: Age structure 2025 versus 1989. Source: The World Bank (1991).*

chance for self-sufficiency in capital formation based on their own augmented savings. At the same time, long-run demographic changes also shift investment demand requirements across countries. This is possible, even likely, because the progress of the worldwide demographic transition is at very different stages in the developed and less-developed countries (LDCs). A plausible consequence, I show, is that the demand for foreign capital in Latin America (and conceivably, by extension, for other LDCs) will steadily decline over the next 30 years, and even reverse, with a profound switch to sizable current account surpluses.

2. POPULATION CHANGE, SAVING AND INVESTMENT: THE WORLD IN DEMOGRAPHIC TRANSITION

Our understanding of population trends over the next 30 years is based on careful calculations by demographic experts. Their predictions rest on elaborate models of age- and income-specific birth and death rates and an iterative solution method which tracks the population structure cohort by cohort. The most up-to-date forecasts are those recently presented by the World Bank (Table 1). These figures reveal the basis of the pessimist case: during 1989–2025 the share of the population of working age (15–64 years) will decline in the high-income economies, by 6.1 percentage points from 66.8% to 60.7%. On the one hand, the child dependency-rate (the share of the population aged 0–14 years) is tipped to decline by 2.7 points from 20.5% to 17.8%, following the usual demographic transition to lower fertility rates. This decline, however, is overwhelmed by a rise in the elderly dependency-rate (the share of the population aged over 65), which will grow by 8.8 points, almost doubling from 9.4% to 16.3% — the elderly explosion the pessimists so fear.

Significantly, viewed in the context of worldwide demographic trends, this pattern of demographic

Table 1. *World demographic predictions: Age structure, 1989–2025*

	Share of population aged 0–14 (%)			Share of population aged 15–64 (%)			Share of population aged 65+ (%)		
	1989	2025	Change	1989	2025	Change	1989	2025	Change
A. World, By Region									
Low & Middle Income Economies	35.7	26.7	–9.0	59.7	65.2	+5.5	4.6	8.1	+3.5
Sub-Saharan Africa	46.8	37.4	–9.4	50.6	59.4	+8.8	2.6	3.2	+0.6
East Asia	29.8	21.5	–8.3	64.8	66.9	+2.1	5.4	11.6	+6.2
South Asia	38.7	25.8	–12.9	57.4	67.5	+10.1	3.9	6.7	+2.8
Europe, Middle East & North Africa	35.4	29.5	–5.9	58.3	62.5	+4.2	6.3	8.0	+1.7
Latin America & Caribbean	36.6	23.6	–13.0	58.9	67.1	+8.2	4.5	9.3	+4.8
High Income Economies	20.5	17.8	–2.7	66.8	60.7	–6.1	12.7	21.5	+8.8
World	25.8	20.2	–5.6	64.8	63.5	–1.3	9.4	16.3	+6.9
B. Latin American Countries									
Costa Rica	36.2	22.1	–14.1	59.6	66.3	+6.7	4.2	11.6	+7.4
Dominican Republic	38.1	23.2	–14.9	58.4	68.0	+9.6	3.5	8.8	+5.3
El Salvador	44.7	22.7	–22.0	52.1	67.4	+15.3	3.2	9.9	+6.7
Guatemala	45.7	28.9	–16.8	51.5	66.4	+14.9	2.8	4.7	+1.9
Haiti	40.1	31.0	–9.1	55.8	64.0	+8.2	4.1	5.0	+0.9
Honduras	45.0	28.1	–16.9	51.7	66.9	+15.2	3.3	5.0	+1.7
Jamaica	33.8	20.9	–12.9	59.2	67.9	+8.7	7.0	11.2	+4.2
Mexico	38.1	22.9	–15.2	58.3	68.3	+10.0	3.6	8.8	+5.2
Panama	35.4	21.9	–13.5	59.9	67.2	+7.3	4.7	10.9	+6.2
Trinidad & Tobago	33.6	22.2	–11.4	60.7	65.8	+5.1	5.7	12.0	+6.3
Argentina	29.9	21.5	–8.4	61.1	65.0	+3.9	9.0	13.5	+4.5
Bolivia	43.9	31.1	–12.8	52.9	64.6	+11.7	3.2	4.3	+1.1
Brazil	35.5	22.8	–12.7	60.1	66.9	+6.8	4.4	10.3	+5.9
Chile	30.7	21.3	–9.4	63.4	65.7	+2.3	5.9	13.0	+7.1
Colombia	35.9	22.2	–13.7	60.0	67.9	+7.9	4.1	9.9	+5.8
Ecuador	40.1	24.0	–16.1	56.3	68.4	+12.1	3.6	7.6	+4.0
Paraguay	41.1	30.2	–10.9	55.4	63.7	+8.3	3.5	6.1	+2.6
Peru	38.4	23.8	–14.6	58.1	68.4	+10.3	3.5	7.8	+4.3
Uruguay	25.9	20.0	–5.9	62.7	63.9	+1.2	11.4	16.1	+4.7
Venezuela	38.5	23.3	–15.2	57.9	67.5	+9.6	3.6	9.2	+5.6

Source: The World Bank (1991).

change is the exception, not the rule. In fact, everywhere else, in both low- and middle-income economies, the decline in youth dependency rates dominates the growth in the elderly fraction of the population (Figure 2). These countries are predicted to experience an increase in their shares of population of working age, on average a rise of 5.5 points from 59.7% to 65.2%, whereupon the share would exceed the figure for high-income economies. The pattern is repeated throughout the regions of the less-developed world, and striking examples include South Asia (+10.1 points), Sub-Saharan Africa (+8.8 points) and Latin America and the Caribbean (+8.2 points). Looking more closely, the pattern is followed even on a country-by-country basis within Latin America (Table 1, Panel B).

Obviously, the developing world is at a completely different and earlier phase in the demographic transition than the developed world, and our intuition as to the likely demographic impacts of world population change on capital flows as we enter the next century must be careful to differentiate between the high-income economies and the rest. A focus on the former is too restrictive, since one cannot neglect the impact of demographic changes in the less-developed world. The question remains, what impact will such changes have? Can they counter the pessimist case? The key issue is this: can demographically induced changes to net excess savings supply in less-developed countries over the next 30 years reduce their external dependence on foreign capital imports, and thus delink them from a global borrowing environment supposedly constrained by a savings shortfall in the high-income group of countries?

Using as my case study a sample of Latin American countries, I will address this question in two stages. First, we must take seriously the claim that demographic structure effects saving and investment; I will

test such a theory using Latin American macroeconomic panel data for the postwar period. Second, I implement the following "natural" counterfactual exercise: if the Latin American group of countries had their predicted year-2025 age-distributions today, how would their savings rates, investment rates, and, hence, dependence on foreign capital via the current account, be affected? It will be seen that the demographic changes likely to occur in Latin America over the next 30 years could alleviate savings constraints significantly, crowding out larger and larger shares of foreign capital, to the extent that dependence on foreign capital (in the form of current account deficits) could be eliminated, even reversed by 2025. Indeed, if the figures are correct even to an approximation, Latin America might then be a major capital exporter in the world economy, running sizable current account surpluses.

3. POPULATION CHANGE, SAVING AND INVESTMENT: THEORY AND PRACTICE

The notion that demographic characteristics in a population may determine patterns of aggregate consumption and saving dates back to the development of the life-cycle theory by Franco Modigliani *et al.* (Modigliani and Ando, 1957; Ando and Modigliani, 1963; Modigliani, 1966). The basic idea was that high saving in mid-life years would offset "dis-saving" in early and later life. The first serious empirical tests of the model in the context of the developing world came with the seminal work of Nathaniel Leff, who turned the theory around to regard dependency rates as the determinant of savings rates, inputing an inverse relationship (Leff, 1969). The relationship was confirmed in cross-section data for a large sample of countries, but the debate these findings sparked gradually dissipated the force of the argument. Critics objected to the lack of a formal model, the omitted-variable problem, and the sample-selection criteria, and a succession of authors attacked the premise. The dependency-rate hypothesis, however, has returned to the fore with a tight model developed by Maxwell Fry and Andrew Mason, and empirically verified in cross-section (Mason, 1981; Fry and Mason, 1982; Fry, 1985; Mason, 1987; Mason, 1988).[1]

The turbulent path of the dependency-rate hypothesis through the literature gives us useful insights into the pessimist case which we seek to analyze. One element in the dependency-rate theories that has run into deep trouble is the assertion that elderly dependents generate dis-savings in the same way as children. We know that children "dis-save," since they form a consumption burden, and do not engage in productive activity. The same is not necessarily true of the elderly: they may have considerable income from investments and they may save due to bequest motives. Kotlikoff and Summers noted that in their sample the elderly were, for whatever reason, one of the groups with the highest propensity to save (Kotlikoff and Summers, 1981). In this way the pessimist case rests on shaky ground: there may be more elderly around in the developed world over the next decades, but they might well contribute more aggregate saving, not less. On the other hand, substantial predicted declines in dependency rates in the less-developed world, driven in large part by reductions in child dependency-rates (Figure 1), offer what is arguably a more credible guarantee of augmented saving capacity, as consumption burdens are reduced.

The discussion thus far has centered on savings in the aggregate, but two other topics need to be mentioned. First, savings may be disaggregated into public and private savings. Should these components be similarly affected by demographic change? The aforementioned literature has exhaustively discussed this point. To some extent we expect similarity in the two since they are substitutes to some degree. Moreover, just as children and the aged are dependents in the private sector of the economy, so too they represent a potential drain on the public coffers, depending on the structure of welfare policy and services provided by government. In this paper, the separate components are explicitly considered by an analysis of both private and public consumption in the Latin American sample.

Second, on the other side of the current account identity, what of the demographic determinants of investment? Here, no debate to rival the dependency-rate hypothesis has surfaced. Economic historians, however, have long appreciated the importance of population-sensitive categories of investment (housing, infrastructure and education, for example) as being one demographically sensitive aspect of accumulation, a topic which has been studied in detail for the New World frontier regions of the late-19th century (Hall, 1963; Green and Urquhart, 1976; Edelstein, 1982). More recently, econometric studies by Brander and Dowrick (1994), Higgins (1992), and Taylor (1994) have confirmed the importance of labor-supply effects (through the share of population of working age) as a major positive influence on investment rates. Clearly, investment, and not just saving, also warrants exploration as a source of current-account movements in the context of demographic change. In the next section, just such issues are examined in a model of aggregate demand — including components of both saving and investment — using contemporary macroeconomic data for Latin America.

4. POPULATION CHANGE, SAVING AND INVESTMENT: LATIN AMERICA IN THE LATE-20TH CENTURY

The dependency-rate hypothesis, then, is a hypothesis to be tested empirically. I therefore chose to test it

Table 2. *Aggregate demand determinants: Consumption and investment by random effects estimation**

Sample	*HIINC*	*MIDINC*	*LOINC*	*AFRI*	*ASIA*	*SCAM*	*ALL*
NOBS	110	205	135	170	85	115	515
Dep. vble.: *CC*							
G	4.43	0.35	−7.65	9.28	7.01	7.20	0.44
	(2.53)	(0.14)	(0.79)	(1.66)	(1.21)	(2.75)	(0.28)
*D*1	−0.15	0.26	0.18	0.35	0.57	0.26	0.30
	(1.71)	(2.07)	(0.41)	(1.09)	(2.01)	(1.80)	(4.94)
*D*2	0.46	−0.11	−0.14	0.02	−0.09	0.06	0.10
	(2.25)	(0.47)	(0.22)	(0.06)	(0.16)	(0.26)	(0.68)
*D*3	−0.30	−0.15	−0.04	−0.37	−0.48	−0.32	−0.40
	(1.37)	(0.49)	(0.04)	(0.62)	(0.58)	(0.99)	(2.12)
*GD*1	8.34	−0.47	7.38	3.57	−5.35	−3.37	0.37
	(6.18)	(0.26)	(0.87)	(0.69)	(1.15)	(1.69)	(0.37)
*GD*2	−10.78	−0.73	9.37	15.55	−9.58	−12.40	−1.36
	(3.34)	(0.19)	(0.71)	(2.03)	(1.15)	(2.90)	(0.52)
*GD*3	2.44	1.20	−16.75	−19.11	14.93	15.77	0.99
	(0.71)	(0.23)	(0.81)	(1.59)	(1.20)	(2.80)	(0.30)
ln *PC*	−0.39	−0.01	0.15	0.18	−0.03	−0.19	0.11
	(3.47)	(4.49)	(1.56)	(2.01)	(1.29)	(4.05)	(5.90)
R^2	.98	.94	.93	.92	.97	.97	.94
Dep. vble.: *CI*							
G	−1.22	−0.80	−2.95	0.10	−4.46	−0.13	0.48
	(0.62)	(0.37)	(0.49)	(0.03)	(0.85)	(0.05)	(0.40)
*D*1	0.34	−0.08	−0.14	−0.34	−0.24	0.05	−0.15
	(2.92)	(0.86)	(0.55)	(1.65)	(0.94)	(0.52)	(3.59)
*D*2	−0.04	0.24	0.20	−0.01	0.47	0.11	0.12
	(0.19)	(1.25)	(0.52)	(0.04)	(0.92)	(0.61)	(1.06)
*D*3	−0.30	−0.17	−0.06	0.35	−0.24	−0.16	0.02
	(1.18)	(0.65)	(0.11)	(0.89)	(0.32)	(0.67)	(0.17)
*GD*1	−6.23	1.79	3.24	2.98	3.78	1.01	−0.62
	(3.93)	(1.10)	(0.61)	(0.84)	(0.89)	(0.54)	(0.80)
*GD*2	5.43	1.11	3.59	−2.13	6.64	0.36	0.23
	(1.49)	(0.33)	(0.43)	(0.40)	(0.89)	(0.09)	(0.11)
*GD*3	0.80	−2.91	−6.83	−0.86	−10.42	−1.37	0.40
	(0.21)	(0.63)	(0.53)	(0.10)	(0.92)	(0.26)	(0.15)
ln *PI*	−0.15	−0.14	−0.08	−0.09	−0.14	−0.15	−0.11
	(1.77)	(0.94)	(0.40)	(1.76)	(0.14)	(1.02)	(2.83)
R^2	.94	.82	.71	.63	.89	.91	.83
Dep. vble.: *CG*							
G	−1.91	−1.79	1.34	2.10	−5.52	0.13	−0.96
	(1.74)	(1.31)	(0.18)	(0.56)	(1.31)	(0.09)	(0.96)
*D*1	−0.16	0.02	0.12	−0.03	−0.27	0.01	0.03
	(2.18)	(0.29)	(0.38)	(0.17)	(1.28)	(0.15)	(0.83)
*D*2	−0.40	−0.11	−0.15	−0.14	−0.58	0.04	−0.10
	(2.99)	(0.85)	(0.32)	(0.54)	(1.36)	(0.33)	(0.99)
*D*3	0.56	0.09	0.03	0.17	0.85	−0.05	0.06
	(3.70)	(0.50)	(0.04)	(0.43)	(1.40)	(0.29)	(0.51)
*GD*1	0.85	0.44	−2.65	−2.57	4.99	−0.94	0.38
	(1.00)	(0.43)	(0.41)	(0.74)	(1.48)	(0.88)	(0.61)
*GD*2	2.85	2.76	−0.90	−2.59	6.98	−0.17	1.18
	(1.40)	(1.28)	(0.09)	(0.50)	(1.16)	(0.07)	(0.71)
*GD*3	−3.70	−3.20	3.55	5.17	−11.97	1.11	−1.56
	(1.66)	(1.10)	(0.23)	(0.64)	(1.33)	(0.36)	(0.74)
ln *PC*	−0.07	−0.07	−0.04	−0.04	−0.07	−0.06	−0.05
	(5.53)	(2.58)	(0.69)	(1.65)	(1.96)	(1.53)	(3.74)
R^2	.79	.69	.78	.79	.80	.75	.70

*Absolute *t*-statistics appear in parentheses.

Specification: All regressions are random-effects models with panel data 1965–89, five-year averages, five periods per country. The following sets of coefficients are constrained to sum to zero: (*D*1, *D*2, *D*3) and (*GD*1, *GD*2, *GD*3). The constant terms are not shown

(Table 2 footnotes continued opposite)

Table 3. *Latin America: Demographic effects on consumption and investment*

Partial derivates of real aggregate demand shares of GDP with respect to age distribution shares		
Private consumption (*CC*)	Investment (*CI*)	Public consumption (*CG*)
$\partial(CC)/\partial D1 = 0.192$	$\partial(CI)/\partial D1 = 0.068$	$\partial(CG)/\partial D1 = -0.007$
$\partial(CC)/\partial D2 = -0.204$	$\partial(CI)/\partial D2 = 0.120$	$\partial(CG)/\partial D2 = 0.035$
$\partial(CC)/\partial D3 = 0.012$	$\partial(CI)/\partial D3 = -0.188$	$\partial(CG)/\partial D3 = -0.028$

Source: Table 2. Coefficients are calculated at the 1985–89 sample mean of G for the SCAM sample (2.1%).

on a sample of Latin American countries, using panel data over the last 20 years.

Table 2 presents the results of a very general econometric model of the determinants of aggregate-demand shares following Taylor (1994). The model incorporates three types of control variable. First, the growth rate G, to account for changes in saving and investment behavior as predicted in the standard neoclassical growth model along the transitional dynamic, a simultaneity in saving and investment noted by Obstfield (1986, 1994) in the context of capital mobility tests, but of equal importance here. Second, controls are applied for the demographic structure, using the vector ($D1$, $D2$, $D3$) and its interaction with G; here, the D components represent the shares of the population age distribution in the 0–14, 15–64 and 65+ groups, respectively, with both direct effects and Mason-Fry type growth-interaction effects (both were found to be significant). Finally, controls are incorporated for macroeconomic price structures which vary greatly across countries; here (*PC, PI, PG*) denote the relative prices of private consumption, investment and public consumption, respectively, it being already well known that investment prices at least explain a good deal of crosscountry investment variance (De Long and Summers, 1991; Jones, 1992; Taylor, 1994).[2] To summarize, the model takes the following form:

$$CC_{it} = \alpha_C + \beta_C\,(G,\ D1,\ D2,\ D3,\ \mathrm{G}.D1,\ G.D2,\ G.D3,\ \ln PC)'_{it} + uC_i + vC_{it},$$

$$CI_{it} = \alpha_I + \beta_I\,(G,\ D1,\ D2,\ D3,\ \mathrm{G}.D1,\ G.D2,\ G.D3,\ \ln PI)'_{it} + uI_i + vI_{it},$$

$$CG_{it} = \alpha_G + \beta_G\,(G,\ D1,\ D2,\ D3,\ \mathrm{G}.D1,\ G.D2,\ G.D3,\ \ln PG)'_{it} + uG_i + vG_{it}, \qquad (1)$$

where the β_X are coefficient row-vectors, uX_i are country effects and vX_{it} are error terms.

Since theory posits only an explanation of real consumption and investment activity, care is taken to estimate (1) with dependent variables (*CC, CI, CG*) evaluated at world prices.[3] Data are taken from the latest Penn World Table and the *Social Indicators of Development* (The World Bank, 1991; Summers *et al.*, 1993). In the time dimension, data are grouped into five five-year period averages for 1965–69 through 1985–89. The model fits well using a random-effects estimator for panel data in various samples, including restrictions to high-, low- and middle-income groups. Interest in this paper focuses solely on the column of results for the Latin American sample (SCAM), where the model performs adequately.[4]

(Table 2 footnotes cont.)

Tests of restrictions: For each regression, an F-test was applied to test for the presence of demographic effects, the null being that the coefficients of ($D1$, $D2$, $D3$, $GD2$, $GD3$) were equal to zero. Results: null always rejected, significance level $P = 0.00$.

Model selection: The following tests were made of alternate specifications. (a) Fixed effects versus random effects null, Hausman test, null always accepted, significance level $P = 1.00$. (b) Fixed effects versus OLS null, Chow test, null always rejected, significance level $P = 0.00$. (c) Random effects versus OLS null, Breusch-Pagan test, null always rejected, significance level $P = 1.00$.

Samples: HIINC (high income countries), *MIDINC* (middle income countries), *LOINC* (low income countries), *AFRI* (Africa), *ASIA, SCAM* (South and Central America), *ALL* (the full sample).

Variables: The variables used are as follows (* denotes a PWT variable, ** a SID variable). $CC = CC^*/100$, share of private consumption in GDP (current international prices); $CI = CI^*/100$, share of investment in GDP (current international prices); $CG = CC^*/100$ share of public consumption in GDP (current international prices); G = growth rate of real output ($RGDPCH^*$ times POP^*); $PC = (PC^*/P^*)$, relative price of private consumption; $PI = (PI^*/P^*)$, relative price of investment; $PC = (PG^*/P^*)$, relative price of public consumption; $DI = AGEA^{**}/100$, $D2 = AGEB^{**}/100$ and $D3 = 1–D1–D2$ are the share of population in age ranges 0–14, 15–64, and 65+ respectively.

Sources: PWT refers to Penn World Table, version 5.5. SID refers to Social Indicators of Development.

Table 4. *Current-account counterfactuals: Latin American Countries, 2025 versus 1989*

	Counterfactual change predicted with 2025 age distribution			Actual 1985–89	Counter-factual	Actual 1989	Base-line	Counter-factual	Counter-factual
	$\Delta(S/Y)$ %	$\Delta(I/Y)$ %	$\Delta(CA/Y)$ %	CA/Y %	CA/Y %	GDP US$bn	CA US$bn	CA US$bn	ΔCA US$bn
Costa Rica	3.13	–2.08	5.22	–8.00	–2.78	5.22	–0.42	–0.15	0.27
Dominican Republic	4.24	–1.13	5.37	–5.38	–0.01	6.65	–0.36	0.00	0.36
El Salvador	7.17	–1.01	8.18	–5.38	2.80	5.86	–0.32	0.16	0.48
Guatemala	6.71	0.45	6.26	–4.40	1.86	8.15	–0.36	0.15	0.51
Haiti	3.14	0.30	2.84	–7.90	–5.06	2.37	–0.19	–0.12	0.07
Honduras	6.29	0.56	5.73	–8.06	–2.33	4.32	–0.35	–0.10	0.25
Jamaica	3.96	–0.78	4.74	–7.56	–2.82	3.88	–0.29	–0.11	0.18
Mexico*	3.81	–1.20	5.01	–0.58	4.43	200.73	–1.16	8.90	10.06
Panama	3.37	–1.63	5.00	–1.38	3.62	4.55	–0.06	0.16	0.23
Trinidad & Tobago	3.13	–1.20	4.33	–4.34	–0.01	4.20	–0.18	0.00	0.18
Argentina*	1.68	–1.34	3.03	–2.84	0.19	53.07	–1.51	0.10	1.61
Bolivia	4.31	0.40	3.91	–11.00	–7.09	4.52	–0.50	–0.32	0.18
Brazil*	3.58	–2.26	5.84	–0.22	5.62	319.15	–0.70	17.94	18.64
Chile*	2.01	–2.09	4.10	–5.12	–1.02	25.25	–1.29	–0.26	1.03
Colombia*	4.08	–1.25	5.32	–0.72	4.60	39.41	–0.28	1.81	2.10
Ecuador*	4.70	–0.50	5.20	–5.76	–0.56	10.38	–0.60	–0.06	0.54
Paraguay	3.50	–0.35	3.86	–9.04	–5.18	4.13	–0.37	–0.21	0.16
Peru*	4.36	–0.76	5.11	–3.32	1.79	28.61	–0.95	0.51	1.46
Uruguay	1.37	–1.02	2.39	–0.36	2.03	7.17	–0.03	0.15	0.17
Venezuela*	4.35	–1.154	5.50	–1.02	4.48	43.83	0.45	1.97	2.41
"Big 8"	3.84†	–1.32†	5.16†	–2.39†	2.76†	667.36‡	–5.44‡	30.82‡	36.26‡
All	3.94†	–0.90†	4.85†	–4.62†	0.23†	781.45‡	–10.36‡	30.53‡	40.90‡

*Denotes "Big 8" group of countries by GDP rank ordering.
†Unweighted average.
‡Total.
Sources: Tables 1–3. The World Bank (1991). See text.
Note: Baseline CA is Actual 1989 GDP times Actual 1985–89 CA/Y.

What do the econometric results say about demographic change and its relationship to real aggregate demand? The results in Table 2 are interpreted here by evaluating partial derivatives of the aggregate demand components with respect to the D-vector, that is by evaluating $\partial CC/\partial Di$, $\partial CI/\partial Di$, and $\partial CG/\partial Di$ (for $i = 1, 2, 3$), in a calculation where G takes its sample average value in 1985–89 (which is 0.021). Table 3 presents these partial derivatives. With respect to real private consumption, the young represent the greatest burden for our sample ($\partial CC/\partial D1 = 0.192$); the working-age promote saving ($\partial CC/\partial D2 = -0.204$); and the elderly have little effect ($\partial C/\partial D3 = 0.012$). With respect to the real investment share, a strong labor-supply effect is evident in the large and positive $D2$ coefficient ($\partial CI/\partial D2 = 0.120$); the young place more modest demands on aggregate real investment ($\partial CI/\partial D1 = 0.068$) and increases in the elderly share reduce investment requirements ($\partial CI/\partial D3 = -0.188$). For public consumption the effects are weak, but, strangely, the main positive effect, albeit small, arises from the working-age share ($\partial CG/\partial D2 = 0.034$), with small negative effects associated with a rising young population ($\partial CG/\partial D1 = -0.007$) or aged population ($\partial CG/\partial D3 = -0.028$).

How might such partial derivatives translate into saving-investment shifts and movements in the current account? Some care is needed here, since such questions refer to nominal variables, that is, shares of saving and investment evaluated at domestic prices.[5] Accordingly we must adjust our coefficients for relative domestic (versus world) prices. Given the current account identity, $CA = S - I$, we may write $CA/Y = S/Y - I/Y$; hence, $CA/Y = 1 - C/Y - G/Y - I/Y$, where CA is the current account in nominal currency, Y is GDP, C and G are private and public consumption, S is saving ($S = Y - C - G$), and I investment. CA/Y here omits net factor income from abroad, $NFIA/Y$, which we assume invariant in the present comparative statics exercise; a fuller accounting would require comparative dynamics for example, of the country's debt path We then may calculate the following expressions:

$$\partial[CA/Y]/dD1 = \partial[S/Y]/\partial D1 - \partial[I/Y]/\partial D1,$$
where $\partial[S/Y]/\partial D1 = -PC\,\partial CC/\partial D1 - PG\partial CG/\partial DP1$,
$\partial[I/Y]/\partial D1 = PI\partial CI/\partial D1$;

$$\partial[CA/Y]/dD2 = \partial[S/YP]/\partial D2 - \partial[I/Y]/\partial D2,$$
where $\partial[S/Y]/\partial D2 = -PC\,\partial CC/\partial D2 - PG\,\partial CG/\partial D2$,
$\partial[I/Y]/\partial D2 = PI\,\partial CI/\partial D2$;

and

$$\partial[CA/Y]/dD3 = \partial[S/Y]/\partial D3 - \partial[I/Y]/\partial D3,$$
$$\text{where } \partial[S/Y]/\partial D3 = -PC\ \partial CC/\partial D3 - PG\ \partial CG/\partial D3,\ \partial[I/Y]/\partial D3 = PI\ \partial CI/\partial D3. \quad (2)$$

These estimated partial derivatives are used below to calculate counterfactual changes in Latin American foreign borrowing under the predicted 21st century age-distributions.

5. POPULATION CHANGE, SAVING AND INVESTMENT: LATIN AMERICA INTO THE NEXT CENTURY

The main concern of this paper is to identify whether a demographically induced scarcity of financial capital in the high-income economies could adversely affect saving, investment and capital flows in Latin America over the next 30 years. Having already identified a statistically significant link between demographic structure and the current account, I must now demonstrate that predicted demographic trends will entail quantitatively significant change in the region's capital flows. To do this I propose a novel counterfactual exercise: based on the 1985–89 patterns of consumption, saving and investment in Latin America, what would we predict as the counterfactual current-account balance of the 11 countries in our sample if instead they had had the predicted 2025 age-distributions during 1985–89?

The basis of this counterfactual is clear enough: if these countries had had the lower predicted 2025 dependency rates, they would have saved and invested differently, as indicated by our econometric results (Table 3). Invoking a small-country assumption for these countries in the context of world capital markets, we then assume that extra aggregate domestic saving crowds out foreign investment one-for-one; and we assume, symmetrically, that extra aggregate domestic investment crowds in foreign investment one-for-one. Thus, a one percentage-point rise in the nominal saving-to-GDP ratio (investment-to-GDP ratio) implies a one percentage-point decline (rise) in the nominal current account-to-GDP ratio.

The assumptions are restrictive, the demographic predictions debatable, the perturbation large, and the counterfactual ambitious — but the exercise serves its purpose as a means to approximate the impact of alleged demographic changes on external dependence and the evolving relationship of developing countries to world capital markets. The results are striking (Table 4). Translating these shifts in demographic structure reveals the huge potential for the crowding out of foreign borrowing. The 2025 age structure in Latin America, if applied now, might lead to increases in domestic saving in all countries (around four percentage points. For all but three countries in the sample, the shift in S/Y is predicted to be over three percentage points; nine countries exhibit shifts in excess of four percentage points. Simultaneously, investment demands are predicted to diminish, though the change in investment rates is not as dramatic as that in saving rates. The investment rate drops about 0.9 percentage points on average (1.3 percentage points in the Big 8). On net, then, shifts in the current account are going to be dominated by saving-dependency effects in most countries, and on average the predicted shift in the current account balance as a share of GDP (CA/Y) is an increase of five percentage points. The point to be emphasized here is that these impacts are quantitatively large: not just in terms of shifts in the saving, investment and current account shares of GDP, but also in terms of the amount of capital flow redirected relative to world capital market. Obviously, scale matters here: the biggest country, Brazil, might experience a current account change from –$1 billion per annum to about +$18 billion per annum, a shift of about $19 billion dollars. Mexico contributes another $10 billion, and Argentina, Chile, Colombia and Venezuela add about $7 billion per annum. The Big 8 group of countries together could supply a total change of $36 billion or so, and for the full sample the demographic shock might release about an extra $40 billion per annum into the world capital market.

Of course, such estimates are fraught with problems such as underlying demographic predictions, coefficient estimation in the model, assumptions of linearity with respect to large perturbations, and the small-country assumption of a partial-equilibrium framework where countries do indeed have the freedom to costlessly adjust their current accounts. In general equilibrium, we could expect the world interest rate to fall in the presence of such a capital supply shock, which would no doubt mute the size of the predicted change. All caveats notwithstanding, the final estimate is of an order of magnitude that cannot be ignored, even if its absolute accuracy is in doubt.[6] The shock would turn Latin America, collectively, from net borrower (of now $10 billion per annum from the rest of the world) to a net lender (of about $30 billion per annum); would after some lag erase Latin America's debt overhang from the 1980s crisis and quickly turn most countries into net creditors; and would increase the rest of the world's capital supply by an amount close to half the enormous US annual current account deficit of the late 1980s. A profound redirection of international capital flows indeed.

6. CONCLUSIONS

In the decades ahead, world demographic trends indicate that the global dependency rate will rise, which is to say our planet's share of the population of

working age will be gradually diminishing. According to the established dependency-rate hypothesis, such changes in the world age-distribution should adversely affect our capacity to save and invest in the world as a whole, a pessimistic prediction for economic growth.

The regional incidence of these demographic changes shows, however, a marked bias. Whereas the high-income economies will see an overwhelming expansion in the elderly fraction of their populations, the low- and middle-income economies will experience the typical demographic transition to fewer children in the age-distribution without a countervailing increase in people of old age. This observation suggests that the general equilibrium of the world saving-investment nexus may be fundamentally realigned in the years to come, with enormous repercussions for world financial markets and the pattern of international capital flows. Poorer countries, with demographically-reduced foreign capital requirements, will rely less on borrowing from the rich countries to sustain their capital accumulation.

In reality, the transition will not be as simple as this, for a number of reasons, and the realignment of financial markets depends on the realization of the putative augmented savings-capacities in the poorer countries. One immediate cause for doubt relates to the predicted demographic changes themselves — they are at best conjectural, and, if fertility and mortality trends in the less-developed countries do not follow a favorable path along the demographic transition, no potential for increased savings will be seen. My results merely suggest what that potential might be if the predictions turn out right. Another caveat concerns the ability of financial intermediaries in the less-developed countries to mobilize such demographically augmented savings should they be forthcoming. In Latin America, for example, it is easy to envisage a financial sector as sophisticated as that in, say, Argentina, being well equipped to effectively channel extra domestic savings as they accrue. In more backward financial sectors, such as Peru or Bolivia, the outcome may well depend on the kind of growth and development in their financial institutions that takes place in the coming decades.[7]

The demographic transition and its timing around the world may lead to a wholesale transformation in the direction and magnitude of international financial flows in the longer run. Pessimistic pronouncements regarding the increasing scarcity of financial capital and the implications for economic retardation do not apply with equal force throughout the world. In particular, favorable demographic prospects in Latin America (and elsewhere in the developing world) offer poorer countries the chance to finally break away from external dependence in capital markets, moving from net borrowing to net lending along the way. Although many commentators have depicted external-capital dependence as a burden on development in Latin America and elsewhere (the dependency school of development economics, for example), the diminution or reversal of capital inflows as discussed here has no normative implication *per se*. In the counterfactual, countries are merely reallocating their portfolio across countries in keeping with their overall saving and investment decisions.

The possible institutional, welfare and policy consequences of a $100 million dollar shift in capital movements should not, however, be underestimated. Undoubtedly, the financial services sector would experience a profound reorientation in the face of such a change. Policy makers do concern themselves with national surpluses and deficits, possibly due to misguided mercantilism, perhaps because in reality no small open economy faces a completely elastic supply of capital at the "world interest rate." Economists have also long argued that saving-investment correlations across countries suggest that current account balances are not truly free to adjust. A "new growth theory" literature makes clear the potential for spillovers and long-run gains from accumulation via externalities. Thus, with only quasi-mobility in world capital markets, the changes in international capital flows already noted may indeed have consequences for accumulation, growth and welfare. Such possibilities not withstanding, the magnitude of the potential changes is striking enough as a positive result to warrant further exploration and extension to other samples.

NOTES

1. Jeffrey Hammer places the new evidence in context: even the sceptics have to be aware that the role of the dependency rate as a determinant of savings rates is now essentially an empirical matter (Hammer, 1986).

2. The intuition here is the standard downward-sloping demand curve for consumption or investment, a property that may easily be demonstrated in any number of standard macroeconomic models.

3. *CI*, for example, represents the ratio of consumption at world prices to output at world prices.

4. In the econometric analysis (Table 2) the sample SCAM refers to the Penn World Table definition of the South and Central American sample. This sample includes the countries in Table 1, plus Puerto Rico, Guyana and Suriname. Due to a lack of demographic projections for the latter three countries, we revert to the Table 1 sample in all other contexts for the purpose of this paper.

5. Ultimately, we want to evaluate the crowding-out (or crowding-in) potential of demographic change with respect to capital inflows. This relies on a measure of how many pesos of investment and saving will be displaced or added, and hence

how the national surplus-deficit position will be affected. The properties of internationally priced consumption and investment quantities are irrelevant here, and a relative price adjustment is needed. I am grateful to Robert Summers for advice on how to make the adjustment in Penn World Table 5.5.

6. Even an overestimation by a factor of 2 would entail a true shift of $20 billion in the Latin segment of world capital markets — still a massive redirection of capital flows by any reckoning.

7. Uncertainty about institutional and social capability applies with extra force in the poorest countries. Any economic forecast for most backward Haiti (admittedly the smallest country in the sample) is probably meaningless at present.

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