Demographic Shocks and Global Factor Flows

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How economists view the impact of demography on economic events has changed a great deal over the past decade or so. When, in the late 1980s, Allen Kelley (1988) was writing his magisterial survey on the economic consequences of population growth in the Third World, the conventional wisdom was that Malthus did not matter much. Furthermore, the focus was on aggregate population growth. Since Kelley's 1988 survey, we have learned two important lessons that should have been obvious then, but were not: First, changes in the composition of the population often matter far more than changes in population aggregates; and second, when it comes to demographic impact, we need to think about long transitions rather than equilibrium steady states. These two lessons have taught us a great deal about the connection between demographic shocks and global factor flows—and even about growth.

What Is a Big Demographic Shock?

Any old demographic shock will not do. A medical advance or the elimination of a disease that influences everyone regardless of age will have an impact on population growth, but it will not have an impact on the composition of the population. A medical advance that extends longevity is a different matter entirely, since it increases the share of the

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population that is retired and elderly, as modern debates over social security have exposed so clearly. Similarly, if the HIV/AIDS virus attacked all ages equally it would have far smaller economic effects compared with the reality that it attacks sexually active young adults and thus influences the composition of the population. War has the same effect, especially on young adult males. To take another relevant but less painful example, a big baby boom certainly will have an impact on population composition, since the child cohort gets an enormous boost during the baby boom, and that big cohort can play an important economic role as it ages over many decades. The impact of a baby boom will persist long after the event is over. There have been many baby booms over the centuries, but the one North Americans know best is the OECD postwar baby boom of the 1940s and 1950s (Easterlin 1980).

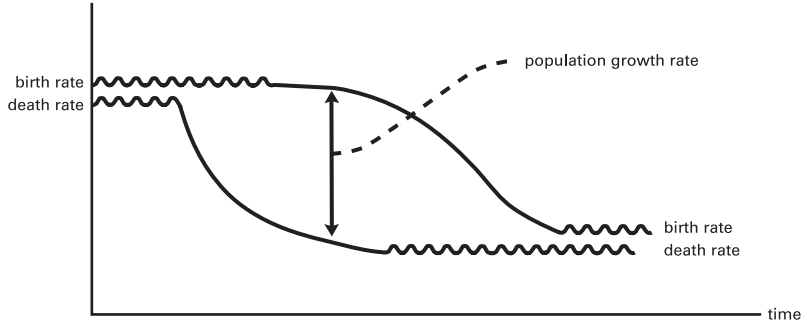
The baby boom example just cited was produced by marriage and fertility behavior. But a sharp decline in child mortality can have the same effect. Indeed, this is the demographic shock that hit the Third World after World War II and set in motion there what we now call the demographic transition. It was a *much* bigger demographic shock than the more familiar OECD baby boom.

The demographic transition describes the change from pre-industrial high fertility and mortality to post-industrial low fertility and mortality. Figure 1 offers a stylized view of the transition. Declines in mortality—especially infant and child mortality—mark the beginning of these demographic transitions, and changes in the age structure are exacerbated since most of these early declines in mortality are enjoyed by infants and children. True, the improved survivor rates for children induce parents to reduce their fertility. If parents adjusted completely and immediately, there would be no youth glut, no acceleration in population growth, and no transition worth talking about. But they do not; their adjustment is slow, so that the youth glut is large and persistent. After a lag, however, fertility begins to decline, marking the next stage of the transition. The population growth rate is implicit in the top panel of Figure 1 as the difference between fertility and mortality. The bottom panel makes the population dynamics explicit: The demographic transition must be accompanied by a cycle in population growth *and* the age structure. Note that the share working undergoes even more dramatic changes over the demographic transition than does population growth. In any case, the demographic transition takes many decades to complete. It took Europe at least a century to complete its transition, it took East Asia half that time, and it appears that Africa will end up somewhere in between.

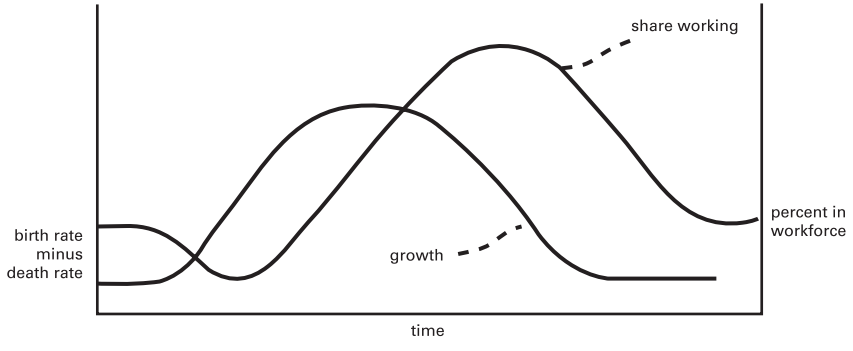
Figure 1 establishes three points. First, the demographic shock will be bigger the more it is centered mainly on a specific group, like the very young, or young adults, or the elderly. Second, the demographic shock must be big to matter. Third, once the shock takes place, it will influence economic events long after the initial shock is forgotten.

Figure 1

Demographic Transition



Population Growth and the Age Structure



How Demographic Shocks Can Influence Global Factor Flows and Growth

To simplify greatly, across-border migrations can be viewed as reflecting excess labor supply in the sending emigrant region and excess labor demand in the receiving immigrant region. I stress labor markets since most mass migrations are driven by economic events, in particular by gaps between regions in real wages and living standards. Since young adults have the most to gain and the least to lose by moving, migration is very selective by age (and sometimes by gender). This selectivity fact of life was already apparent by the late nineteenth century when an enormous 76 percent of the immigrants entering the United States

between 1868 and 1910 were young adults ages 15 to 40, during a period when the figure was only 42 percent for the U.S. resident population (Hatton and Williamson 1998, p. 11). The mover-stayer comparison was even more dramatic for the European regions sending the migrants: 80 percent of the Irish emigrants were young adults ages 15 to 34, when the figure for Irish residents staying behind was only 35 percent. What was true of European migrants during the peak of the mass transatlantic migrations was also true of immigrants into English cities during the first Industrial Revolution. In 1851, about 76 percent of the city immigrants were older than 19, while this was true of only 41 percent of the city residents (Williamson 1990, p. 41). Figure 2 documents this young adult selectivity for migrants moving from the countryside into English cities in the 1850s. This self-selection by age is just as true today of rural Egyptians seeking employment in Cairo, rural Filipinos seeking employment in Manila, Africans seeking employment in southern Europe, or Mexicans seeking employment in California. True, young adult self-selection tends to evaporate during famine, civil war, and other disasters, when whole families move. But it is absolutely clear that if numbers in the young adult age cohort increase in the sending region, and if they decrease in the receiving region, then across-border migration is encouraged.

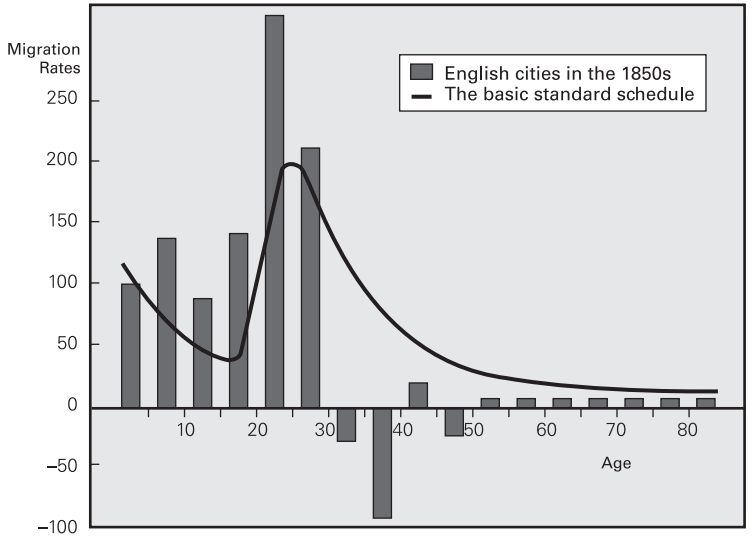
What I just described is the *direct* influence of demography on labor and population flows between countries. There is also an *indirect* influence to consider: When a big child cohort gets old enough to enter the labor market, the glut of young adults can erode job availability, weaken wage offers, and generally cause living standards for young adults to deteriorate. If the demographic glut is in the sending region, then poorer labor market conditions will send out more emigrants. If the glut is in the receiving region, then it will discourage immigration.

Demographically young nations tend to send emigrants, while demographically old nations tend to receive them. If liberal immigration policy allows this process to play itself out, mass migrations from emerging nations in the middle of their demographic transitions will always flood the advanced nations that have completed their demographic transitions. If restrictive immigration policy tries to choke off this process, then illegal immigration will try to circumvent it.

So far, so good. But things get a little more contentious when we turn from migration and global labor markets to financial flows and global capital markets. It is an innocuous statement to describe a capital inflow as a domestic savings shortfall for financing domestic investment requirements. Demography can influence both the savings and the investment sides, but it is the savings part of the story that economists fight about. I start there.

Over forty years ago, Ansley Coale and Edgar Hoover (1958) proposed their famous dependency-burden hypothesis. It was based on a simple but powerful intuition: Rapid population growth from falling

Figure 2
Migrant Age-Selectivity: English Cities in the 1850s



Note: The "standard" schedule is the estimated curve for all British cities from the 1840s to the 1860s. The out-migration rate for ages 0 to 5 is 100, and the English rural age-specific population is taken as a base. Williamson (1990, p. 43).

infant and child mortality and rising fertility swells the ranks of dependent young, and that demographic event increases consumption requirements at the expense of savings. Eventually, the youth dependency burden evolves into a young adult glut and the resulting savings boom contributes to accumulation and an economic miracle; finally, the demographic transition is manifested by a big elderly burden, low savings, and a deflation of the miracle. Thus, the Coale-Hoover hypothesis suggests, for example, that some of the impressive rise in East Asian savings rates over the quarter century following 1965 (and before the bust in the 1990s) can be explained by the equally impressive decline in dependency burdens, and that as the elderly dependency rate rises in East Asia over the next three decades, some of the high savings rates there should tend to vanish. So much for theory. What about fact? When faced with hard evidence, the Coale-Hoover hypothesis has had its ups and downs. This is not the place to recite its evolution (see Bloom and Williamson 1998 or Mason 2001 for a survey), so I will simply note that the dependency-burden hypothesis has enjoyed something of a renaissance over the past decade or so.

What about investment demand? Here the argument is less contentious. As the children of a baby boom become young adults, the rise in the

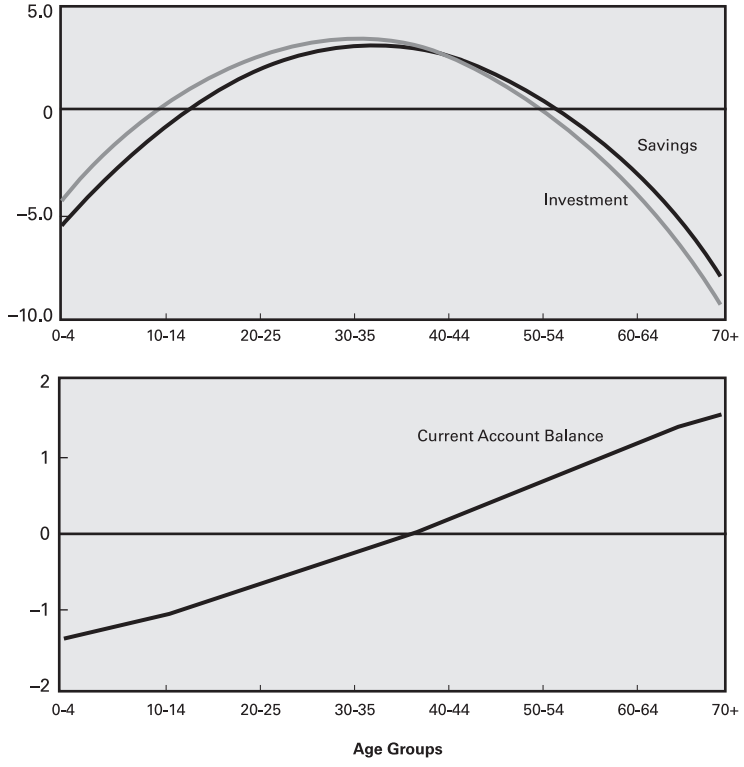
labor force implies the need for more investment in infrastructure to get the new entrants to work, to equip them while at work, and to house them as they leave their parents and form their own families.

In short, investment demand and savings supply are likely to be positively correlated over a demographic transition. When there is a glut of children and elderly, investment demand and savings supply will both be low. When there is a glut of working adults, investment demand and savings supply will both be high. Which dominates? If savings supply outruns investment demand as the big youth cohort evolves to working maturity, then capital inflows will shrink, perhaps becoming net outflows. Do they? The answer will dictate what happens to international capital flows. Matthew Higgins and I offered an answer a few years ago (Higgins and Williamson 1997). Using annual national accounts data for sixteen Asian nations over the three decades up to 1992, we got the results plotted in Figure 3 for the three critical national income shares: savings, investment, and the current account balance. The coefficients plotted there are the change in each of the three shares associated with a unit increase in the log age shares, controlling for everything else. The figure shows very clearly that youth and old-age dependency have a depressing effect on savings. Moreover, the coefficients appear to be consistent with the "hump" savings pattern predicted by the life-cycle hypothesis, attaining their highest values during mid-life. The implicit age distribution coefficients for the investment equation appear at first glance to be quite similar to those for savings. To bring the differences into relief, the implicit age distribution coefficients for the current account balance are plotted in the bottom half of Figure 3. The coefficients that are clearly negative for the early portion of life become positive as the population ages, indicating that the adult-induced increase in investment demand is eventually outweighed by the adult-induced increase in savings supply. This implies that young nations passing through demographic transitions also pass through a relatively long period of foreign capital dependency, before graduating into a period of financial independence. In the illustration offered by Figure 3, the coefficients turn positive after around age 40, as the induced fall in investment demand is way ahead of the induced fall in savings.

Demographically young nations tend to be net capital importers and demographically old nations tend to be net capital exporters. If global capital markets are well integrated, and if pro-global policy lets it happen, capital tends to move between nations like an *intergenerational transfer* from old to young.

This is the basic argument. What follows are four examples from both the recent and the distant past that appear to confirm the argument. These examples also suggest that demographic shocks rival economic shocks as determinants of factor flows, especially in a world where policy is pro-global.

Figure 3
Estimated Age-Based Coefficients for Changes in Savings, Investment, and Current Account Balance Shares in GDP, East Asia, 1950 to 1992

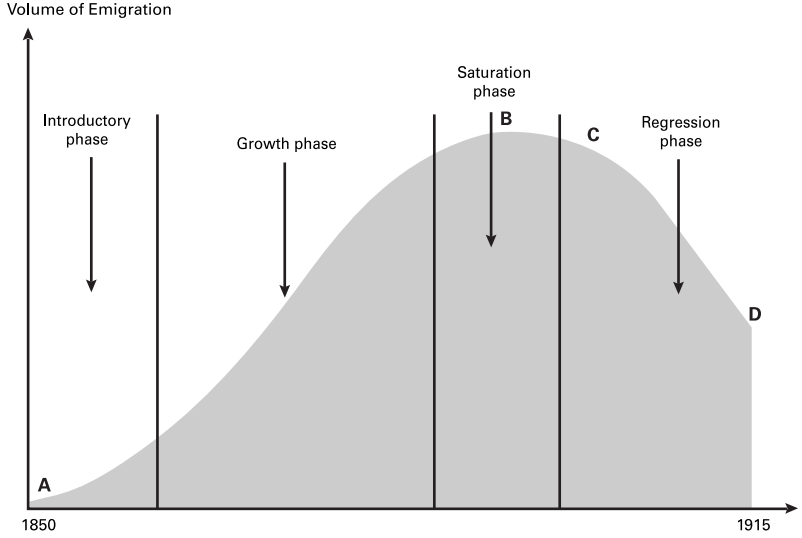


Source: Higgins and Williamson (1997, p. 274).

Demographic Shocks and European Mass Migrations Before 1914

During the transatlantic mass migrations in the half-century before World War I, 60 million emigrants moved from Europe to the New World. This European mass emigration began in the more developed northwest and then spread to the less developed south and east. European emigrants were persuaded to move by the prospect of large earnings gains for themselves and their children, by the pace of development at home, by the cumulative effects of past migrations through what sociologists call the "friends and relatives effect," and, what is most important for this paper, by demographic events in the sending regions (Hatton and Williamson 1998, Ch. 3). Once mass migration gained momentum, emigration rates as high as fifteen per thousand per annum were recorded for relatively poor countries like Italy and Ireland.

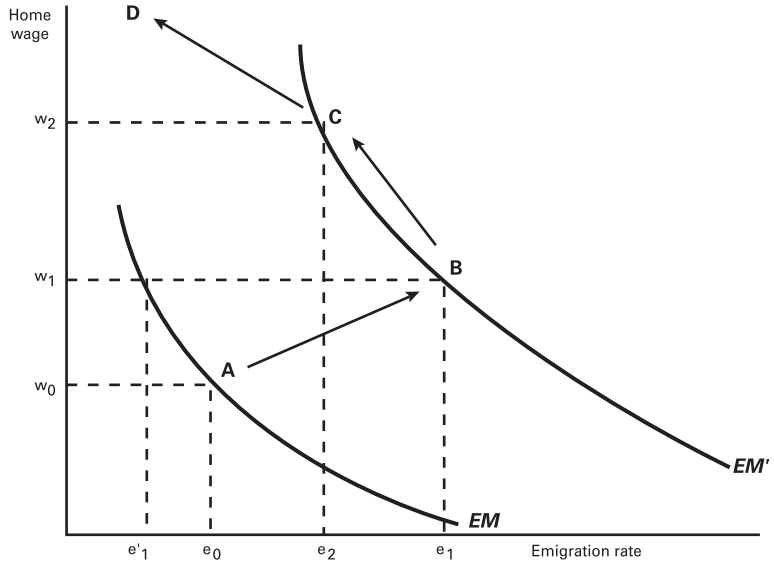
Figure 4
Stylized Pattern of European Late Nineteenth-Century Emigration



Note: The stages of emigration (A to D) are also reproduced in Figure 5, showing their relation to home wages.
Source: O'Rourke and Williamson (1999, p. 128).

European countries typically passed through a life cycle, from low, to high, to low emigration rates, following the life-cycle pattern in Figure 4. The delay—poor countries recording at first only modest levels of emigration—seems to be somewhat of a paradox, since simple economics would suggest that poor countries would record the highest rates of emigration. The paradox is resolved as soon as we remember that migration is constrained by poverty at home, that is to say, by the availability of the financial resources to invest in the move. The paradox returns when we note in Figure 4 that emigration rates *rose* for some time as these sending regions underwent impressive growth at home, impressive enough, in fact, that emigrant countries like Ireland, Italy, and Scandinavia began to catch up with leaders like Britain and the United States. Why would emigration *rise* when wage gaps between home and abroad were *falling*? The answer is that demographic and other forces mattered too. Figure 5 offers a simple characterization of the time path, where movements along some downward-sloping home country emigration function (EM) are isolated from shifts in that function. In preindustrial episodes, we observe low emigration rates (e_0) and low wages (w_0). Industrialization revolutions, demographic transitions, and other events then serve to raise both the emigration function to EM′ and real

Figure 5
Stylized Emigration Responses



Source: O'Rourke and Williamson (1999, p. 129).

wages to w_1. The former dominates in this example, since emigration rates have risen to e_1; in the absence of the shift in EM, emigration rates would have fallen to e_1'. In later stages of development, either EM is taken to be stable or it shifts back to its original position, so that further improvements in real wages at home, to w_2, cut back emigration rates to e_2, or lower. Thus, the stylized facts of Figure 4 are reproduced in Figure 5.

What, then, accounted for the rightward shifts in EM during the European mass emigrations a century ago? As these poor European regions started their demographic transitions, rising rates of population growth were generated by higher fertility and lower child mortality, so youth dependency rates rose there too. Since emigration self-selects young adults, a larger and larger share of the population in poor European regions became potential emigrants as those big youth cohorts aged. The facts are that about one-half of the surge in European emigration before World War I was driven by a rise in the young adult share in sending regions. In addition, the young adult boom produced a labor supply glut at home which put pressure on land and other domestic resources, thus lowering living standards and pushing out even more emigrants. Of course, these forces eventually eased off as the demo-

graphic transition ran its course, helping to shift EM in Figure 5 inward and causing emigration rates to fall, as in the "regression phase" of Figure 4.

The bottom line is that more than half of the European mass emigrations before World War I were driven by demographic shocks.

Demographic Shocks and Contemporary African Emigrations

The same fundamentals that drove European emigration a century ago are even more powerful in Africa today. After all, Africa has undergone a more dramatic demographic transition than did Europe a century ago. Population growth rates in Africa are expected to remain above 2 percent for the next two decades, rates that are almost double those of the poor parts of Europe sending out migrants before World War I. The contrast is even more striking when rates of increase of young adults are compared, and these individuals, of course, are the ones most likely to move. Furthermore, the wage gaps favoring Europe over Africa today are more than double the gaps that favored the New World over poor Europe in the nineteenth century. If Africans are as responsive to migration fundamentals as Europeans were a century ago, then large outflows should be taking place now and larger ones should be expected in the future. But restrictions on immigration in high-wage OECD countries have so far stemmed much, but certainly not all, of this potential flow. Thus, the stock of African-born living in the West is a lot smaller than it would have been under "free" immigration policies.

It has been estimated that 2.8 percent of the 1990 resident population of sub-Saharan Africa were living outside their country of birth (Hatton and Williamson 2001). This is a much lower percentage than in Western Europe (6.1 percent) or the United States (8.6 percent) but, of course, these two are immigrant regions. Comparisons with other emigrant regions, like Asia or Latin America, would be more relevant, and by this comparison the African figure looks *much* higher: Of the 1990 resident populations, 1.4 percent in Asia and 1.7 percent in Latin America were living outside their country of birth. The Caribbean was the only emigrating region that recorded a higher rate (2.9 percent) than sub-Saharan Africa, and it was not higher by much.

Regarding immigration policy in regions targeted by Africans, potential emigrants have a wide range of choices. True, across-border migration within Africa is not as free as it is between United States regions or between European Union members, but the barriers within the African continent are far lower than between it and the high-wage industrial world. In West Africa, the treaty that formed the Economic Community of West African States in 1975 contained a protocol providing for free movement of labor. Agreements for trade and economic cooperation in other regions—such as the Common Market for Eastern and Southern Africa, the Southern African Development Community,

and the Eastern and Southern African Preferential Trade Area—were set up with free factor mobility as an objective. In any case, with completely porous borders between most contiguous African countries, a large amount of undocumented migration takes place and attempts to control migration have been only partial at best.

When the determinants of net emigration are explored for twenty-one African countries between 1977 and 1995, the empirical results are very similar to those for the European emigrations a century ago (Hatton and Williamson 2001). The two most important influences are gaps in real wages or living standards between home and abroad, and the share of the population ages 15 to 29. Demographic events mattered in Africa's recent past and they will matter even more in its future, for three reasons. First, population growth puts pressure on land and other resources, lowering the marginal product of labor and living standards at home and encouraging emigration as real wage gaps between home and abroad widen. The forces of diminishing returns are especially powerful in agricultural economies like those in Africa, where land is a key resource and there are no unexploited frontiers. Second, the underlying economic growth of the African economies has been dismal over the last two decades, and most analysts project more of the same over the next two decades. Thus, there are unlikely to be many African industrial "miracles" raising wages and keeping potential emigrants at home. Indeed, living standards between home and abroad are likely to widen even further. Third, the projected demographic changes are big. Under one set of assumptions, out-of-Africa emigration pressure from both demographic and economic forces has been projected to reach 2.4 per thousand by the year 2025. Most of this projected emigration pressure is due to demographic change. If this projected out-of-Africa emigration rate is achieved, it would be about the same as European rates in the 1870s, 2.2 per thousand, but less than half of the rates in the 1900s, 5.4 per thousand. While the projected African rates are not quite comparable to the "free" migration records set in the pre-World War I decades, they still imply sizable numbers: One estimate has it that annual out-of-Africa emigration would increase by about 2.1 million between 1995 and 2025. These significant increases follow from the rise in the young adult population share from 27.2 percent in 1995 to 30.1 percent in 2025 (on top of rapid overall population growth), and the rise in population density from 24.5 to 44.1 per square kilometer over the same period.

Although this is no longer an age of "free" intercontinental migration, these estimates of net migration for the countries of sub-Saharan Africa suggest that exactly the same forces are at work driving African across-border migration today. Rapid growth in the cohort of young potential migrants, population pressure on the resource base, and poor economic performance are the main forces driving African emigration. In Europe a century ago, more modest demographic increases were accom-

panied by strong catching-up economic growth in low-wage emigrant regions. Furthermore, the sending regions of Europe eventually underwent a slowdown in demographic growth, serving to choke off some of the huge migration. Yet, migrations were still mass. Africa today offers a contrast: Economic growth has faltered, its economies have fallen further behind the leaders (no catch-up here), and a demographic speedup will occur in the near future (no slowdown here).

The pressure on African emigration will, therefore, intensify, manifested by a growing demand for entrance into high-wage labor markets of the developed world. The demographic unknown in this equation is, of course, African success in controlling the spread of the HIV/AIDS. If the disease spreads rapidly, then some, but not all, of the emigration pressure will subside. If it is controlled early, then these emigration predictions are more likely to prevail. There is at least a reasonable chance that by 2025 Africa will record far greater mass migrations than did nineteenth-century Europe.

How European Capital Was Pushed and Pulled by Demographic Shocks Before 1914

International capital mobility has profound implications for economic growth in both theory and practice. It matters theoretically because most theories of growth, from Ricardo to Solow to Romer, emphasize domestic savings as a key determinant of long-run growth. But international capital mobility breaks the link between domestic savings and domestic investment, making investment demand a far more important determinant of economic growth than domestic savings supply. Capital flows can matter hugely in practice, enabling poorer economies to invest and grow more rapidly than they would have been able to do otherwise.

The late nineteenth century saw international capital flows larger in scale than anything seen before or since (O'Rourke and Williamson 1999, Chapter 11). The City of London was at the center of this global capital market, and the British were doing a very large share of the capital exporting. They had already put 17 percent of their wealth overseas by 1870, but the figure increased to 33 percent by 1913. With each surge in net foreign investment abroad, the British commitment to the global capital market rose: The ratio of net foreign investment abroad to total domestic savings was about 35 percent in the late 1860s and early 1870s, it was about 47 percent in the late 1880s, and it was about 53 percent in the years immediately prior to the Great War. While Britain was the central player, France, Germany, and other advanced European economies were involved too. For example, German foreign investment amounted to almost one-fifth of its total domestic savings in the 1880s, very big by the standards of the 1990s. France achieved even higher

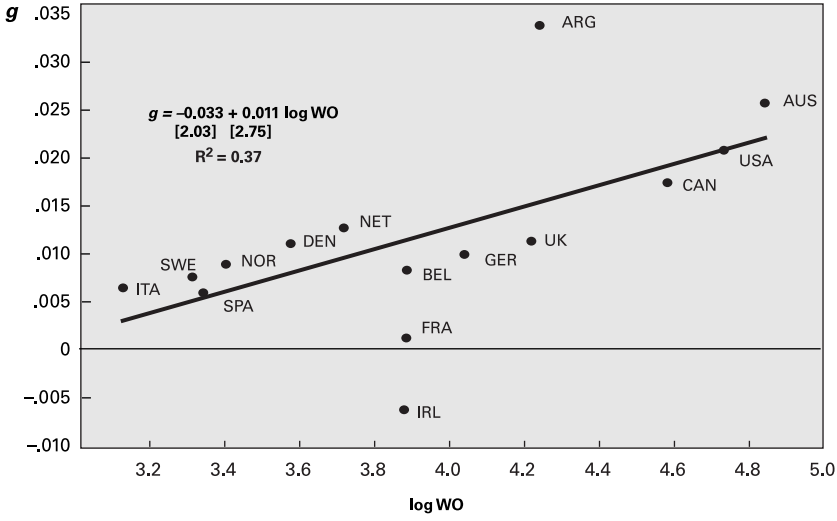
figures from the 1850s to the early 1870s, as well as during the late 1890s and late 1900s.

Foreign capital "dependence" was equally large at the receiving end. In 1913, foreigners owned almost one-half of the Argentine capital stock and one-fifth of the Australian capital stock. Even the United States, whose domestic savings had taken on an increasing share of its investment requirements since the 1830s boom, still registered high levels of foreign capital dependence toward the end of the century: The net stock of foreign liabilities as a share of GNP was still about 26 percent in 1894. This U.S. foreign liability share was large even compared to some of the Latin American countries prior to the 1980s "Tequila" debt crises: The 1980 figures were 22 percent for Argentina, 19 percent for Brazil, and 30 percent for Mexico. Net inward foreign investment as a share of gross fixed capital formation ranged from 10 to 20 percent among the major Third World importers in the decade prior to 1984. The same statistic for the four decades between 1870 and 1910 was 37 percent for Canada, about 70 percent for Argentina, and perhaps as much as 75 percent for Mexico.

Where did all this foreign capital go during this first global capital market boom? A decade has passed since Robert Lucas (1990) asked why capital does not flow from rich to poor countries, posing what is widely known as the Lucas Paradox. Lucas used contemporary evidence to document his Paradox, and cited one example in particular—the very modest flow of capital from the United States to India during the second great global capital market boom, after 1970. Lucas also suggested that the same had probably been true of the first great global capital market boom, after 1870. He was, of course, right: Very little of British capital exports went to poor countries prior to World War I (Clemens and Williamson 2000). Indeed, about two-thirds of it went to the rich New World where only one-tenth of the world's population lived, and only about a quarter of it went to Asia and Africa where almost two-thirds of the world's population lived. The simplest explanation of this apparent paradox is that British capital chased after European emigrants and that both were seeking cheap land and other natural resources. This venerable capital-chased-after-labor explanation argues that an omitted third variable must have been at work, and most economic observers of the late nineteenth century would say that the omitted variable was natural resources, while most economic observers of the late twentieth century would say it was human capital. Both of these two explanations miss an important third possibility, *demography*.

Not only did rapid population growth in the New World contribute to its booming investment demand, but high youth dependency rates might have choked off New World savings, also contributing to those huge capital flows (Taylor and Williamson 1994). Labor scarcity in the New World generated the long-run labor supply response documented in Figure 6. The economically active population (the total population minus

Figure 6
Real Wages and Population Growth, 1870 to 1913



Source: O'Rourke and Williamson (1999, p. 231).

the dependent youths and elderly) grew faster in the labor-scarce New World than in the labor-abundant European periphery, with the European industrial core lying in the middle. This long-run labor supply response in the labor-scarce New World took two forms. First, there was the domestic response. Couples married early and had more children, and the children had higher survival rates. This would have produced youth gluts and youth dependency burdens in the New World were it not for the second response. Mass migration partially offset these domestic dependency burden effects since, as we have seen, it self-selected young adults. But only partially: the gap in dependency rates between the New World and the United Kingdom was very large, perhaps even larger than it was a decade or so ago between the Third World and the OECD. (That gap was 15 to 16 percentage points in 1989, while the U.K.-New World gap in the 1870s was as high as 20 percentage points.)

The Coale-Hoover dependency-burden model (1958) can be used to help explain capital flows in the pre-1914 period. Their model suggests that these dependency burdens (and their absence in demographically mature parts of Europe that were exporting the capital) should have choked off domestic savings in the New World (and augmented it in Europe), thus pushing foreign capital out of Europe and pulling it in to the New World. It turns out that this was indeed the case: Perhaps as

much as two-thirds of British net foreign investment abroad can be explained by these demographic forces (Taylor and Williamson 1994).

It appears that capital flows during the first global capital market boom can be viewed in large part as an intergenerational transfer induced by demographic dynamics.

The Demographic and Foreign Capital Dependence Connection in East Asia, 1950 to 1992

In the early 1970s, South Korea was concerned about its heavy dependence on external financing (especially Japanese) and commissioned World Bank papers to explore why Korea saved so little. By the late 1980s, Korea had doubled its savings rate, and its current account balance as a share of gross domestic product had swung from −8 percent to +3.2 percent in just a decade. Over the same period, the dependency rate fell by more than 12 percentage points, and the working-age share rose about the same amount. At least one commentator argued persuasively that the correlation was not spurious (Kang 1994) and that the demographic transition was the key to the Korean switch from net capital imports to net capital exports.

While the South Korea case was canonical, the rest of East Asia exhibited the same experience. Table 1 records how domestic savings rates soared everywhere in East Asia, on average rising from a little less than 14 percent in the late 1950s to an amazing 35 percent in the early 1990s. Investment shares in GDP also soared, but not by quite as much: from a little less than 19 percent to almost 31 percent over the same three decades. The difference between the two, the current account share, fell by more than 7 percentage points, from −4.9 to +2.4. Thus, in only three

Table 1
Savings, Investment, and Net Capital Flows in Asia as Percent Shares of GDP, 1950 to 1992

Period	Savings	Investment	Current Account Balance
1950–54		18.03	
1955–59	13.93	18.79	−4.86
1960–64	18.26	23.53	−4.59
1965–69	23.97	25.08	−3.39
1970–74	28.97	28.50	−1.35
1975–79	29.65	29.96	−.67
1980–84	28.62	29.14	.09
1985–89	34.01	28.27	5.26
1990–92	35.03	30.78	2.38

Note: Unweighted country averages.
Source: Higgins and Williamson (1997, Table 3).

Table 2
Dependency Rates in Asia During the Second Half of the Twentieth Century

Country	Youth Dependency Peak Years vs. 1990–92	Young 0–14	Prime 25–59	Old 65+
Bangladesh	1975–79	46.00	29.64	3.52
	1990–92	43.28	31.43	2.88
China	1965–69	40.00	35.51	4.36
	1990–92	26.44	43.65	5.99
Hong Kong	1960–64	40.71	40.94	2.99
	1990–92	20.07	50.77	9.26
India	1965–69	40.42	35.83	3.58
	1990–92	36.32	37.34	4.60
Indonesia	1970–74	42.16	34.37	3.11
	1990–92	34.90	37.65	4.10
Japan	1950–54	34.70	38.05	5.08
	1990–92	17.97	48.86	12.42
Korea, Rep.	1965–69	42.78	34.55	3.28
	1990–92	24.78	47.27	4.99
Malaysia	1960–64	45.63	31.76	3.34
	1990–92	37.96	37.15	3.79
Myanmar	1965–69	41.12	34.23	3.61
	1990–92	36.81	36.15	4.16
Nepal	1975–79	42.22	34.90	3.19
	1990–92	41.94	34.09	3.15
Pakistan	1965–69	46.27	31.12	3.44
	1990–92	45.88	31.27	2.74
Philippines	1965–69	45.17	30.73	2.84
	1990–92	39.56	35.33	3.42
Singapore	1960–64	43.48	35.05	2.38
	1990–92	23.26	51.82	5.89
Sri Lanka	1955–59	41.73	34.29	3.70
	1990–92	31.84	41.12	5.41
Taiwan	1960–64	45.20	34.82	2.55
	1990–92	26.39	45.52	6.51
Thailand	1965–69	46.24	31.45	2.96
	1990–92	31.50	40.64	4.07

Source: Higgins and Williamson (1997, Table 1).

decades, East Asia switched from being a major net capital importer to being a major net capital exporter. East Asia was very dependent on foreign capital in the 1950s, but completely independent by the early 1990s before the meltdown.

As in South Korea, demographic dependency was highly correlated with the graduation from foreign capital dependency everywhere in East

Asia. With only two precocious exceptions, Sri Lanka (1955-59) and Japan (1950-54), Asia surged to peak youth dependency rates in the 1960s and 1970s. Table 2 shows when each country peaked, but the modal decade was the 1960s. These peak youth dependency rates were much higher in emerging Asia than they were in the developed countries. While the "young" share averaged about 26 percent during the OECD baby boom in the 1950s, the peak rates in Asia were in many cases 20 percentage points higher, two of the most extreme examples being from the area about which Coale and Hoover were writing in 1958—Bangladesh and Pakistan (both about 46 percent). Furthermore, it appears that the surge in the Asian youth dependency rates was largely a phenomenon of the second half of the twentieth century. As best as we can document it, the youth dependency rate remained fairly stable at high levels prior to the Pacific War, reflecting some pre-industrial demographic equilibrium. Asia has been in dynamic economic and demographic transition ever since.

Is this correlation spurious? Apparently not. I already reported the results in Figure 3, where models of savings and investment rate behavior were estimated on this Asian experience. And when Matthew Higgins and I (1997) used these results to ask just how much of East Asian capital flows could be explained by these demographic shocks, the answer was—almost all of it. Since we wrote that paper, other economists have estimated smaller effects, but the conclusion that the demographic transition in East Asia had a very big impact on capital flows across borders has not been overturned (Mason 2001).

East Asian Miracles, Meltdowns, and Demographic Transitions

I have argued that changing age distributions matter when assessing the impact of demographic change on economic performance. I am in good company, since many economists have argued that in the early stages of the demographic transition, per capita income growth is diminished by large youth dependency burdens and small working-age adult shares: There are relatively few workers and savers. As the transition proceeds, per capita income growth is promoted by smaller youth dependency burdens and larger working-age adult shares: There are relatively many workers and savers. The early burden of having few workers and savers becomes a potential gift later on: a disproportionately high share of working-age adults. Still later, the economic gift evaporates, perhaps becoming a burden again, as the elderly share rises.

If this story is correct, then some of the poor growth performance in East Asia prior to 1965 can be attributed to the fact that the region was carrying a very heavy youth dependency burden, which, by itself, was pushing down growth rates. Without the youth dependency burden, so the argument goes, East Asia would have had higher growth rates prior to 1965. As East Asia graduated from the demographic burden phase to

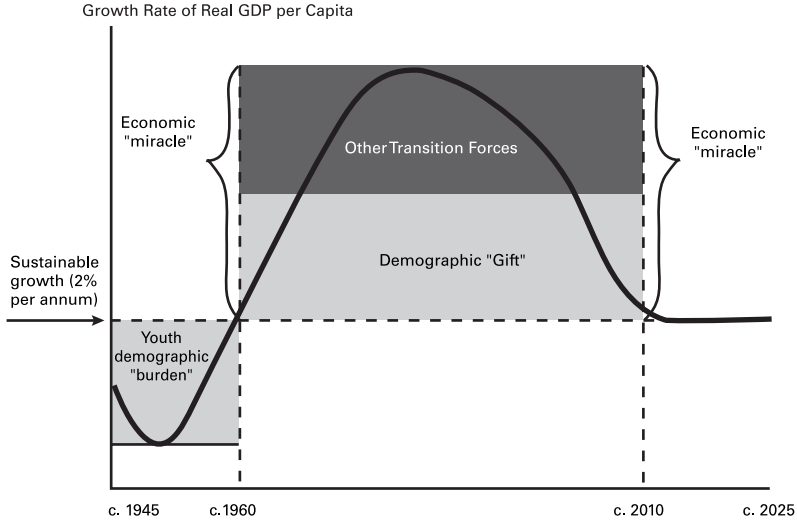
the demographic gift phase, the youth dependency burden decreased and the proportion of working-age adults increased. The result was growth acceleration abetted by demographic forces: In short, the gift was used wisely. This and other transitional forces—productivity gains from borrowing foreign technologies, from shifting labor from low-productivity sectors (agriculture) to high-productivity sectors, from exploiting globalization potential—all served to push the growth rate far above its pre-1965 level to the "miraculous" rates for the quarter century that followed. The demographic transition accounts for a decrease in the growth rate associated with high youth dependency burdens and a subsequent rise in the growth rate deriving from the emergence of the demographic gift in place of the burden. However, sometime in the near future the demographic gift in East Asia will dissipate (and consequently, economic growth will tend to slow down) as the share of elderly in the population increases. Indeed, perhaps it has already. Once the demographic transition is complete, population growth will no longer affect economic performance. Hence, any economic effect due to the changing age distribution is only temporary, although, as we have seen, "temporary" can be as long as fifty years, or even longer.

Figure 7 offers a stylized version of this economic narrative where the sustainable growth rate is taken to be about 2 percent per annum. East Asia carried a heavy youth dependency burden between the late 1940s and the early 1960s, as the region started its demographic transition. The burden contributed to a poor per capita income growth performance, since the labor force per capita fell and domestic savings were suppressed. Figure 7 characterizes poor growth as that falling below the sustainable 2 percent per annum level. After fifteen or twenty years, the large youth cohort began to hit East Asian labor markets, labor force per capita rose, savings rates surged, and accumulation became rapid. This was the "miracle" episode that reached its peak in the early 1990s. Since then, the demographic transition has lost most of its steam, and long-run growth rates have fallen—the region led by Japanese stagnation and hastened on its way by a debt crisis.

If Figure 7 represents the East Asia facts, what does it tell us about the contribution of the demographic transition to the miracle? Demography is not everything, of course, but when reading Figure 7, the reader should note that the contribution of the demographic transition to the East Asian miracle will also depend on how the miracle is defined. If the miracle is defined as the peak growth rates achieved between 1960 and today, then the figure suggests that demography accounts for about a third of the miracle; if it is defined as the surplus over the sustainable rate, then it accounts for almost half; and if it is defined as the increase in growth rates from the postwar period before 1960 to the years since, then it accounts for almost three-quarters.

A recent paper by David Bloom and me (1998) has offered evidence

Figure 7
Stylized Model of Economic Growth and Demographic Transition in East Asia, 1945 to 2025



Source: Bloom and Williamson (1998, p. 430).

that appears to confirm the rough magnitudes suggested by Figure 7. First, we estimated growth equations the world around (a sample of 78 countries) for the quarter century between 1965 and 1990, like those reported in Table 3. Here, the growth rate of the working-age population (GEAP) joins population growth (GPOP) in the regression, along with other now-standard variables measuring schooling, natural resource endowment, trade policy, public sector savings rates, quality of institutions, and economic geography. Table 3 confirms that the growth of the working-age population has had a powerful positive impact on GDP per capita growth, while growth of the total population has had a powerful negative impact. Consider the results reported in the second column of the table. The coefficient on the growth rate of the working-age population is positive, statistically significant, and big: A 1 percent increase in the growth rate of the working-age population is associated with a 1.46 percent increase in the growth rate of GDP per capita. The coefficient on the growth rate of the total population is negative, statistically significant, and almost as big: A 1 percent decrease in the growth rate of the dependent population is associated with about a 1 percent increase in the growth rate of GDP per capita.

The third and fourth columns of Table 3 show what happens when

Table 3
Effects of Population Growth on Economic Growth, 1965 to 1990
Dependent variable: Growth rate of real GDP per capita, 1965 to 1990

	OLS Estimates			
Independent Variables	(1) Specification 1	(2) Specification 2	(3) Specification 1 (constrained)	(4) Specification 2 (constrained)
GEAP6590	1.95	1.46		
	(.38)	(.34)		
GPOP6590	−1.87	−1.03		
	(.43)	(.40)		
GEAP6590-GPOP6590			1.97	1.68
			(.38)	(.35)
GDP per Capita as Ratio of US GDP per Capita, 1965	−1.36	−2.00	−1.39	−1.97
	(.21)	(.21)	(.21)	(.22)
Log Life Expectancy, 1960		3.96		2.94
		(.97)		(.97)
Log Years of Secondary Schooling, 1965	.50	.22	.50	.28
	(.16)	(.14)	(.16)	(.14)
Natural Resource Abundance	−4.86	−2.35	−4.86	−2.57
	(1.2)	(1.0)	(1.1)	(1.1)
Openness	2.06	1.92	2.00	1.72
	(.40)	(.32)	(.38)	(.33)
Quality of Institutions	.23	.20	.22	.15
	(.08)	(.07)	(.08)	(.07)
Access to Ports (Landlocked)	−.35	−.64	−.31	−.40
	(.34)	(.27)	(.32)	(.27)
Average Gov't Savings, 1970–90	.14	.12	.14	.13
	(.03)	(.03)	(.03)	(.03)
Located in the Tropics		−1.31		−1.20
		(.30)		(.31)
Ratio of Coastline Distance to Land Area		.24		.23
		(.11)		(.12)
Constant	−2.46	−19.5	−2.28	−14.3
	(.79)	(4.3)	(.69)	(4.1)
Adjusted R^2	.76	.86	.78	.85

Note: Standard errors are reported in parentheses below coefficient estimates.
Source: Bloom and Williamson (1998, Table 3).

the impacts of the growth rates of the working-age and the entire population are constrained to be equal but of opposite sign. In a long-run steady state, when the age distribution is stable, population growth would not matter in either of these two specifications (GEAP−GPOP=0).

Table 4
Contribution of Demographic Change to Past Economic Growth, 1965 to 1990

	Average Growth Rate				Estimated Contribution, 1965–90 (Columns correspond to specifications in Table 3)			
Region	Real GDP per Capita	Population	Economically Active Population	Dependent Population	(1)	(2)	(3)	(4)
Asia	3.33	2.32	2.76	1.56	1.04	1.64	.86	.73
East Asia	6.11	1.58	2.39	.25	1.71	1.87	1.60	1.37
Southeast Asia	3.80	2.36	2.90	1.66	1.25	1.81	1.07	.91
South Asia	1.71	2.27	2.51	1.95	.66	1.34	.48	.41
Africa	.97	2.64	2.62	2.92	.14	1.10	−.07	−.06
Europe	2.83	.53	.73	.15	.43	.52	.39	.33
South America	.85	2.06	2.50	1.71	1.03	1.54	.87	.74
North America	1.61	1.72	2.13	1.11	.94	1.34	.81	.69
Oceania	1.97	1.57	1.89	1.00	.74	1.14	.62	.53

Source: Bloom and Williamson (1998, Table 2).

In transition, when the age distribution changes, population growth does matter. The coefficient here is big, positive, and significant. Thus, where the growth rate of the economically active exceeds that of the population, higher GDP per capita growth rates have appeared (holding everything else constant). Equivalently, where the middle of the age distribution (ages 15 to 64) grows faster than the tails (ages 14 and below and 65 and above), GDP per capita growth is faster. Of course the opposite is true if the dependent population is growing faster than the workforce.

Next, we asked how much of the East Asian miracle was explained by these demographic shocks. Between 1965 and 1990, the working-age population in East Asia grew 2.4 percent per annum, dramatically faster than the 1.6 percent rate for the entire population, yielding a 0.8 percent differential (Table 4). Combining the coefficients from the estimated growth equations and the growth rates of the working-age and total populations, Table 4 reports that population dynamics can explain between 1.4 and 1.9 percentage points of GDP per capita growth in East Asia, or as much as one-third of the miracle (1.9/6.11). If instead the miracle is defined as the difference between current GDP per capita growth—a transitional rate where population dynamics matter—and the assumed steady state of 2 percent, then population dynamics can explain almost half of the miracle (1.9/[6.11-2]). Thus, Figure 7 is confirmed. Furthermore, it turns out that the countries that benefited most from these demographic events were South Korea, Singapore, Taiwan, Hong Kong, Thailand, and Malaysia—all of which are old or new fast-growing tigers in East Asia. It is no coincidence that these tigers attracted most of

Table 5
Contribution of Demographic Change to Future Economic Growth, 1990 to 2025

Region	Projected Growth Rate			Estimated Contribution, 1990–2025 (Columns correspond to specifications in Table 3)			
	Population	Economically Active Population	Dependent Population	(1)	(2)	(3)	(4)
Asia	1.36	1.61	.99	.61	.99	.50	.43
East Asia	.43	.20	.87	−.40	−.14	−.44	−.38
Southeast Asia	1.29	1.66	.63	.83	1.10	.73	.62
South Asia	1.65	2.11	.90	1.02	1.38	.90	.77
Africa	2.40	2.78	1.88	.98	1.63	.73	.68
Europe	.17	−.004	.48	−.32	−.16	−.34	−.29
South America	1.50	1.87	.94	.82	1.15	.71	.60
North America	1.28	1.33	1.21	.21	.645	.11	.10
Oceania	1.08	.93	1.37	−.22	−.24	−.31	−.26

Source: Bloom and Williamson (1998, Table 3).

Paul Krugman's attention when he asserted that the East Asian miracle was driven mainly by high rates of accumulation and labor force growth (Krugman 1994). I agree with Krugman, but I argue that a demographic transition was doing a lot of the work.

Finally, we turned to the future, and, unless other forces offset these demographic influences, the future will look very different. Table 5 reports our forecast based on the coefficients of the estimated growth model and the United Nations demographic projections up to the year 2025. In East Asia, GDP per capita growth attributable to demographic influences is projected to be *negative* between 1990 and 2025, declining from a positive gain of 1.4 to 1.9 percentage points between 1965 and 1990 to a *loss* of 0.1 to 0.4 percentage points up to 2025, a projected retardation of 1.5 to 2.3 percentage points due solely to demographic forces.

Demographic shocks have played an important role in East Asian growth since 1950. They were much more modest in Europe, which received only a small post-baby-boom boost of 0.3 to 0.5 percentage points. Even South America's demographic impact, 0.7 to 1.5 percentage points, was smaller than East Asia's. Still, South America has undergone much the same experience as East Asia (Taylor 1995).

A Final Remark

These four examples have explored the connection between demographic shocks and global factor flows by taking one region at a time. I have not asked whether the poor countries just before World War I would have attracted more foreign capital were not demographic factors so powerful in pulling that capital into the rich New World. I have not asked whether the poor countries just after World War II would have pulled in

more foreign capital were not baby booms in the OECD helping to keep that capital at home. I have not asked whether Africa—reaching the middle of its demographic transition—will gain as global capital retreats from Asia and Latin America, driven out of those regions in part by subsiding demographic forces. In short, world general economic-demographic equilibrium is not considered here, and that is surely the next step.

What is unusual about the present is that two halves of the world are in different demographic phases. This seems to be a good thing, since the elderly OECD will want to vent its capital surplus on the young Third World carrying a capital deficit, while the young Third World will want to vent its labor surplus on to the elderly OECD struggling with labor scarcity. Will policy allow global labor and global capital markets to make this intergenerational transfer?

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