WORLD FACTOR MIGRATIONS AND DEMOGRAPHIC TRANSITIONS

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This lecture explores the connection between demographic transitions, mass migrations and international capital flows. It reviews how demographic transitions influence the size of age cohorts, and then how these changes in age distribution influence excess demands in receiving regions and excess supplies in sending regions. The lecture offers four examples – two from the first global century and two from the second global century – where shocks generated by demographic transitions have had an enormous impact on factor flows: European mass migrations to the New World before 1914; African mass migrations to the OECD over the past two decades; British capital export to the New World before 1914; and capital flows across East Asian borders after 1950 and before the melt down of the 1990s. The lecture concludes with an assessment of the demographic contribution to the East Asian miracle (and slowdown) over the past half century.

How economists view the impact of demography on economic events has changed a great deal over the past two decades, and economic history has played a key part in the conversion. When Allen Kelley, another frequent Australian academic visitor, was writing his magisterial survey on the economic consequences of Third World population growth back in the late 1980s, the conventional wisdom was that Malthusian concerns were unsupported by history and that the way to make the assessment was to focus on aggregate population growth in the long run. Since Kelley's 1988 survey,

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we have learned two important lessons that should have been obvious then, but were not: first, changes in population age composition often matters far more than changes in population aggregates; and second, when it comes to demographic impact, transition economics works far better than equilibrium steady state economics. These two lessons have taught us a great deal about the connection between industrial revolutions, demographic transitions and global factor flows.

The kind of demographic shock matters. 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 which extends longevity is a different matter entirely, since it increases the share of the population 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 age 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. That big cohort will also play an important economic role as it ages over many decades, persisting long after the initial event is forgotten.[2]

The baby boom example just cited is produced by marriage and fertility behaviour. But a sharp decline in child mortality can have the same effect. Indeed, this is exactly the demographic shock which hit the Third World after World War II and set in motion there what we now call the demographic transition. Demographic transitions are associated with industrial revolutions, so it is no surprise to find them in 19th century Europe and its overseas offshoots as they started modern economic growth. These demographic transitions generated *much* bigger demographic shocks than did the more familiar OECD baby boom following World War II.

The demographic transition describes the change from pre-industrial high fertility and mortality to post-industrial low fertility and mortality. Like industrial revolutions, the demographic

2 Easterlin, *Birth and Fortune*; Easterlin, *Growth Triumphant*.

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 offers a stylised view of the transition. Declines in 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 induces parents to reduce their fertility. If parents adjusted their fertility behaviour completely and immediately, there would be no child glut, no acceleration in population growth, and no transition worth talking about. But instead, parents adjust fertility only slowly, so that the child 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 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* in the age structure. Note that the share working – one manifestation of the age structure – undergoes even more dramatic change over the demographic transition than does population growth.

Figure 1 establishes three points. First, the demographic shock will have a more important impact if it is centred on a specific group, like children, 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. To illustrate these points as they apply to world factor migrations, the remainder of this lecture draws on four examples, two drawn from the first global century before 1914 and two from the second global century after 1950.

HOW THE DEMOGRAPHIC TRANSITION CAN IMPACT GLOBAL FACTOR FLOWS

Across-border migrations can be viewed as reflecting excess factor supply in the sending region and excess factor demand in the receiving region. Let me start with labour markets and migrations.

Most mass migrations are driven by economic events, in particular by real wage and living

standard gaps between regions. Labour markets matter, and 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 19th century when an enormous 76 per cent of the immigrants entering the United States between 1868 and 1910 were young adults aged 15-40, this during a period when the figure was only 42 per cent for the US resident population.[3] The mover-stayer comparison was even more stark for the European regions sending the migrants: 80 per cent of the Irish emigrants were young adults aged 15-34, when the figure for Irish residents staying behind was only 35 per cent. The same was true of the Danes and other European emigrants, as shown in Figure 2: over the late 19th century, more than 56 per cent of Danish emigrants were between the ages of 15 and 29, while more than 70 per cent of the Irish emigrants were. What was true of European migrants during the mass trans-Atlantic migration peak, was also true of immigrants into English cities during the first industrial revolution: in 1851, about 76 per cent of the city immigrants were older than 19, while this was true of only 41 per cent of the city residents.[4] 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 southern California. True, young adult self-selection tends to evaporate during famine, civil war and ethnic cleansing when whole families move. But it is absolutely clear that if numbers in the young adult age cohort increase in the sending region, more potential emigrants are at risk. The impact of demography on mass migration will be even more powerful if the receiving, high-wage region is in another, later phase of the demographic transition when young adults are scarce and the elderly are abundant.

What I just described is the *direct* influence of demography on labour and population flows between countries. There is also an *indirect* influence to consider: when a big child cohort gets old enough to enter the labour market, the young adult glut can erode job availability, weaken wage

3 Hatton and Williamson, *Age of Mass Migration*, 11.
4 Williamson, *Coping with City Growth*, 41.

offers, and generally cause living standards for young adults to deteriorate.[5] If the demographic glut is in the sending region, then poorer labour market conditions will send out more emigrants. If there is a scarcity of young adults in the receiving region, then it will encourage even more emigration.

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 (still low-wage) in the middle of their demographic transitions will always flood the advanced nations (now high-wage) who have completed their demographic transitions. If restrictive immigration policy tries to choke off this process, then illegal immigrants and asylum seekers will try to circumvent it.

Things get a little more contentious when we turn from mass migrations and global labour markets, to financial flows and global capital markets. It is an innocuous statement to describe a capital inflow as a means to finance domestic investment requirements when there is a domestic savings shortfall. While demography can influence both the savings and the investment side, it's the savings part of the story that economists fight about. I start there.

Forty-five years ago, Ansley Coale and Edgar Hoover proposed their famous dependency-burden hypothesis.6 It was based on a simple but powerful intuition. Rapid population growth induced by falling 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 maybe even an economic miracle. Finally, the demographic transition is manifested by a big elderly burden, low savings, and a growth slow-down from the miracle. Thus, the Coale-Hoover hypothesis suggests, for example, that some of the impressive rise in East and Southeast Asian savings rates over the quarter century following 1965 (and before the financial melt-down in the 1990s) can be explained by the equally impressive decline in dependency

[5] And it can create inequality as a consequence. See Higgins and Williamson, Explaining inequality.

6 Coale and Hoover, *Population Growth.*

burdens, and that as the elderly dependency rate rises in 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, so I will simply note that the dependency-burden hypothesis has enjoyed something of a *renaissance* over the past decade or so.[7]

What about investment demand? Here the argument is less contentious and will sit well with economic historians my age. As the children of a baby boom become young adults, the rise in the labour 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. Moses Abramovitz, Noel Butlin, Richard Easterlin, Simon Kuznets and other economic history pioneers called this 'population sensitive' investment while offering explanations for 19th century long swings or Kuznets cycles, global instability of which Australia was a part.

In short, investment demand and savings supply are likely to be positively correlated over a demographic transition. When there is a glut of children or 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.[8] 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 (*e.g.* net foreign investment or net capital flows). 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

7 See Mason, *Population Change.*

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 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 allows these forces to play themselves out, capital will tend to move between nations like an *intergenerational transfer* from old to young.

This is the basic argument connecting demographic transitions with world factor migrations. What follows are four examples from both the recent and the distant past which 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.

DEMOGRAPHIC EVENTS AND EUROPEAN MASS MIGRATIONS BEFORE 1914

During the trans-Atlantic mass migrations in the half-century before World War I, about 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

8 Higgins and Williamson, Age structure dynamics.

pace of development at home, by the cumulative effects of past migrations through what sociologists call the 'friends and relatives effect' and, most importantly for this lecture, by demographic events in the sending and receiving regions.[9] Once mass migration gained momentum, annual emigration rates as high as 15 per thousand per annum were recorded for relatively poor countries like Italy and Ireland.

European countries typically passed through a life cycle, from low, then high, then low emigration rates. Poor countries record only modest levels of emigration at the beginning, and this fact seems somewhat paradoxical. After all, simple economics would suggest that poor countries would record the highest rates of emigration since their citizens have the most to gain from the move. The paradox is resolved as soon as we remember that emigration is constrained by poverty at home, that is to say, by the lack of resources needed to finance the move. The paradox appears again when we recall 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 answers are two: a gradual release from the poverty constraints on the move, and a powerful rise in demographic forces adding to potential movers. Figure 4 repeats a simple characterisation of this national life-cycle time path suggested by previous collaborative work with Timothy Hatton, where movements along some downward-sloping home country emigration function (EM) are isolated from shifts in that function. In pre-industrial episodes, we observe low emigration rates (e_0) and low wages (w_0).[10] Industrial revolutions, demographic transitions and other events then serve to raise the emigration function to EM' and the real wage 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, EM is either taken to be stable, or, more likely, it shifts back to its original position, so

9 Hatton and Williamson, *Age of Mass Migration*, chapter 3; Hatton and Williamson, *Global Migrations*, chapter 4.
10 Hatton and Williamson, *Age of Mass Migration*, Figure 3.1.

that further improvements in real wages at home, to w_2, cut back emigration rates to e_2, or lower. Thus, Europe's stylised historical emigration facts are reproduced by the movements in Figure 4.

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 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 also produced a labour 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 demographic transition ran its course, helping to shift EM in Figure 4 inwards, and causing emigration rates to fall.

To repeat, more than half of the European mass emigrations before World War I were driven by population cohort effects related to the demographic transition.

DEMOGRAPHIC TRANSITIONS, AIDS AND MODERN 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. Population growth rates in Africa are expected to remain above 2 per cent 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, of course, are the ones most likely to move. Furthermore, the wage ratios favouring Europe over Africa today (from ten or twenty to one) are more than double the ratios that favoured the New World over poor Europe in the 19th century (from three or five to one). 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 per cent of the 1990 resident population of sub-Saharan Africa were living outside their country of birth.[11] This is much lower than Western Europe (6.1 per cent) or the United States (8.6 per cent), but, of course, these two are immigrant regions. Comparisons with other emigrant regions, like Asia or Latin America, are more relevant, and by this comparison the African figure looks *much* higher: of the 1990 resident populations, 1.4 per cent in Asia and 1.7 per cent in Latin America were living outside their country of birth. The Caribbean was the only emigrating region that recorded a higher rate (2.9 per cent) than sub-Saharan Africa, and it wasn't higher by much.

Regarding immigrant 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 within the United States or between EU members, but the barriers within the African continent are far lower than between it and the high-wage industrial world. 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 that for the European emigrations a century.[12] The two most important influences are gaps in real wages or living standards between home and abroad, and the share of the population aged 15-29. Demographic events mattered in Africa's recent past and they will matter even more in its future. There are three reasons for this: First,

11 Hatton and Williamson, Demographic and economic pressure; Hatton and Williamson, *Global Migrations*, chapter 14.
12 Hatton and Williamson, *Global Migrations*, chapter 14.

population growth puts pressure on land and other resources, lowering the marginal product of labour and living standards at home, 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 very 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 1.0 per thousand by the year 2030. [13] Most of this projected emigration pressure is due to demographic change. These out-of-Africa emigration rates, if actually achieved by 2030, would be modest by the standards of the pre-World War I mass migrations from Western Europe: the figure for the 1870s was 2.2 per thousand and for the 1900s 5.4 per thousand. Yet, they still imply sizeable numbers since the projected emigrants per annum total rises by about 800,000 over 20 years. These significant increases follow from the rise in the young adult population share from 27.7 in 2000 to 29.6 in 2020 and the rise in population density from 27.4 to 41.5 per square kilometre over the same period. These calculations are only illustrative, but they indicate that demography matters in Africa today just as it did in Europe a century ago.

Demographic predictions have become especially uncertain because of the HIV/AIDS pandemic. About 25 million are infected in Africa and the prevalence rate among adults in sub-Saharan Africa is 8.6 per cent.[14] The disease is particularly prevalent in southern Africa where the adult prevalence rates are 37 per cent in Botswana, 25 per cent in Zimbabwe, and 20 per cent in South Africa. The demographic estimates underlying the emigration forecasts just cited were constructed in 2002, thus anticipating the effects of the epidemic: they assume that a large proportion of the young adult population increase induced by the demographic transition will be decimated. Without the

13 Hatton and Williamson, *Global Migrations*, chapter 16.

HIV/AIDS pandemic, the out-of-Africa forecasts would have been 2.4 per thousand, about the same as European rates in the 1870s.

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 as a century ago. 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 19th century Europe, more modest demographic increases were accompanied 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 mass migration. Yet, migrations were still mass. Africa today offers a contrast: economic growth has faltered, its economies have fallen further behind the leaders, and there will be a demographic speed up in the near future.

The pressure on African emigration will, therefore, intensify, manifested by a growing demand for entrance into high-wage labour 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 it 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 two or three decades from now Africa will record far greater mass migrations than did 19th century Europe.

HOW DEMOGRAPHIC EVENTS HELPED PUSH AND PULL EUROPEAN CAPITAL BEFORE 1914

International capital mobility can have profound implications for economic growth in both theory and practice. It can matter theoretically, because most theories of growth, from Ricardo to Solow to

14 Hatton and Williamson, *Global Migrations*, chapter 14.

Romer, emphasise accumulation 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 19th century saw international capital flows larger in scale than anything seen before or since.[15] The City of London was at the centre of this global capital market, and the British were doing a very large share of the capital exporting. They had already put 17 per cent of their wealth overseas by 1870, but the figure had increased to 33 per cent 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 per cent in the late 1860s and early 1870s, it was about 47 per cent in the late 1880s, and it was about 53 per cent 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 a 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 half of the Argentine capital stock and a fifth of the Australian capital stock. Even the United States, whose domestic saving had taken on an increasing share of its investment requirements since the 1830s boom16, still registered high levels of foreign capital dependence towards the end of the century: the net stock of foreign liabilities as a share of GNP was still about 26 per cent in 1894. This US 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 per cent for Argentina, 19 per cent for Brazil and 30 per cent for Mexico. Net inward foreign investment as a share of gross fixed capital formation ranged from 10 to 20 per cent amongst the major Third World importers in the decade prior

15 O'Rourke and Williamson, *Globalization*, chapter 11; Obstfeld and Taylor, Globalization.

to 1984. The same statistic for the four decades between 1870 and 1910 was 37 per cent for Canada, about 70 per cent for Argentina, and perhaps as much as 75 per cent for Mexico.

Where did all this foreign capital go during this first global capital market boom? More than a decade has passed since Robert Lucas asked why capital does not flow from rich to poor countries, posing what is widely known as the Lucas Paradox.[17] 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 right: very little of British capital exports went to poor countries prior to World War I.[18] Indeed, about two-thirds of it went to the rich New World where only a 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. Table 1 documents that the Lucas Paradox was not only present in the first global century before World War I, but it was even more powerful then compared to now in the second global century. If poor countries offer high returns and if capital rushes there to exploit them, we would expect negative coefficients on the GDP per capita variable in Table 1. Instead, we find positive (and significant) coefficients – that is, rich countries got the capital, and the elasticities (in brackets) were twice as high in 1907-1913 than in 1992-1998.

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-labour explanation argues that there must have been an omitted third variable at work, and most economic observers of the late 19th century would say that the omitted variable was natural resources, while most economic observers of the late 20th 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

16 Williamson, Inequality.
17 Lucas, Why doesn't capital flow.
18 Clemens and Williamson, Wealth bias.

demand, but high youth dependency rates helped choked off New World savings, also contributing to those huge capital flows.[19] Labour scarcity in the New World generated the long run labour supply response documented in Figure 5. The economically active population (the total population minus the dependent youths and elderly) grew faster in the labour-scarce New World than in the labour-abundant European periphery, with the European industrial core lying in the middle. This long run labour supply response in the labour scarce New World took two forms. First, there was the domestic response. Couples married early, 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 still very large, perhaps even larger than it was a decade or so ago between the Third World and the OECD (that gap was 15-16 percentage points in 1989, while the UK-New World gap in the 1870s was as high as 20 percentage points).

The Coale-Hoover dependency-burden model that 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 who 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: indeed, perhaps as much as two-thirds of British net foreign investment abroad can be explained by these demographic forces.[20]

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 FOREIGN CAPITAL AND DEMOGRAPHIC DEPENDENCE CONNECTION IN EAST ASIA 1950-1992

19 Taylor and Williamson, Capital flows.

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 per cent to 3.2 per cent 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, and that the demographic transition was the key to the Korean switch from net capital imports to net capital exports.[21]

While the South Korea case was canonical, the rest of East Asia exhibited the same experience. Table 2 records how domestic savings rates soared everywhere in East Asia, on average rising from a little less than 14 per cent in the late 1950s to an amazing 35 per cent in the early 1990s. Investment shares in GDP also soared, but not by quite as much: from a little less than 19 per cent to almost 31 per cent 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 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 financial meltdown.

Like South Korea, demographic dependency was highly correlated with the graduation from foreign capital dependency everywhere in 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 3 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 per cent 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

20 Taylor and Williamson, Capital flows.

(both about 46 per cent). Furthermore, it appears that the surge in the Asian youth dependency rates was largely a phenomenon of the second half of the 20th 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 behaviour were estimated on this Asian experience. And when Matthew Higgins and I 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.[22]

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 disproportionally 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

21 Kang, Why did Koreans.

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 labour from low (agriculture) to high productivity sectors (industry), from exploiting globalisation 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, 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 longer.

Figure 6 offers a stylised version of this economic narrative where the sustainable growth rate is taken to be about 2 per cent 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 labour force per capita fell and domestic savings was suppressed. Figure 6 characterises poor growth as that falling below the sustainable 2 per cent per annum level. After 15 or 20 years, the large youth cohort began to hit East Asian labour markets, labour 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.

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22 Mason, *Population change*; Birdsall *et al.*, *Population Matters*.

If Figure 6 represents the East Asia facts, what does it tell us about the contribution of the demographic transition to the miracle? Demography isn't everything, of course, but when reading Figure 6, 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.

Not too long ago, David Bloom and myself offered evidence which appears to confirm the rough magnitudes suggested by Figure 6.[23]

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 4. 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 4 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 one per cent increase in the growth rate of the working age population is associated with a 1.46 per cent 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 one per cent decrease in the growth rate of the dependent population is associated with about a one per cent increase in the growth rate of GDP per capita. The third and fourth columns of Table 4 show what happens when the impact of the growth rates of the working-age and the entire population are constrained to be equal but of opposite sign. In long run steady state, when the age distribution is

23 Bloom and Williamson, Demographic transitions.

stable, population growth wouldn't matter in either of these two specifications (GEAP – GPOP = 0). 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 15-64) grows faster than the tails (ages 15 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 per cent per annum, dramatically faster than the 1.6 per cent rate for the entire population, yielding a 0.8 per cent differential (Table 5). Combining the coefficients from the estimated growth equations and the growth rates of the working age and total population, Table 5 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 a 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 per cent, then population dynamics can explain almost half of the miracle (1.9/[6.11-2]). Thus, Figure 6 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 Paul Krugman's attention when he asserted that the East Asian miracle was driven mainly by high rates of accumulation and labour force growth.[24] I agree with Krugman, but argue that it was a demographic transition 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. The forecast was based on the coefficients of the estimated growth model and the UN demographic projections up to the year 2025. In East Asia, GDP per capita growth

24 Krugman, The myth.

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 events have played an important role in East Asian growth since 1950. During the same half century, demographic events 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.[25]

A WORLD ASSESSMENT

These examples have explored the connection between population shocks associated with the demographic transition 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 gotten 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 gotten more foreign capital were not baby booms in the OECD helping 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, there is no world economic-demographic equilibrium considered here, and that would surely be an interesting 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 struggling with capital scarcity, while the young Third World will want to

25 Taylor, Debt, dependence.

vent its labour surplus on to the elderly OECD struggling with labour scarcity. The big question is whether policy will allow global labour and global capital markets to make this intergenerational transfer.

References

Birdsall, N., Kelley, A., and Sinding, S. (eds.) (2001), *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World* (Oxford: Oxford U.P.).

Bloom, D., and Williamson, J.G. (1998), Demographic transitions and economic miracles in emerging Asia. *World Bank Economic Review,* 12: 419-55.

Clemens, M. A. and Williamson, J.G. (2004), Wealth bias in the first global capital market boom 1870-1913, *Economic Journal* (forthcoming).

Coale, A. J. and Hoover, E. (1958), *Population Growth and Economic Development in Low-Income Countries* (Princeton, NJ: Princeton U.P.).

Easterlin, R. A. (1980), *Birth and Fortune* (New York: Basic Books).

Easterlin, R. A. (1996), *Growth Triumphant: The Twenty-First Century in Historical Perspective* (Ann Arbor, Mich.: University of Michigan Press).

Hatton, T. J. and Williamson, J.G. (1998), *The Age of Mass Migration: An Economic Analysis* (New York: Oxford U.P.).

Hatton, T. J. and Williamson, J.G. (2003), Demographic and economic pressure on emigration out of Africa, *Scandinavian Journal of Economics*, 105: 465-86.

Hatton, T. J. and Williamson, J.G. [ongoing], *Global Migrations: Past, Present and Policy* (ongoing book manuscript).

Higgins, M. and Williamson, J.G. (1997), Age structure dynamics in Asia and dependence on foreign capital. *Population and Development Review,* 23: 261-93.

Higgins, M. and Williamson, J.G. (2002), Explaining inequality the world round: Cohort size, Kuznets curves, and openness. *Southeast Asian Studies*, 40: 268-302.

Kang, K. (1994), Why did Koreans save so little and why do they now save so much? *International Economic Journal,* 8: 99-111.

Kelley, A.C. (1988), Economic consequences of population change in the Third World. *Journal of Economic Literature,* 26: 1685-728.

Krugman, P. (1994), The myth of Asia's miracle. *Foreign Affairs,* 73: 62-78.

Lucas, R.E. (1990), Why doesn't capital flow from rich to poor countries? *American Economic Review,* 80: 92-6.

Mason, A. (ed.) (2001), *Population Change and Economic Development in East Asia* (Stanford, Cal.: Stanford U.P.).

Obstfeld, M. and Taylor, A.M. (2003), Globalization and capital markets. In M. Bordo, A.M. Taylor and J.G. Williamson eds. *Globalization in Historical Perspective* (Chicago: University of Chicago Press).

O'Rourke, K.H. and Williamson, J.G. (1999), *Globalization and History* (Cambridge, Mass.: MIT Press).

Taylor, A.M. (1995), Debt, dependence and the demographic transition: Latin America into the next century. *World Development,* 102: 869-79

Taylor, A.M., and Williamson, J.G. (1994), Capital flows to the New World as an intergenerational transfer. *Journal of Political Economy,* 102: 348-71.

Williamson, J.G. (1979), Inequality, accumulation, and technological imbalance: A growth-equity conflict in American history? *Economic Development and Cultural Change,* 27: 231-52.

Williamson, J.G. (1990), *Coping with City Growth during the British Industrial Revolution* (Cambridge: Cambridge U.P.).

Williamson, J.G. (2001), Demographic shocks and global factor flows. In J.N. Little and R.K. Triest eds. *Seismic Shifts: The Economic Impact of Demographic Change* (Boston, Mass.: Federal Reserve Bank of Boston).

Table 1. Wealth bias during the two great capital export booms

Dependent variable	1907-1913 Annual average gross British capital received (flow, in 1990 US$)	1992-1998 Annual average change in stock of private capital liabilities (flow, in 1990 US$)
GDP, 1990 US$	0.000208 (3.32)*** [0.534]	0.00467 (8.68)*** [0.624]
GDP per capita, 1990 US$	10,700 (2.43)** [0.965]	97,900 (2.20)** [0.410]
Constant	–11,100,000 (1.06)	–44,700,000 (0.11)
Estimator	OLS	OLS
N	34	155
R^2	0.414	0.463

Notes: Absolute values of t-statistics are in parentheses. Elasticities (at average regressor values) are in square brackets. *** Significant at the 1% level. ** Significant at the 5% level.
Source: Clemens and Williamson, Wealth bias, Table 2.

Table 2. Savings, investment and net capital flows in East Asia as per cent shares in GDP, 1950–1992

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	-0.67
1980–84	28.62	29.14	0.09
1985–89	34.01	28.27	5.26
1990–92	35.03	30.78	2.38

Notes: Unweighted country averages.
Source: Higgins and Williamson, Age structure dynamics, 267.

Table 3. Dependency rates in Asia during the second half of the 20th Century (in per cent)

		Youth Dependency		
	Peak Years	Young	Prime	Old
Country	*vs.* 1990-92	0–14	25–59	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, Age structure dynamics, 264.

Table 4. Effects of population growth on economic growth, 1965-90
(dependent variable: growth rate of real GDP per capita, 1965-90)

Independent Variables	OLS Estimates			
	(1) Specification 1	(2) Specification 2	(3) Specification 1 (constrained)	(4) Specification 2 (constrained)
GEAP (growth rate of economically active population 1965-90)	1.95 (.38)	1.46 (.34)		
GPOP (population growth rate 1965-90)	-1.87 (.43)	-1.03 (.40)		
GEAP – GPOP			1.97 (.38)	1.68 (.35)
Log GDP per capita as ratio of US GDP per capita, 1965	-1.36 (.21)	-2.00 (.21)	-1.39 (.21)	-1.97 (.22)
Log life expectancy, 1960		3.96 (.97)		2.94 (.97)
Log years of secondary schooling 1965	.50 (.16)	.22 (.14)	.50 (.16)	.28 (.14)
Natural resource abundance	-4.86 (1.2)	-2.35 (1.0)	-4.86 (1.1)	-2.57 (1.1)
Openness	2.06 (.40)	1.92 (.32)	2.00 (.38)	1.72 (.33)
Quality of institutions	.23 (.08)	.20 (.07)	.22 (.08)	.15 (.07)
Access to ports dummy	-.35 (.34)	-.64 (.27)	-.31 (.32)	-.40 (.27)
Average government savings, 1970-90	.14 (.03)	.12 (.03)	.14 (.03)	.13 (.03)
Tropics dummy		-1.31 (.30)		-1.20 (.31)
Ratio of coastline to land area		.24 (.11)		.23 (.12)
Constant	-2.46 (.79)	-19.5 (4.3)	-2.28 (.69)	-14.3 (4.1)
Adjusted R^2	0.76	0.86	0.78	0.85

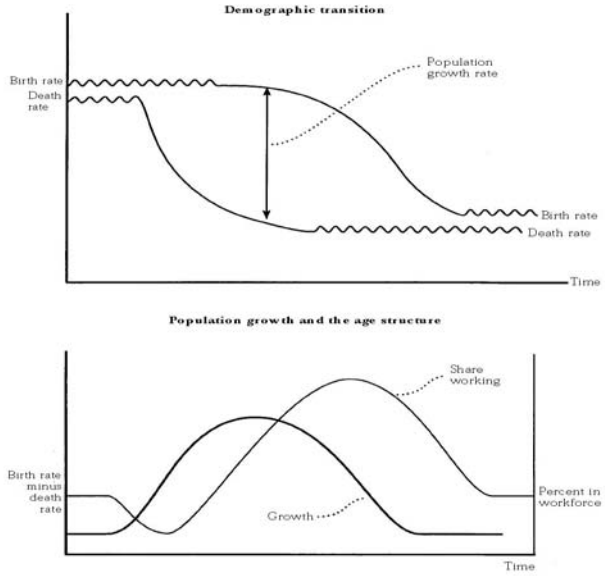
Notes: Standard errors are reported in parentheses below coefficient estimates.
Source: Bloom and Williamson, Demographic transitions, 436.

Table 5. Contribution of demographic change to past economic growth

Regions	Average growth rate of real GDP per capita, 1965-90	Average growth rate of population, 1965-90	Average growth rate of economically active population, 1965-90	Average growth rate of dependent population, 1965-90	Estimated contribution, 1965-90 (columns correspond to specifications in Table 4)			
					(1)	(2)	(3)	(4)
Asia	3.33	2.32	2.76	1.56	1.04	1.64	0.86	0.73
East Asia	6.11	1.58	2.39	0.25	1.71	1.87	1.6	1.37
Southeast Asia	3.8	2.36	2.9	1.66	1.25	1.81	1.07	0.91
South Asia	1.71	2.27	2.51	1.95	0.66	1.34	0.48	0.41
Africa	0.97	2.64	2.62	2.92	0.14	1.1	-0.07	-0.06
Europe	2.83	0.53	0.73	0.15	0.43	0.52	0.39	0.33
South America	0.85	2.06	2.5	1.71	1.03	1.54	0.87	0.74
North America	1.61	1.72	2.13	1.11	0.94	1.34	0.81	0.69
Oceania	1.97	1.57	1.89	1	0.74	1.14	0.62	0.53

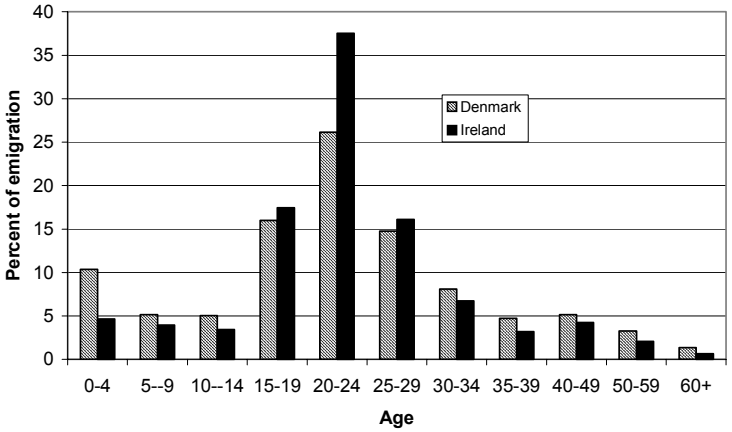
Source: Bloom and Williamson, Demographic transitions, 442.

Figure 1. The stylised demographic transition



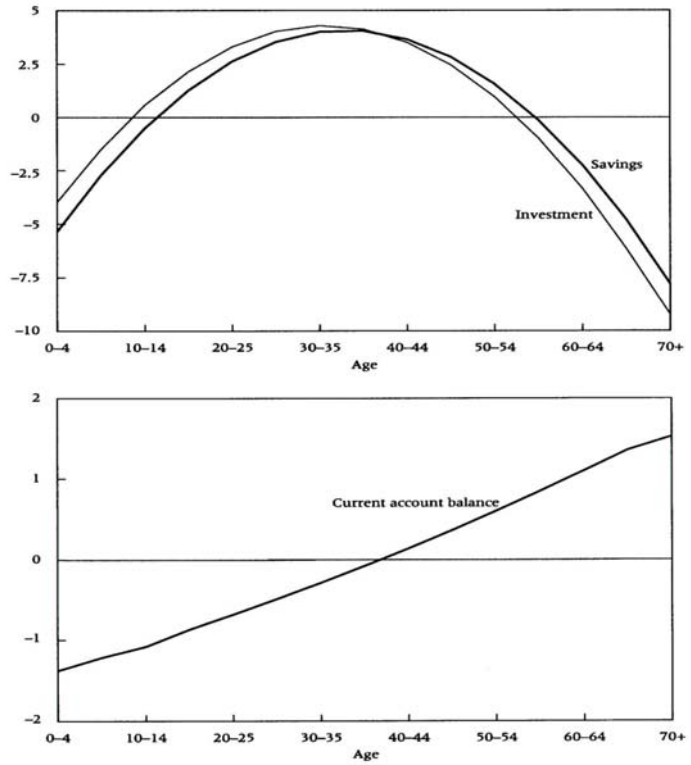
Source: Bloom and Williamson, Demographic transitions, 423.

Figure 2. Age distribution of emigrants: Denmark 1868-1900 and Ireland 1871-1910



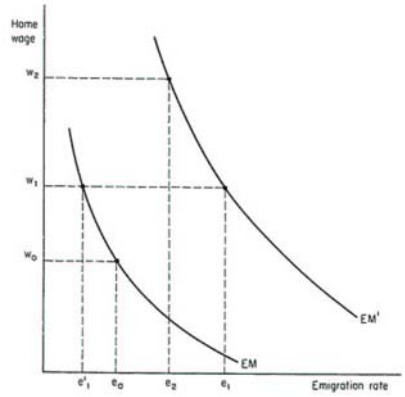
Source: Hatton and Williamson, *Global Migrations*, Table 5.1.

Figure 3. Estimated age-based coefficients for changes in savings, investment, and current account balance shares in GDP, East Asia 1950-92



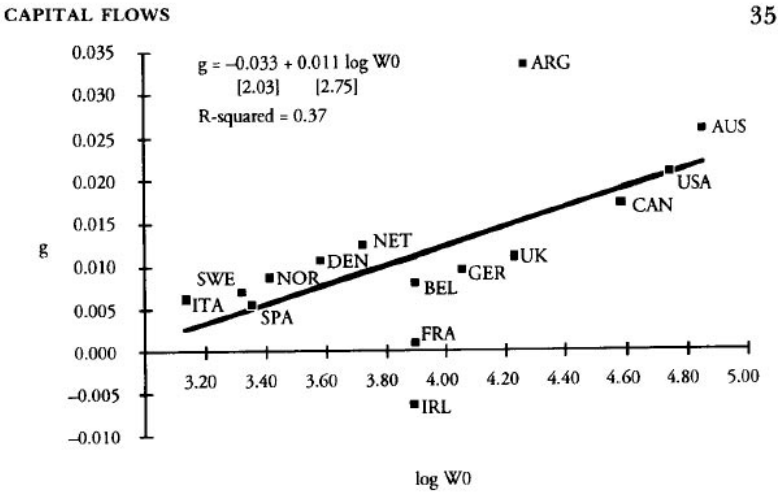
Source: Higgins and Williamson, Age structure dynamics, 274.

Figure 4. Stylised country emigration responses



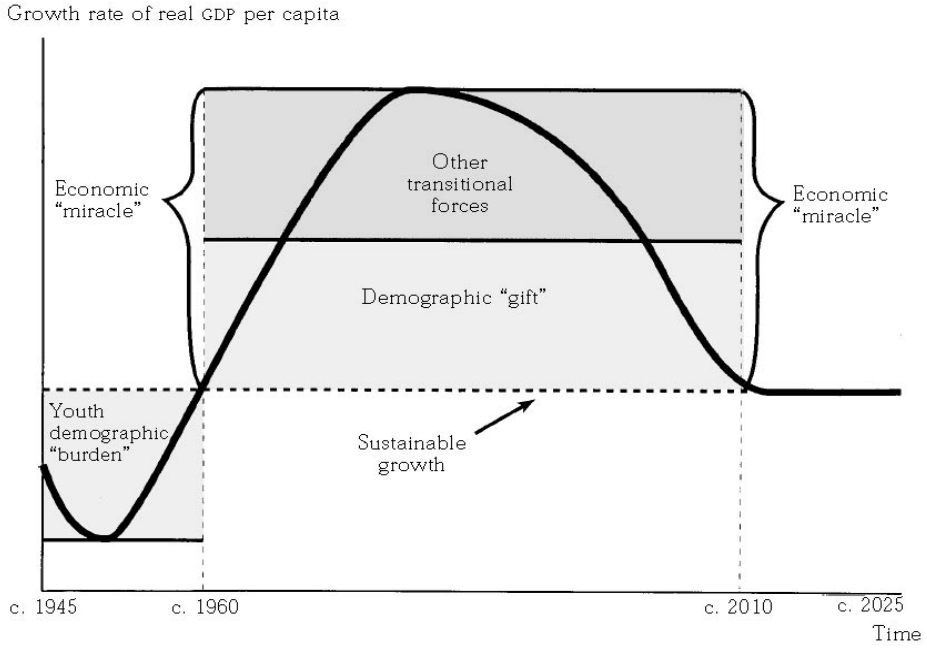
Source: Hatton and Williamson, *The Age of Mass Migration*, 36.

Figure 5. Real wages and population growth, the Atlantic Economy 1870-1913



Note: W_0 is the real wage in 1870; g is the annual growth rate of population over the period.
Source: Taylor and Williamson, Capital flows, 351.

Figure 6. Stylised view of economic growth and the demographic transition, East Asia 1945-2025



Source: Bloom and Williamson, Demographic transitions, 430.