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Aging and Economic Opportunities: Major World Regions around the Turn of the Century

by

Jere R. Behrman, Suzanne Duryea and Miguel Székely*

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* Behrman is the William R. Kenan, Jr. Professor of Economics and Director of the Population Studies Center at the University of Pennsylvania and can be contacted at Economics, McNeil 160, 3718 Locust Walk, University of Pennsylvania, Philadelphia, PA 19104-6297, USA; telephone 215 898 7704, fax 215 898 2124, e-mail jbehrman@econ.sas.upenn.edu. Duryea and Székely are Economists in the Office of the Chief Economist, Inter-American Development Bank, 1300 New York Ave. NW, Washington, DC 20577; telephone 1 202 623 3589 and 1 202 623 2907; fax 1 202 623 2481; e-mail suzanned@iadb.org and miguels@iadb.org. Behrman collaborated with Duryea and Székely on this paper as a consultant to the Inter-American Development Bank. We thank participants at a seminar at the IDB, as well as Alejandro Gaviria, David Lam, Carmen Pages, Ugo Panizza and Paul Schultz for helpful discussions.

Abstract: This paper presents new evidence for major world regions and for the most populous countries in each region on associations between the average ages of populations and three groups of economic outcomes: (1) macroeconomic aggregates (domestic saving as a share of GDP, GDP per capita, capital per worker and tax revenue as a share of GDP); (2) governmental expenditures on education and health; and (3) social indicators (inequality, unemployment, homicide rates, and schooling progression rates). The results suggest that the variables considered follow clear age-related patterns, that the patterns differ by regions, and that the patterns differ with different policy regimes related to trade openness, domestic financial market deepening and macroeconomic volatility. The evidence is consistent with the possibility that some age structure shifts can provide favorable conditions for development. Apparently regions such as East Asia in recent decades have been able to benefit from this demographic opportunity. However, in others such as Latin America and the Caribbean -which is at the verge of experiencing the largest age structure shifts in the coming decades- creating an adequate economic environment to translate the opportunity into higher living standards for its population is a major challenge.

Key Words: demographic transition, aging, age structure, economic development, life-cycle savings, social sectors, dependency ratios, working-age population, unemployment

JEL classification: J11, J14, and O111

Introduction

The emphasis on demographic factors in economic development has varied considerably over time. In some eras demographic factors have been viewed by many as strongly shaping development prospects, often with dire concerns about overpopulation in a Mathusian tradition. At other times -- including most of the 1970s, 1980s and early 1990s -- demographic factors have been considered by economists as one of many aspects of the development process, in part responding endogenously to that process, but without any particular centrality. More recently, there has been a revival of emphasis on demographic factors as importantly shaping development options with this revisionist emphasis being on implications of the changing age structure in the latter part of the demographic transition.

Before the onset of the stereotypic demographic transition, crude birth rates and death rates are both relatively high and young and old dependency ratios are stable. In the first phase of the transition mortality falls, particularly infant and child mortality, as a result of improvements in clean water, nutrition, and sanitation methods, so that the young dependency ratio increases. In the second phase of the transition, fertility typically falls after infant mortality has declined, perhaps because couples can achieve a desired family size with lower fertility. With a lag the young dependency ratio falls due to the lowered fertility rates. With a much greater lag (perhaps after fertility and mortality rates have stabilized in the third stage), as the population bulge due to the first phase of the transition ages and becomes old, the old dependency ratio increases. In the third phase of the transition fertility rates and mortality rates are moderate. So, the demographic transition leads to changes in the age structure of the population that may be rapid if the demographic transition is rapid.

A central question in this new perspective has been whether there is a "window of demographic opportunity" through which East and Southeast Asian have passed and Latin America and the Caribbean (LAC) is passing because of transitory low dependency ratios (due to falling youth dependency ratios with lesser fertility and more slowly increasing old dependency ratios and associated life cycle patterns in savings, human resource investments, health demands, work patterns, etc.). ADB (1997, p. 158), for example, claims that Asia's recent "demographic gift" has accounted for 0.5 to 1.3 percentage points of the annual GDP per capita growth rate, or from 15 to 40 percent of the average annual growth rate of 3.3 percent between 1965 and 1990.

Because of this and other studies, increasingly conventional wisdom has become that the age structure changes that occur as part of the demographic transition may affect substantially economic options in the medium run. The empirical explorations related to such possibilities to date, however, have been limited and have not considered many of the channels through which these effects might be manifested.

This paper presents some new empirical evidence on associations between age structures of populations, as summarized by their average ages, and selected economic outcomes. We start in Section 1 by briefly documenting differences in age structures across major regions in the world and selected countries including the most populous ones for each region. In Section 2 we present our strategy for estimating the age pattern of a series of variables and discuss the advantages and disadvantages of using the country average age as a summary indicator of age structure. Section 3 presents the country average age patterns, net of country fixed effects and year fixed effects, for four aggregate macroeconomic variables (domestic saving, GDP per capita, capital per worker and tax revenue), three variables related to the provision of public education and health, and four socioeconomic indicators (the Gini coefficient, unemployment rates, homicide rates and schooling progression rates). Section 4 explores if the country average age patterns differ between low and high levels of trade openness, financial market deepening and macroeconomic stability. Section 5 concludes.

1. Age Structures in Major World Regions and Subregions in 1995 and 2020

Table 1 presents data on the population age structures in major world regions and subregions in 1995 and on those estimated for 2020 using the moderate UN (1998) population projections and definitions of regions and subregions. The population shares for three age groups are given: "young" (0-14 years old), "working age" (15-64 years old), and "old" (65 and older).[1]

All six African subregions are in the initial stage of the demographic transition, with large proportions of the population in the young age group (42% in 1995) due to recent high fertility rates. The relative size of the working age population is lower than in any other region in

[1] For convenience as a shorthand terminology we use "young,", "working-age" and "old" to refer to these three age groups throughout this paper. These designations are meant only to capture the age structures of populations, not necessarily to describe behavioral choices (e.g., whether the majority of persons at various ages are working) or health, both of which vary substantially across populations and over time in the same population.

the world (54%), while the share of population in the old age group is negligible (3%). The average population age ranged from 21.0 to 24.2 years in 1995 (with Eastern Africa the lowest). Central and South America and South-central, Southeastern and Western Asia also are relatively young (with average ages in the 24.4 to 27.0 range), but are well into the second stage of the transition. These subregions have on average around 35% of their population in the young age group, around 61% in the working age group and not more than 5% in the old group. In contrast, Eastern Asia and the countries in Europe and North America are well into the final stage of the transition. Around 20% of their populations is in the young age group, two thirds of their populations is of working age, and with the exception of Eastern Asia, more than 12% of their populations is old. The average ages in 1995 were 30.5 years for Eastern Asia, 35.2 for Northern American, and between 35.8 and 38.3 years for the European subregions (with Western Europe the highest). Thus there is considerable current variation in age structures among regions and subregions, with average ages by subregions in 1995 ranging from 21.0 in Eastern Africa to 38.3 years in Western Europe. The regions/subregions that are relatively "younger" include all those in Africa, Latin American and the Caribbean (LA), and Asia (excluding Eastern Asia). Those in Eastern Asia and Europe and North America are relatively "older."

Due to the speed of the demographic transition in the developing world, there is a tendency for the "younger" regions to catch up with the "older" ones. By the year 2020, the proportions of populations in working age across all subregions (with the exceptions only of Western, Eastern and Middle Africa) will be fairly similar – between 0.63 and 0.69 -- according to the UN medium projections. The main difference among regions will be that the proportion of the old will be much larger in the "older" countries (0.12 in Eastern Asia and from 0.16 to 0.21 in the subregions of Europe and North America but less than 0.10 in the "younger" subregions), while the younger ones will still have substantial proportions of the young (from 0.24 to 0.41 in Africa, Asia (excluding Eastern Asia), and LAC, but under 0.20 in the "older" subregions). The young dependency ratios are projected to decline significantly between 1995 and 2020 in the younger subregions, but only marginally in the older ones. The old dependency ratios are projected to increase quite dramatically in the older subregions, but only marginally in the younger subregions.

The average ages across subregions are also slowly tending to convergence, though with considerable lags for three of the African subregions. Between 1995 and 2020, the UN medium

projections are that in LAC and Asia the average age will increase by 6.1 and 5.5 years, while it will rise by 4.4 years in Europe and North America. The average in Africa is expected to increase by only 3.3 years, reflecting that young dependency will still be very high in this region. However for Western Sahara and Northern Africa, the projected increases in average ages are 5.5 and 5.6 years respectively, so the lag in convergence in Africa basically is for the other four African subregions.

Table 1 shows that of all the regions that for 1995 we classify as "younger", Central America and South America are the ones that are predicted to experience the greatest changes in age structure in the following 25 years.[2] Southeastern Asia will also experience a relatively fast demographic transition, but it will be somewhat slower than the average in LAC.

2. Methodological Considerations

General Strategy: In the following sections we explore the relations between changing age structures and a series of aggregate variables across regions and over time. To look at the relations between changing age structures and aggregate economic variables we draw on the literature on the dynamic analysis of individual decision making using time series of cross-sectional data. In this literature, the average behavior of cohorts of individuals are followed through in the absence of data that tracks the same individual as he/she ages time (Browning, Deaton and Irish 1985). In a similar fashion, we follow the average behavior of a set of variables as countries go from a stage at which large proportions of their population are young to later stages at which the relative shares of older groups increases. The main difference between our approach and the micro life-cycle analysis is that when individuals are followed, there is a natural and inevitable steady aging process. But an older country can become younger or age at a reduced rate due to a surge in fertility. Therefore countries do not necessarily follow a natural monotomic linear progression from young to old. In fact in the initial stages of the demographic transition the average age of a population tends to fall and only subsequently does it tend to rise.

[2] In Behrman, Duryea and Székely (1999) we take a closer look at the Latin American and Caribbean countries. Specifically, we look at the demographic structure in each country, and we also discuss in detail where each country fits into the picture presented in the following sections of this paper.

In the context of the literature on individual decision making, a change in any aggregate variable can be traced back to three factors. First, individuals may behave differently at each stage of their life cycles, and therefore a change in the age composition of the population shifts the value of aggregate variables even though for any individual conditional on life-cycle stage or age there is no change in behavior. Second, there can be factors that are common to all cohorts and stages of the life cycle within a country, or country effects, such as a common culture. Third, there can be factors that are common to all cohorts and stages of the life cycle across countries at a point of time, such as a shock in international markets, or period (year) effects. Our interest here is in the first of these three effects – i.e., how life cycle effects are revealed as the population shares of different birth cohorts change due to the demographic transition.

Representation of Country Age Structures: There are many ways of summarizing information on the age structure of a country. We use the mean age. The mean has the disadvantage of not summarizing all relevant information about the age structure of a country, but it simplifies the interpretation of our results and conveys almost the same information as would alternatives such as the tripartite division among young, working-age adults, and old.[3] The mean age is in fact highly correlated with the population shares of these broad groups. The correlation coefficients between the country average age and the share of the population in the 0-14, 15-64, 65 and over groups, are -.97, .89, and .96, respectively, for 1950-1995. [4]

To give a better idea about the relation between mean country ages and the population shares in the young, working-age and old age groups, we use panel data for the period 1950 to 1995 to estimate three regressions in which the dependent variables are the three population shares for the young, working-age and old age groups, respectively, and the right-side variables are average country ages, country fixed effects and year fixed effects. The coefficient estimates for the age dummies are shown in Figure 1. The figure therefore shows the typical distribution of population in the three broad age groups corresponding to each country average age (while abstracting from country and year fixed effects). A region which has an average age of about 27,

[3] Regressions using the shares of different population subgroups rather than country mean ages (not presented) are not significantly more consistent with variations in the dependent variables that are discussed in the next two sections.

[4] Correlations for finer disaggregations of the age groups to the age ranges 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-60 and 60-64 are .36, .30, .41, .65, .81, .88, .91, .93, .94, .77, .6, .50, .51 and .54, respectively. Note that the correlations between the average and the division of the population into young, working age and over 65 are quite strong, but the correlations decline if the working age population is split in finer partitions. Therefore, our results mainly capture shifts among the three broad age groups mentioned in the text.

as for Asia and LAC in 1995, for example, has about 34% of its population in the young group, 62% in the working-age group, and 4% in the old group. Africa is younger, with a larger share of young and a smaller share of working-age population (and slightly smaller share of old). The four rapidly growing East Asian countries (Hong Kong, Korea, Taiwan, and Singapore – indicated by "4 East Asia") are much older, and the developed countries are older still, with much smaller shares of young and larger shares of both working-age and old groups in their populations.

To test whether these patterns differ by regions, we estimate the same relations separately by regions. Figure 2 plots the coefficient estimates for the average age variables obtained with the working-age population share as the dependent variable. This figure suggests that the average East Asian country has a slightly larger proportion of its population in the working age at each country average age than do LAC, Eastern Europe and developed countries. The largest difference is observed at 30 years of age, where the average East Asian country typically has 69% of its population in the 15-64 group, while the average developed country has around 63%. However, the only significant differences are those between the averages for developed and East Asian countries for the average age range of 27 to 31, where the latter systematically has a significantly larger proportion of population in working age, at the same average age. These results and similar results for the young and old age groups suggest that the interpretation of what average country age means in terms of the age structure of a population will be very similar irrespectively of the region in which each country is located, with but a few exceptions.

Table 2 presents summary statistics for the average country ages, by major regions. The mean average age for the period 1950-1995 for all 164 countries included in the analysis is 25.2 years. The minimum is 19 years and the maximum is 39 years. There is a large difference between developed and developing countries. For the former, there are no observations for the country average age in the 19-25 year range while developing country average ages cover the whole spectrum. Among the developing country regions, East Asia has the broadest range (from 21.5 to 39.2), followed by Eastern Europe (22-38), Asia (excluding East Asia, 20 to 34), the Middle East (19-34) and LAC (20-34). Among the developing country regions, Africa has the shortest coverage, from 19 to 29 years of age. Among all the regions, moreover, Africa has the smallest standard deviation because most countries in this region have average country ages close to the mean of 22 years.

A possible concern is that because the panel that we are using is unbalanced, the patterns that emerge from the data could be reflecting differences in composition of the sample across different country average ages. Regression results might only be identified by developing countries at younger ages and mainly by developed countries at old ages. Table 3 gives the number of observations (that is, country-year observations) for every country average age, by region. The first column shows that there are many more observations in the 21-25 year range than in any other, and that the number declines considerably after age 25. All of the observations up to age 24 are from developing countries. At the other extreme, there are relatively few observations in the oldest country average age ranges. In this case, the sample of countries is quite balanced in terms of developed and developing countries, but among the developing countries there are no observations for Africa, LAC, Asia and the Middle East after age 36. For the country average ages of 37, 38 and 39, the developing countries that identify regressions based on the full sample are from East Asia and Eastern Europe.

While the unbalanced sample is not a cause of alarm per se, because the sample size is lower at older ages, the degree of precision of the estimates for the 36-38 range will be lower than for the rest of the country average ages. A smaller balanced panel (in terms of number of observations) could be used instead of the full panel, but the loss of information would be substantial.

Basic Specification for Estimates: The regressions in the next two sections that characterize the relations between a number of aggregate variables and country age structures are parallel to those used to obtain the estimates in Figures 1 and 2, using the same panel of countries for the period 1950 to 1995 and including the same right-side variables: average age of the population of each country in each time period, country fixed effects, and year fixed effects: [5]

$$X_{i,t} = \alpha AD_{i,t} + \beta year_{,t} + \gamma country_i + \varepsilon_{i,t} \quad (1)$$

[5] This procedure is similar to a smoothing technique used and discussed by Deaton and Paxson (1994), Attanasio and Banks (1998), Attanasio (1998) and Jappelli (1999) on household survey data, in which a dependent variable is regressed on a series of age and cohort dummies, while time effects are normalized and assumed to be zero. In our case, we regress the dependent variable on country average age dummy variables and control for year and country fixed effects (including time effects also helps to de-trend the dependent variables). For most of our dependent variables, statistical tests indicate that the country fixed effects and year fixed effects are statistically significant.

where X is a one of a set of aggregate variables for country 'i' and year 't'; AD is a vector of 19 dummy variables indicating the average age of the country in that particular year (the dummy for average age 19 is always the excluded category), the variable year indicates the year of each observation, the variable country indicates the country of each observation and ε is the error term. The coefficient estimates for the elements in the AD vector reveal whether, after controlling for country fixed characteristics and time effects, the X variable shifts as the average age of the country changes.[6] In most of the graphs shown in the following sections we plot the coefficient estimates for the average country age dummy variables after controlling for country and year fixed effects. We interpret the graphs to represent the pattern of an aggregate variable as the average age of a country changes, net of country and year effects. We also estimate two alternative specifications with interactive differences by region or by decade to see whether there are differences among regions or over time in the extent to which age structure changes are associated with changes in the aggregate variables of interest.

3. Estimates of Associations between Country Average Ages and Socioeconomic Outcomes

This section presents the country average age patterns for eleven different variables, classified into three groups: (1) four macro variables: domestic saving, GDP per capita, capital per worker and tax revenue; (2) three indicators of governmental expenditures on education and health; and (3) four indicators of social conditions: the Gini index of inequality, unemployment rates, homicides per 1000 individuals, and schooling progression rates. The estimates are summarized in figures that give the age coefficient estimates, net of country and year fixed effects. Each figure indicates along the horizontal axis the average ages in 1995 for the major world regions and for the most populous country in each region, as well as for the countries with the lowest and highest average ages in the world -- Uganda and Germany, respectively. The

[6] Miles (1999) presents a calibrated general equilibrium model that explicitly considers the connection between demography and savings and then simulates the effect of future demographic changes on savings. Our approach is similar in spirit to Miles' in the sense that we try to identify the pattern that a variable follows as a country ages, but there are two important differences. First, our intention is not to develop a full behavioral model as Miles does, but rather to flesh out the association between X and the average country age. Second, we obtain our patterns from historical data, while Miles' main focus is to simulate the behavior of a specific variable in the future as a result of expected demographic changes.

average age for 1950, 1995 and that estimated for 2025, for all the countries for which information is available, is presented in Appendix C.[7]

3.1 Macro Savings/Capital/Tax/Product Variables

Domestic savings as a share of GNP: Simple versions of life-cycle savings theories predict that individuals save little or dis-save at young ages when their income-generating capacities are lower than their desired consumption, then the same individuals save at high rates when they are in their prime working ages because their annual income flows exceed their average annual permanent income, and then, when the same individuals reach old age and are no longer generating as much income as when they were in their prime working ages, they use past savings for maintaining consumption above their current income. We expect that aggregate domestic savings follow a similar pattern. Countries with high young dependency ratios are expected to have relatively low savings shares in GNP because large shares of their population have relatively low productivities and are at a stage of the life cycle in which they are "investing" in human capital for increasing future income-earning capacities. Countries that have reached a stage of the demographic transition in which their working-age populations are relatively large so that overall dependency ratios are low are expected to save relatively more in order to shift resources for their anticipated desired consumption greater than current income when they become older. Countries with high old dependency ratios are expected to save relatively less because the old are using resources accumulated in the past through individual savings, pension schemes, or other social benefits to maintain their consumption above their current income levels.

Figure 3 plots the coefficient estimates for the country average age dummies from estimating equation (1) with domestic savings as a share of GNP as the dependent variable for the whole sample (the solid line labeled "general pattern"). The figure shows the expected inverted "U" shape for savings along the average-age pattern. As the country average ages increase from the low 20s, the savings rate increases sharply and reaches a peak at around an average of 33 years of age and declines somewhat for higher country average ages. The increase

[7] The appendices provide substantial related information underlying the figures presented in the text. Appendix A gives the central underlying point estimates for these figures, with the basic estimates in Table A1, those with regional interactions for LAC in Table A2 and for East Asia in Table A3, and those with decade interactions for

in the value of the coefficient estimates between ages 20 and 33, the decline between the age 33 dummy and the dummy for ages 37 and 38 and the decline between ages 35 and 36 and 36 and 37 are all significant and are all consistent with the life-cycle savings theory.[8]

Figure 3 also indicates on the horizontal axis regional average ages, the average ages in the most populous country in each region, and the average ages for the two countries with the lowest and highest average ages (Uganda and Germany, respectively), all for 1995. Countries with young populations, such as Uganda, Nigeria, India and most other countries in the African and South Asian regions, have mean ages associated with relatively low savings rates. LAC has populations that are five years older on average than Africa, which implies a larger proportion of the population in the prime-working ages and higher savings rates, as indicated for Brazil. LAC has a slightly older population on average than all of Asia, but a much younger population on average than the four East Asian countries that have undergone the fastest recent demographic transition. It is well known that the East Asian economies have much larger domestic savings rates than the average Latin American and Caribbean country. An important part of the difference may be that the average individual in East Asia is at a later stage of his/her life cycle, which is characterised by higher savings rates. Indeed at the averages for the two regions in the figure the savings rate is twice as high for the average age of the four fast-growing East Asian economies (about 28%) as for the average age for LAC (about 14%). Developed countries such as the United States and Germany are the oldest group. They have somewhat less average savings rates than the four fast-growing East Asian economies perhaps in part because their country average ages are greater than the peak levels in the figure, presumably associated with the increase in the relative weight of older population subgroups that are approaching or have reached retirement ages.

However, the general pattern may be an oversimplification if the nature of the relation varies by region. Figure 3 also plots the country average age dummies for four different groups of countries. Perhaps surprisingly, developing countries have a much more pronounced inverted "U" country average age pattern (with a statistically significant decline after age 33[9]) than does

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LAC in Table A4. Appendix B gives F tests for the significance of differences between coefficients, with one table for each of the 11 dependent variables considered in this section.. Appendix D gives data sources.

[8] In his simulations, Miles (1999) finds a similar pattern for the United Kingdom although the turning point occurs in the future at around age 42.

[9] The 'p' tests for the significance of the difference between all the coefficient estimates of each of the regions by region is not presented here for brevity, but are available upon request.

the whole sample. Thus the general pattern is not driven only by the experience of developed countries, as might be expected given the slowdown and decline in savings that occur at the country average ages for which developed countries have more observations. Actually, the pattern for developed countries is quite flat, with small declines at the highest country average ages.

The pattern for East Asia is much more pronounced and closer to the life-cycle hypothesis prediction than is the pattern for LAC. The increase for East Asia is sharper than average between ages 23 and 29. There is also a sharper (and significant) decline between ages 32 and 35. In contrast, the country average age pattern of domestic savings in LAC is flat between ages 21 and 27, increases (although much less than in East Asia) between ages 27 and 30, and is flat thereafter. For LAC, only the country average age pattern between ages 24 and 27 is significantly different from the patterns for other regions. For East Asia the portion between ages 22 and 28 (where the sharp increase is observed) is significantly different from the rest, but the pattern from age 29 on, is not.

If we consider the worldwide pattern as the generalized relation between age structure and savings, the steeper pattern for East Asia suggests that the region took great advantage of the early part of the demographic transition to boost savings while aging at the end of the transition is associated with greater rates of disavings in the region. In contrast, the early stage of the demographic transition in LAC is associated with no increase in savings. While the expansion of savings between the mean ages of 27 and 30 is as steep as the world average, savings again flattens out after the age of 30. One possibility is that right when the region was provided with the demographic boost, it was hit by the negative shock of the debt crisis. The third of the specifications we have estimated, with decade interactions (in this case together with LAC dummy interactions in Table A4), is intended to address this possibility. These results suggest that, after controlling for the country average age, LAC seems to have been savings less in the 1990s than in the 1960s, but the difference is not statistically significant. Therefore, the slowdown in the country average age pattern should not be attributed to a shock in any specific decade, but must be reflecting structural differences between this and other regions.

GDP per capita: When the country average age increases from low levels there is an initial shift in the age structure of the population toward people in working ages. If the rate of employment

generation were sufficiently large we would expect this process to be associated with an increase in GDP per capita. One way of illustrating this point is by comparing the GDP per capita to the GDP per worker for countries with different age structures. If there were no differences in average worker productivity between two countries, their GDPs per capita would differ if one had a larger share of its population in the working ages than did the other. In Figure 4 we compare Hong Kong (one of the fastest growing economies with one of the oldest populations) with Mexico (which has a relatively young population) and Argentina (which has one of the oldest populations in LAC, but still a young population in comparison with developed countries). The first panel in the figure plots GDP per capita for Mexico and Hong Kong. This panel indicates that GDP per capita in Hong Kong has been greater than that in Mexico since 1960. However, in Hong Kong a larger proportion of the population has been of working age. Therefore if we plot the GDP per worker, the differences narrow considerably. Panel B still indicates that Hong Kong has grown at a much faster pace, but it only seems to have surpassed Mexico in terms of GDP per worker in about 1990. So, our ranking of these two countries for the period 1960-1990 after "adjusting" for differences in population structure would be modified. A similar story applies for the difference between Argentina and Hong Kong in Panels C and D.

Figure 5 plots the coefficient estimates for the country average age dummies from estimating equation (1) with PPP adjusted GDP per capita as the dependent variable. When we use the whole sample of countries we find that GDP per capita is quite flat and stable at young ages, and starts increasing as the population ages (with statistically significant increases after age 27). When comparing the position of specific regions and countries on the horizontal axis, it seems that East Asia (and, more so the four fast-growing East Asian economies) is already benefiting from the demographic effect of reducing young dependency rates, while LAC on average is still at the initial stages of this process and Africa on average has a population much younger than that at which the upturn has occurred historically.

When the regressions are estimated separately for each region, we find that East Asia has a much steeper slope with respect to age than does LAC, all developing countries as a group (the pattern for all developing countries overlaps considerably with the LAC pattern and therefore is not included in Figure 5) or all developed countries. In East Asia the demographic transition was accompanied by a sharp and significant increase in GDP per capita, while for the other regions GDP per capita does not seem to follow a distinguishable average-age pattern. The East Asian

pattern is significantly different from the rest of the world up to age 31 and from ages 37 on. The specification with decade-region interactions suggest that LAC experienced a severe negative shock right at the moment when demographics might start "paying off," with significantly negative effects for the 1980s and 1990s.

Capital per worker: When a country has a relatively young population, the rate at which its working age population is expanding tends to outpace the rate of capital accumulation. But after some point, when the size of the cohorts entering working ages declines, capital per worker tends to increase. Thus, we would expect that capital per worker would follow a similar pattern as GDP per capita, though with country-average-age associated increases commencing at higher ages. Figure 6 presents the country average age pattern that emerges from estimating equation (1) using capital per worker as the dependent variable. As anticipated, the curve is flat at young ages and has a strong positive slope at older ones, with statistically significant increases after age 31.

Regional differences are also apparent in Figure 6. For East Asia, surprisingly there is a negative (and significant) decline between ages 22 and 31, but after this age, there is an increase, which is statistically significant between ages 30 and 33. The patterns for all developing countries and for LAC are quite flat, and significantly less than the average pattern at the oldest ages for LAC. Part of the reason why LAC has a flatter pattern at older ages is that the 1990s decade was characterised by a negative effect on capital per worker for this region. Developed countries have a significant increase at older ages. Therefore mainly East Asian and developed countries determine the general pattern for this variable.

Tax revenue as a share of GDP: Figure 7 presents the coefficient estimates from regressing tax revenue as a share of GDP on the country average age dummies and country and time fixed effects. The pattern for the whole sample indicates that tax revenue as a proportion of GDP declines somewhat with increasing average age of populations until the country average age reaches about 31 years, but increases as the average age of the population increases from 31 years on. This reflects that in the transition from a young to an older population, the relative weight of the potential tax base increases. We expect that at some point, with the increase in the relative size of the population that is retired, there will be reductions in the rate of increase of the

tax share as the average age of the population increases further. Eventually a turning-point in the average-age pattern of tax revenues due to the increased old-age dependency rate will be observed. But apparently, once there is control for country and year fixed effects, the experience for 1950-1995 does not lead to identifying this turning point. All in all, the associations between country average ages and tax revenue shares in GDP are not all that strong (certainly much weaker than for savings shares). The only changes that are actually statistically significant are those between ages 30 and 32 and between ages 34 and 39.

However, the shape of the country average age pattern for tax revenues as a share of GDP differs markedly by region. The increase after age 30 that is observed in the general pattern seems to be determined exclusively by developing countries, where the raise at the second half of the age-spectrum is statistically significant, while the pattern for developed countries is quite flat. The pattern for East Asia is significantly flatter than the general one. The LAC pattern is similar to the general one, but from age 27 is significantly different from those for other regions. For the 1980s and 1990s, moreover, LAC has significantly greater tax revenue as a share of GDP even after controlling for the demographic effect of changing age structures and country and year fixed effects.

3.2 Governmental Expenditures on Education and Health

Public expenditures on education as a share of GDP: We expect that countries with young populations, where the proportion of children is large, face greater demand for educational expenditures, which would be reflected in a larger share of these in GDP. Figure 8 presents the age coefficient patterns for public expenditures on education as a share of GDP.[10] Perhaps surprisingly, the average-age pattern for public expenditures on education is basically flat, with a slight reduction as country average ages increase up to the early 30s and then a slight increase (but practically none of the coefficient estimates differ significantly from each other).[11]

[10] There also may be changes in demands for private services and substitution between public and private educational and health services. We have not been able to find data to explore such possibilities.

[11] The curves in this figure (and in some others below) go below zero even though the underlying dependent variables are nonnegative by definition. This reflects the positive impact of country and/or year effects, which have been purged in the estimates used to obtain these figures. What is of primary interest for this paper is not whether such estimates are positive but what are the slopes as the country average age changes.

However, the relation seems to differ considerably by region. While the pattern from developed countries and all developing countries taken together do not seem to be very different from the general one, East Asia and LAC present stark contrasts. East Asia appears to have a pattern that is not in line with the general one, but the differences are not statistically significant. In LAC, public expenditures in education as a share of GDP falls significantly between ages 20 and 30 and increases between ages 30 and 33 (the pattern between ages 20 and 26 is significantly different from other regions). The decline observed in LAC cannot be attributed to "decade" effects; the interaction between the LAC region dummy and the decade dummies is insignificant after controlling for average age effects and the LAC country average age dummy interaction (see Appendix Table A4).

Public expenditure on primary education per primary school-age child as a proportion of GNP: Figure 9 plots the coefficient estimates from estimating equation (1) for public expenditure on primary education per primary school-age child as a proportion of GNP. This curve indicates that as the country average age increases, public expenditure on primary education per school-age child as a proportion of GNP increases -- with fairly large slopes both for country average ages in the 20 to 25 year range and above 30 years that generally are statistically significant. This pattern is consistent with the fact that if the share of education expenditures for primary education in GDP remains constant as the country average age changes, as suggested by Figure 8, the expenditure per child is relatively small in countries with young populations but public expenditures per primary-age child tend to increase as the relative size of this group falls with the demographic transition. If more public expenditures per primary-school-age child increase the quality of basic public schooling (about which there is some controversy; see, e.g., Hanushek 1995 and Kremer 1995), then this pattern may have an important impact on productivity and other outcomes for these children in their post-schooling years.

Figure 9 suggests that East Asia on average has benefited from the average-age related increases in expenditure per school age child for some time already, though with considerable potential for further benefits as the country average age approaches that of current developed countries. On average LAC is just entering the stage of the average-age profile where this variable increases, with the overall Asian average slightly behind the LAC region. Developed countries as a group have been on the positive-sloping section of the curve for quite some time,

while on the average African countries are still far away from being at the stage where constant public expenditure GDP shares in education imply greater resources per school-age child.

For developing countries, the country average age pattern is steeper than the pattern observed for the whole sample, while the pattern for developed countries is much flatter. This may seem surprising because educational expenditures tend to be higher in developed countries. However, the graph is not inconsistent with that possibility because it is showing that, after controlling for country characteristics such as the preference to spend more on education in general and year effects, there is no evidence that developed countries have spent more per primary school age child as their populations have been aging.

It may be surprising that the pattern for East Asia in Figure 9 is flatter than the pattern for developing countries, and does not show an increase after age 30. This suggests that if East Asian countries spend on average more in education than countries in other developing country regions, as the available evidence seems to indicate, they do so regardless of their age structure. The LAC pattern is much more in line with the one for the whole sample (and is not significantly different from the general pattern), indicating that expenditures in primary education per child increase with country average age, although the increase starts at a later age than the world average.

Health expenditures as a share of GDP: We expect that in very young and very old countries, the demands for health services are larger than if most of the population is of working age. Figure 10 presents the coefficient estimates from the base regression applied to health expenditures as a share of GDP. As expected, the average-age profile for health expenditures is "U" shaped. If countries have low average age (and high young dependency ratios), health expenditures as a share of GDP tend to be high, reflecting the demand for public health services that is typical of the initial stages of the demographic transition that are characterized by high fertility and high infant mortality.[12] As the average age (and the population share of the working age population) increases, the shares of health expenditures in GDP decline. They reach a minimum at age 33 and then start rising for higher average ages, apparently in response to

[12] As shown by Savedoff and Piras (1999), data from LAC reveal that at young country average ages, the proportion of deaths by communicable diseases (that tend to affect infants and small children more than older individuals) is about 90%, but the proportion decreases to about 30% at older ages. At the other end of the life cycle the proportion of deaths due to circulatory diseases and external causes increases substantially at older country average ages.

increased demand by older individuals, who are increasing their population share. The decline up to age 33 is statistically significant, but the coefficient estimates for the country average age dummy from this age on do not differ significantly from one another.

The average age in Africa is associated with a high share of health expenditure, while the typical Asian and LAC countries are at the stage of the demographic transition where the aging process is associated with declining health expenditures as a share of GDP. East Asia is close to the turning point of the health expenditure-age relationship (with the four fast-growing East Asian countries past it), while developed countries have an average age at which expenditures in health tend to increase.

The pattern for all developing countries mirrors the general pattern, while developed countries taken alone suggest a slight reduction in health expenditure shares as countries age. The East Asian pattern is quite flat, but not significantly different from the average. In contrast, LAC follows an inverted "U" pattern, with health expenditures increasing as countries age, and then declining between ages 28 and 32 similarly to the whole.

3.3 Social Indicators

Gini coefficient of inequality: Figure 11 presents the estimated average-age pattern for inequality, using the Gini coefficient as the dependent variable.[13] We obtain an upward sloping curve and the increases observed after age 27 are statistically significant (the only coefficient estimates in the right portion of the figure that are not consistently different from the rest are those for ages 28 and 29). Prima facie the result may seem surprising because it is well known that the oldest and most developed countries tend to have less unequal distributions than do the younger and less developed ones, and developed countries are well represented at older ages. However, the results in Figure 11 are not inconsistent with this well-known fact. The coefficient estimates of the dummy variables are capturing the average-age profile of the Gini coefficient with controls

[13] Dummy variables indicating that the index comes from a household rather than an individual distribution and that the welfare indicator is consumption rather than income also were introduced into the specification, but with no significant implications for the coefficient estimates of the age dummy variables. The coefficient estimates for these inequality data indicators (i.e., household versus individual, consumption versus income) are not presented in Table A1 for brevity but are available upon request. The income distribution data was "cleaned" to assure that within the same country the welfare indicator (income or expenditure) and the unit of observation (households or individuals) remains unchanged.

for country effects. The country effects control for characteristics such as the degree of homogeneity and the general level of development over the sample period.

The estimates imply that abstracting from such differences among countries, as a population ages there is an age structure effect that generates pressures toward increasing inequality. This evidence is in line with results from several studies using micro data that have found that inequality within cohorts tends to increase with age in part because of the persistent effects of good and bad shocks experienced early in the life cycle (e.g., good or bad luck in initial job match, bad luck in experiencing chronic illnesses or disabilities).[14] The regression results suggest that these effects are reflected in the Gini inequality index for the whole distribution of income. When the population weight of older (and more unequal) age groups increases, inequality tends to rise. This does not imply that a country will necessarily become more unequal as it ages, but simply that there are unequalizing age structure factors that will predominate unless there are other stronger effects in the opposite direction.

On average, Africa, Asia and LAC are close to the lowest part of the curve for the whole sample. In contrast East Asia and even more the developed countries on average have larger current unequalizing effects due to their age structures. This is striking because LAC has been the most unequal region in the world in recent decades. If inequality within cohorts continues to increase with country average age in LAC, there will be intensified age-structure inequality-increasing pressures in much of the region in the initial decades of the 21st century. In fact, according to Figure 11, the country average age pattern for the Gini coefficient is steeper in Latin America than in any other region in the 27-31 age range, although the difference is only statistically significant for the change observed by age 28. East Asia has the steepest pattern for average ages 27 and under, a pattern that is significantly different from those for other regions. The pattern for all developing countries mirrors the general pattern. The pattern for the developed countries does not deviate from the general pattern in contrast to what might have been expected by some because of the relatively low inequality in the developed countries.

Unemployment rates: Changes in the age structure are also expected to have strong effects on unemployment rates because different age groups usually have very different probabilities of

[14] See, for instance Attanasio and Székely (1998), Deaton (1997), Deaton and Paxson (1994), Duryea and Székely (1998) and Lam (1997).

becoming unemployed. Unemployment rates tend to be higher among younger workers because when individuals enter the labor market for the first time they spend more time searching for the best match for their skills, they are less costly to release, they tend to have less information about labor markets, and they and potential employers tend to have less knowledge about their own comparative advantages and preferences than do older workers.[15] Thus, we would expect that when the working age population of a country is relatively young, unemployment rates will tend to be higher, but unemployment will be lessened as the age structure shifts toward older ages. Figure 12 presents estimates that are consistent with these expectations. Unemployment rates are relatively high and even increasing when the country average age is very young, and decline continuously between the ages of 22 and 33. For ages higher than 33, unemployment rates start increasing again. One interpretation of the increase at older country average ages is that there may be increasing difficulty in finding employment at older ages due to the specificity of human capital and experience. The increase between ages 20 and 21 and the decline between ages 26 and 33 both are statistically significant, as is the difference between the coefficient estimate for age 31 and the coefficient estimates for most higher country average ages.

Figure 12 also allows comparisons across regions in the horizontal axis. Africa, Asia and LAC are on average in the downward sloping section of the average-age pattern, implying that as the country average age increases there may be further declines in unemployment rates ceteris paribus. East Asia, in contrast, already is near the lowest point of the average-age- related unemployment pattern and the developed countries are on the upward-sloping segment.

The unemployment rate is the only variable considered so far for which the general pattern is very similar to the patterns observed in the smaller samples of developing, developed, Latin American and Caribbean and East Asian countries. In all of these regions there is a declining trend at relatively younger ages, and an increase at older ages. In statistical terms, the LAC pattern is different from the rest of the regions only for ages 25 to 28 and for age 32 and there do not seem to be any decade effects for this region. The East Asian pattern is only significantly different at some of the youngest ages and at age 36.

[15] Duryea and Székely (1998) discuss these arguments and explore some of their implications for several LAC countries. Another argument, developed in Pages and Montenegro (1999) is that severance payments that increase with tenure provide dis-incentives to hire young workers and create incentives for their displacement if there are negative shocks.

Homicide rates: There is evidence that crime rates tend to be higher among juveniles[16] so we would expect that with a surge in the relative importance of the crime-prone age groups total crime rates would raise and that they would tend to fall as the population shifts to older ages.[17] As noted by Morrison, Pages and Fuentes (1999), information on crime rates is usually plagued by problems of under-reporting, but generally homicide rates tend to be subject to less measurement error than other crime indicators. Thus, Figure 13 uses homicide rates. The form of the curve for the whole sample supports the argument that there is an inverted "U" relation between homicide rates and age structure with a peak at country average age of 26, although there is a slight increase at the oldest ages. However, the only cases where the coefficient estimates are statistically significantly different from each other are in the increase observed between ages 22-24 and age 28, close to where the peak is observed. So, there is evidence of a positive relationship between shifts of population from young to juvenile, and increases in homicide rates, but the expected reduction from shifts to older ages is not statistically significant.

On average LAC and Asia are close to the country average age at which homicide rates peak, while Africa is on the verge of entering the age range with the positive relation between age structure shifts from young to juvenile ages and homicide rates. East Asia is on the downward slope of the general curve, where age structure shifts are expected to result in reductions in homicides.

The pattern observed in developing countries mirrors the general pattern for the whole sample, while in developed countries there seems to be a reduction at older ages rather than a slight increase. In LAC, the country average age pattern of homicide rates is significantly different at ages 24 to 28, where rather than registering a turning point, homicide rates increase. In fact, from age 26 on, homicide rates remain much more stable. There is also is a significant and negative decade effect in the 1990s in LAC. For East Asia the pattern also differs from the one that emerges for the whole sample. In the case of this region, homicide rates increase consistently with country average age, and the differences from the overall pattern are statistically significant

[16] Some of the best evidence comes from the United States. See Levitt (1998).

[17] Easterlin (1978, 1987) argues that this effect is reinforced in the case of individuals born in relatively large cohorts. Morrison, Pages and Fuentes (1999) present some empirical evidence for LAC that supports this argument. Levitt (1998) argues that the demographic effect is observed but not very large in the United States.

Schooling progression: Figure 14 plots the country average age coefficient estimates for schooling progression -- the probability that a student belonging to the cohort that is of school age in the year of reference, progresses to grade 4. We choose this variable because we would like to capture the crowding out effect that would be expected to occur when large proportions of a population demand a service. The probability of progression to grade 4 is low at young country average ages, and then increases as country average age increases, with relatively steep slopes for the country average age ranges of 23-27 and 31-35. The difference between the coefficient estimates for ages 20 to 34 and those for ages 36-39 are significant in most cases. This pattern is consistent with the crowding out argument, and is also consistent with the results in Figure 9 that suggests that public education expenditures per child (which presumably have an effect on the quality of education) are initially low, and start increasing when a country ages.

It would appear that on average the LAC region has already benefited from this positive effect for the 23-27 age range, though with potential in the future for the gains from the 31-35 age range. East Asia on the average is poised to benefit from the gains for the 31-35 age range. The four fast-growing East Asian economies on the average apparently already have benefited from most of the latter age range

The nature of the relationship seems to be different in LAC than in other regions. While the pattern for developing countries, East Asia and developed countries is in line with the general pattern, the relation between country average age and the probability of progressing to grade 4 in LAC is much flatter (although the differences are only statistically significant in few cases). The reason why LAC diverges from the other regions does not seem to be that the region was subject to a shock in a specific decade. In fact, the decade effects for the 1990s and 1980s are significantly higher than those observed in the 1960s, even after controlling for country and year fixed effects and country average age. This suggests that on average, the region has not been able to benefit from the demographic opportunity to improve its education prospects.

4. Age Patterns and Policy Variables

The evidence presented so far indicates that a number of key variables for the development process have clear average-age-related patterns. LAC is entering the stage where some of the strongest (mostly positive) age structure effects will start to be perceived, while East

Asia has already for a while been at a stage in which their population age structures have provided favorable conditions for development. Africa has much younger populations, which means that most of these potential gains are further in the future.

We also find that for some regions the average-age pattern significantly differs from the general pattern. One reason might be that some regions have been more able to translate the demographic opportunity into better economic performance by implementing specific complementary policies. Consider, for instance, Figures 5 that shows that clearly East Asia has followed a country average age pattern for GDP per capita that is very different from the LAC experience, even after controlling for country specific effects and year effects.

This leads to the question of which are the policies associated with more desirable age patterns. If in fact, demography provides a boost for GDP per capita, as Figure 5 suggests, why have the LAC and East Asian experiences been so different? In this section we try to shed light on this question by including some policy variables in the analysis. We explore whether the demographic opportunities for increasing GDP per capita, increasing savings and improving education attainment are associated with trade policy, financial market development, macroeconomic stability and governmental expenditures on education.

Our econometric strategy is similar to the one used in the previous section to identify age patterns by region; we divide the sample in different ways to check whether an age pattern is different among subsamples. We re-estimate equation (1) for GDP per capita, unemployment rates, domestic savings as a share of GDP and the probability of progressing to grade 4, respectively; but rather than using the whole sample as we did to derive the general patterns in Section 3, we subdivide the sample depending on whether the value of the policy indicator of interest for country 'i' at time 't' is below or above the median for that variable. In addition we run a regression for the full sample in which we include interactions between a dummy variable that indicates whether or not each observation is associated with a value above or below the relevant policy indicator mean and the country average age dummies (Appendix Table A5). This last regression permits testing whether there are statistically significant differences between coefficient estimates of the country average age variables if the policy indicator is above versus below the median. [18]

[18] Two additional regressions were estimated to check for the robustness of the patterns in all the figures presented below. First we estimate equation (1) by including the observations where the value of the policy variable of interest is above the median, and also include the policy variable of interest as control. Second we regress the dependent

The four policy variables on which we focus are: (i) exports plus imports over GDP as a proxy for trade openness[19]; (ii) the value of credit to the private sector as a share of GDP as a measure of financial market development; (iii) the absolute value of the coefficient of variation of the GDP per capita growth rate for 't', 't-1', 't-2', and 't-3' as a proxy for macroeconomic volatility; and (iv) in the case of the probability of progressing to grade 4, the proportion of governmental expenditures on education relative to GDP. Table 4 presents some summary statistics for these variables, all of which have substantial variation in the sample. Because, as in Section 3, in all our regressions here we continue to include country and year fixed effects, again all of the age patterns that we report are net of country specific characteristics and year effects.

Domestic savings rates: One of the most emphasized aspects of changing age structures, as noted above, is the change in savings that occurs under the life-cycle savings models. The extent to which the tendencies to change savings patterns as age structure changes, however, may depend importantly on aspects of the economy that are related to major policy choices, several of which we now investigate.

Domestic savings as a proportion of GDP and trade openness: In the full sample there is evidence of a somewhat inverted "U" pattern between country average age and domestic savings (Figure 3). Figure 15a plots the coefficient estimates for the average country age for the two subsamples defined by being above or below the median trade openness. The interaction terms in the lower part of Table A5 indicate that the average age pattern of domestic savings is statistically significantly different for countries with trade openness above the median than for those with openness below the median. The coefficient estimates for the average age pattern of domestic savings for the countries with openness above the median is very similar to the overall

variable on the age dummies and country and time effects for the cases where the value of the policy variable of interest is below the median, and also include the policy variable of interest as a control. We only present below the cases where the country average age patterns that result from the regression are not modified by the inclusion of this control.

[19] One drawback of this particular indicator of trade openness is that small economies may be inherently more open than large ones due to scale economies, and that countries with certain mixes of factor endowments also tend to trade more. Spilimbergo, Londoño and Székely (1999) construct a measure of trade openness that controls for country size (in terms of both, geographic size and GDP), geographic location in terms of distance to the major world markets, and factor endowments. We use this measure of trade openness as an alternative to exports plus imports over GDP in the regressions described below, but in all cases, the coefficients of interest were insignificant in statistical terms. Therefore, the conclusions derived from the use of the proxy for trade openness described in the text should be taken with caution, since they are not robust to other indicators of openness.

general pattern in Figure 3. It increases fairly sharply with country average age until age 33, and then declines somewhat thereafter. In contrast, the estimates for the subsample for which trade openness is below the median have a much flatter pattern with a peak at a country average age of 31. This difference suggests that in the countries that are relatively more open to trade, the shift in age structure toward older ages is more likely to be translated into higher saving.

Domestic savings as a proportion of GDP and financial market development: The extent to which age structure changes due to the demographic transition can provide an opportunity for savings also a priori depends on the development of financial markets. If individuals are credit constrained and are subject to uncertainty, savings will be of much higher frequency and individuals will be less able to save with long-term objectives such as accumulating assets for retirement and will find it more difficult to shift between current and future consumption.[20] Figure 15b explores if in fact the country average age pattern of domestic savings differs at higher or lower levels of financial market development. The average difference in the age patterns for the subsamples below and above the median is statistically significant. Figure 15b shows that the age pattern for observations above the median is similar to the general pattern for the overall sample in Figure 3, while the pattern for observations below the median deviates substantially after age 28, with a sharp decline in domestic savings after this age rather than a further increase and a leveling off at older ages. This result is consistent with the idea that if financial markets are more developed, individuals have more opportunities to save, and the financial system is more efficient in allocating credit. Therefore, it is more plausible that individuals are able to behave as the life-cycle theory predicts.

Domestic savings as a proportion of GDP and macro economic volatility: The methodology employed for Figure 15a and 15b was also applied to the relation between domestic savings and macroeconomic volatility. But the difference between the two age patterns of coefficient estimates is not statistically significant so we do not present a figure for this case.[21]

[20] Deaton (1991) discusses this argument in detail.
[21] The results are available upon request.

GDP per capita: Although the demographic transition from a young to an older population initially can boost the prospects for economic growth due to the reduction in the young-dependency ratio, the shift to larger proportions of the population in working ages can also constitute a potential threat if the right policies are not in place. Figure 5 suggests that in East Asia this shift was accompanied by substantial increases in GDP per capita, but this would have not been the case if the population moving to working age did not have employment opportunities. We here consider types of policies that a priori would be expected to affect the likelihood of translating the demographic shift into an opportunity rather than a burden.

GDP per capita and trade openness: If a country is open to trade and the size of the working age population is increasing quickly, it would seem to be more able to exploit the comparative advantage of having more labor. However when we split the sample according to levels of exports plus imports as a share of GDP above and below the median, we find no significant differences so we do not present a figure for this case.

GDP per capita and financial market development: Better financial markets improve the allocation of financial resources, which would be expected to be associated with more employment generation. Figure 16a plots the coefficient estimates from estimating relation (1) for subsamples for which the level of private credit as a share of GDP are above and below the median, respectively. The differences are statistically significant. For the cases where financial markets are relatively more developed, the country average age pattern of GDP has a positive slope from age 27 on, and is much steeper. For those with relatively low financial development, the country average age pattern is practically flat. This suggests that financial markets may play an important role in assuring that the expansion of the working age population is translated into greater economic activity.

GDP per capita and macroeconomic volatility: We expect that countries that are subject to lower macroeconomic volatility would benefit from lower uncertainty. A more stable environment during the period of expansion of the working age population will make it more likely to attract investment, which is needed to create enough jobs for the new entrants into the labor market. Figure 16b plots the coefficient estimates that result from estimating relation (1) with GDP per

capita as the dependent variable for the two subsamples in which, respectively, our measure of macro volatility is above and below the median. Although the curves do not seem to differ markedly at very young and old ages, for several cases between ages 25 and 34 the observations with relatively low volatility present significantly sharper increases in GDP per capita than the cases below the median. This provides some support for the argument that a more stable macroeconomic environment provides more favorable conditions in which to take advantage of the demographic opportunity presented by the enlarged working-age population.

Unemployment rates: For reasons similar to those articulated above for savings rates and GDP per capita, a priori it would seem that the coefficient estimates for the country average age patterns in unemployment rates also might be associated with policy alternatives.

Unemployment rates and trade openness: Figure 17 plots the coefficient estimates for the unemployment rates when we divide the sample into cases for which our proxy for trade openness is above and below the median, respectively. The hump-shape in the country average age pattern for unemployment rates observed in Figure 12 is present in the cases of low trade openness, but absent in those of relatively high openness. In fact, consistent with the results discussed in Section 3, unemployment rates appear to be relatively high at young ages and relatively low at older ones, but the decline in unemployment along the country average age profile is much steeper in the cases where openness is above the median. This suggests that in fact, trade policy might help to release some pressure from the labor markets at the time when large shares of the population are entering working-age even if such effects are not reflected in GDP per capita.

Unemployment rates and (a) financial market development and (b) macroeconomic volatility: While a priori arguments are easy to make about why financial market development and macroeconomic volatility both may be related to the estimated coefficients for the country average age patterns, in fact we find no significant differences so we do not present these figures.

Probability of progressing to grade 4: Finally, we estimate four sets of regressions using the probability of progressing to grade 4 as the dependent variable. As subsample classification

criteria, we use the three indicators that we examined for the other dependent variables in this section -- trade openness, financial market development, and macroeconomic volatility -- and the proportion of governmental expenditures on education as a share of GDP. A priori there are arguments that each of these policy-related indicators might affect schooling success both through changing the expected rates of return from investing in schooling and through changing the costs of schooling directly and through the opportunity costs of time spend in school. But we do not find evidence of significant differences in the age patterns of estimates for subsamples defined by any of these four policy-related indicators. We find this a surprising result (or nonresult). Perhaps schooling is affected through other channels such as changing the quality of education, but – if so – micro estimates suggest that even in this case there should be induced changes in the quantity of schooling as well (e.g., Birdsall 1985).

5. Conclusions

The economic literature has varied considerably over time regarding the importance that it has given to demographic factors in the process of economic development. At times those who perceive that Mathusian factors severely limit human options have considered population growth a major determinant of economic options, perhaps the major determinant. At other times, including in most of the mainstream economic literature of the last half century, demographic considerations have been treated as but one of many factors that might shape aggregate options in part because they respond to, as well as affect, the development process. A number of studies of empirical associations between population characteristics and economic aggregates in the 1950s through the early 1990s revealed very little that supported those that thought that demographic factors played major conditioning roles in the development process.

In the 1990s, however, there has been a rebirth of emphasis on the importance that demographic factors may play in conditioning economic development. This emphasis has not been on traditional Mathusian population pressures, but instead on how the shifting age structure during the demographic transition may offer medium-term economic opportunities. This recent aggregate evidence, perhaps supported by very recent micro analysis of life cycle savings, raises again the question of whether there is an inverse relation between population growth and per capita income growth, particularly through transitory effects on the age structure of population

(which, although transitory, may last for decades). Thus, there has been a recent shift from emphasis on the negative long-run effects of population growth on economic outcomes to focus on medium-run effects of changes in the age structure on economic outcomes, with increasing emphasis on the opportunities that transitory reductions in dependency ratios may afford. The empirical explorations related to such possibilities to date, however, have been limited and have not considered many of the channels through which these effects might be manifested.

This paper presents new evidence on the association between the average age of a population and three groups of economic outcomes: (1) macroeconomic aggregates (domestic savings as a share of GDP, GDP per capita, capital per worker and tax revenue as a share of GDP); (2) governmental expenditures in education and health; and (3) social indicators (inequality, unemployment, homicide rates, and schooling progression rates). This evidence is based on analysis of panel data for 164 countries for 1950-1995. The results suggest that the variables considered follow clear age-related patterns, that the patterns differ by regions, and that the patterns differ with different policy regimes related to trade openness, domestic financial market deepening and macroeconomic volatility. The evidence is consistent with the possibility that some age structure shifts can provide favorable conditions for development. Apparently regions such as East Asia in recent decades have been able to benefit from this demographic opportunity. However, in others such as LAC and South Asia (which are at the verge of experiencing the largest age structure shifts in the coming decades) and with further lag, Africa -- creating an adequate economic environment to translate the opportunity into higher living standards for its population is a major challenge.

Figure 1

Population share of Age Groups
Corresponding to each Average Age

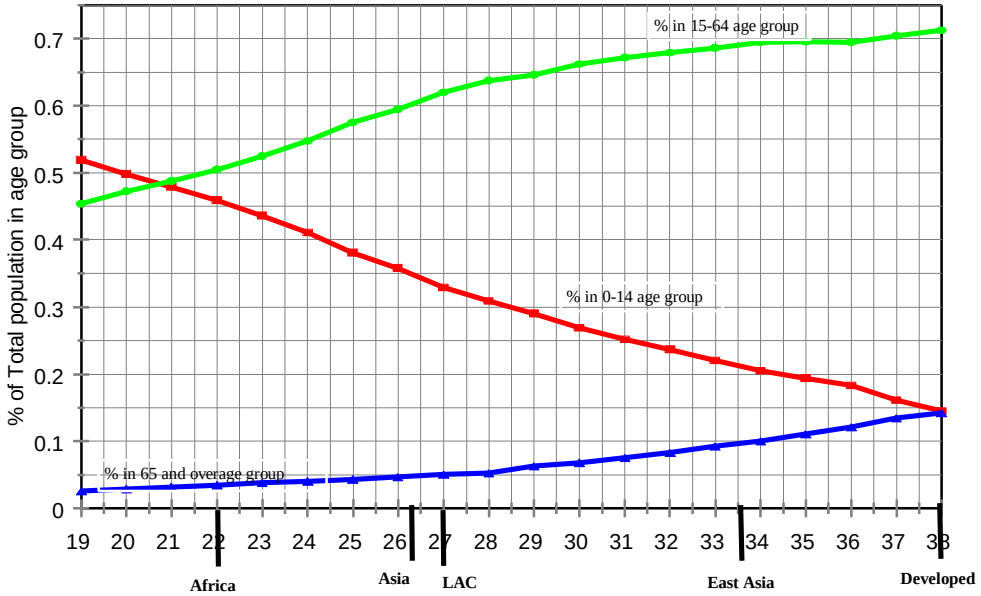

Figure 2

Population Share of 15-64 Age Group
Corresponding to Each Average Age

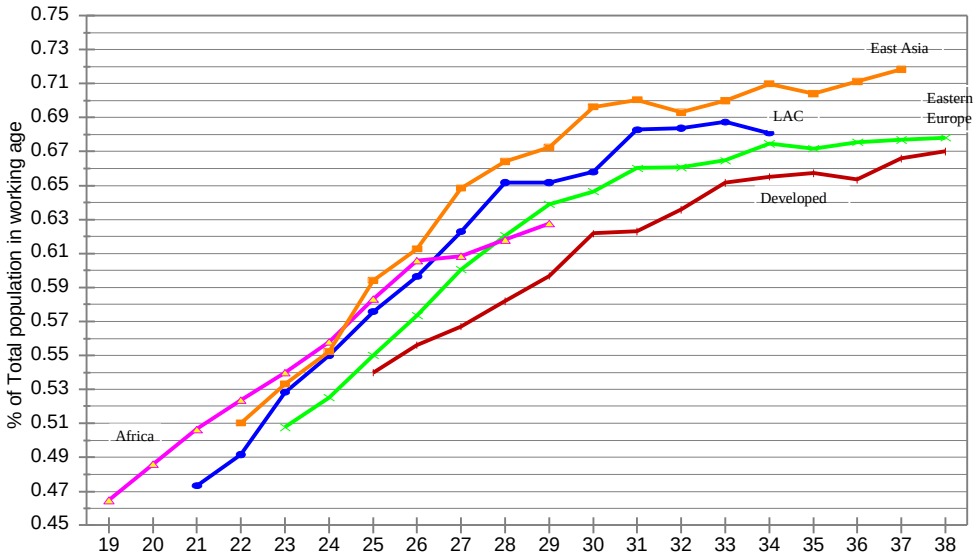

Figure 3

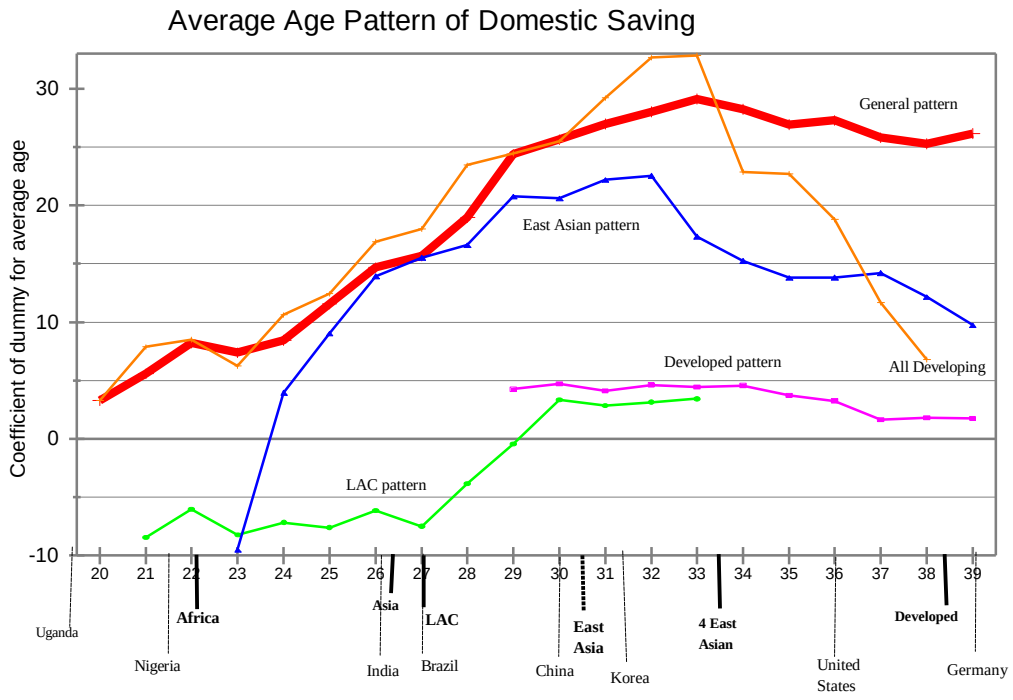

Figure 4

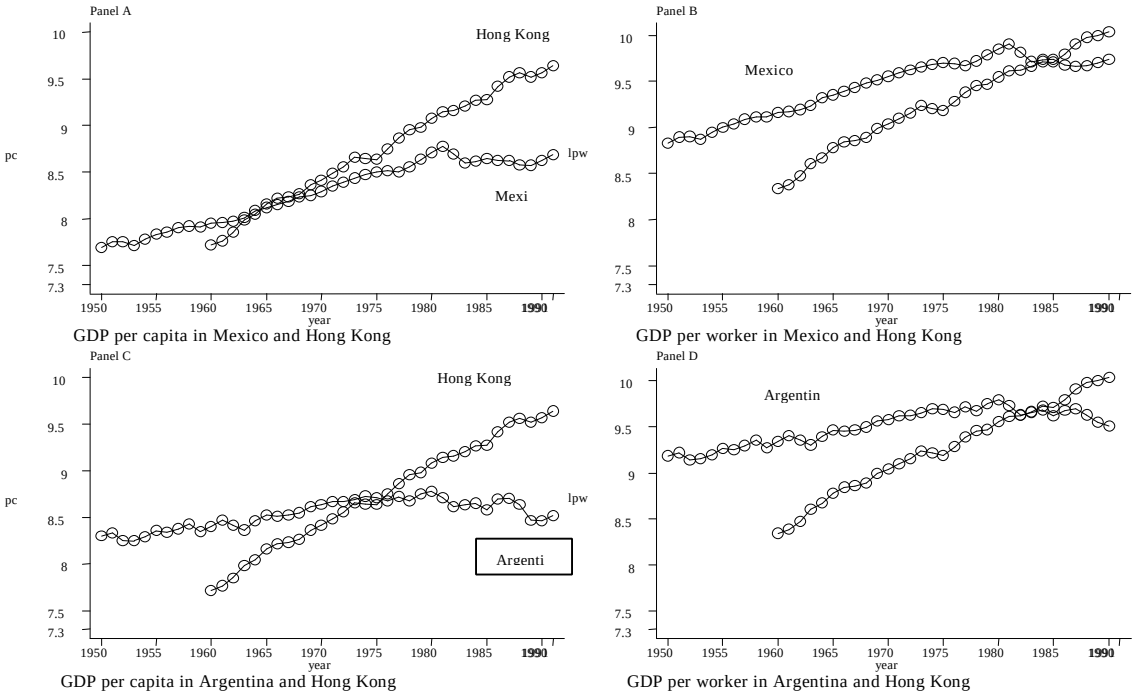

Figure 5

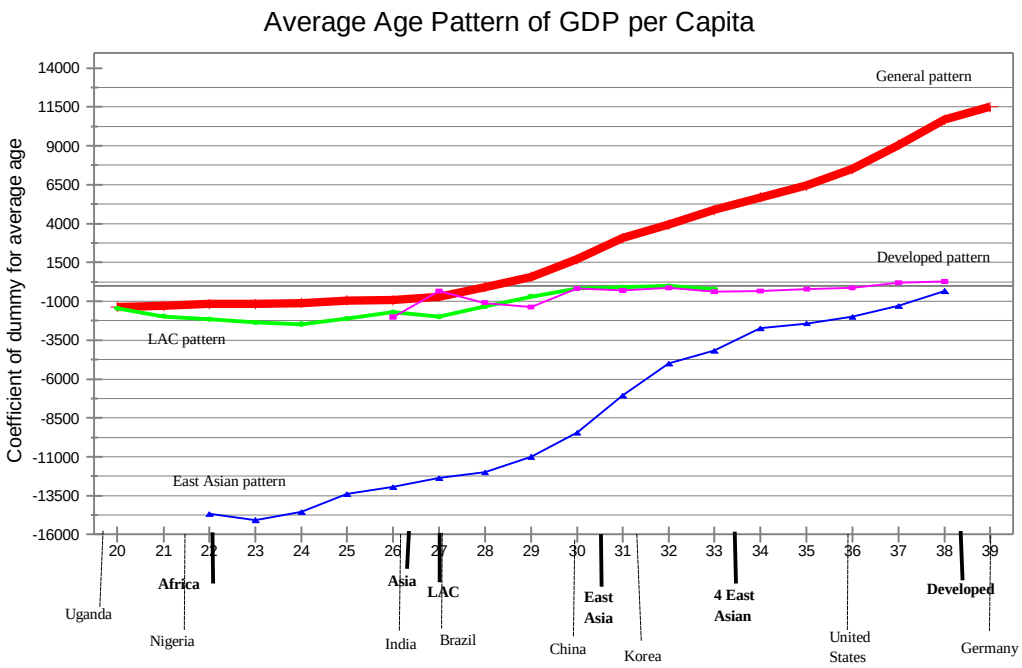

Figure 6

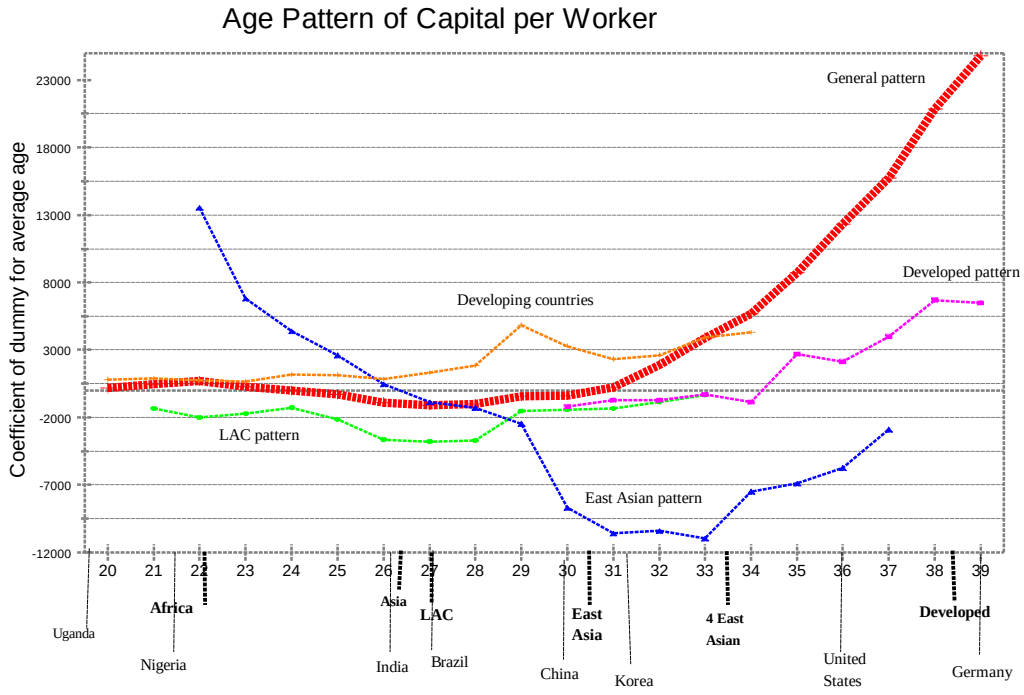

Figure 7

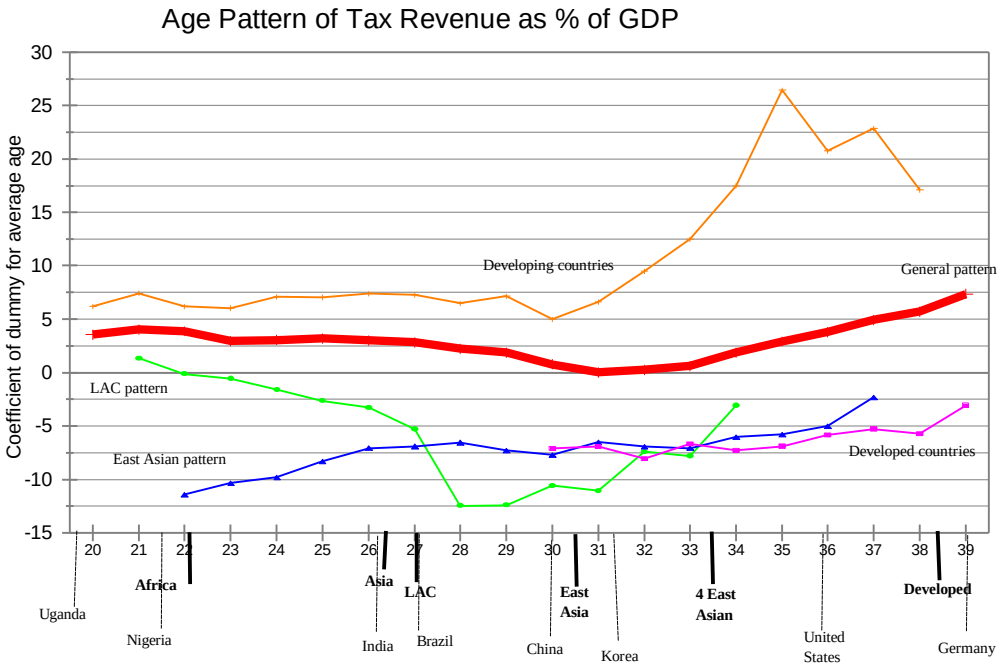

Figure 8

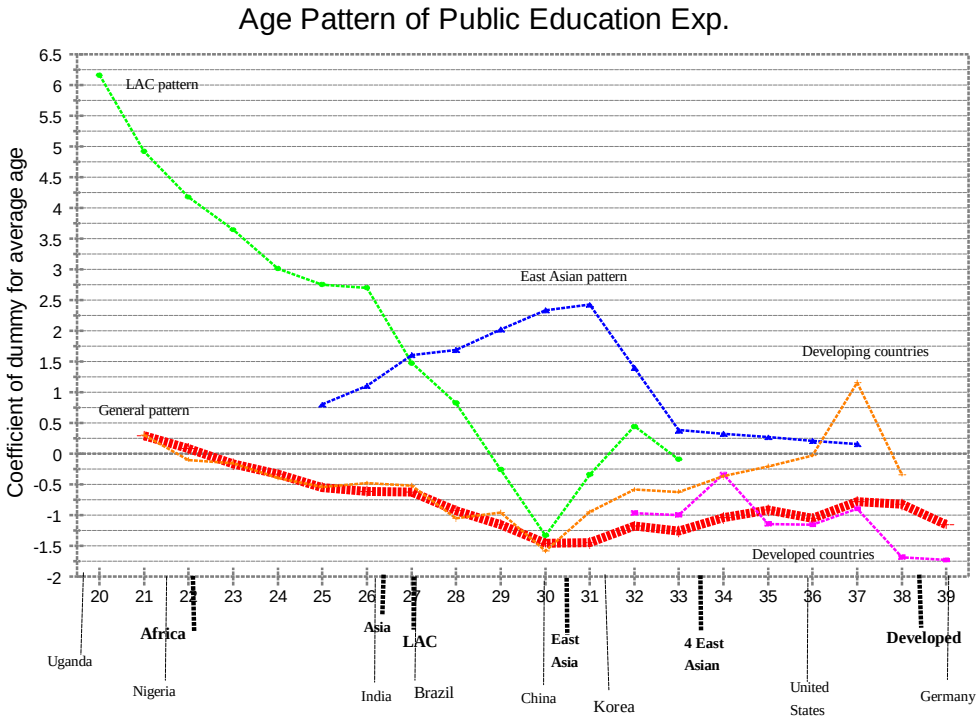

Figure 9

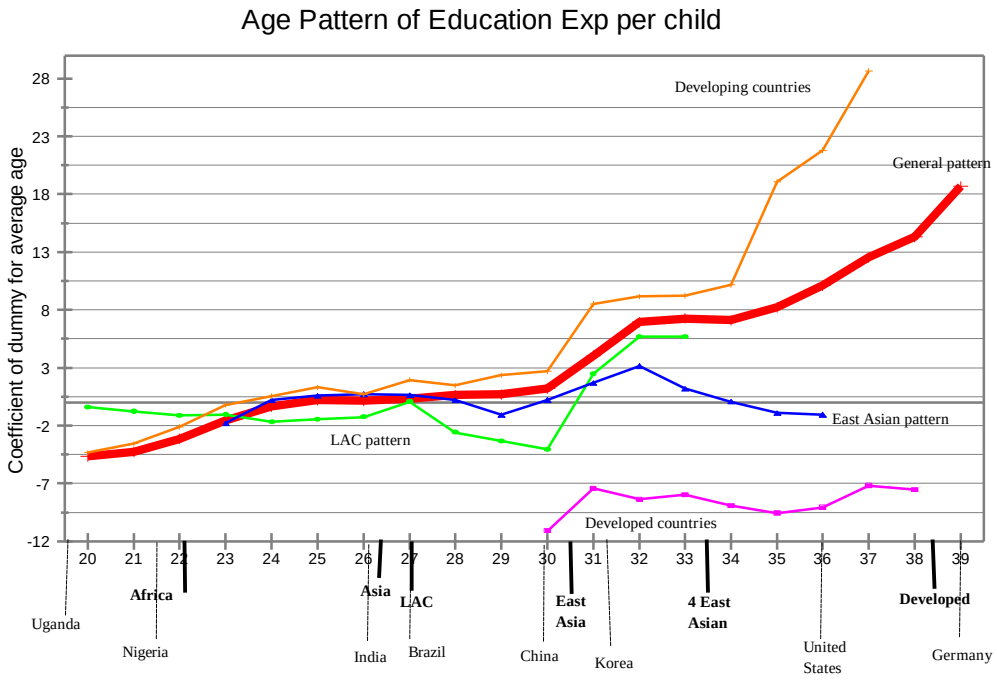

Figure 10

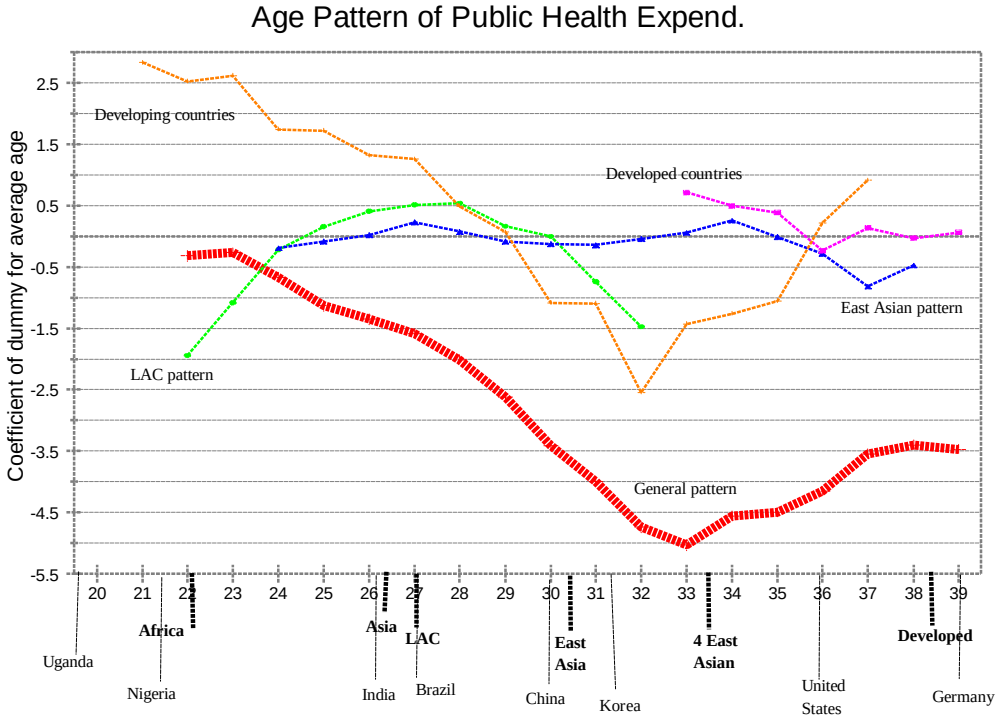

Figure 11

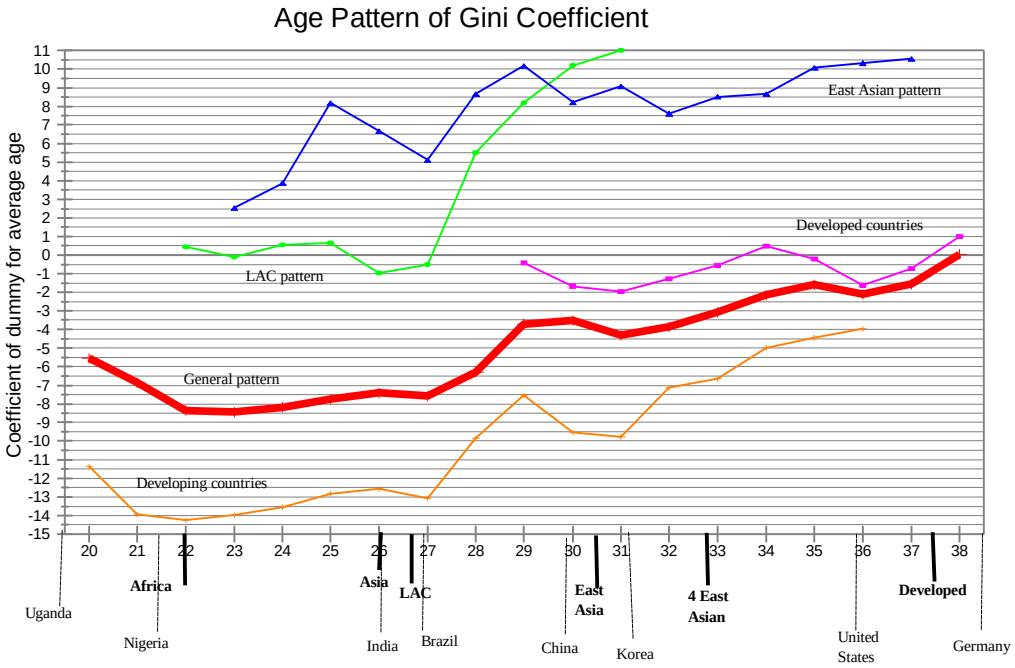

Figure 12

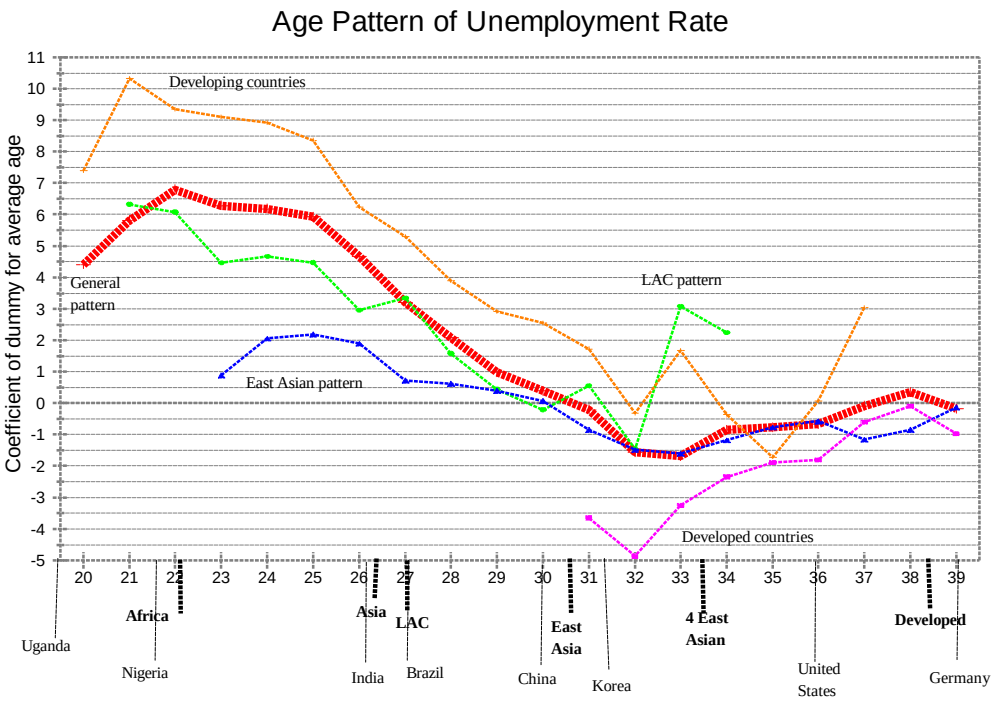

Figure 13

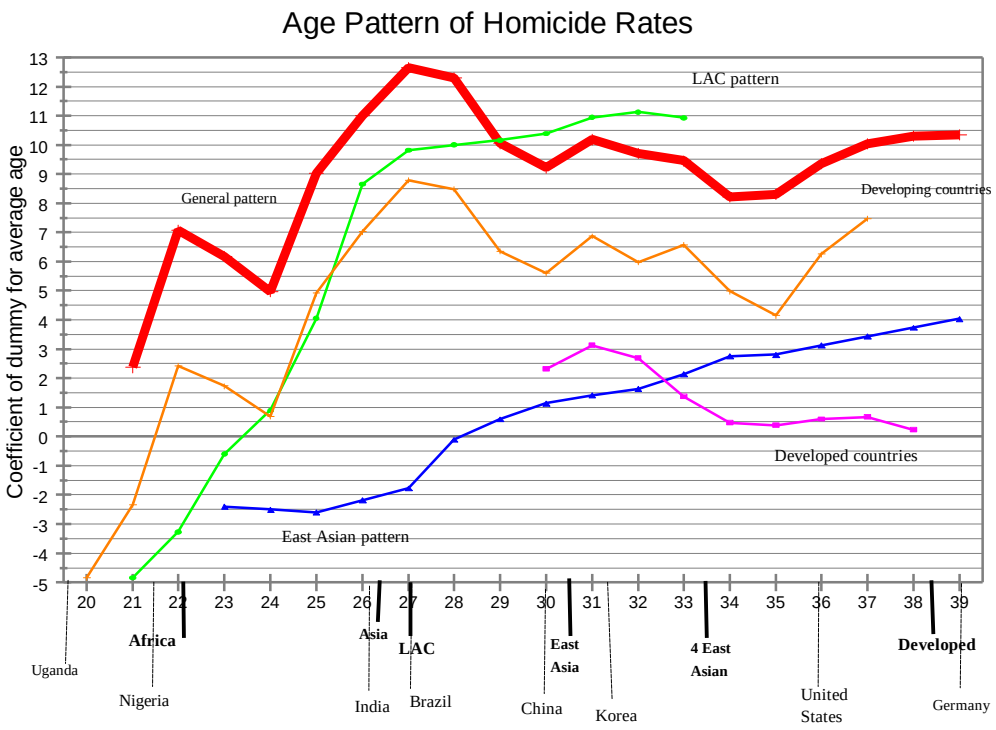

Figure 14

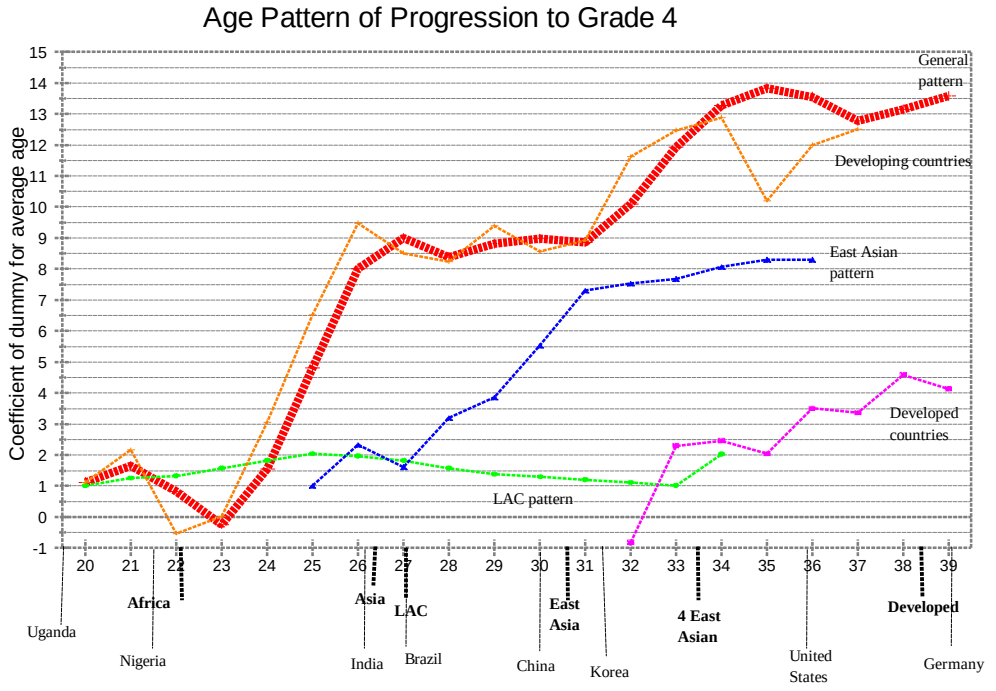

Figure 15a

Average Age Pattern of Domestic Saving
for High and Low Levels of Openness

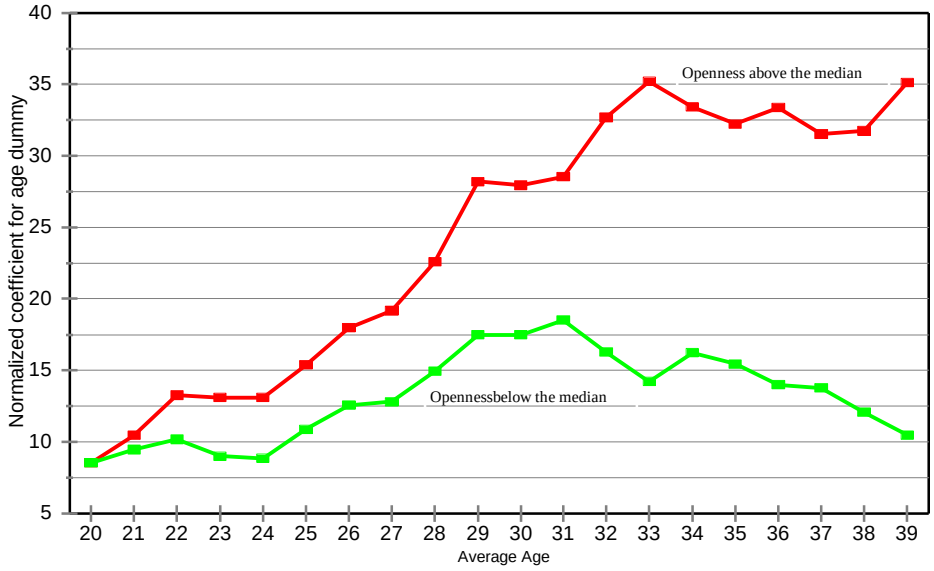

Figure 15b

Average Age Pattern of Domestic Saving
for High and Low Private Credit/GDP

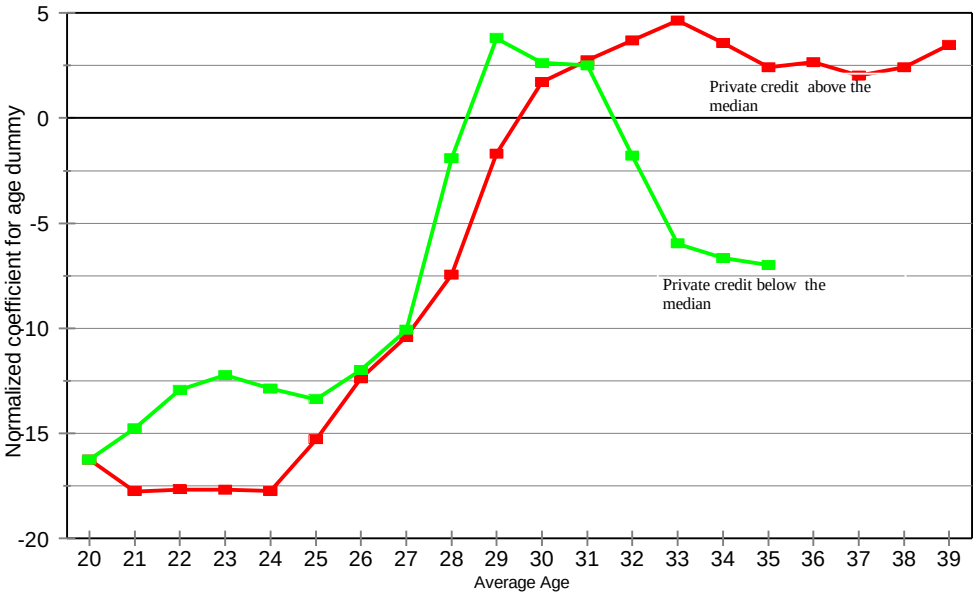

Figure 16a

Average Age Pattern of GDP per capita
for High and Low Private Credit

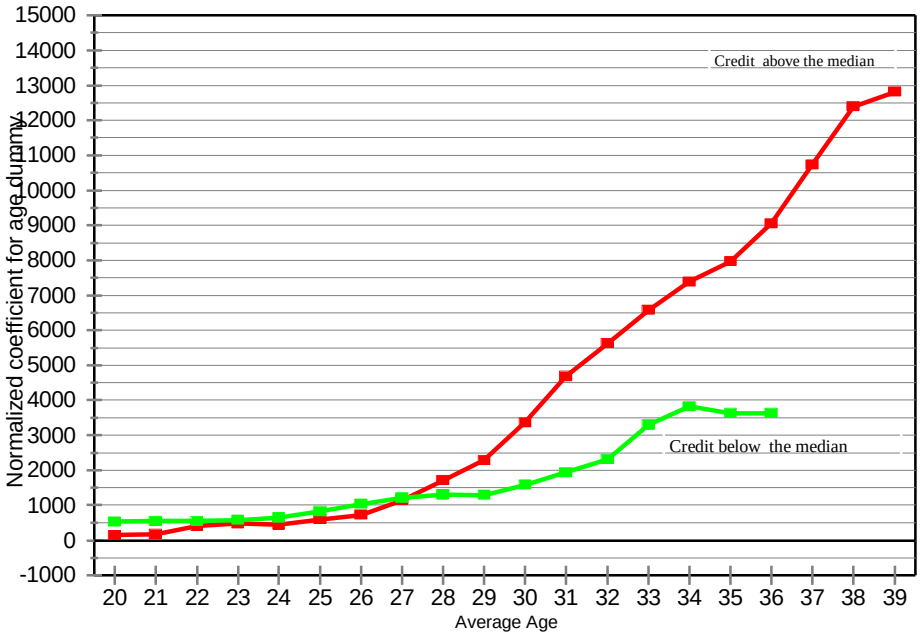

Figure 16b

Average Age Pattern of GDP per capita
for High and Low Volatility

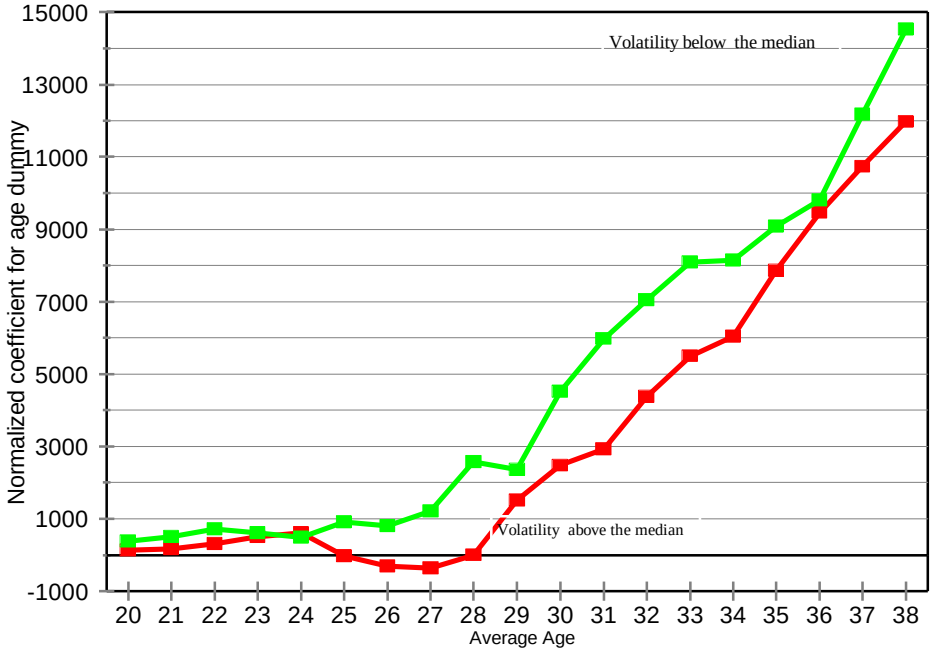

Figure 17

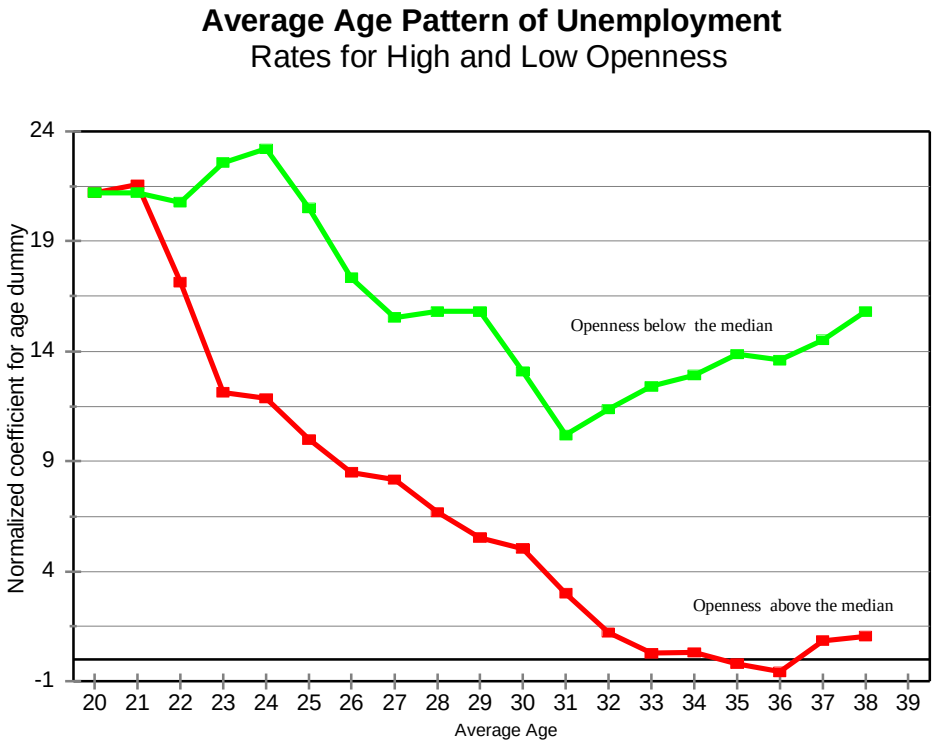
Average Age Pattern of Unemployment
Rates for High and Low Openness
Normalized coefficient for age dummy
24
19
14
9
4
-1
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
Average Age
Openness below the median
Openness above the median

Table 1

Demographic Structure of the Population

Region	(%) of Pop. 0-14 Age grp.		(%) of Pop. 15-64 Age grp.		(%) of Pop. 65 and over		Young dep. Ratio		Old dependency Ratio		Average Age of Population	
	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020	1995	2020
World total	0.31	0.25	0.62	0.66	0.07	0.09	0.50	0.38	0.10	0.14	28.3	32.6
Africa												
Southern Africa	0.38	0.31	0.58	0.63	0.04	0.06	0.66	0.49	0.07	0.09	24.7	28.2
Western Sahara	0.39	0.28	0.57	0.67	0.03	0.05	0.68	0.41	0.06	0.07	23.4	28.9
Western Africa	0.46	0.39	0.51	0.57	0.03	0.03	0.89	0.69	0.05	0.06	21.4	23.6
Eastern Africa	0.46	0.40	0.51	0.57	0.03	0.03	0.90	0.70	0.05	0.05	21.0	23.1
Middle Africa	0.46	0.41	0.51	0.55	0.03	0.03	0.91	0.75	0.06	0.06	21.5	22.7
Northern Africa	0.39	0.27	0.58	0.67	0.04	0.06	0.67	0.41	0.07	0.09	24.2	29.8
Average Africa	0.42	0.34	0.54	0.61	0.03	0.04	0.79	0.57	0.06	0.07	22.70	26.03
Latin America and Caribbean												
Central America	0.37	0.26	0.59	0.66	0.04	0.07	0.63	0.40	0.07	0.11	24.4	31.0
South America	0.33	0.24	0.62	0.67	0.05	0.09	0.53	0.36	0.08	0.13	27.0	32.8
Average LAC	0.35	0.25	0.61	0.67	0.05	0.08	0.58	0.38	0.08	0.12	25.70	31.91
Asia												
South-central Asia	0.37	0.27	0.59	0.67	0.04	0.06	0.63	0.40	0.07	0.10	25.2	30.4
South-eastern Asia	0.34	0.24	0.61	0.69	0.04	0.07	0.56	0.35	0.07	0.10	25.7	31.8
Western Asia	0.37	0.30	0.59	0.63	0.04	0.06	0.63	0.48	0.08	0.10	25.1	29.0
Eastern Asia	0.25	0.19	0.68	0.69	0.07	0.12	0.37	0.28	0.10	0.17	30.5	37.3
Average Asia	0.33	0.25	0.62	0.67	0.05	0.08	0.55	0.38	0.08	0.12	26.61	32.11
Europe and North America												
Northern America	0.22	0.19	0.66	0.64	0.12	0.16	0.34	0.30	0.19	0.26	35.2	39.0
Northern Europe	0.19	0.18	0.65	0.63	0.15	0.19	0.30	0.28	0.24	0.30	37.7	40.9
Western Europe	0.18	0.15	0.67	0.65	0.15	0.20	0.26	0.23	0.22	0.31	38.3	43.0
Southern Europe	0.17	0.14	0.68	0.66	0.15	0.21	0.25	0.21	0.21	0.31	37.8	43.7
Eastern Europe	0.21	0.16	0.67	0.68	0.12	0.16	0.31	0.24	0.18	0.23	35.8	40.3
Average Europe and NA	0.19	0.16	0.67	0.65	0.14	0.18	0.29	0.25	0.21	0.28	36.97	41.38

Source: Calculated from United Nations Population Statistics, 1996 revision.

Table 2

Summary statistics for average age by region

Region	Mean	Standard Deviation	Max	Min
All regions	25.2	6.57	19	40
Industrial	34.0	2.84	26	40
LDC's	24.1	6.06	19	38
Africa	22.3	1.62	19	29
LAC	24.4	3.06	20	34
Asia	23.8	2.42	20	35
Middle East	23.3	2.61	19	34
East Asia	23.2	9.45	0	39
4 East Asian	26.5	3.31	22	35
Eastern Europe	30.0	4.29	22	38
Western Europe	34.5	2.71	27	40

Source: Authors' calculations.

Table 3

Observations by Region

Average Age	All regions	Industrial	LDC's	Africa	LAC	Asia	Middle East	East Asia	4 East Asian	Eastern European	Western Europe
19	20		20	11			7				
20	236		236	106	28	8	50				
21	1,080		1,080	595	165	60	164	47			
22	1,580		1,580	645	187	223	216	33	5	32	
23	1,555		1,555	413	283	270	208	44	28	100	
24	1,139		1,139	210	229	211	129	34	15	83	
25	655	3	655	89	160	90	64	59	27	60	
26	393	14	390	26	84	33	27	36	9	91	
27	292	8	278	23	50	24	34	19	7	75	10
28	236	43	228	32	42	15	35	18	7	56	5
29	239	66	196	12	33	6	15	19	11	75	26
31	263	123	197		52	23	10	16	10	82	34
32	383	127	260		42	9	7	15	10	124	67
33	352	78	225		29	6	12	10	5	123	93
34	254	122	176		19	5	8	6	3	104	52
35	303	137	181		7	4	1	6	3	122	94
36	336	182	199					3	1	118	118
37	296	102	114					3		82	177
38	163	88	61					3		32	99
39	107	34	19					3		4	85

Table 4

Summary statistics for policy-related variables

variable Median	Median	Mean	Standard Deviation	Max	Min
Exports+Imports/GDP	53.3	62.3	42.11	423.4	4.67
Private Credit/GDP	22.9	32.1	28.44	209.068	0.08681
Volatility	1.3	6.0	69.60	659.152	0.01134
Exp. in Education/GDP	12.5	14.8	9.80	71.8132	0.54539

Source: Authors' calculations from various sources.

Appendix A
Table A1

Dummy Coefficient Estimates

Dependent Variable	Age Dummies																		
	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Dom. Saving (%GDP)	3.3	7.9	8.5	6.3	10.6	12.5	16.9	14.4	23.6	25.2	26.1	27.9	28.2	30.1	26.5	27.5	27.1	24.5	26.1
	1.05	*2.50*	*2.66*	*1.93*	*3.25*	*3.78*	*5.00*	*4.15*	*6.75*	*7.12*	*7.22*	*7.61*	*7.59*	*8.02*	*6.97*	*7.09*	*6.90*	*6.14*	*6.32*
GDP per capita	-1346	-1185	-1150	-1194	-998	-849	-961	-422	281	904	2575	3560	4347	5469	5946	6967	8080	10069	11374
	-3.63	*-3.13*	*-3.00*	*-3.10*	*-2.58*	*-2.18*	*-2.43*	*-1.05*	*0.69*	*2.21*	*6.27*	*8.68*	*10.57*	*13.15*	*14.21*	*16.52*	*19.04*	*23.42*	*26.08*
Cap. per Wker	192	785	605	-27	-19	-566	-1237	-976	-1055	166	-948	1362	2451	5346	6030	11457	13253	18249	23458
	0.19	*0.73*	*0.54*	*-0.02*	*-0.02*	*-0.47*	*-0.98*	*-0.72*	*-0.78*	*0.12*	*-0.63*	*0.89*	*1.60*	*3.41*	*3.77*	*7.04*	*8.00*	*10.71*	*13.35*
Tax Rev. (%GDP)	3.55	4.59	3.17	2.74	3.39	3.00	3.09	2.65	1.81	2.04	-0.48	0.60	-0.07	1.29	2.45	3.42	4.16	5.73	5.69
	2.70	3.54	2.36	1.99	2.44	2.12	2.12	1.73	1.17	1.28	-0.30	0.36	-0.04	0.74	1.38	1.92	2.30	3.09	2.97
Exp. Educ. (%GDP)		0.29	-0.13	-0.21	-0.47	-0.63	-0.60	-0.65	-1.20	-1.12	-1.79	-1.11	-1.25	-1.28	-0.81	-1.02	-1.10	-0.46	-1.19
		0.80	*-0.24*	*-0.35*	*-0.74*	*-0.97*	*-0.87*	*-0.88*	*-1.56*	*-1.37*	*-1.97*	*-1.13*	*-1.13*	*-1.14*	*-0.69*	*-0.84*	*-0.87*	*-0.36*	*-0.89*
Exp. p/child prim.	-4.67	-3.86	-2.41	-0.66	-0.04	0.50	-0.22	0.94	0.33	1.06	1.39	6.75	7.17	7.38	6.87	9.57	10.68	14.41	14.29
	-2.01	*-1.63*	*-0.97*	*-0.26*	*-0.02*	*0.18*	*-0.08*	*0.32*	*0.11*	*0.33*	*0.42*	*1.86*	*1.89*	*1.91*	*1.74*	*2.38*	*2.62*	*3.44*	*3.30*
Health Exp. (%GDP)			-0.32	-0.22	-1.12	-1.14	-1.55	-1.62	-2.40	-2.83	-3.99	-4.01	-5.47	-4.59	-4.53	-4.48	-3.83	-3.25	-3.55
			-1.15	*-0.45*	*-1.89*	*-1.74*	*-2.12*	*-2.00*	*-2.71*	*-2.90*	*-3.59*	*-3.24*	*-4.17*	*-3.19*	*-3.05*	*-2.88*	*-2.36*	*-1.96*	*-2.09*
Gini coefficient	-5.55	-8.14	-8.56	-8.34	-8.00	-7.51	-7.31	-7.85	-4.70	-2.69	-4.32	-4.29	-3.44	-2.72	-1.56	-1.65	-2.55	-0.56	0.66
	-1.53	*-2.64*	*-3.00*	*-3.03*	*-3.00*	*-2.99*	*-2.94*	*-3.30*	*-1.94*	*-1.25*	*-2.11*	*-2.24*	*-1.86*	*-1.53*	*-0.91*	*-1.01*	*-1.62*	*-0.37*	*0.43*
Unemployment Rate	4.40	7.23	6.35	6.22	6.14	5.68	3.64	2.77	1.40	0.55	0.23	-0.65	-2.47	-0.91	-0.81	-0.75	-0.60	0.40	0.28
	1.25	*2.08*	*1.90*	*1.94*	*1.97*	*1.87*	*1.22*	*0.95*	*0.48*	*0.19*	*0.08*	*-0.24*	*-0.93*	*-0.35*	*-0.31*	*-0.29*	*-0.24*	*0.16*	*0.11*
Homicides per 1000		2.37	7.07	6.18	4.97	9.01	11.00	12.64	12.29	10.05	9.21	10.19	9.70	9.45	8.22	8.31	9.36	10.03	10.30
		0.79	*1.63*	*1.37*	*1.03*	*1.80*	*2.07*	*2.22*	*2.09*	*1.64*	*1.42*	*1.48*	*1.34*	*1.25*	*1.04*	*1.03*	*1.11*	*1.14*	*1.12*
Progression to Grade 4	1.12	2.17	-0.53	0.03	3.06	6.53	9.48	8.50	8.24	9.39	8.56	9.14	11.03	12.84	13.71	13.94	13.15	12.41	13.87
	0.37	*0.72*	*-0.17*	*0.01*	*0.92*	*1.93*	*2.72*	*2.38*	*2.29*	*2.45*	*2.16*	*2.20*	*2.51*	*2.86*	*2.97*	*2.97*	*2.79*	*2.62*	*2.80*

Source: Authors' calculations. 't' Statistics presented in italics below the coefficients.

Table A2

Estimation of Average Age Patterns for Aggregate Variables with Regional Interactions
(Coefficients for Interaction of Latin American Dummy with Avg. Age Dummy)

Dependent	Interacted Age Dummies														Year	Cor
Variable	20	21	22	23	24	25	26	27	28	29	30	31	32	33	Trend	
Dom. Saving (%GDP)	8.2	-9.4	-7.2	-7.0	-10.5	-13.3	-14.5	-4.8	-10.9	-3.9	3.6	1.4	1.3	-0.9	-0.1	21
	1.27	*-1.61*	*-1.26*	*-1.24*	*-1.86*	*-2.37*	*-2.56*	*-0.86*	*-2.01*	*-0.76*	*0.72*	*0.33*	*0.32*	*-0.22*	*-6.12*	*6.*
GDP per capita	5209	4436	3891	3378	2807	3063	4663	4063	4201	4731	3433	2860	1920	285	53	-101
	7.31	*6.76*	*6.03*	*5.29*	*4.42*	*4.79*	*7.20*	*6.67*	*6.93*	*7.99*	*6.11*	*6.23*	*3.90*	*0.58*	*35.58*	*-34*
Cap. per Wker		-2515	-3987	-3350	-1516	-1643	-3369	-3441	-4193	-3985	5235				243	-469
		-1.63	*-2.33*	*-1.84*	*-0.79*	*-0.81*	*-1.60*	*-1.40*	*-1.64*	*-1.15*	*2.07*				*21.26*	*-21*
Tax Rev. (%GDP)	1.74	2.83	3.96	1.96	2.14	2.78	1.66	-5.32	-5.83	7.63	7.54	12.17	10.87	16.03	0.09	-16
	1.36	*1.83*	*2.36*	*1.13*	*1.18*	*1.44*	*0.72*	*-2.20*	*-2.20*	*2.34*	*2.18*	*3.09*	*2.56*	*3.70*	*6.13*	*-5*
Pub. Exp. Educ. (%GDP)	7.24	5.21	4.33	3.57	2.84	2.51	2.57	0.59	0.89		-0.89	-0.29	1.07	0.62	0.03	-56
	4.03	*3.34*	*3.11*	*2.82*	*2.32*	*2.10*	*2.22*	*0.53*	*0.83*		*-0.50*	*-0.21*	*0.86*	*0.74*	*2.74*	*-2*
Pub. Exp. p/child prim.	-0.59	-2.13	-4.09	-5.77	-4.78	-1.42	1.90	-0.04	-1.42	-1.73	1.36	4.97	0.01	0.60	-0.03	76
	-0.23	*-0.65*	*-1.17*	*-1.57*	*-1.24*	*-0.34*	*0.38*	*-0.01*	*-0.23*	*-0.25*	*0.18*	*0.62*	*0.00*	*0.06*	*-1.13*	*1.*
Pub. Health Exp. (%GDP)		-2.25		0.41	0.62	1.12	0.80	1.29	0.96	5.01			0.35		0.06	-10
		-2.51		*0.52*	*0.65*	*0.97*	*0.59*	*0.79*	*0.50*	*2.78*			*0.33*		*2.88*	*-2*
Gini coefficient		-2.17	-0.71	-0.63	1.48	1.98	-1.55		8.68	6.74	9.92	2.56			-0.04	126
		-0.46	*-0.17*	*-0.16*	*0.38*	*0.51*	*-0.37*		*2.02*	*1.07*	*1.39*	*0.41*			*-2.10*	*3.*
Unemployment Rate	5.80	6.40	3.55	3.82	3.93	6.71	8.35	8.33	6.88	4.15	6.65	5.82	8.05	6.13	0.13	-25
	2.47	*2.41*	*1.26*	*1.34*	*1.34*	*2.21*	*2.72*	*2.23*	*1.83*	*1.05*	*1.65*	*1.42*	*1.92*	*1.37*	*4.41*	*-4*
Homicides per 1000		-0.44	7.63	10.40	14.34	27.87	21.58	41.01	22.45	-1.73	-3.04		5.25	7.57	-0.09	180
		-0.06	*1.03*	*1.35*	*1.88*	*3.46*	*2.52*	*4.60*	*2.28*	*-0.26*	*-0.49*		*0.80*	*0.88*	*-1.17*	*1.*
Progression to Grade 4	-27.75	-13.23	-8.56	0.99	6.08	3.13	-0.89		26.09		-33.79			-1.19		85
	-2.94	*-1.45*	*-1.06*	*0.13*	*0.77*	*0.40*	*-0.12*		*2.71*		*-4.25*			*-0.34*		*24*

Source: Authors' calculations. 't' Statistics presented in italics below the coefficients.

Table A3

Estimation of Average Age Patterns for Aggregate Variables with Regional Interactions
(Coefficients for Interaction of East Asian Dummy with Avg. Age Dummy)

Dependent Variable	Interacted Age Dummies																		Year Trend
	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	-0.1
Dom. Saving (%GDP)	-30.7	-35.6	-24.8	-21.5	-16.8	-3.2	-10.8	-2.1	2.3	3.3	4.7	-1.9	1.2		1.8	6.2	3.8	1.8	53
	-4.68	*-5.53*	*-3.85*	*-3.47*	*-2.62*	*-0.49*	*-1.75*	*-0.36*	*0.40*	*0.58*	*0.81*	*-0.31*	*0.20*		*0.26*	*0.89*	*0.54*	*0.18*	*35.58*
GDP per capita	-6656	-7210	-7088	-5971	-4263	-3831	-3919	-2959	-3066	-1183	-2	-418	685		-667	-1923	-2270	-2246	243
	-9.33	*-10.23*	*-9.96*	*-8.73*	*-6.10*	*-5.65*	*-5.80*	*-4.49*	*-4.67*	*-1.82*	*-0.00*	*-0.58*	*0.96*		*-0.81*	*-2.33*	*-2.74*	*-2.37*	*21.26*
Cap. per Wker	-4385	-6339	-3845	-1255	-753		1044	-211	-5226	-7765	-5094	-6267	-398	-3501	-2337	-2336	-3272		0.09
	-2.48	*-3.50*	*-2.27*	*-0.76*	*-0.44*		*0.48*	*-0.09*	*-2.09*	*-3.15*	*-2.04*	*-2.48*	*-0.14*	*-1.17*	*-0.82*	*-0.82*	*-0.94*		*6.13*
Tax Rev. (%GDP)	-1.68		-1.33	0.50	2.24	2.55	2.05	0.05	10.62	11.05	11.12	8.78	8.96	7.61	7.34	8.29	10.46		0.03
	-0.74		*-0.60*	*0.22*	*0.97*	*1.05*	*0.84*	*0.02*	*3.69*	*3.68*	*3.26*	*2.32*	*2.37*	*1.90*	*1.94*	*2.18*	*2.61*		*2.74*
Pub. Exp. Educ. (%GDP)		-1.04		-1.02	-0.74	-1.41	-0.64	-0.71	0.73					-1.35		-2.45			-0.03
		-0.55		*-0.60*	*-0.43*	*-0.87*	*-0.38*	*-0.51*	*0.52*					*-1.03*		*-2.08*			*-1.13*
Pub. Exp. p/child prim.	2.78		1.24	3.18	6.96	9.19	10.00	8.88	10.75	-0.29	4.81	3.05	3.09		-0.57				0.06
	0.80		*0.39*	*0.96*	*1.98*	*2.14*	*2.13*	*1.69*	*1.92*	*-0.06*	*1.22*	*0.78*	*0.73*		*-0.15*				*2.88*
Pub. Health Exp. (%GDP)			-0.27		-0.14			0.22	2.27	-2.50		-0.17				-1.18	-0.46		-0.04
			-0.29		*-0.15*			*0.26*	*1.73*	*-2.95*		*-0.28*				*-1.36*	*-0.58*		*-2.10*
Gini coefficient	-13.89	-10.53	-7.68	-2.66	-6.01	-6.37		-3.06	-3.69	-2.78	-5.46	-5.17	-6.08	-4.47		-4.99			0.13
	-3.02	*-2.48*	*-1.83*	*-0.65*	*-1.39*	*-1.64*		*-0.53*	*-0.64*	*-0.48*	*-0.95*	*-0.90*	*-1.04*	*-0.73*		*-0.87*			*4.41*
Unemployment Rate	0.76	0.56	4.12	3.75	4.90	3.90	1.08	1.45	1.46	-1.45	-2.56	-2.91	-3.73	-6.33	-6.76	-5.79			-0.09
	0.46	*0.33*	*2.23*	*2.04*	*1.80*	*1.40*	*0.37*	*0.47*	*0.45*	*-0.44*	*-0.77*	*-0.83*	*-1.05*	*-1.77*	*-1.87*	*-1.51*			*-1.17*
Homicides per 1000	-16.66	-15.56	-21	-27	-23.02	-21.34	-21.28	-21.57	-22.35	-21.00	-19.07	-21.46		-24.47		-26.35			
	-2.05	*-2.40*	*-3.13*	*-3.60*	*-3.18*	*-2.72*	*-2.41*	*-2.35*	*-2.41*	*-2.13*	*-1.77*	*-1.99*		*-2.24*		*-2.36*			
Progression to Grade 4			-1.99	-6.75	-8.62	-6.85	-3.35	-2.13	-3.46		3.73	1.56	0.33		0.81	1.61			
			-0.33	*-1.18*	*-1.51*	*-1.27*	*-0.63*	*-0.40*	*-0.63*		*0.79*	*0.31*	*0.07*		*0.17*	*0.34*			

Source: Authors' calculations. 't' Statistics presented in italics below the coefficients.

Table A4

Estimation of Average Age Patterns for Aggregate Variables
with Regional and Decade Interactions
(Coefficients for Interaction of Latin American Dummy-Decade Dummy)

Dependent	Decade Interaction				Year	Constant	No.	No.	T-bar	R-square	F Test
Variable	1960	1970	1980	1990	Trend		Obs.	Countries		Within	
Dom. Saving (%GDP)		1.8	0.0	-0.5	-0.1	213.5	934	164	5.70	0.10	50.19
		2.16	*0.03*	*-0.39*	*-5.84*	*5.88*					
GDP per capita	-2	142	-342	-1265	56	-108876	1,123	139	8.10	0.68	200.19
	-0.02	*1.34*	*-2.94*	*-8.44*	*32.59*	*-31.90*					
Cap. per Wker		473	-229	-2015	251	-486816	374	63	5.90	0.75	209.24
		1.26	*-0.49*	*-2.94*	*19.63*	*-19.50*					
Tax Rev. (%GDP)			1.16	0.97	0.09	-153.58	503	134	3.80	0.16	72.76
			2.70	*1.39*	*5.68*	*-5.19*					
Pub. Exp. Educ. (%GDP)			-0.94	-1.41	0.04	-66.08	338	141	2.40	0.12	17.46
			-1.20	*-1.69*	*3.18*	*-2.99*					
Pub. Exp. p/child prim.			1.21	0.21	-0.04	93.79	405	126	3.20	0.09	39.07
			1.74	*0.17*	*-1.42*	*1.67*					
Pub. Health Exp. (%GDP)											
Gini coefficient	3.45	1.64	1.44	0.68	-0.05	149.27	126	52	2.40	0.11	26.69
	1.61	*0.84*	*0.73*	*0.30*	*-2.51*	*3.37*					
Unemployment Rate		1.94	2.94	1.31	0.18	-355.66	226	75	3.00	0.25	34.73
		1.09	*1.59*	*0.66*	*6.14*	*-5.96*					
Homicides per 1000			-2.76	-5.66	0.00	-4.22	374	115	3.30	0.40	11.19
			-1.43	*-1.86*	*0.04*	*-0.03*					
Progression to Grade 4			5.68	11.13		83.37	264	123	2.10	0.18	36.47
			5.84	*6.57*		*24.93*					

Source: Authors' calculations. 't' Statistics presented in italics below the coefficients.

Table A5

Estimation of Average Age Patterns for Aggregate Variables
With Interactions Between Age Patterns and Policy Dummies

Average	Dependent Variable: Domestic Saving/GDP				Dependent Variable: Unemployment		Dependent Variable: PPP Adjusted GDP per capita			
	Policy Variabes				Policy Variabe		Policy Variabes			
Age	Trade Openness		Private Credit		Trade Openness		Private Credit		Volatility of GDP Growth	
Dummy	Coeff.	t stat.	Coeff.	t stat.	Coeff.	t stat.	Coeff.	t stat.	Coeff.	t stat.
a20	-21.5	*-3.16*	-3.6	*-0.40*	7.1	*0.74*	25	*0.02*	258	*0.24*
a21	-19.4	*-3.18*	-3.5	*-0.39*			153	*0.11*	405	*0.39*
a22	-19.8	*-3.32*	-2.6	*-0.29*	16.3	*1.91*	208	*0.15*	652	*0.62*
a23	-21.8	*-3.66*	-4.6	*-0.50*	14.5	*1.76*	316	*0.23*	432	*0.41*
a24	-18.8	*-3.15*	-4.2	*-0.45*	15.8	*1.93*	827	*0.60*	569	*0.53*
a25	-16.5	*-2.82*	-0.8	*-0.08*	15.6	*1.99*	848	*0.60*	645	*0.59*
a26	-13.6	*-1.94*	0.8	*0.08*	15.7	*2.04*	696	*0.46*	740	*0.67*
a27	-13.6	*-1.67*	0.8	*0.08*	13.0	*1.68*	939	*0.60*	1,403	*1.23*
a28			8.6	*0.85*	11.5	*1.46*	1,322	*0.87*	2,194	*1.91*
a29	-0.7	*-0.08*	4.0	*0.37*	4.5	*0.96*	2,720	*1.70*	2,516	*2.19*
a30	1.0	*0.13*	-5.2	*-0.49*	4.8	*1.07*	4,272	*2.80*	4,162	*3.63*
a31	3.0	*0.40*	5.2	*0.45*	4.3	*1.02*	4,029	*2.56*	5,654	*4.91*
a32	-2.1	*-0.27*	4.0	*0.37*	3.3	*0.70*	6,022	*3.82*	6,571	*5.71*
a33	1.9	*0.25*	7.7	*0.57*	5.1	*1.12*	6,144	*3.69*	7,196	*6.10*
a34	3.9	*0.50*	-0.6	*-0.03*	4.7	*1.03*	5,269	*2.59*	7,989	*6.82*
a35	0.2	*0.03*	10.8	*0.93*	5.1	*1.17*	9,535	*5.91*	9,195	*7.76*
a36	0.6	*0.08*	6.2	*0.57*	4.8	*1.04*	9,164	*5.54*	10,108	*8.58*
a37	0.7	*0.09*	1.5	*0.13*	3.6	*0.81*	9,624	*4.84*	12,643	*10.50*
a38	-0.9	*-0.09*	-2.5	*-0.18*	6.6	*1.37*	10,212	*5.02*	15,183	*11.88*
a39									12,221	*8.99*
year	-0.1	*-2.57*	-0.1	*-2.49*	0.2	*2.40*	42	*11.51*	41	*11.45*
Policy Variable	-23.4	*-2.56*	-19.7	*-1.68*	5.1	*1.41*	(300)	*-0.17*	2,046	*1.99*
Age-Policy Interactions										
age20*policy	24.0	*2.44*	10.4	*0.86*			374	*0.21*	(2,124)	*-1.88*
age21*policy	24.4	*2.61*	16.0	*1.36*	11.0	*1.57*	498	*0.29*	(2,076)	*-1.97*
age22*policy	27.6	*2.96*	17.8	*1.51*	-4.5	*-1.02*	537	*0.31*	(2,267)	*-2.16*
age23*policy	26.7	*2.86*	17.0	*1.44*	-4.2	*-1.07*	213	*0.12*	(2,069)	*-1.97*
age24*policy	25.3	*2.70*	21.7	*1.83*	-6.7	*-1.62*	(132)	*-0.08*	(1,806)	*-1.71*
age25*policy	24.5	*2.60*	18.7	*1.56*	-5.8	*-1.39*	112	*0.06*	(1,742)	*-1.60*
age26*policy	24.6	*2.40*	20.8	*1.66*	-9.3	*-2.21*	(19)	*-0.01*	(2,480)	*-2.15*
age27*policy	24.6	*2.20*	21.1	*1.63*	-5.6	*-1.25*	712	*0.37*	(1,961)	*-1.69*
age28*policy	18.2	*2.36*	20.6	*1.63*	-5.6	*-1.07*	526	*0.28*	(3,164)	*-2.67*
age29*policy	22.5	*2.00*	27.8	*2.13*			213	*0.11*	(1,453)	*-1.24*
age30*policy	16.0	*1.42*	36.3	*2.83*			56	*0.03*	(1,936)	*-1.72*
age31*policy	19.3	*1.80*	26.5	*1.95*			1,368	*0.73*	(3,052)	*-2.74*
age32*policy	26.6	*2.49*	28.6	*2.25*	-2.2	*-0.73*	167	*0.09*	(3,396)	*-3.04*
age33*policy	24.1	*2.32*	24.7	*1.64*	-3.7	*-1.19*	1,277	*0.65*	(1,951)	*-1.68*
age34*policy	16.4	*1.62*	29.9	*1.68*	-4.5	*-1.27*	2,614	*1.15*	(2,807)	*-2.48*
age35*policy	24.2	*2.41*	19.5	*1.49*	-4.7	*-1.16*	(755)	*-0.40*	(2,753)	*-2.46*
age36*policy	22.1	*2.15*	23.5	*1.85*	-5.5	*-1.27*	1,132	*0.59*	(1,626)	*-1.44*
age37*policy	19.0	*1.80*	26.7	*2.05*	-1.6	*-0.40*	2,749	*1.25*	(3,112)	*-2.61*
age38*policy	23.1	*1.97*	32.3	*2.10*	-2.8	*-0.63*	3,629	*1.60*	(4,268)	*-3.57*
age39*policy	23.8	*2.27*	30.3	*2.66*			13,309	*8.55*		
Constant	207.8	*3.01*	178.3	*2.76*	-381.6	*-2.37*	(82,159)	*-11*	(79,788)	*-11.2*
No. Obs.	934		934		226		1,123		1,123	
Countries	164		164		75		139		139	
T-bar	5.70		5.70		3.01		8.08		8.08	
R-sq within	0.08		0.11		0.34		0.64		0.65	
F(40, 730)	1.67		2.14		1.70		41.34		42.96	
Prob > F	0.01		0.00		0.02		0.00		0.00	

Source: Author's calculations

Appendix B

Table B1: F Tests for significance of differences between coefficients
Dependent variable: Domestic Saving

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	*0.000*																		
22	*0.000*	0.316																	
23	*0.014*	*0.040*	*0.000*																
24	*0.000*	*0.002*	*0.006*	*0.000*															
25	*0.000*	*0.000*	*0.000*	*0.000*	*0.014*														
26	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*													
27	*0.000*	*0.000*	*0.000*	*0.000*	*0.003*	*0.121*	*0.050*												
28	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*											
29	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.247										
30	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.107	0.508									
31	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.011*	0.073	0.245								
32	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.009*	*0.055*	0.188	0.783							
33	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.002*	*0.014*	0.104	0.148						
34	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.125	0.454	0.846	0.334	0.198	*0.005*					
35	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.055*	0.217	0.470	0.800	0.612	0.075	0.458				
36	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.093*	0.316	0.601	0.676	0.508	0.064	0.638	0.791			
37	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*	0.670	0.730	0.420	0.064	*0.032*	*0.001*	0.206	*0.022*	*0.020*		
38	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.301	0.697	0.981	0.389	0.281	*0.040*	0.836	0.399	0.486	0.309	
39	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.022*	*0.003*	0.511	0.796	0.982	0.669	0.596	0.305	0.949	0.735	0.800	0.637	0.969

Table B2: F Tests for significance of differences between coefficients
Dependent variable: PPP-Adjusted GDP per capita

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.158																		
22	0.120	0.604																	
23	0.266	0.918	0.507																
24	*0.013*	*0.051*	*0.056*	*0.006*															
25	*0.000*	*0.002*	*0.001*	*0.000*	0.082														
26	*0.021*	0.093	0.129	0.051	0.748	0.350													
27	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.002*	*0.000*												
28	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*											
29	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*										
30	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*									
31	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*								
32	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*							
33	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*						
34	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*					
35	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*				
36	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*			
37	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*		
38	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	
39	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.331

Table B3: F Tests for significance of differences between coefficients
Dependent variable: Capital Per Worker

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.185																		
22	0.440	0.608																	
23	0.721	0.080	0.082																
24	0.742	0.115	0.141	0.983															
25	0.281	*0.024*	*0.026*	0.263	0.175														
26	0.062	*0.002*	*0.002*	*0.034*	*0.013*	0.179													
27	0.196	*0.034*	*0.043*	0.205	0.171	0.548	0.714												
28	0.175	*0.030*	*0.038*	0.178	0.149	0.478	0.800	0.922											
29	0.980	0.523	0.636	0.828	0.826	0.361	0.088	0.207	0.089										
30	0.308	0.105	0.132	0.353	0.326	0.673	0.753	0.977	0.900	0.122									
31	0.303	0.596	0.472	0.170	0.151	*0.035*	*0.005*	*0.019*	*0.005*	0.098	*0.000*								
32	*0.049*	*0.132*	0.084	*0.015*	*0.011*	*0.001*	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*	*0.010*							
33	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*						
34	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.124					
35	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*				
36	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*			
37	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*		
38	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	
39	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*

Table B4: F Tests for significance of differences between coefficients
Dependent variable: Tax Revenue as Share of GDP

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	*0.0428*																		
22	0.5672	*0.0008*																	
23	0.2620	*0.0004*	0.2541																
24	0.8378	*0.0387*	0.6336	0.0856															
25	0.5029	*0.0140*	0.7517	0.5656	0.3076														
26	0.6067	*0.0424*	0.8989	0.5405	0.5507	0.8556													
27	0.3769	*0.0292*	0.5211	0.9089	0.2854	0.6019	0.5172												
28	0.0924	*0.0022*	0.1035	0.2379	*0.0289*	0.0893	0.0677	0.2621											
29	0.1751	*0.0108*	0.2265	0.4320	0.1011	0.2283	0.1882	0.4738	0.7666										
30	*0.0008*	*0.0000*	*0.0005*	*0.0014*	*0.0000*	*0.0002*	*0.0001*	*0.0014*	*0.0134*	*0.0029*									
31	*0.0204*	*0.0007*	*0.0228*	*0.0499*	*0.0067*	*0.0167*	*0.0132*	*0.0511*	0.2323	0.1274	0.1354								
32	*0.0070*	*0.0002*	*0.0075*	*0.0168*	*0.0020*	*0.0049*	*0.0038*	*0.0163*	0.0860	*0.0405*	0.6139	0.2959							
33	0.1020	*0.0110*	0.1339	0.2344	0.0692	0.1280	0.1086	0.2399	0.6432	0.4771	*0.0346*	0.3054	*0.0114*						
34	0.4417	0.1132	0.5802	0.8198	0.4346	0.6362	0.5816	0.8657	0.5815	0.7081	*0.0010*	*0.0111*	*0.0006*	*0.0292*					
35	0.9316	0.4005	0.8527	0.5999	0.9802	0.7278	0.7823	0.5298	0.1761	0.2198	*0.0000*	*0.0003*	*0.0006*	*0.0003*	*0.0903*				
36	0.6838	0.7661	0.4783	0.2925	0.5513	0.3548	0.3896	0.2340	*0.0566*	0.0694	*0.0000*	*0.0000*	*0.0006*	*0.0006*	*0.0065*	0.1518			
37	0.1606	0.4401	0.0773	*0.0333*	0.0809	*0.0353*	*0.0395*	*0.0183*	*0.0020*	*0.0021*	*0.0000*	*0.0000*	*0.0006*	*0.0006*	*0.0006*	*0.0006*	*0.0006*		
38	0.1883	0.4782	0.0992	*0.0468*	0.1046	*0.0496*	*0.0551*	*0.0266*	*0.0037*	*0.0040*	*0.0000*	*0.0000*	*0.0006*	*0.0006*	*0.0006*	*0.0003*	*0.0056*	0.9426	
39	*0.0033*	*0.0137*	*0.0010*	*0.0003*	*0.0008*	*0.0002*	*0.0003*	*0.0001*	*0.0006*	*0.0006*	*0.0000*	*0.0006*	*0.0006*	*0.0006*	*0.0006*	*0.0006*	*0.0006*	*0.0009*	*0.0009*

Table B5: F Tests for significance of differences between coefficients
Dependent variable: Public Expenditure in Education as % of GDP

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.423																		
22	0.807	0.266																	
23	0.726	0.282	0.788																
24	0.459	0.138	0.35	0.274															
25	0.332	0.084	0.197	0.117	0.478														
26	0.387	0.125	0.293	0.249	0.663	0.89													
27	0.381	0.139	0.312	0.294	0.64	0.962	0.874												
28	0.118	*0.025*	*0.052*	*0.031*	0.087	0.133	0.085	0.116											
29	0.17	*0.05*	0.106	0.086	0.192	0.28	0.225	0.233	0.842										
30	*0.049*	*0.011*	*0.023*	*0.016*	*0.037*	*0.049*	*0.038*	*0.033*	0.294	0.141									
31	0.259	0.119	0.227	0.227	0.372	0.481	0.438	0.456	0.887	0.984	0.132								
32	0.257	0.133	0.238	0.243	0.367	0.457	0.423	0.44	0.951	0.857	0.386	0.782							
33	0.254	0.134	0.236	0.24	0.36	0.444	0.411	0.425	0.92	0.826	0.423	0.74	0.929						
34	0.49	0.317	0.506	0.533	0.716	0.844	0.811	0.849	0.65	0.693	0.159	0.607	0.283	0.121					
35	0.401	0.252	0.405	0.422	0.574	0.68	0.646	0.673	0.844	0.907	0.299	0.891	0.621	0.495	0.477				
36	0.385	0.245	0.388	0.404	0.545	0.642	0.61	0.633	0.912	0.978	0.38	0.985	0.773	0.691	0.497	0.832			
37	0.718	0.535	0.769	0.813	0.997	0.866	0.89	0.844	0.442	0.459	0.098	0.35	0.14	0.077	0.405	0.084	*0.015*		
38	0.375	0.245	0.378	0.392	0.517	0.602	0.571	0.59	0.995	0.937	0.491	0.91	0.93	0.876	0.446	0.683	0.784	*0.014*	
39	0.454	0.324	0.469	0.489	0.614	0.698	0.672	0.694	0.942	0.996	0.521	0.995	0.875	0.837	0.694	0.898	0.978	0.324	0.897

Table B6: F Tests for significance of differences between coefficients
Dependent variable: Public Expenditure in primary education per child

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.311																		
22	*0.038*	*0.056*																	
23	*0.001*	*0.001*	*0.016*																
24	*0.000*	*0.000*	*0.009*	0.354															
25	*0.000*	*0.000*	*0.008*	0.197	0.467														
26	*0.007*	*0.012*	0.090	0.693	0.860	0.446													
27	*0.002*	*0.004*	*0.032*	0.260	0.449	0.729	0.306												
28	*0.012*	*0.022*	0.108	0.528	0.797	0.901	0.671	0.629											
29	*0.009*	*0.017*	0.074	0.343	0.517	0.736	0.410	0.941	0.582										
30	*0.011*	*0.020*	0.078	0.315	0.459	0.638	0.371	0.806	0.508	0.833									
31	*0.000*	*0.000*	*0.000*	*0.002*	*0.004*	*0.007*	*0.002*	*0.009*	*0.001*	*0.004*	*0.001*								
32	*0.000*	*0.000*	*0.000*	*0.003*	*0.005*	*0.008*	*0.002*	*0.010*	*0.002*	*0.005*	*0.001*	0.735							
33	*0.000*	*0.000*	*0.000*	*0.003*	*0.005*	*0.007*	*0.002*	*0.009*	*0.002*	*0.004*	*0.001*	0.617	0.813						
34	*0.000*	*0.000*	*0.001*	*0.008*	*0.011*	*0.017*	*0.006*	*0.021*	*0.006*	*0.012*	*0.006*	0.933	0.773	0.558					
35	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*	*0.001*	*0.000*	*0.000*	*0.000*	0.062	*0.038*	*0.031*	*0.003*				
36	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.012*	*0.003*	*0.002*	*0.000*	0.141			
37	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*		
38	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.913	
39	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*

Table B7: F Tests for significance of differences between coefficients
Dependent variable: Public expenditures in Health as % of GDP

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21																			
22	0.252	0.252																	
23	0.652	0.652	0.815																
24	0.059	0.059	0.122	*0.004*															
25	0.081	0.081	0.159	*0.024*	0.923														
26	*0.034*	*0.034*	0.065	*0.010*	0.270	0.161													
27	*0.046*	*0.046*	0.083	*0.023*	0.329	0.274	0.834												
28	*0.007*	*0.007*	*0.012*	*0.002*	*0.037*	*0.021*	0.059	*0.012*											
29	*0.003*	*0.003*	*0.006*	*0.001*	*0.019*	*0.011*	*0.030*	*0.013*	0.242										
30	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*	*0.002*	*0.000*	*0.011*	0.022									
31	*0.001*	*0.001*	*0.002*	*0.000*	*0.005*	*0.004*	*0.009*	*0.006*	*0.047*	0.099	0.970								
32	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.018*	*0.000*							
33	*0.001*	*0.001*	*0.002*	*0.001*	*0.006*	*0.004*	*0.009*	*0.007*	*0.038*	0.071	0.468	0.391	0.096						
34	*0.002*	*0.002*	*0.003*	*0.001*	*0.009*	*0.007*	*0.014*	*0.012*	*0.052*	0.096	0.538	0.477	0.112	0.811					
35	*0.004*	*0.004*	*0.006*	*0.003*	*0.015*	*0.012*	*0.022*	*0.020*	0.076	0.133	0.613	0.572	0.159	0.802	0.885				
36	*0.018*	*0.018*	*0.027*	*0.017*	0.063	0.057	0.093	0.091	0.253	0.395	0.880	0.849	0.045	0.210	0.194	0.095			
37	*0.050*	*0.050*	*0.071*	*0.050*	0.152	0.144	0.221	0.223	0.506	0.725	0.499	0.435	0.009	*0.040*	*0.029*	*0.005*	*0.003*		
38	*0.037*	*0.037*	*0.052*	*0.036*	0.113	0.105	0.163	0.162	0.385	0.564	0.696	0.649	0.033	0.139	0.124	0.066	0.352	0.201	
39	*0.053*	*0.053*	0.073	*0.054*	0.151	0.143	0.214	0.215	0.468	0.661	0.623	0.575	0.034	0.135	0.124	0.082	0.352	0.715	0.679

Table B8: F Tests for significance of differences between coefficients
Dependent variable: Gini Coefficient

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.176																		
22	0.176	0.712																	
23	0.228	0.881	0.775																
24	0.291	0.911	0.483	0.570															
25	0.415	0.664	0.289	0.300	0.457														
26	0.478	0.596	0.275	0.297	0.434	0.817													
27	0.365	0.861	0.578	0.666	0.887	0.728	0.586												
28	0.749	0.066	*0.012*	*0.009*	*0.013*	*0.025*	*0.043*	*0.005*											
29	0.300	*0.006*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.139										
30	0.662	0.064	*0.015*	*0.013*	*0.017*	*0.028*	*0.040*	*0.007*	0.795	0.137									
31	0.659	0.070	*0.018*	*0.017*	*0.022*	*0.033*	*0.045*	*0.009*	0.782	0.135	0.971								
32	0.465	*0.030*	*0.006*	*0.005*	*0.006*	*0.008*	*0.012*	*0.001*	0.404	0.489	0.348	0.210							
33	0.337	*0.015*	*0.002*	*0.002*	*0.002*	*0.002*	*0.003*	*0.000*	0.200	0.976	0.096	*0.033*	0.267						
34	0.185	*0.004*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.049*	0.334	*0.007*	*0.000*	*0.007*	0.066					
35	0.202	*0.006*	*0.001*	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*	0.065	0.403	*0.016*	*0.003*	*0.022*	0.137	0.894				
36	0.336	*0.023*	*0.006*	*0.005*	*0.005*	*0.006*	*0.008*	*0.001*	0.215	0.915	0.142	0.082	0.319	0.831	0.188	0.115			
37	0.120	*0.003*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.023*	0.138	*0.004*	*0.000*	*0.004*	*0.018*	0.225	0.097	*0.001*		
38	0.064	*0.001*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.008*	*0.047*	*0.001*	*0.000*	*0.001*	*0.006*	*0.055*	*0.023*	*0.000*	0.187	
39	0.127	*0.008*	*0.002*	*0.002*	*0.002*	*0.002*	*0.003*	*0.001*	*0.053*	0.210	*0.035*	*0.025*	*0.063*	0.127	0.365	0.314	0.106	0.714	0.670

Table B9: F Tests for significance of differences between coefficients
Dependent variable: Unemployment rate

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	*0.011*																		
22	0.122	0.272																	
23	0.178	0.276	0.833																
24	0.206	0.275	0.765	0.868															
25	0.373	0.159	0.405	0.327	0.250														
26	0.608	*0.002*	*0.002*	*0.000*	*0.000*	*0.000*													
27	0.289	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.066*												
28	0.061	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.014*											
29	*0.022*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.136										
30	*0.018*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	0.091	0.605									
31	*0.005*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.006*	0.067	0.171								
32	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.002*							
33	*0.007*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.014*	0.076	0.143	0.681	*0.005*						
34	*0.012*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.033*	0.139	0.232	0.832	*0.007*	0.833					
35	*0.018*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.003*	0.060	0.202	0.308	0.908	*0.013*	0.784	0.913				
36	*0.026*	*0.000*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*	*0.008*	0.103	0.298	0.428	0.948	*0.017*	0.645	0.735	0.784			
37	0.089	*0.002*	*0.003*	*0.001*	*0.000*	*0.000*	*0.028*	0.087	0.454	0.906	0.874	0.287	*0.001*	0.087	0.078	*0.057*	0.062		
38	0.092	*0.003*	*0.004*	*0.002*	*0.001*	*0.001*	*0.034*	0.096	0.438	0.838	0.966	0.402	*0.005*	0.184	0.182	0.162	0.195	0.825	
39	*0.051*	*0.001*	*0.002*	*0.001*	*0.000*	*0.000*	*0.015*	0.043	0.212	0.431	0.546	0.999	0.144	0.824	0.889	0.927	0.953	0.260	0.330

Table B10: F Tests for significance of differences between coefficients
Dependent variable: Homicide Rates

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.430																		
22	0.104	0.132																	
23	0.172	0.247	0.660																
24	0.306	0.479	0.398	0.511															
25	0.073	0.083	0.475	0.160	0.013														
26	*0.040*	*0.041*	0.218	*0.056*	*0.003*	0.294													
27	*0.027*	*0.027*	0.134	*0.038*	*0.004*	0.135	0.477												
28	*0.037*	*0.041*	0.189	*0.071*	*0.015*	0.238	0.636	0.904											
29	0.103	0.135	0.491	0.298	0.125	0.735	0.744	0.355	0.479										
30	0.156	0.216	0.654	0.471	0.263	0.956	0.601	0.312	0.405	0.785									
31	0.141	0.191	0.555	0.394	0.223	0.770	0.832	0.511	0.602	0.966	0.731								
32	0.181	0.248	0.643	0.491	0.313	0.875	0.756	0.470	0.551	0.927	0.874	0.851							
33	0.213	0.289	0.694	0.550	0.374	0.927	0.730	0.464	0.536	0.881	0.943	0.786	0.908						
34	0.300	0.407	0.859	0.729	0.551	0.876	0.570	0.351	0.411	0.676	0.793	0.527	0.577	0.580					
35	0.305	0.411	0.852	0.725	0.552	0.893	0.593	0.372	0.430	0.697	0.816	0.557	0.590	0.623	0.967				
36	0.267	0.356	0.744	0.620	0.463	0.950	0.760	0.526	0.584	0.886	0.971	0.816	0.907	0.974	0.662	0.545			
37	0.254	0.336	0.690	0.572	0.427	0.865	0.865	0.636	0.690	0.997	0.857	0.968	0.920	0.846	0.530	0.402	0.690		
38	0.263	0.344	0.681	0.570	0.433	0.841	0.908	0.690	0.740	0.962	0.826	0.978	0.870	0.800	0.519	0.414	0.656	0.887	
39	0.283	0.367	0.695	0.591	0.461	0.847	0.920	0.718	0.764	0.960	0.837	0.974	0.881	0.823	0.583	0.529	0.738	0.909	0.987

Table B11: F Tests for significance of differences between coefficients
Dependent variable: % of school age cohort progressing to grade 4

Age dummy	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
20																			
21	0.962																		
22	0.197	0.063																	
23	0.069	*0.018*	0.199																
24	0.311	0.201	0.966	0.204															
25	0.738	0.670	0.398	0.057	0.300														
26	0.719	0.697	0.122	*0.014*	0.060	0.274													
27	0.457	0.391	0.966	0.503	0.982	0.486	0.104												
28	0.381	0.317	0.894	0.643	0.853	0.377	0.083	0.822											
29	0.405	0.357	0.841	0.790	0.804	0.436	0.153	0.782	0.912										
30	0.123	0.095	0.297	0.505	0.241	0.094	*0.023*	0.196	0.269	0.324									
31	0.089	0.069	0.208	0.352	0.166	0.068	*0.018*	0.118	0.172	0.205	0.705								
32	0.095	0.078	0.208	0.331	0.172	0.080	*0.026*	0.130	0.177	0.204	0.613	0.812							
33	0.067	*0.053*	0.145	0.232	0.116	*0.052*	*0.017*	0.082	0.114	0.131	0.426	0.523	0.399						
34	*0.058*	*0.047*	0.126	0.198	0.100	*0.046*	*0.015*	0.071	0.097	0.110	0.355	0.424	0.304	0.680					
35	*0.058*	*0.047*	0.123	0.191	0.099	*0.047*	*0.016*	0.071	0.096	0.108	0.337	0.401	0.308	0.633	0.885				
36	*0.010*	*0.007*	*0.024*	*0.041*	*0.016*	*0.006*	*0.001*	*0.008*	*0.013*	*0.015*	0.072	*0.062*	*0.010*	*0.035*	0.066	*0.008*			
37	*0.001*	*0.000*	*0.003*	*0.005*	*0.001*	*0.000*	*0.000*	*0.000*	*0.001*	*0.001*	*0.007*	*0.003*	*0.000*	*0.000*	*0.000*	*0.000*	*0.001*		
38	*0.002*	*0.001*	*0.005*	*0.008*	*0.002*	*0.001*	*0.000*	*0.001*	*0.002*	*0.002*	*0.012*	*0.008*	*0.000*	*0.002*	*0.004*	*0.000*	*0.042*	0.882	
39	*0.008*	*0.007*	*0.016*	*0.023*	*0.012*	*0.006*	*0.003*	*0.009*	*0.011*	*0.012*	*0.035*	*0.038*	*0.029*	*0.046*	0.060	*0.056*	0.210	0.605	0.649

Appendix C

	Country	Average Age		
		1950	1995	2025
1	Afghanistan	20.61	22.81	25.15
2	Africa	22.70	22.13	25.65
3	Albania	25.92	27.71	35.12
4	Algeria	24.27	23.41	31.36
5	Angola	23.11	20.91	22.87
6	Argentina	27.79	30.83	35.11
7	Armenia	28.22	30.28	37.74
8	Asia	25.44	27.45	34.12
9	Australia	31.84	34.87	39.26
10	Austria	35.08	37.78	43.92
11	Azerbaijan	28.24	27.71	35.09
12	Bahamas, The	24.28	27.94	36.48
13	Bahrain	22.17	26.63	36.35
14	Bangladesh	25.16	23.19	30.89
15	Barbados	27.64	33.12	39.43
16	Belarus	31.19	35.69	41.28
17	Belgium	35.47	38.46	42.78
18	Belize	24.32	22.24	30.85
19	Benin	28.77	20.64	24.08
20	Bhutan	23.86	22.83	25.22
21	Bolivia	23.35	23.54	28.87
22	Bosnia and Herzegovina	24.46	33.30	42.34
23	Botswana	21.61	21.42	26.86
24	Brazil	22.96	27.00	34.80
25	Brunei	25.37	25.43	35.42
26	Bulgaria	29.99	37.79	42.22
27	Burkina Faso	22.23	20.68	22.68
28	Burundi	23.23	21.02	24.73
29	Cambodia	22.55	23.14	28.64
30	Cameroon	24.01	22.28	24.84
31	Canada	29.98	35.57	41.46
32	Cape Verde	25.66	22.37	29.91
33	Caribbean	25.14	28.51	34.28
34	Central African Republic	26.10	23.25	25.70
35	Chad	25.15	22.68	24.73
36	Chile	25.73	29.10	35.72
37	China	26.89	29.65	37.71
38	Colombia	22.88	25.73	33.55
39	Comoros	22.65	20.67	25.13
40	Congo	23.78	21.56	23.49
41	Costa Rica	22.65	25.94	32.76
42	Cote d'Ivoire	21.99	21.71	26.72
43	Croatia	31.00	37.22	41.37
44	Cuba	26.49	32.65	41.73
45	Cyprus	27.20	33.46	38.14
46	Czech Republic	33.03	36.32	42.08
47	Denmark	32.70	38.24	41.01
48	Djibouti	20.63	22.98	26.68
49	Dominican Republic	22.10	25.23	33.75
50	East Timor	23.29	22.87	29.87
51	Ecuador	25.22	24.93	32.86
52	Egypt	23.64	24.89	32.19
53	El Salvador	22.24	23.98	31.58
54	Equatorial Guinea	27.35	23.21	24.88
55	Eritrea	21.73	22.10	25.64
56	Estonia	33.01	36.52	42.55
57	Ethiopia	21.98	21.30	22.79
58	Europe	31.71	37.06	42.56
59	Fiji	20.64	25.74	33.47
60	Finland	29.72	37.70	41.78
61	France	34.82	37.43	42.87
62	French Polynesia	21.58	25.87	33.21
63	Gabon	29.43	26.21	26.15
64	Gambia, The	24.25	23.27	26.37
65	Georgia	31.79	34.21	38.28
66	Germany	34.71	39.25	44.48
67	Ghana	21.39	21.78	25.75
68	Greece	29.37	38.76	44.60
69	Guadeloupe	24.59	30.79	37.22
70	Guam	22.44	27.52	34.70
71	Guatemala	21.57	21.98	26.87
72	Guinea	22.39	20.79	23.04
73	Guinea-Bissau	24.86	23.79	24.83
74	Guyana	23.72	25.88	34.61
75	Haiti	26.31	23.67	25.50
76	Honduras	21.30	21.85	28.98
77	Hong Kong	24.81	34.42	44.98
78	Hungary	31.89	37.44	41.75
79	Iceland	29.35	33.57	38.82
80	India	24.07	26.12	33.12
81	Indonesia	24.14	26.18	33.54
82	Iran, I.R. of	25.35	22.18	28.55
83	Iraq	21.28	22.24	27.26
84	Ireland	32.02	33.32	39.94
85	Israel	26.99	30.53	35.91
86	Italy	31.58	39.38	47.26
87	Jamaica	25.34	27.11	34.89
88	Japan	26.14	38.83	45.47
89	Jordan	22.94	21.45	26.48
90	Kazakstan	27.96	29.34	35.23
91	Kenya	24.17	20.73	27.40
92	Korea	23.36	30.67	39.59
93	Korea, North	23.38	28.32	36.41
94	Kuwait	23.31	23.43	34.32
95	Kyrgyz Republic	30.24	25.82	32.16
96	Latvia	33.41	36.81	41.40
97	Lebanon	27.63	26.06	33.25
98	Lesotho	24.23	23.30	26.27
99	Liberia	23.08	22.91	24.11
100	Libya	23.77	21.59	24.88

Source: Authors'calculations from UN (1998)

Appendix C

	Country	Average Age		
		1950	1995	2025
101	Lithuania	31.59	35.52	40.81
102	Luxembourg	35.01	37.74	41.20
103	Macau	26.67	30.73	40.91
104	Macedonia	27.28	32.29	38.43
105	Madagascar	22.79	20.84	24.29
106	Malawi	21.50	20.85	23.17
107	Malaysia	24.23	24.83	32.61
108	Mali	21.74	20.56	23.19
109	Malta	27.39	34.80	39.44
110	Martinique	25.48	32.46	38.06
111	Mauritania	22.90	22.35	26.14
112	Mauritius	21.66	28.89	35.71
113	Melanesia	23.53	23.64	28.78
114	Mexico	24.01	24.93	33.74
115	Moldova	30.03	32.19	36.89
116	Mongolia	23.19	23.53	31.32
117	Morocco	21.84	24.58	32.83
118	Mozambique	22.84	22.00	23.95
119	Myanmar	24.57	25.25	31.81
120	Namibia	23.64	23.02	25.93
121	Nepal	24.55	22.79	27.16
122	Netherlands	30.36	37.01	43.54
123	Netherlands Antilles	26.40	31.76	37.91
124	New Caledonia	28.57	27.68	34.98
125	New Zealand	31.18	33.91	38.04
126	Nicaragua	21.41	21.63	29.14
127	Niger	21.71	20.28	22.38
128	Nigeria	21.13	21.51	24.61
129	Norway	33.54	37.52	40.57
130	Oceania	30.03	32.04	36.15
131	Oman	22.65	21.14	22.53
132	Pakistan	25.43	22.37	27.92
133	Panama	24.33	26.58	34.73
134	Papua New Guinea	23.98	23.28	28.16
135	Paraguay	26.12	23.05	28.58
136	Peru	23.44	25.20	32.99
137	Philippines	22.73	23.96	31.36
138	Poland	28.63	34.37	39.47
139	Polynesia	21.19	25.04	32.51
140	Portugal	29.41	37.50	42.94
142	Qatar	23.25	29.53	36.55
144	Romania	29.14	35.37	41.49
145	Russian Federation	28.97	35.74	41.42
146	Rwanda	21.02	20.51	24.83
147	Samoa	20.45	23.91	31.56
149	Senegal	23.15	21.75	25.21
150	Sierra Leone	23.91	22.12	23.94
151	Singapore	22.99	31.75	41.17
152	Slovak Republic	29.89	33.84	40.13
153	Slovenia	30.66	36.99	43.95
154	Solomon Islands	22.44	21.53	26.45
155	Somalia	23.14	20.67	22.61
156	South Africa	24.52	25.06	29.79
157	Spain	30.42	37.70	45.61
158	Sri Lanka	23.47	28.55	35.78
159	Sudan	22.35	22.91	28.00
160	Suriname	24.96	25.50	33.54
161	Swaziland	22.11	21.53	27.56
162	Sweden	34.50	38.93	41.54
163	Switzerland	33.85	38.17	44.17
164	Syrian Arab Republic	23.77	21.29	29.25
165	Taiwan			
166	Tajikistan	26.59	23.21	30.12
167	Tanzania	20.94	20.97	24.54
168	Thailand	22.35	28.03	37.41
169	Togo	23.80	21.58	23.87
170	Trinidad & Tobago	24.27	28.45	36.02
171	Tunisia	25.17	25.46	33.42
172	Turkey	24.28	27.14	34.77
173	Turkmenistan	27.82	23.88	31.20
174	Uganda	21.70	19.89	22.00
175	Ukraine	30.79	36.99	41.81
176	United Arab Emirates	23.09	28.12	36.78
177	United Kingdom	34.86	37.97	41.50
178	United States	31.60	35.21	39.37
179	Uruguay	30.69	33.96	36.41
180	Uzbekistan	28.55	23.95	31.12
181	Vanuatu	20.83	22.55	27.46
182	Venezuela	21.91	25.11	32.75
183	Viet Nam	26.24	24.81	32.85
184	West Bank and Gaza	23.07	18.83	21.21
185	Yemen, Republic of	23.24	19.99	22.90
186	Yugoslavia	29.65	35.27	39.34
187	Zaire	22.55	20.91	22.87
188	Zambia	21.47	19.91	23.95
189	Zimbabwe	22.08	21.30	26.90

Source: Authors'calculations from UN (1998)

Appendix Table D: Data Sources	
Variables	**Source**
all age structure variables	United Nations (1998)
domestic savings as a share of GNP	World Bank World Development Indicators (1998)
PPP adjusted GDP per capita	For 1950-1992, Penn World Tables. The World Bank Development Indicators (1998) provide a series of PPP adjusted GDP per capita for the period 1980-1997. We use the growth rates from the World Bank (using the same definition as in the Penn World Tables) to extend the Penn World Tables series through 1995.
capital per worker	Penn World Tables
tax revenue as a share of GDP	World Bank World Development Indicators (1998)
public expenditures on education as a share of GDP	World Bank World Development Indicators (1998)
public expenditure on primary education per primary school-age child as a proportion of GNP	World Bank World Development Indicators (1998)
health expenditures as a share of GDP	World Bank World Development Indicators (1998)
Gini coefficients	"good quality" distribution data from Deininger and Squire (1996)
Unemployment rates	ILO (1998)
homicide rates	Fajnzylber, Lederman and Loayza (1998), who combine homicide rates from the United Nations Surveys of Criminal Trends and Operations of Criminal Justice Systems, and data from the World Health Organization.
Probability that a student belonging to the cohort that is of school age in the year of reference, progresses to grade 4	World Bank World Development Indicators (1998)
trade openness ((imports plus exports))/GDP	Penn World Tables.
private credit as a share of GDP	World Bank World Development Indicators (1998)
macro volatility	constructed from the Penn World tables and World Bank data
expenditures in education as a share of GDP	World Bank World Development Indicators (1998)

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