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Gone with the wind: demographic transitions and domestic saving

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Abstract

This study explores the relationship between demographic factors and saving rates using a panel dataset covering 110 countries between 1963 and 2012. In line with predictions from theory, this paper finds that lower dependency rates and greater longevity increase domestic saving rates. However, these effects are statistically robust only in Asia. In particular, Latin America, which is a region that has undergone a remarkably similar demographic transition, did not experience the same boost in saving rates as Asia. The paper highlights that the potential dividends arising from a favorable demographic transition are not automatically accrued. This is a sobering message at a time when the demographic tide is shifting in the world.

JEL classifications: E21; J10; O16
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1. Introduction

Demographic factors are important determinants of a country's saving behavior (Modigliani and Ando, 1957; Ando and Modigliani, 1963; Modigliani, 1966). In Asia, a favorable demographic transition over the last half century has supported high saving and investment rates (Bloom and Williamson, 1998). In this paper we explore if demographic factors are behind saving performance in other regions as well.

One key demographic factor is a country's "dependency rate;" i.e., the share of the non-working population (both young and old) relative to the working age population. A country's transition from a high to a low age dependency rate is expected to lead to higher aggregate saving rates because of the increasing share of savers in the economy vis-à-vis the non-working.[1] This is known as the "demographic dividend" (Lee and Mason, 2006).

Life expectancy is another demographic factor with implications for saving. The expected impact of increasing longevity on aggregate saving rates is however, ambiguous. On the one hand, people living longer may save more during their working years to finance a longer retirement. On the other hand, increasing longevity may indirectly contribute to lower saving rates, via increasing old dependency rates. The structure of incentives that is embedded in a country's pension systems (i.e., mandatory saving schemes) can determine which of these forces prevails (see, e.g., Bloom et al., 2007).

Over the last five decades every region of the world has experienced a decline in the age dependency rates and increases in life expectancy. However, the world has witnessed a marked divergence in domestic saving rates: whereas domestic saving rates have risen in Asia, they have stagnated in Latin America, declined in North America and Europe, and remained particularly low in Africa.[2] This paper explores whether divergent saving behaviors across regions can be explained by asynchronous demographic transitions.

We show that it is not the case. This conclusion is particularly clear when comparing Asia to Latin America. These two regions have experienced similar demographic transitions over the sample period, but remarkably different saving responses. While in Asia saving rates increased to

[1] The theoretical underpinnings for the relationship between demographic factors and saving come from the Life-Cycle Hypothesis (LCH). The LCH is derived from the aggregation of finite-lived overlapping generations and introduces age-related consumer heterogeneity. The LCH posits that individuals will have negative saving when they are young, have positive saving during their working years, and run down their saving in retirement. In the absence of growth, these will add up to zero. In the presence of growth, younger generations will be "wealthier" than older ones that will be dissaving: this difference can generate a positive relationship between growth and aggregate saving.

[2] Related to the disparity in saving rates across regions, we have also seen divergent investment and growth rates in different parts of the world.

approximately 30 percent of GDP in 2010 from 12 percent in the 1960s, in the case of Latin America, saving performance has gone largely unchanged.[3] The evolution of saving rates in Latin America during the period of declining dependency rates contrasts not only with Asia, but also with the expectations that economists had two decades before, when the region's population was still relatively young and thus the demographic dividend was incipient.[4] Decades later, the average saving rate in Latin America has remained practically unchanged.

In view of the variations in demographic trends and in saving performance across regions and over time, this paper addresses two questions. First, what is the impact of demographic factors on domestic saving rates? Second, how much have demographic changes contributed to the evolution of saving rates in different regions?

These questions have long been an issue of concern. Leff (1969) explored the relationship between dependency rates and saving rates using a cross-country dataset for 74 countries in 1964 and showed that lower dependency rates had a positive effect on aggregate saving rates. More recent papers have attempted to explore the effects of variations on dependency rates primarily in samples of Asian countries. Higgins and Williamson (1996, 1997) have attributed the increase in saving rates in Asia since the 1960s to an impressive decline in youth-dependent burdens. Bloom and Williamson (1998) and Bloom, Canning and Malaney (2000) have argued that the demographic dividend accounted for as much as one-third of East Asia's economic miracle.

Other papers have explored the relationship between longevity and saving rates. Li, Zhang and Zhang (2007) provide theoretical justification for the related yet independent roles of longevity and old-age dependency rates in determining saving rates. Using panel data for the period from 1960 to 2004, they find that longevity has a positive effect on saving rates, and that the old dependency rate has negative effects on saving and investment.

Bloom et al. (2007) study how the impact of life expectancy on saving rates depends on the prevailing pension system. Analyzing a cross-country panel, they find that increased longevity raises aggregate saving rates in countries with defined contribution pension systems, and that provide people incentives to stop working when reaching the retirement age. Instead, in countries with pay-as-you-go

[3] On differential saving performance across regions, see Becerra, Cavallo and Noy (2015).

[4] For example, Taylor (1995) argued that the favorable demographic prospect in Latin America would offer these economies an opportunity to significantly alleviate their saving constraints by 2025. Moreover, higher levels of saving in less-developed economies were expected to have significant repercussions on international capital markets and in the pattern of capital flows across borders, counteracting the potential pernicious effects of population aging in some regions and crowding out large proportions of foreign capital.

systems with high income replacement rates, the saving effect disappears. Their panel data are restricted to those countries for which there are data characterizing their pension systems.[5]

This paper contributes to the literature by studying the impact of demographic factors on saving rates using a comprehensive panel dataset, covering 110 developing and developed countries for the 1963–2012 period. Using panel estimates we discover a significant degree of heterogeneity in regional specific estimates. Importantly, in order to isolate the idiosyncratic impact of demographic factors, the inter-regional comparisons are performed using a common empirical framework and controlling for other determinants of saving rates. We find that demographic factors have a significant impact on saving rates only in Asia. The contrast in the saving response to demographic changes is particularly striking when comparing Asia and Latin America. A counterfactual analysis shows that average saving rate in Latin America should be around 8 percentage points of GDP higher if the response of saving to demographic factors in that region had been the same as the one estimated for Asia. A variance decomposition analysis confirms that the impact of demographic factors has been a significant contributor to saving rates in Asia, but not in Latin America.

The remainder of this paper is organized as follows. Section 2 briefly characterizes the evolution of dependency rates, life expectancy and saving rates across regions. Section 3 presents the data. Section 4 explores the relationship between demographic changes and domestic saving rates. Section 5 conducts an extensive set of robustness checks. Finally, Sections 6 and 7 conclude by putting the results in the context of the previous literature.

2. The Role of Demographic Factors

A country's demographic transition moves through three broad phases (see, e.g., Bloom, Canning, and Sevilla, 2001). In the first phase, improvements in medicine and public health reduce mortality rates, particularly infant and child mortality rates because the young population is the most vulnerable to infectious disease. During this phase, there is usually an increase in the youth population and therefore in age dependency rates. In the second phase, as families internalize that more children are likely to survive, they decide to give birth to fewer children, leading to declines in the youth population and in dependency rates. Finally, in the third phase, an extension in average life expectancy increases the portion of old population, which results in so-called "population aging."

[5] In the regressions, the authors control for demographic structure, however they do not evaluate how the impact of longevity may differ across regions and focus instead on the incidence of alternative pension systems.

During the period in which the labor force grows faster than the population dependent on it, rural agrarian economies with high mortality and fertility rates are generally transformed into urban industrial economies characterized by low mortality and fertility rates and high life expectancies (Lee and Mason, 2006). For that reason this period is called the "demographic dividend."

The importance of this period of the demographic transition lies in the fact that it offers the beneficiary countries an opportunity to accelerate economic growth through a number of channels: increases in the labor force, higher saving and investment rates, buildup of human capital, and stronger demand for goods and services, among others (Bloom and Williamson, 1998). These channels are mainly associated with the fact that different age groups in a population behave differently. Bloom, Canning and Sevilla (2000) highlight, for example, that children require intensive investment in education and health, working-age adults supply labor, saving and investment, and the elderly need health care and retirement income.

The world as a whole has experienced a period of declining dependency rates over the last five decades. As shown in Figure 1, there were 76 dependents for every 100 working-age adults in 1965. By 2010, that number had dropped to 52. According to United Nations (UN) projections, the dependency rate in the world is now reaching its bottom. In the decades ahead, it is expected that the world's share of the population of working age will start decreasing, particularly driven by an expansion in the elderly share of the population in most regions.

The demographic dividend can last several decades, but there is always an inflexion point at which the dependency rate begins to increase again. Thus, the "demographic dividend" is time-constrained. Moreover, the potential benefits from the demographic dividend may not automatically accrue. Instead, the demographic dividend provides a "window of opportunity" whereby the potential benefits are realized only under specific circumstances and depend on how economic agents and societies collectively respond to the changes. A case in point is differential saving behavior in regions that have had similar demographic trends over the last five decades. We will show below that empirically, similar demographic transitions can have different effects on saving rates.

2.1. Demographic Transition in the World and across Regions

The decline in dependency rates that have been documented in the previous section materialized in all regions of the world. In fact, in 2010 even "aging" Europe and North America experienced their lowest dependency rates ever. Figure 2 shows the dependency rate for six different regions based on data and projections from the UN (UN, 2013). In North America, Europe, and Oceania, the ratio of

nonworking-age to working-age population decreased slowly over the last five decades. Although they are starting their aging demographic phases, North America and Europe boasted fewer dependents than ever in 2010. According to UN projections, these regions have reached their minimum dependency rates, and the ratios should now begin to increase.

By contrast, reductions in Asian dependency rates have been rapid. As Figure 2 shows, there were 81 dependents for every 100 working-age adults in 1965. By 2010, that number had dropped to just 48. Latin America has followed a similar trend, although its dependency rate in 1965—at the beginning of the demographic transition—was a bit higher than that in Asia. In 1965, there were approximately 89 dependents for every 100 working-age adults. By 2010 that number had dropped to 54. According to UN projections, dependency rates in Asia and Latin America are expected to reach their respective lows some time between 2015 and 2020.

Africa is an exception because its demographic transition is asynchronous with the rest of the world. Africa's demographic dividend began late. In 1985, there were more than 92 dependents for every 100 working-age adults. In 2010, the number of dependents has declined to 80 dependents for every 100 working-age adults. The projections indicate that dependency rates will not reach their lowest levels until the end of the century.

Table 1 presents details of the demographic transition by region. The first column of the table reports the region. The second and third columns report the years of the highest and lowest dependency rates respectively. The fourth and fifth columns report the highest and lowest dependency rates. Finally, the sixth column reports the difference between the highest and lowest dependency rates. As reported in the table, except for Africa, the timing of the demographic transition has been somewhat similar across regions, with more diversity in the levels of the dependency rates at both the beginning and the end of the demographic transition; the timing of the inflexion points in each region; and the slope of the curves.

The overall age dependency ratio can be divided between young and old dependents. Young dependency is usually defined as the ratio of population under age 15 to the age group from 15 to 64 (i.e., working-age population), while old dependency is the ratio of population over 64 to the age group from 15 to 64. Figure 3 shows that while the world's young dependency rate has been declining since the mid-60s, the old-age dependency rate has been increasing and the rate of increase is expected to accelerate in over the coming decades. Figure 4 shows that both young and old dependency ratios have shown similar patterns across world regions, with a remarkable synchronicity between Asia and

Latin America. Africa is the only region that has a largely young population, and the demographic dividend has yet to fully materialize.

The dynamics of dependency ratios in the world have been influenced by changes in mortality, fertility rates and longevity. Figure 5 shows that there have been significant changes in life expectancy in all regions. Life expectancy in Latin America has increased from around 50 years in the 1950s to close to 75 years presently, and in 20 years it is expected to be close to the life expectancy of advanced economies. Asia in turn has followed a similar path of increasing life expectancy. Improvements in life expectancy in Africa have been less than in other world regions.

In summary, there have been large demographic changes in the world over the last five decades. In this global context, the demographic transitions of Asia and Latin America in particular have shown remarkable similarities.

2.2. Domestic Saving Rates across Regions

Figure 6 shows domestic saving by region based on data from the World Bank's 2015 World Development Indicators (WDI). While domestic saving rates have risen in Oceania and Asia over the last five decades, they have stagnated in Latin America and Africa, and have slightly declined in North America and Europe. The average saving rate in Asia increased from 12 percent of GDP in the 1960s to approximately 30 percent in recent years.

The contrast between saving rates in Asia and Latin America is particularly striking despite similar demographic transitions. Of course, demographic factors are not the only determinants of saving behavior. Therefore, in order to make regional comparisons, it is important to embed the analysis within an empirical framework that simultaneously controls for other factors that might account for the differential saving patterns. In this paper, we explore this issue using a comprehensive panel dataset that includes country-level data on saving rates, demographic factors and other saving determinants.

3. Data

The data used in this paper come mainly from the World Bank's 2015 WDI dataset. The dataset contains a wide range of demographic variables, including populations of different age groups and life expectancy. To construct countries' dependency rates, the age group from 15 to 64 is chosen as the working-age population, and the population under age 15 and over 64 is considered the nonworking-age population. The dataset also covers a comprehensive set of macro variables, such as the ratio of

domestic saving to GDP, the real GDP growth rate, and GDP per capita. For robustness check purposes, we also use aggregate domestic saving rates from the World Penn Table (WPT) database.

To reduce the influence of transitory shocks on saving rates we follow Li, Zhang and Zhang (2007) and compute five-year averages from the annual observations, collapsing the data spanning from 1963 through 2012.[6] Additionally, to rule out the possibility that the results are driven by outliers and to reduce potential coding errors, we clean the data in several ways. First, we eliminate countries with less than 30 years of available (annual) data. Second, we exclude all observations in which any of the variables exceeds the sample mean by more than four standard deviations. Third, we exclude the observations in which the domestic rate change exceeds the sample mean by more than four standard deviations. This allows us to exclude episodes associated with extreme shocks such as sudden stops, severe financial crisis, or natural disasters that may drastically affect aggregate saving. Fourth, we do not consider offshore financial centers. Fifth, we exclude countries with a population of less than 250,000 inhabitants.

After the cleaning of the data, the final sample is comprised of 110 advanced and developing countries and 953 five-year observations over the period 1963-2012. Appendix A1 reports the countries included in the final sample. Table 2 presents the descriptions, units, and sources of the variables used in the econometrics models. Table 3 reports summary statistics for the overall sample.

4. Estimation

The objective of this study is to explore the relationship between demographic factors and saving rates. The first step is to employ panel regression analysis to determine the effects of dependency rates and life expectancy on aggregate domestic saving rates. We begin the regression analysis by estimating the effects of dependency rates and life expectancy on saving rates. This specification is expressed as follows:

$$\text{Saving}_{ct} = \mathbf{A}_c + \mathbf{B}_t + \beta\ \text{Dependency}_{ct} + \gamma\ \text{Life Expectancy}_{ct} + \theta\ X_{ct} + \varepsilon_{ct},$$

where $Saving_{ct}$ is the ratio of aggregate domestic saving to the GDP of country c during period t. $Dependency_{ct}$ is the dependency rate, $Life\ Expectancy_{ct}$ is life expectancy at birth in number of years and X_{ct} is a set of control variables. $\mathbf{A}_c$ and $\mathbf{B}_t$ are vectors of country and year dummy variables, respectively, and ε_{ct} is the error term. Given that the specification include country and time fixed effects, the

[6] Because all the models include one-period lagged variables, all regressions actually use nine periods of the averaged data.

coefficients of interest (i.e., β and γ) are analogous to a difference-in-differences estimator in a multiple-treatment-groups and multiple-time-periods setting (Imbens and Wooldridge, 2009).

The baseline specification is based on earlier studies that have documented that life expectancy affects aggregate domestic saving rates via behavioral effects related to expected longevity and also via the effects associated with the population's age structure (age dependency); see Li, Zhang and Zhang (2007) and Bloom et al. (2007). On the one hand, individuals that expect to live longer may save more to finance a longer retirement. Bloom et al. (2007) show that the strength of this effect is contingent on the prevailing retirement regime. On the other hand, increasing life expectancy implies that a country's population ages over time, which is expected to reduce saving capacity.

In all regressions we include as control variables lagged GDP growth and the lagged logarithm of the level of GDP per capita expressed in constant 2005 U.S. dollars. There are two reasons for controlling for these variables. First, earlier research suggests that economic growth and economic development are important determinants of domestic saving (Leff, 1969; Loayza, Schmidt-Hebbel and Servén, 2000).[7] Second, since both variables are likely to be correlated to many other factors, they are a convenient proxy to control for unobserved determinants of domestic saving that are not captured by either time or country fixed effects. In particular, given that GDP per capita and GDP growth change in response to sufficiently large changes in a country's macroeconomic environment, their inclusion (together with country and year fixed effects) helps reduce omitted variable bias.[8]

4.1. Results: Saving Determinants

Table 4 shows the results from estimating a basic regression relating dependency rates and life expectancy with aggregate saving rates by ordinary least squares. Robust standard errors are reported in parentheses.

The results in column 1 show that lower dependency rates have, on average, a positive effect on domestic saving rates. This effect is statistically significant and economically meaningful. A decrease in one standard deviation of the dependency rate is associated, on average, with a 2.4 percentage point increase (i.e., -0.12 x 0.20) in the domestic saving rate. The results associated with

[7] Additionally, according to the Life-Cycle Hypothesis (LCH), in the presence of growth younger generations will be "wealthier" than older ones that will be dissaving: this difference can generate a positive relationship between growth and aggregate saving.

[8] Given that we replicate the baseline regressions for some particular regions (i.e., Asia and Latin America), it is not desirable to reduce either the number of countries or the number of observations. Therefore, we prefer a parsimonious specification to avoid substantial sample size drops when we increase the number of control variables. As shown in the robustness check section, the results are qualitatively identical when we consider additional control variables.

the control variables indicate that higher saving rates are associated with higher economic growth and higher levels of economic development—both are statistically highly significant. Although the baseline regression is a parsimonious model, as shown by the adjusted R-squared, it is able to explain an important proportion of the variance of saving rates (i.e., around three-quarters of the variance of saving rates).

Column 2 of the table reports the results from estimating the baseline regression (including life expectancy). Thus, this specification explores both the direct and indirect effect of longevity on saving rates. The positive and statistically highly significant coefficient on life expectancy suggests that individuals that expect to live longer save more for a longer retirement on average. This result, in conjunction with the negative and significant coefficient on the age dependency rate, confirms the independent roles of longevity and the population's age structure in determining aggregate saving rates.

Next, in columns 3, 4 and 5 we explore potential heterogeneities in the impact of the age dependency rate and life expectancy on domestic saving across regions. To do this, we augment the baseline regressions with interaction terms between the age dependency rate and five dummy variables (columns 3 and 4); and between the life expectancy and the five dummy variables (column 5). The dummy variables take the value one for countries in five different regions and zero otherwise. The regions are: North America, Europe, Oceania, Latin America, and Africa. The omitted region is Asia.

The results point towards significant heterogeneity in coefficient estimates across regions. In particular, the results in columns 3 and 4 suggest that the negative relationship between dependency rates and saving rates estimated in the panel regressions is only statistically significant and economically meaningful in Asia. We do not find any significant negative relationship between dependency rates and saving rates in the other regions.[9] In the case of life expectancy (column 5), the results indicate that this variable has a positive and significant impact on saving rates in Asia, but that this effect tends to vanish in other regions.

These results are consistent with a sequence of studies suggesting that a large part of the saving boom in Asia can be explained by the evolution of its population's age structure (Leff, 1969; Fry and Mason, 1982; Kelley and Schmidt, 1995; Kelley and Schmidt, 1996; Higgins and Williamson, 1997). The novelty is that, according to these results, Asia is the exception rather than the rule.

[9] As reported in column 4 of Table 4, the marginal effect of dependency rates on saving rates is -0.2435 for Asia, 0.125 for North America, 0.062 for Europe, 0.054 for Oceania, -0.005 for Latin America and the Caribbean, and it is -0.094 for Africa. With the exception of the coefficient on Asia, we cannot reject the null hypothesis that these values are equal to zero at the 5 percent level for Africa and the 10 percent level for the rest of the regions.

4.2. Asia versus Latin America

This section contrasts the experiences of Asia and Latin America in various ways: replicating the regressions on different sub-samples of countries, performing a variance decomposition analysis, and performing a counterfactual exercise. The interest in comparing Asia and Latin America arises because both regions have exhibited similar demographic transitions over the last five decades (see Figures 2, 4 and 5), but they have behaved differently in terms of aggregate saving rates (see Figure 6). Whereas saving rates have boomed in Asia during the demographic dividend period, they have stagnated in Latin America.

Table 5 re-estimates the base regressions for different sub-samples of countries. Column 1 reports the results for a sub-sample of both Asian and Latin America countries, column 2 reports the results for a sub-sample of Asian countries, and column 3 reports the results for a sub-sample of Latin America countries. Columns 4 and 5 consider a sample of both Asian and Latin America countries jointly (as in column 1) but the specification of the models includes the interaction of the dependency rate and the life expectancy, respectively, with a dummy variable that takes the value 1 for Latin America countries and 0 for Asian countries. Finally, columns 6 and 7 perform the same exercise in a different way. These regressions are run using the full sample of countries (as in Table 4), but introducing interaction terms for Asia and Latin America only. Therefore, the coefficients of the interaction terms relate to the regional-specific effects of Asia and Latin America vis-à-vis the rest of the world bundled together. The results are consistent across the different sub-samples and specifications. Overall, they all consistently point in the direction of an attenuated impact of demographic factors on saving rates in Latin America vis-à-vis Asia. That is, lower dependency rates and higher longevity have a positive effect on saving rates in Asia, but these effects tend to vanish in Latin America. For example, the marginal effect of the age dependency ratio on saving rates is roughly -0.3 and statistically highly significant in Asia (column 2), while it is around -0.06 and not significant in Latin America (column 3).

So far, we have shown that dependency rates, life expectancy, GDP per capita, and economic growth are all determinants and jointly explain a significant proportion of the variance of domestic saving rates in panel regressions. The next step is to quantify the relative contribution of these variables—in addition to unobserved country and time fixed effects—in explaining the variance of aggregate domestic saving rates. To undertake this quantification, we perform a variance

decomposition exercise based on the results from columns 2 and 3 of Table 5. The variance decomposition is given by

$$1 = \frac{Cov(Saving_{ct}, A_c)}{Var(Saving_{ct})} + \frac{Cov(Saving_{ct}, B_t)}{Var(Saving_{ct})} + \frac{Cov(Saving_{ct}, \beta Dependency_{ct})}{Var(Saving_{ct})} +$$

$$\frac{Cov(Saving_{ct}, \gamma \text{Life Expectancy}_{ct})}{Var(Saving_{ct})} + \frac{Cov(Saving_{ct}, \theta X_{ct})}{Var(Saving_{ct})} + \frac{Cov(Saving_{ct}, \varepsilon_{ct})}{Var(Saving_{ct})}.$$

Table 6 reports the variance decomposition analysis for two regions: Asia and Latin America. From the analysis, the major differences between Asia and Latin America are related to the contributions of dependency rates and life expectancy to saving rates. Whereas these contributions are approximately 23 percent and 8 percent, respectively, in Asia, they are just 3 percent and -0.7 percent in Latin America. These results underscore the importance of decreased dependency rates and higher life expectancy in Asia as significant drivers of the observed dynamics of saving rates in that region, whereas the role of the population's age structure and longevity has been quantitatively less (or not) important in Latin America. Additionally, the results suggest that country fixed effects and GDP per capita explain a very important share of the variance of saving rates in both regions. Country fixed effects account for 25 percent and 36 percent of the variance of domestic saving rates in Asia and Latin America, respectively, and GDP per capita accounts for approximately 27 percent and 29 percent of the total variance in the same regions. These results additionally suggest that the process of demographic transition in Asia has explained a greater proportion of the variance of saving rates than time-invariant country characteristics, while the opposite is true in Latin America. Economic growth and time fixed effects are relatively less important determinants.

Having already identified a statistically significant and economically meaningful effect of dependency rates on saving rates in Asia, we also implement a counterfactual exercise assessing how the evolution of saving rates would have been in Latin America if the effect of demographic factors on saving rates would have been the one reported in Asia. Figure 7 shows the counterfactual analysis using the results from columns 2 and 3 of Table 5. Specifically, the figure shows that if the coefficient associated to the relationship between dependency rates and saving rates in Latin America had been -0.296 (i.e., the one for Asia) instead of -0.066, nowadays the average domestic saving rate in Latin America would have been 8 percentage points of GDP higher. That is, around 27 percent instead of 19 percent.

4.3. Young versus Old Dependency Rates

Results in tables 4 to 6 show that, on average, aggregate domestic saving rates tend to increase when the share of the dependent population decreases. But, it is likely that changes in the proportion of the population in the youth-dependent category and in the elderly-dependent category may have different effects on aggregate saving rates. Moreover, young and old dependency rates have a quite different evolution over time. Figure 3 shows that while the world's young dependency rate has been declining since the 1960s, the old-age dependency rate has been increasing. These general trends are observed in all regions and are expected to continue for several decades, although we observe some differences in the historical and expected speed of the transitions of some regions. For example, Figure 4 shows that Europe will experience a very rapid increase in the proportion of its old population in the next decades, while Africa is not projected to experience any significant increase in the old population in the decades ahead. On the other hand, once again Latin America and Asia display very similar patterns of their young and old dependency rates.

Table 7 explores potential heterogeneity decomposing the age dependency rate in two: the ratio of young to working age population and the ratio of old to working age population. Column 1 shows that the coefficients associated with young and old dependency rates are negative and statistically significant in the whole sample of countries. Columns 2 and 3 show that only the coefficient associated with young dependency rates is significant in a sample of Asian countries and none is significant in a sample of Latin America countries. Columns 4 to 6 consider a sample of both Asian and Latin America countries jointly, but the specification of the models includes the interaction of the dependency rates (young and old) and the life expectancy, with a dummy variable that takes the value 1 for Latin America countries and 0 for Asian countries. Columns 7 and 8 employ the whole sample and augment the previous two specifications with interactions terms using a dummy variable that takes the value 1 for Asia countries and 0 for the rest of the countries. The bottom-line is that dependency ratios (particularly young dependency ratios) have bigger impacts on saving rates in Asia than in Latin America.

5. Robustness Checks

This section shows that the baseline results are robust to an extensive set of additional checks, including using a set of additional control variables, estimating dynamic panels, and alternative data

sources for domestic saving rates. We start the battery of robustness checks by considering a comprehensive set of control variables that includes the primary school enrollment rate, population growth, the proportion of urban population, and the annual inflation rate. Table 8 shows that population growth and inflation are positively and negatively related to saving rates, respectively. The coefficients on primary school enrollment and urban population are not statistically significant. All the main previous findings remain qualitatively unchanged. We do not include all these control variables in all the reported regression because the sample size drops dramatically from 953 to 685 observations (i.e., a 28 percent sample size drop).[10]

Next, we employ two alternative dynamic panel saving rates regression models to assess how dependency rates affect saving rates. We start applying the Difference GMM estimator developed by Arellano and Bond (1991), which first-differences the linear regression model and uses lagged dependent variable levels to instrument for the first difference of the lag.[11] This estimator allows addressing the potential endogeneity of dependency rates, and explicitly controls for potential biases arising from country specific time-invariant effects. We employ one lag of the exogenous variables as the instrument set. Then, we estimate a dynamic fixed effect panel model employing the bias correction methods for unbalanced panels developed by Bruno (2005). In contrast to the Difference GMM estimator, it assumes that all the independent variables are exogenous.

Tables 9 and 10 report the results from estimating dynamic panel models. While some control variables become not statistically significant, the results pertaining to demographic variables remain qualitatively unchanged. That is, lower dependency rates and higher longevity have a positive effect on saving rates in Asia, but these effects vanish in Latin America (columns 4 and 5 of Tables 9 and 10).

As a final robustness check, the baseline regressions are replicated using an alternative data source for domestic saving rates. Specifically, Table 11 reports the results from estimating the baseline models using PWT data. Overall, most of the main results remain qualitatively unchanged.

6. Putting the Results in Context

[10] We have also estimated the regressions including tertiary education and female labor force participation. The main results remain unchanged, the sample size drop is even more drastic and the coefficients associated with these variables are not statistically significant. The idea of including these two variables is that there may be some dividends associated with better education and female labor participation that may be simultaneously affecting the results.

[11] This paper does not employ the System GMM because the further assumption of this model is that the time-invariant individual effects are uncorrelated with the difference of the independent variables. This assumption is not satisfied in the specifications including the interaction of the dependency rate with regional dummy variables, as the difference of the interaction term is likely to be correlated with time-invariant country effects.

Li, Zhang and Zhang (2007) and Bloom et al. (2007) are two influential papers that are close to ours in terms of data coverage and estimation strategies. Contrasting the results with those papers sheds light on how to interpret the results. Those studies find that old-age dependency has significant negative effects on aggregate saving for the world as a whole. We find the same result in the panel regressions; however, we find that this negative association is driven by Asia.

Earlier studies do not find a significant impact of young dependency ratio on saving. Li, Zhang and Zhang (2007) estimate the impact of lagged fertility (instead of young age dependency) on saving rates. They find a negative effect that is not robust to the inclusion of other relevant controls. Similarly, Bloom et al. (2007) do not find any significant impact of young age dependency in any of their specifications. This paper finds that young age dependency has a negative effect on saving rates; however this effect is driven solely by what happens in Asia. Young age dependency does not seem to affect saving in the rest of the world.

Li, Zhang and Zhang. (2007) find that life expectancy has a positive and significant impact on saving rates in most specifications. Bloom et al. (2007) find that higher life expectancy leads to higher saving rates in countries with fully funded pension systems, universal coverage and retirement incentives. Instead, they find that life expectancy has no saving effect in countries with pay-as-you-go systems with high replacement rates. Interestingly, we find that life expectancy has a positive significant effect on saving rates in the panel regressions. However, this effect is driven once again by what happens in Asia. The fact that extended longevity has a positive effect on saving in Asia but not in other regions might be related to differences in the prevailing pension systems. We cannot test this hypothesis directly due to lack of data. However it is worth highlighting that the majority of Latin America countries covered in the Bloom et al. (2007) paper had pay-as-you-go systems with a high replacement rate, and none had universal coverage with fully funded system and retirement incentives. This is a constellation of pension regimes that do not bode well for saving rates according to the authors. Instead some of the Asian countries included in that paper had fully funded systems with universal coverage and retirement incentives; some had pay-as-you-go with high replacement rates; and some had other combinations. This means that we would expect higher life expectancy to have a bigger effect on saving in Asia than in Latin America.

All in all, this paper finds that empirical estimates of the effects of demographic factors on saving rates in panel regressions hide a significant degree of inter-regional heterogeneity in coefficient estimates. In particular, only in Asia are the effects statistically significant.

7. Conclusions

The findings in this paper highlight that the potential dividends from a period of declining dependency rates and higher life expectancy are not automatically accrued and that they may be realized only under certain conditions. In particular, the impacts of these demographic factors on saving rates vary significantly across world regions.

According to UN projections most world regions will soon be at the end of a period of declining dependency rates. Dependency rates should start increasing, particularly driven by an expansion in the elderly share of their populations. Nowhere in the world are these demographic factors as salient as in Latin America, which is a region that over the last half a century has undergone a very similar demographic transition compared to Asia. The results in this paper suggest that Latin America, in contrast to Asia, missed some of the potential benefits associated with this period of declining dependency rates. Additionally, the absence of a positive response of saving rates to longevity in Latin America suggests that increasing life expectancy in the region may not by itself help to boost saving rates. More research should be focused on trying to untangle which are the conditions that mediate in the relationship between demographic factors and aggregate saving rates. In particular, research should explore if there is scope for policy interventions in case there is a market failure. For example, the presence—or absence—of thereof of fully funded pension systems with universal coverage and retirement incentives might be one such condition, as revealed by Bloom et al. (2007). These findings may be very important for Africa, which is the only world region that still has to undergo the bulk of the demographic dividend.

Appendix A1. Countries Included in the Sample

Africa
Algeria
Benin
Botswana
Burkina Faso
Burundi
Cameroon
Central African Republic
Chad
Comoros
Congo, Rep.
Cote d'Ivoire
Egypt, Arab Rep.
Equatorial Guinea
Ethiopia
Gabon
Gambia, The
Ghana
Kenya
Lesotho
Liberia
Madagascar
Malawi
Mali
Mauritania
Mauritius
Morocco
Mozambique
Namibia
Niger
Nigeria
Rwanda
Senegal
Sierra Leone
South Africa
Sudan
Swaziland
Togo
Tunisia
Uganda
Zambia
Zimbabwe

Asia
Bahrain
Bangladesh
Bhutan
China
India
Indonesia
Iran, Islamic Rep.
Israel
Japan
Jordan
Korea, Rep.
Mongolia
Nepal
Oman
Pakistan
Philippines
Saudi Arabia
Singapore
Sri Lanka
Syrian Arab Republic
Thailand
Turkey

Europe
Albania
Austria
Belgium
Bulgaria
Denmark
Finland
France
Germany
Greece
Ireland
Italy
Latvia
Luxembourg
Malta
Netherlands
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom

Latin America and the Caribbean
Argentina
Barbados
Bolivia
Brazil
Chile
Colombia
Costa Rica
Dominican Republic
Ecuador
El Salvador
Guatemala
Guyana
Honduras
Mexico
Nicaragua
Peru
Suriname
Trinidad and Tobago
Uruguay
Venezuela

Northern America
Canada
United States

Oceania
Australia
Fiji
New Zealand
Papua New Guinea

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Table 1. Demographic Transition, by Region

Region	Start	End	Max.	Min.	Δ Ratio
World	1965	2015	75.68	52.07	23.61
More developed regions	1960	2005	58.13	47.60	10.53
Less developed regions	1965	2015	84.39	52.20	32.19
Least developed countries	1985	2080	92.30	56.45	35.85
Less developed regions, excluding China	1970	2035	86.04	53.54	32.50
Sub-Saharan Africa	1985	2090	93.75	54.22	39.53
Africa	1985	2090	91.90	54.95	36.96
Eastern Africa	1985	2075	97.87	55.92	41.96
Middle Africa	1995	2085	97.40	52.02	45.38
Northern Africa	1970	2040	93.56	50.83	42.73
Southern Africa	1965	2045	85.39	46.18	39.21
Western Africa	1985	2100	92.91	52.01	40.89
Asia	1965	2015	80.84	46.86	33.99
Eastern Asia	1965	2010	76.39	37.69	38.69
South-Central Asia	1965	2040	82.94	46.12	36.82
South-Eastern Asia	1970	2025	90.16	46.79	43.37
Western Asia	1965	2035	88.01	47.34	40.67
Europe	1965	2010	56.20	46.51	9.684
Eastern Europe	1960	2010	56.81	40.35	16.458
Northern Europe	1975	2005	58.43	50.89	7.544
Southern Europe	1975	1995	58.01	47.30	10.711
Western Europe	1970	1985	59.12	46.90	12.217
Latin America and the Caribbean	1965	2020	88.77	49.58	39.195
Caribbean	1970	2020	85.39	51.96	33.431
Central America	1965	2030	100.74	50.98	49.764
South America	1965	2020	85.46	48.05	37.41
North Africa	1960	2005	66.89	48.49	18.393
Oceania	1960	2010	68.40	53.13	15.269
Australia/New Zealand	1960	2010	64.74	48.31	16.434
Melanesia	1980	2060	87.10	50.05	37.053
Micronesia	1965	2020	86.70	52.29	34.415
Polynesia	1965	2020	104.60	55.55	49.046

Table 2. Description of the Variables

Variable	Description	Source
Domestic savings/GDP	Ratio of gross domestic savings to GDP	WDI (2015)
Dependency rate	Ratio of population aged 0-14 and 65+ to population 15-64	WDI (2015)
Dependency rate, young	Ratio of population aged 0-14 to population 15-65	WDI (2015)
Dependency rate, old	Ratio of population aged 65+ to population 15-64	WDI (2015)
Life expectancy	Life expectancy at birth in number of years	WDI (2015)
Growth	GDP growth (annual %)	WDI (2015)
GDP per capita	GDP per capita (constant 2005 US$)	WDI (2015)
Primary school enrollment rate	School enrollment, primary (% gross)	WDI (2015)
Population growth	Population growth (annual %)	WDI (2015)
Proportion of urban population	Urban population (% of total)	WDI (2015)
Inflation rate	Inflation, consumer prices (annual %)	WDI (2015)

Table 3. Summary Statistics

Variable	Mean	Std. Dev.	Min	Max
Domestic savings / GDP	0.18	0.13	-0.39	0.79
Dependency rate	0.74	0.20	0.29	1.13
Dependency rate, young	0.64	0.24	0.20	1.06
Dependency rate, old	0.10	0.06	0.03	0.35
Life expectancy	62.92	11.75	31.98	82.79
Growth	3.87	3.06	-7.13	26.40
GDP per capita	8,303	12,821	131	81,443
Primary school enrollment rate	94.52	23.36	12.47	164.86
Population growth	0.02	0.01	-0.02	0.07
Proportion of urban population	49.16	25.34	2.32	100.00
Inflation rate	0.20	1.39	-0.03	27.19

Table 4. Domestic Saving Rates and Dependency Rates

	(1)	(2)	(3)	(4)	(5)
Age dependency ratio *(t)*	-0.1201***	-0.1105***	-0.2692***	-0.2435***	-0.1136***
	(0.033)	(0.032)	(0.044)	(0.045)	(0.037)
Life expectancy *(t)*		0.0027***		0.0021**	0.0045***
		(0.001)		(0.001)	(0.001)
Age dependency ratio *(t)* x North America			0.4406***	0.3690***	
			(0.115)	(0.119)	
Age dependency ratio *(t)* x Europe			0.3543**	0.3060**	
			(0.145)	(0.148)	
Age dependency ratio *(t)* x Oceania			0.3302**	0.2975*	
			(0.156)	(0.155)	
Age dependency ratio *(t)* x LAC			0.2488***	0.2384***	
			(0.050)	(0.051)	
Age dependency ratio *(t)* x Africa			0.1917***	0.1494**	
			(0.064)	(0.065)	
Life expectancy (t) x North America					-0.0085***
					(0.003)
Life expectancy (t) x Europe					-0.0039**
					(0.002)
Life expectancy (t) x Oceania					0.0017
					(0.004)
Life expectancy (t) x LAC					-0.0049***
					(0.001)
Life expectancy (t) x Africa					-0.0019
					(0.001)
Growth *(t-1)*	0.0048***	0.0045***	0.0049***	0.0046***	0.0045***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log GDP per capita *(t-1)*	0.0895***	0.0903***	0.0837***	0.0847***	0.0856***
	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)
Observations	953	953	953	953	953
Adjusted R-squared	0.7417	0.7453	0.7491	0.7509	0.7501
Country fixed effects	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES

Table 5. Domestic Saving Rates and Dependency Rates, by Region

	(1) Asia & LAC	(2) Asia	(3) LAC	(4) Asia & LAC	(5) Asia & LAC	(6) Whole Sample	(7) Whole Sample
Age dependency ratio *(t)*	-0.2157***	-0.2965***	-0.0667	-0.3293***	-0.2090***	-0.0721	-0.1208***
	(0.047)	(0.057)	(0.055)	(0.048)	(0.042)	(0.050)	(0.036)
Age dependency ratio *(t)* x LAC				0.2754***		0.0589	
				(0.049)		(0.057)	
Age dependency ratio *(t)* x Asia						-0.1790***	
						(0.061)	
Life expectancy *(t)*	0.0025	0.0032	-0.0007	0.0010	0.0043**	0.0021**	0.0027**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Life expectancy (t) x LAC					-0.0058***		-0.0030***
					(0.001)		(0.001)
Life expectancy (t) x Asia							0.0020
							(0.001)
Growth *(t-1)*	0.0056***	0.0068***	0.0034*	0.0056***	0.0056***	0.0046***	0.0045***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
log GDP per capita *(t-1)*	0.0748***	0.0519***	0.0829***	0.0545***	0.0546***	0.0832***	0.0838***
	(0.013)	(0.016)	(0.021)	(0.012)	(0.012)	(0.013)	(0.013)
Observations	372	187	185	372	372	953	953
Adjusted R-squared	0.7504	0.8016	0.6692	0.7728	0.7705	0.7510	0.7497
Country fixed effects	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES

Table 6. Variance Decomposition Analysis: Asia and Latin America

	Asia	**LAC**
Dependency rate	22.5%	2.9%
Life expectancy	8.1%	-0.7%
Economic growth	4.6%	1.5%
GDP per capita	27.0%	28.8%
Country fixed effects	25.1%	36.0%
Time fixed effects	-3.5%	3.8%
Residual	16.2%	27.7%
Total	**100%**	**100%**

Table 7. Domestic Saving Rates and Dependency Rates (young versus old), by Region

	(1) Whole Sample	(2) Asia	(3) LAC	(4) Asia & LAC	(5) Asia & LAC	(6) Asia & LAC	(7) Whole Sample	(8) Whole Sample
Age dependency ratio, young *(t)*	-0.0745**	-0.2991***	-0.0635	-0.2082***	-0.3282***	-0.2902***	-0.0398	-0.0382
	(0.034)	(0.068)	(0.076)	(0.057)	(0.058)	(0.066)	(0.048)	(0.048)
Age dependency ratio, old *(t)*	-0.9031***	-0.2763	-0.1152	-0.2890	-0.3140	-0.3253	-1.0111***	-1.0444***
	(0.140)	(0.212)	(0.597)	(0.207)	(0.204)	(0.205)	(0.173)	(0.174)
Life expectancy *(t)*	0.0027***	0.0032	-0.0007	0.0024	0.0010	0.0026	0.0021**	0.0028**
	(0.001)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Age dependency ratio, young *(t) x LAC*					0.2731***	0.1815**	0.0619	-0.0262
					(0.050)	(0.082)	(0.057)	(0.069)
Age dependency ratio, old *(t) x LAC*					0.2131	0.4411	0.4272	0.7834**
					(0.406)	(0.438)	(0.361)	(0.382)
Life expectancy (t) *x LAC*						-0.0030		-0.0035**
						(0.002)		(0.002)
Age dependency ratio, young *(t) x Asia*							-0.1584***	-0.1795**
							(0.061)	(0.079)
Age dependency ratio, old *(t) x Asia*							0.3601*	0.4135*
							(0.215)	(0.232)
Life expectancy (t) *x Asia*								-0.0012
								(0.002)
Growth *(t-1)*	0.0043***	0.0068***	0.0034*	0.0055***	0.0056***	0.0056***	0.0044***	0.0042***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
log GDP per capita *(t-1)*	0.1013***	0.0514***	0.0831***	0.0760***	0.0542***	0.0529***	0.0923***	0.0922***
	(0.014)	(0.017)	(0.021)	(0.014)	(0.013)	(0.012)	(0.014)	(0.014)
Observations	953	187	185	372	372	372	953	953
Adjusted R-squared	0.7540	0.8003	0.6670	0.7497	0.7714	0.7726	0.7593	0.7601
Country fixed effects	YES	YES	YES	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES	YES	YES	YES

Table 8. Domestic Saving Rates and Dependency Rates, Additional Controls

	(1)	(2)	(3)	(4)	(5)
Age dependency ratio *(t)*	-0.1427***	-0.1350***		-0.2871***	-0.1381***
	(0.042)	(0.041)		(0.048)	(0.045)
Age dependency ratio, young *(t)*			-0.0891**		
			(0.043)		
Age dependency ratio, old *(t)*			-0.8758***		
			(0.137)		
Life expectancy *(t)*		0.0023**	0.0030***	0.0018	0.0059***
		(0.001)	(0.001)	(0.001)	(0.001)
Age dependency ratio *(t)* x North America				0.2586	
				(0.286)	
Age dependency ratio *(t)* x Europe				-0.0336	
				(0.123)	
Age dependency ratio *(t)* x Oceania				0.0212	
				(0.269)	
Age dependency ratio *(t)* x LAC				0.2978***	
				(0.068)	
Age dependency ratio *(t)* x Africa				0.2112***	
				(0.076)	
Life expectancy (t) x North America					-0.0052
					(0.004)
Life expectancy (t) x Europe					-0.0007
					(0.002)
Life expectancy (t) x Oceania					0.0009
					(0.004)
Life expectancy (t) x LAC					-0.0072***
					(0.002)
Life expectancy (t) x Africa					-0.0040***
					(0.001)
Growth *(t-1)*	0.0033***	0.0030**	0.0024*	0.0030**	0.0033***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log GDP per capita *(t-1)*	0.0503***	0.0506***	0.0632***	0.0390***	0.0369**
	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)
Primary school *(t-1)*	0.0001	-0.0001	-0.0002	0.0000	0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Population growth *(t-1)*	1.6333***	1.3805**	0.9728*	1.2964**	1.2553**
	(0.604)	(0.611)	(0.586)	(0.575)	(0.599)
Urban population *(t-1)*	0.0004	0.0003	-0.0002	0.0005	0.0007
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Inflation *(t-1)*	-0.0021**	-0.0022**	-0.0024**	-0.0021**	-0.0020**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Observations	685	685	685	685	685
Adjusted R-squared	0.8187	0.8206	0.8279	0.8280	0.8281
Country fixed effects	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES

Table 9. Domestic Saving Rates and Dependency Rates, Difference GMM

	(1)	(2)	(3)	(4)	(5)
Domestic savings *(t-1)*	0.4794***	0.4716***	0.4535***	0.5006***	0.5119***
	(0.078)	(0.066)	(0.075)	(0.057)	(0.052)
Age dependency ratio *(t)*	-0.0421	0.1023		-0.1804***	-0.0844*
	(0.061)	(0.154)		(0.061)	(0.051)
Age dependency ratio, young *(t)*			-0.0355		
			(0.065)		
Age dependency ratio, old *(t)*			-0.0771		
			(0.263)		
Life expectancy *(t)*		0.0027**	0.0019*	0.0017	0.0049***
		(0.001)	(0.001)	(0.001)	(0.001)
Age dependency ratio *(t)* x North America				0.0915	
				(0.116)	
Age dependency ratio *(t)* x Europe				0.0603	
				(0.150)	
Age dependency ratio *(t)* x Oceania				0.1395	
				(0.218)	
Age dependency ratio *(t)* x LAC				0.2017***	
				(0.066)	
Age dependency ratio *(t)* x Africa				0.1992**	
				(0.089)	
Life expectancy (t) x North America					-0.0019
					(0.003)
Life expectancy (t) x Europe					0.0003
					(0.003)
Life expectancy (t) x Oceania					0.0001
					(0.003)
Life expectancy (t) x LAC					-0.0049***
					(0.001)
Life expectancy (t) x Africa					-0.0023
					(0.002)
Growth *(t-1)*	0.0017	0.0010	0.0015	0.0030***	0.0029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log GDP per capita *(t-1)*	-0.0247	-0.0431**	-0.0086	-0.0128	-0.0176
	(0.019)	(0.022)	(0.021)	(0.015)	(0.015)
Observations	725	725	725	725	725
Time fixed effects	YES	YES	YES	YES	YES

Table 10. Domestic Saving Rates and Dependency Rates, Bruno (2005)

	(1)	(2)	(3)	(4)	(5)
Domestic savings *(t-1)*	0.8201***	0.8117***	0.7880***	0.8160***	0.5119***
	(0.135)	(0.140)	(0.129)	(0.142)	-0.052
Age dependency ratio *(t)*	-0.0512	-0.0400		-0.1179***	-0.0843*
	(0.032)	(0.033)		(0.044)	(0.051)
Age dependency ratio, young *(t)*			-0.0267		
			(0.036)		
Age dependency ratio, old *(t)*			-0.2471		
			(0.220)		
Life expectancy *(t)*		0.0011	0.0012	0.0009	0.0048***
		(0.001)	(0.001)	(0.001)	(0.001)
Age dependency ratio *(t)* x North America				-0.0540	
				(0.359)	
Age dependency ratio *(t)* x Europe				-0.0597	
				(0.223)	
Age dependency ratio *(t)* x Oceania				0.0799	
				(0.195)	
Age dependency ratio *(t)* x LAC				0.1281**	
				(0.053)	
Age dependency ratio *(t)* x Africa				0.0879*	
				(0.053)	
Life expectancy (t) x North America					-0.0018
					(0.002)
Life expectancy (t) x Europe					0.0002
					(0.002)
Life expectancy (t) x Oceania					0.0001
					(0.003)
Life expectancy (t) x LAC					-0.0049***
					(0.001)
Life expectancy (t) x Africa					-0.0022
					(0.001)
Growth *(t-1)*	0.0024***	0.0022***	0.0022***	0.0022***	0.0029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log GDP per capita *(t-1)*	-0.0092	-0.0086	0.0007	-0.0172	-0.0175
	(0.018)	(0.019)	(0.019)	(0.020)	(0.015)
Observations	836	836	836	836	836
Time fixed effects	YES	YES	YES	YES	YES

Table 11. Domestic Saving Rates and Dependency Rates, PWT Data

	(1)	(2)	(4)	(5)	(6)
Age dependency ratio *(t)*	-0.1146***	-0.1123***		-0.2147***	-0.1002**
	(0.041)	(0.041)		(0.047)	(0.047)
Age dependency ratio, young *(t)*			-0.0653		
			(0.043)		
Age dependency ratio, old *(t)*			-1.1506***		
			(0.187)		
Life expectancy *(t)*		0.0006	0.0006	-0.0002	0.0021
		(0.001)	(0.001)	(0.001)	(0.002)
Age dependency ratio *(t)* x North America				0.4392***	
				(0.117)	
Age dependency ratio *(t)* x Europe				0.2808**	
				(0.137)	
Age dependency ratio *(t)* x Oceania				0.5580***	
				(0.151)	
Age dependency ratio *(t)* x LAC				0.1307**	
				(0.056)	
Age dependency ratio *(t)* x Africa				0.1469*	
				(0.075)	
Life expectancy (t) x North America					-0.0109***
					(0.003)
Life expectancy (t) x Europe					-0.0048**
					(0.002)
Life expectancy (t) x Oceania					-0.0012
					(0.005)
Life expectancy (t) x LAC					-0.0036***
					(0.001)
Life expectancy (t) x Africa					-0.0019
					(0.001)
Growth *(t-1)*	0.0060***	0.0059***	0.0057***	0.0060***	0.0060***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
log GDP per capita *(t-1)*	0.0860***	0.0862***	0.1005***	0.0835***	0.0842***
	(0.015)	(0.015)	(0.016)	(0.015)	(0.016)
Observations	950	950	950	950	950
Adjusted R-squared	0.7249	0.7247	0.7385	0.7294	0.7269
Country fixed effects	YES	YES	YES	YES	YES
Time fixed effects	YES	YES	YES	YES	YES

Figure 1. World Dependency Rate

This figure shows the total dependency ratio (the ratio of the population aged 0-14 and 65+ to the population aged 15-64). Data source: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, DVD Edition.

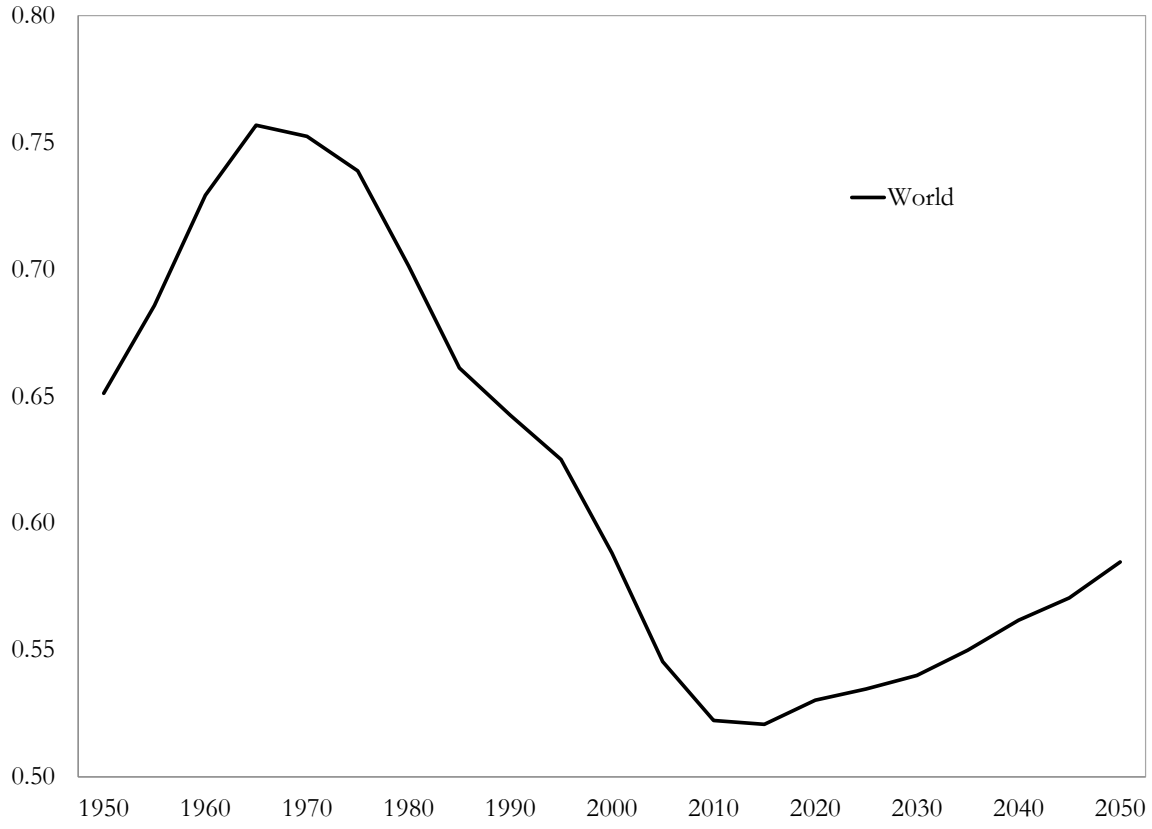


Figure 2. Dependency Rates, by Region

This figure shows the total dependency ratio (the ratio of the population aged 0-14 and 65+ to the population aged 15-64) across six regions: North America, Europe, Oceania, Asia, Latin America, and Africa. Data source: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, DVD Edition.

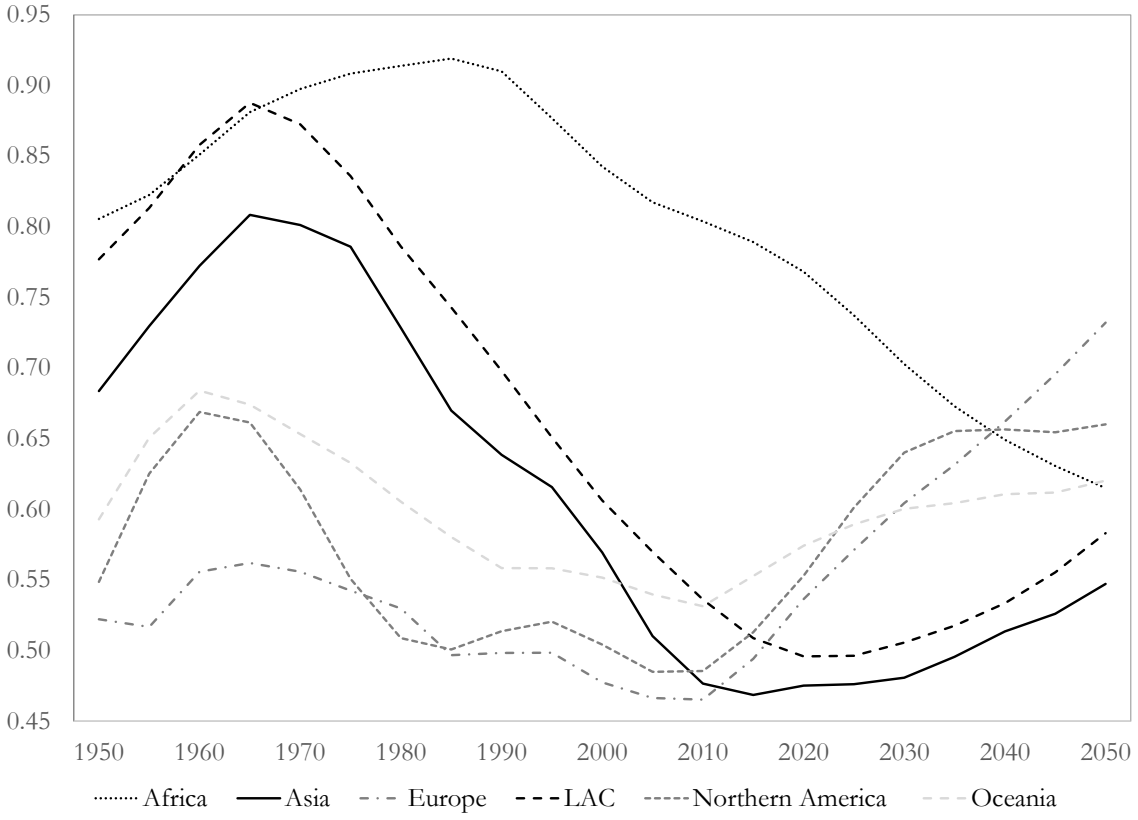


Figure 3. Young and Old Dependency Rates, World

This figure shows the total dependency ratio (the ratio of the population aged 0-14 and 65+ to the population aged 15-64). Data source: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, DVD Edition.

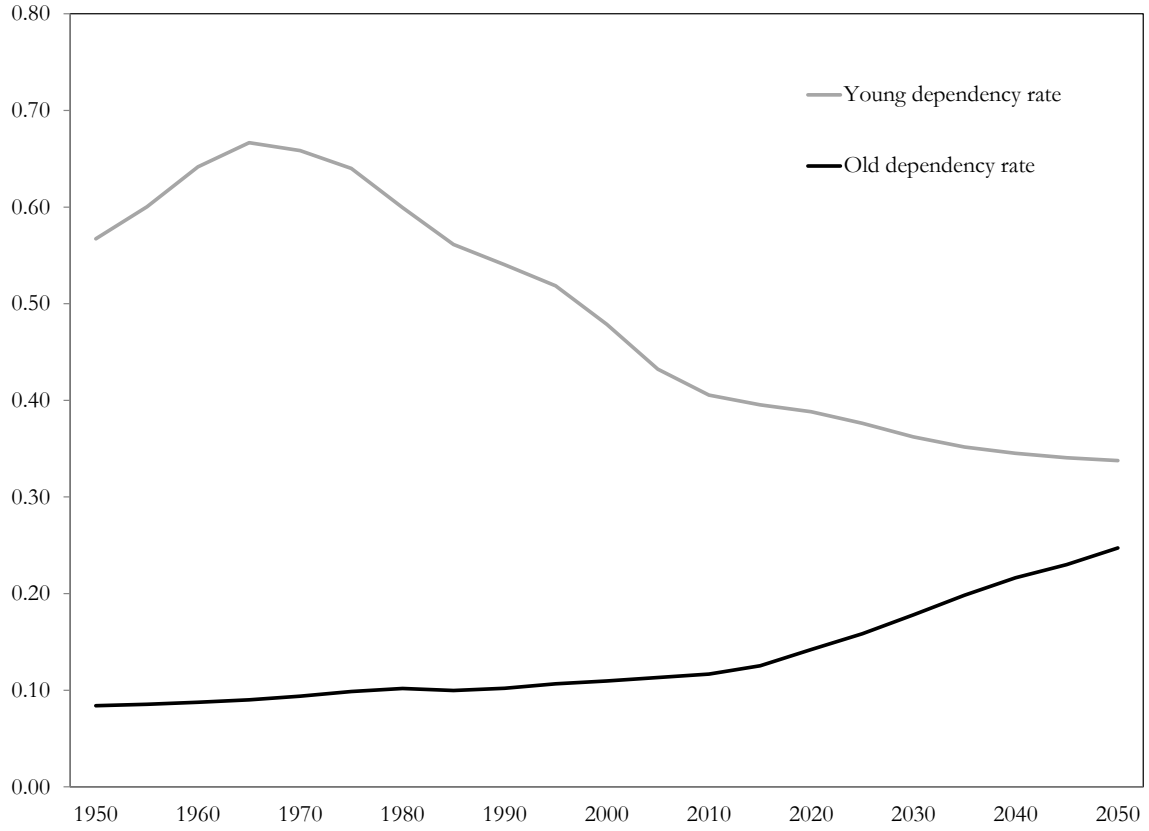


Figure 4. Young and Old Dependency Rates, by Region

This figure shows the young and old dependency rates (the ratio of the population aged 0-14 to the population aged 15-64 and the ratio of population aged 65+ to the population aged 15-64) across six regions: North America, Europe, Oceania, Asia, Latin America, and Africa. Data source: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, DVD Edition.

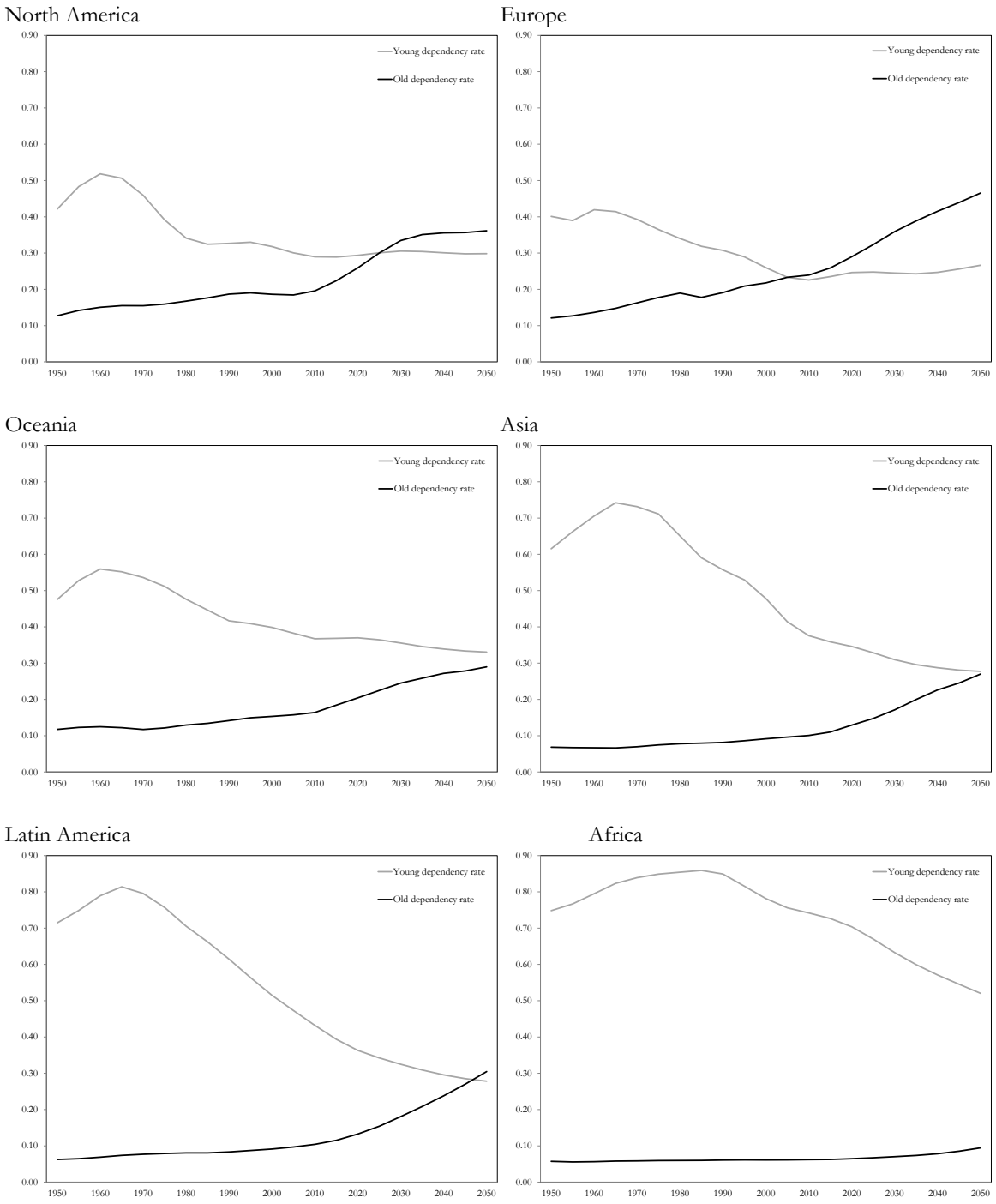


Figure 5. Life Expectancy, by Region

This figure shows life expectancy at birth for both sexes combined (years) across six regions: North America, Europe, Oceania, Asia, Latin America, and Africa. Data source: United Nations, Department of Economic and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, DVD Edition.

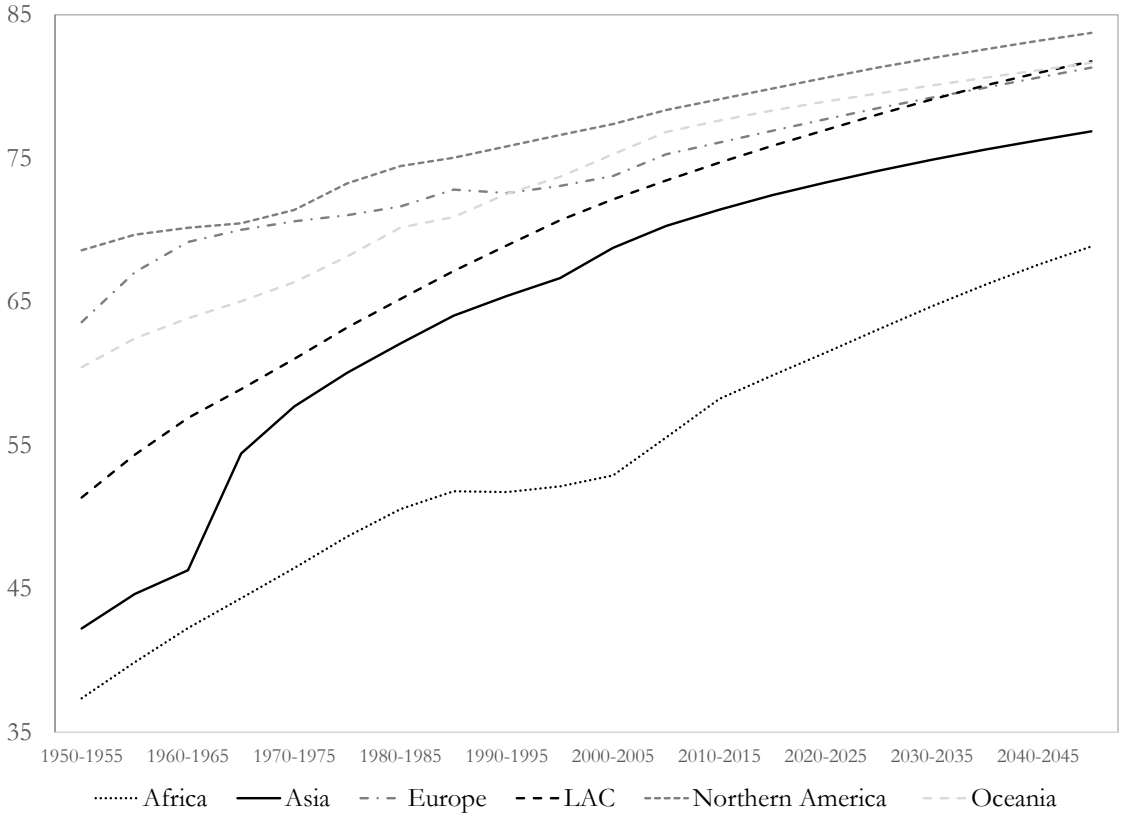
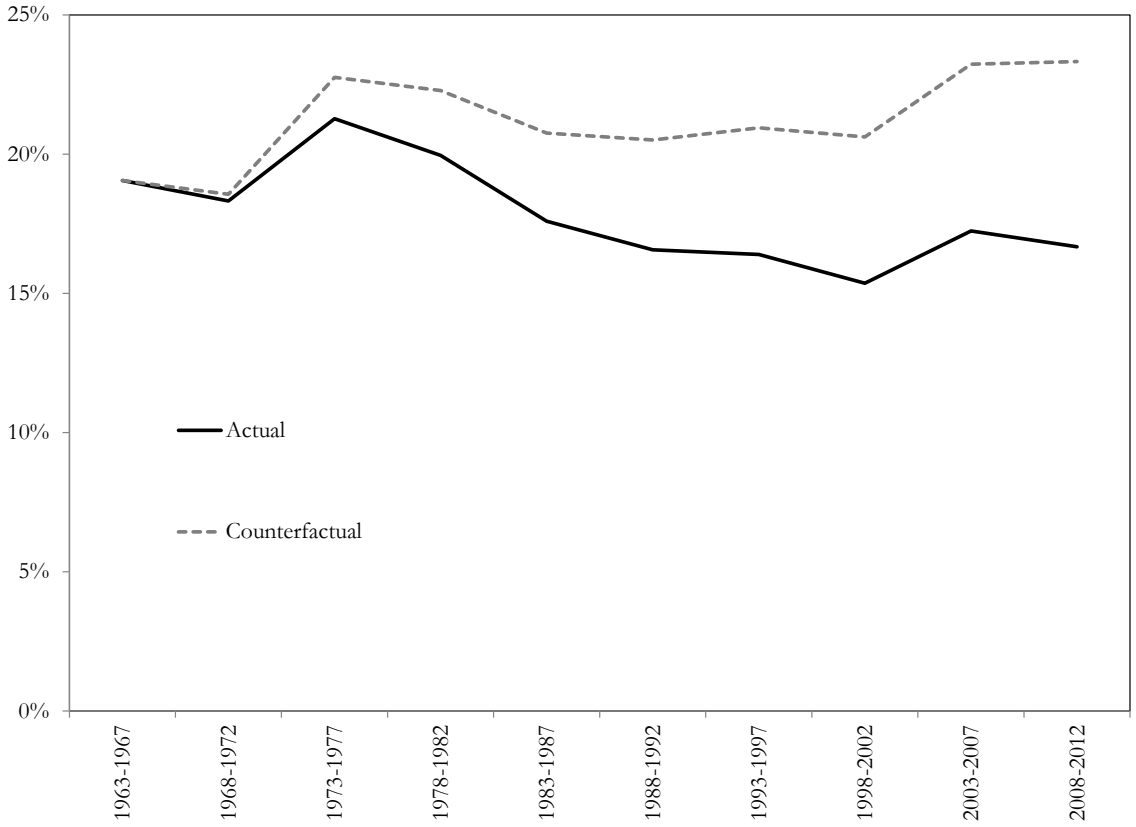


Figure 6. Domestic Saving Rates, by Region

This figure shows domestic saving rates across six regions: North America, Europe, Oceania, Asia, Latin America, and Africa. Data source: World Bank's World Development Indicators (2015).

Figure 7. Counterfactual Exercise: Domestic Saving Rates in Latin America



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