Policy options to respond to the economic challenges of aging populations and their potential impact on the care economy

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DRAFT: The first version of this paper focused on Latin American countries. The final version for PAA will include more countries from around the world. It will also include an analysis of the potential impacts on the unpaid care economy of delaying retirement and increasing women's participation in the formal labor market.

ABSTRACT

Age structure changes have played a role in promoting economic growth by increasing the working-age population relative to the population dependent upon it, but most countries face a future of population aging in which the opposite will be true. We identify the most favorable year in terms of the number of producers relative to consumers in a diverse group of countries and measure the magnitude of future projected decline. We evaluate two alternative policies to offset the decline in relative productive capacity: postponing retirement versus closing the gender gap in labor market production. Different policies are more or less effective in different countries. Of course, increasing older persons' and women's market work time may conflict with non-market roles they played as unpaid caregivers. Using time use data, we evaluate the potential impact on the unpaid care economy of delaying retirement or moving more women into the formal labor market.

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1. Objective

Changes in population age structure have played an important role in promoting economic growth in the region by increasing the working-age population relative to the population dependent upon it. Using data from the National Transfers Account project, we trace the trajectory of the number of producers and consumers in 9 national economies (7 from Latin America and the world's two largest economies, China and the United States, for comparison) from 1950 through 2100. We identify the peak year in which the population age structure will be most favorable in terms of the number of producers relative to consumers in the economy. We measure the magnitude of the decline in the number producers relative to consumers in these economies which accompanies population aging. We then evaluate two alternative policies to offset this decline in the relative productive capacity of the population: extending working life by postponing retirement versus closing the gender gap in labor market production. Both policies are shown to be effective strategies to confront population aging in the region.

2. Introduction

Populations are aging in Latin America and the Caribbean – a process already observed in Europe, the US, and parts of Asia. However, the process in Latin America is unique for two reasons. First, it is occurring at lower levels of economic development. This means that countries are facing a double challenge: confronting the economic and fiscal challenges of an aging population while at the same time pursuing the traditional development goals of raising investment in education and health and insuring economic security for the elderly and other vulnerable populations. Second, this population aging is occurring at a much faster rate than that observed historically. This means that these countries have less time to adapt to the changes in the economic and fiscal environment brought about by population aging.

In this paper, we provide a simple framework which allows us to assess the magnitude of the direct impact of population aging on economies as well as assessing two different economic responses to adapt to this challenge. We begin by measuring the size of the direct, economic impact of changes in population age structure in 7 Latin American countries along with China and the United States. We determine the year in which the population age structure is most favorable for the economy as well as measuring the economic impact of population aging. This detrimental impact is measured in terms of the decline in the number of producers relative to consumers in an aging population – assuming that the age profiles of consumption and production remain fixed at their current levels. We then contrast two different economic responses to counteract the direct economic impact of population aging. The first response is to extend working life: delaying retirement so as to increase the number of producers in the population. The second response is to increase the economic participation of women so as to increase the number of producers in the population.

3. Data and methods

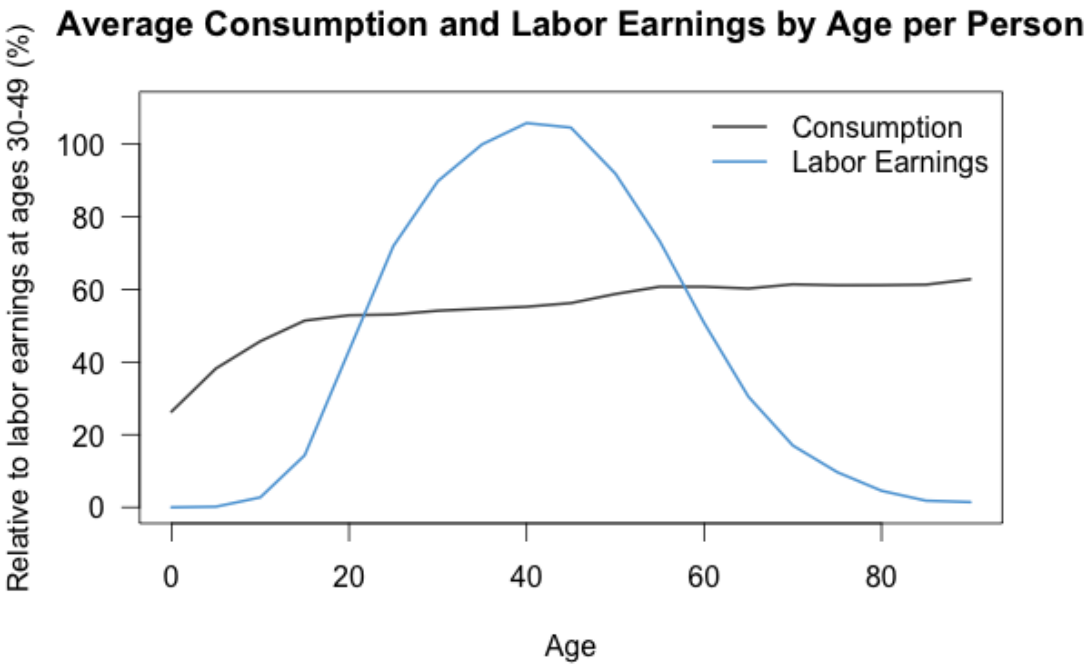
3a. Age profiles of consumption and labor income

There are two key sources of data for this analysis. The first are age profiles of consumption and labor income for the 9 countries. These data are derived from the National Transfer Accounts Project – a global effort including the participation of 43 countries from the Americas, Europe, Asia, and Africa. The National Transfer Accounts measure consumption and labor earnings by age as well as the flows of resources between ages and across generations that take place through families, financial markets, and the government. NTAs reveal the age dimension of national economies. This approach is particularly useful today because the age structure of populations are changing at an unprecedented rate – this is especially true in Latin America and the Caribbean which along with Asia are the most rapidly aging regions in the world. By measuring the generational economy using a unified framework in 43 countries throughout the world, the Global NTA project offers crucial cross-national data on policy and other effects that would be impossible to identify with data from a single country.

Consumption is measured at each age based on household surveys supplemented by administrative data and includes both private and public goods and services. Labor income is measured at each age based on household surveys. Labor income includes wages, salaries, fringe benefits and self-employment income. This average of labor income at each age reflects age differences in labor force participation, unemployment, and wages of those employed. Both consumption and labor income profiles are adjusted to be consistent with aggregate totals of consumption and labor earnings as recorded in the official National Accounts for each country. In this way, NTA can be thought of as providing a complete and coherent measurement of economic relationships between population age groups much the way National Accounts measure economic relationships between sectors (household, production, government, etc.). Details of the calculations are available in the NTA methodology manual (United Nations, 2013).

Figure 1 shows a typical pattern for average consumption by age and average labor earnings by age. In this paper, this pattern is derived by taking a simple average of the 9 countries in our sample. Labor earnings begin to rise sharply in the early 20s as youth enter the labor market. Peak labor earnings occur around the mid 40s. Labor earnings then begin to decline – most sharply in the late 50s and early 60s as individuals retire and exit from the labor market. This typical pattern of labor earnings varies by countries – mostly in the ages of entry and exit from labor markets. Average consumption rises sharply among youth and then is mostly flat or rises slightly throughout the adult years. Consumption patterns vary by country. A slight "hump" in consumption is visible among school-age youth in those countries with large educational investment. Consumption among elderly varies considerably – from countries like Mexico which show declines in consumption at older ages to countries like the US which show enormous increases in consumption at older ages.

Figure 1



3b. Estimates and projections of national populations by age

Estimates and projections of national populations by age are taken from World Population Prospects: The 2012 Revision (United Nations, 2012). For these preliminary results, we have used a single forecast for each country based on the medium fertility variant. For the final paper, we will examine alternative population forecasts to assess plausible variations in population aging in the 6 countries in our study. We access the UN database using the wppExplorer package in the R statistical programming environment (Sevcikova, 2013).

3c. Economic support ratios, extending working life, and increases participation of women in economic life.

The economic support ratio is the ratio of the number of effective producers in the population to the number of effective consumers in the population. The number of effective producers is the sum of the population by age, weighted by average labor income at each age (derived from national NTA data). The number of effective consumers is the sum of the population by age, weighted by average consumption at each age (also derived from national NTA data). The calculation assumes that the age profiles of labor income and consumption are fixed at their current levels for all time periods and only the population size and age distribution changes.

In mathematical notation, the support ratio in year y, SR(y) is calculated as follows:

$$SR(y) = \sum_{x=0}^{\omega} N(x,y) y_l(x) \Big/ \sum_{x=0}^{\omega} N(x,y) c(x)$$

where N(x) is the population count at age x in year y, and $y_l(x)$ and c(x) are the per capita labor income and consumption at age x in the reference NTA year. The summations are over all age groups, from age 0 to the final age category age ω.

In this way, the economic support ratio is a summary measure of the direct economic impact of changes in the age structure of the population --- holding everything else in the economy constant (labor earnings, savings, interest, etc.). An increasing support ratio means that the population age structure is changing favorably with respect to the economy. A one percent increase in the support ratio means that consumption at every age could be increased by one percent –merely because the age structure has changed. This increase in the support ratio is often referred to as the demographic dividend. In a similar way, a one percent decline in the support ratio means that consumption at every age must decline by one percent – merely because the age structure has changed.

The support ratio is an important indicator of the relative importance of changing age structure on an economy. The actual course the economy will take in the future will depend on the response of economic actors to these changes. Thus, declines in support ratio indicate the challenges an economy will face due to changes in age structure but not the economic responses to these challenges. In this paper, we evaluate two types of economic responses to the declines in consumption that would be brought about by population aging. In both cases we evaluate the response necessary to preserve the economic support ratio at its 2015 value. That is, we evaluate the magnitude of the response necessary to counteract the direct, adverse impact of population aging in the 9 economies in our study.

The first response examines a delay in retirement. We simulate this effect by shifting the age profile of labor earnings to the right, from the point of peak labor earnings, representing a delay in average retirement by one year. Thus, if the current labor income curve imagines a 50 year old producing 300 units and 55 year olds producing 200 units, then if retirement were delayed by 5 years, 55 year olds would now be producing 300 units and 60 year olds would be producing 200 units. We continue shifting the profile to the right (delaying average retirement) until the number of effective producers in the economy increases to its 2015 level (relative to the number of effective consumers). That is, we stretch out the labor earnings curve so as to maintain the support ratio at its 2015 level.

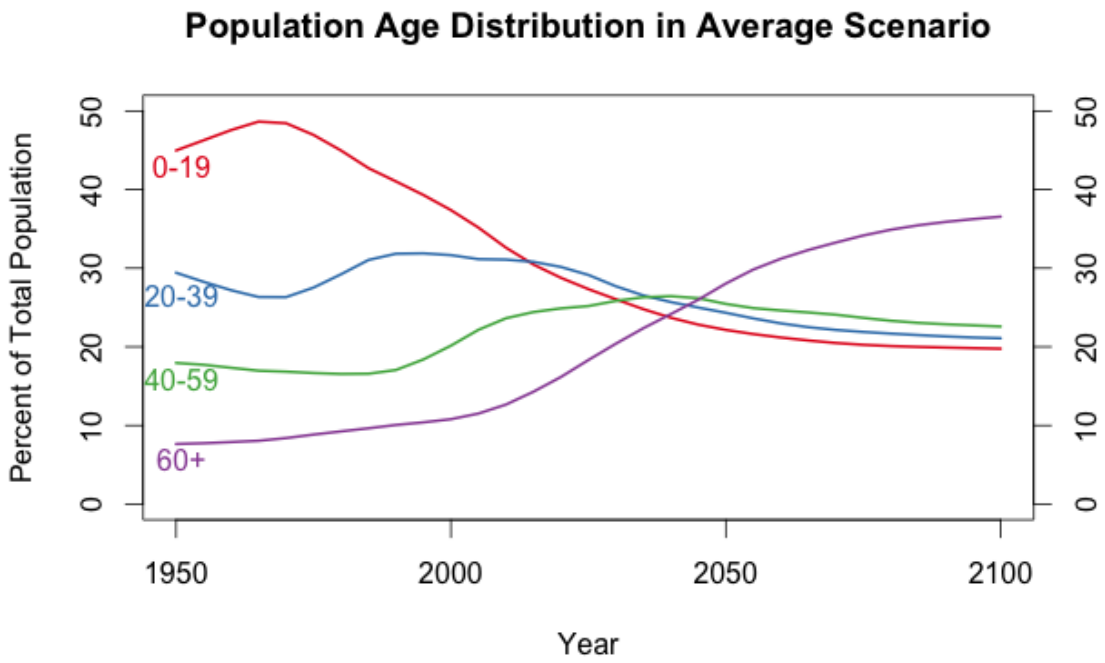
The second response examines closing the gender gap in labor income. The gender gap in labor income is measured based on the product of data by age on labor force participation, average hours worked per week, and average wage by gender, from the Socio-Economic Database for Latin America and the Caribbean (CEDLAS and The World Bank). We simulate this effect by shifting the labor income of women toward that of men, proportionally at each age. We continue shifting the profile of women toward that of men until the number of effective producers in the economy increases to its 2015 level (relative to the number of effective consumers). This shift in labor income represents some (unspecified) combination of increasing labor force participation by women, increase in hours worked by women, and increase in wages per hour worked by women – all moving toward those levels observed for men.

4. Results

4a. A typical pattern of the change in the ratio of producers to consumers over time

We begin our analysis by presenting a "typical" pattern of the change in the ratio of producers to consumers over time as a result of changing age structure. We can define this typical pattern by creating a new country – based on a simple average across our 9 countries. After analyzing this typical pattern, we can then proceed to analyze how the unique demography and unique economic profiles of each country lead them to have unique trajectories. We have already defined the economic profile of this pseudo-country in Figure 1 by taking an average across the 9 countries. In a similar manner, we can define the demography of this pseudo-country by taking the average of the age structure across the 9 countries. Figure 2 shows the changes in this age distribution over time. During the 1950s, the proportion of the population below age 20 increases – as child mortality declined more quickly than fertility. But by the 1970s, the youth population as a percent of the total began a long run decline. The population in the working-ages (20-59) surges around the turn of the century, reaching a peak sometime around 2010. Meanwhile, the population 60+ begins to rise sharply in the new century and eventually becomes the largest population group.

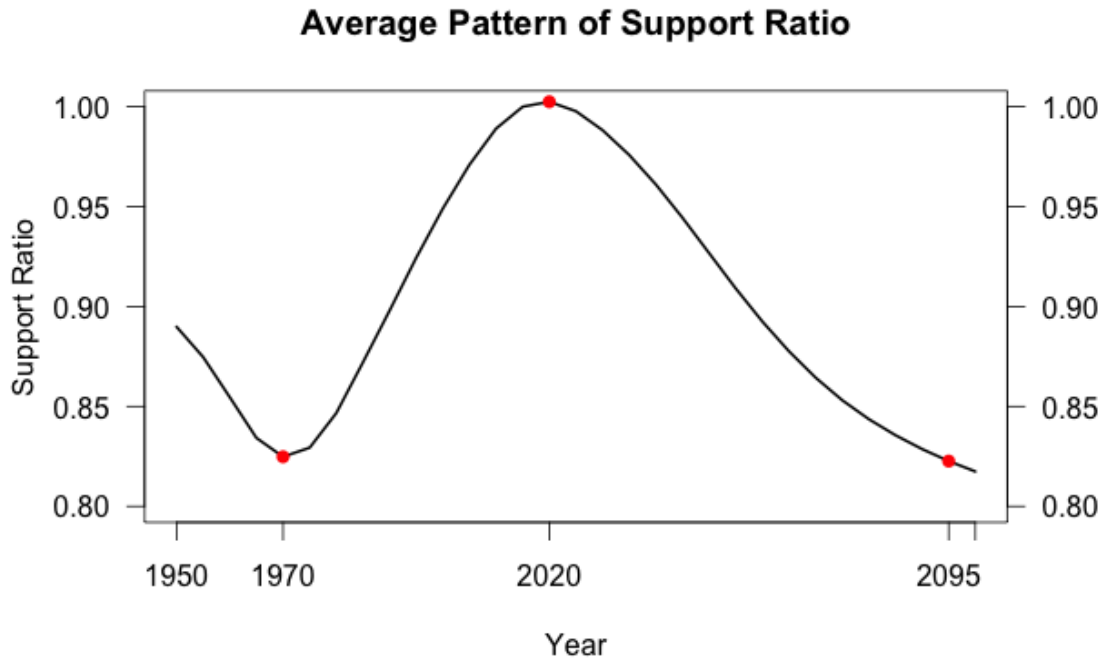
Figure 2



We can summarize the direct economic impact of these changes in the age distribution of the population using the support ratio: the ratio of effective producers to effect consumers in the economy. Using equation 1, we derive the support ratio by weighting the observed population at each age x at time t, N(x,t), by the economic profiles of labor earnings by age y(x) and consumption by age c(x). Figure 3 shows the trajectory of the support ratio over time for this "typical" country. For ease of interpretation, the support ratio has been standardized at 1.0 for the year 2015. In the 1950s, the support ratio declines – reflecting the increase of consumers relative to

producers in the economy due to the surge in the proportion of children in the economy. From 1970 onward, changes in age structure boost the number of producers relative to consumers in the economy – reflecting the surge in the proportion of the population concentrated in the working-ages. This period lasts approximately 50 years – with the support ratio reaching a peak in 2020. This period is often referred to as the "demographic dividend." Examining the support ratio, we see an increase from about 0.82 in 1970 to 1.00 in 2020 – or a gain of about 22% over the period. That is, consumption at every age could increase by 22% -- solely due to changes in the population age structure. This is a sizeable economic impact – but obviously not the main source of economic growth in modern economies which frequently show per capita economic growth in excess of 3% per year.

Figure 3

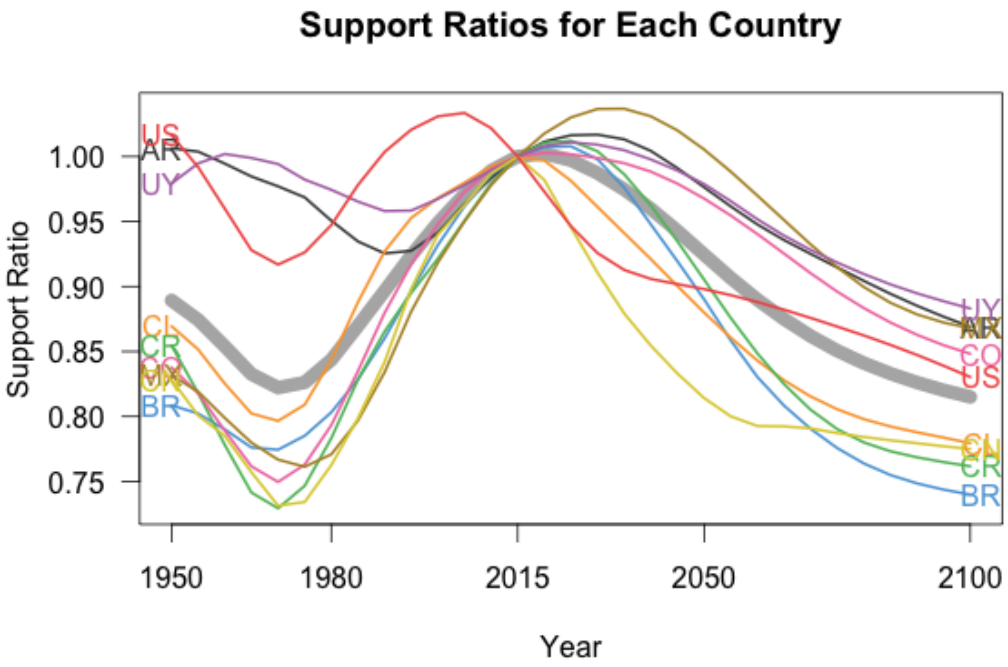


The peak in the economic support ratio represents the year in which the population is most favorable for the economy. That is, this represents the year in which the number of effective producers is maximized relative to effective consumers – when the population is heavily concentrated in the working-ages. It represents an important turning point in the economic history of the country. After decades in which demography favored economic growth, the economy begins to experience the effects of population aging as the number of producers declines relative to the number of consumers. In our example, the support ratio falls from its peak in 2020 of 1.0 to reach 0.82 producers per consumer (the same level as in 1970) in the year 2095. This period of decline lasts 75 years – about 50% longer than the period of the demographic dividend. Other things being equal, the changing age distribution by 2095 would result in an 18% decline in consumption at each age relative to the 2020 levels.

4b. Country-specific patterns

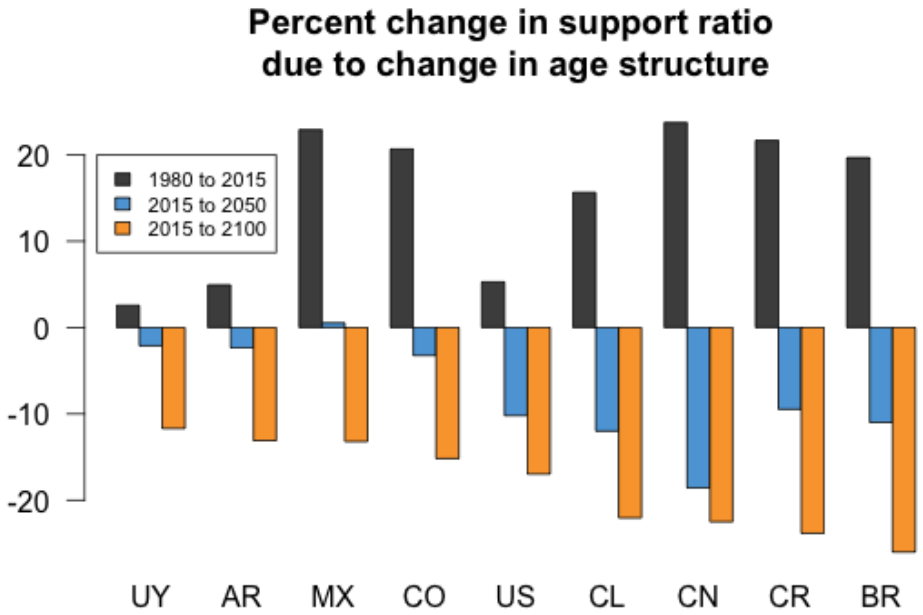
We turn now to consider the trajectory of the support ratio in each of 9 countries in Figure 4. The grey line is the "typical" pattern reproduced from Figure 3. A large diversity is seen across the 9 countries – though most countries tend to follow the swings seen in the typical pattern – a demographic dividend period prior to 2015 followed by population aging-induced decline following 2015.

Figure 4



We can summarize these results by observing the change in the support ratio over various periods: the recent past (1980 to 2015), the near future (2015 to 2050), and the distant future (2015 to 2100). Figure 5 presents these results ordered based on the impact of population aging in the distant future (2015-2100). There are several striking features. First, observing the change over the course of this century (shown in gold), we see that the economic impact of population aging is most severe in Brazil and Costa Rica – more so than in China or in the US. Second, observing the change in the recent past (1980-2015) we see notable demographic dividends in China, Mexico, Costa Rica, Brazil, and Chile. Third, we note the dramatic reversal in fortunes comparing the recent past to the near future. This is most dramatic for the case of China, but is also evident for countries like Brazil, Costa Rica, and Chile.

Figure 5



4c. Demography versus Economic Profiles

The magnitude of the decline in the support ratio observed in these countries is both a reflection of the growing proportion of elderly in these populations but also a reflection of the unique age profiles of consumption and labor earnings in each country. We begin our assessment of the role of each of these factors in Figures 6 and 7. Figure 6 shows the support ratio if each country had the same demography but differed only in terms of their unique economic age profiles. The trajectories of the support ratio are strikingly similar – indicating the greater importance of demography. Figure 7 shows the support ratio if each country had the same economic age profiles but differed only in terms of their unique demography. Here the trajectories are very diverse and the results closely resemble those of Figure 4 – confirming the greater importance of demography in defining the difference in support ratio patterns.

Figure 6

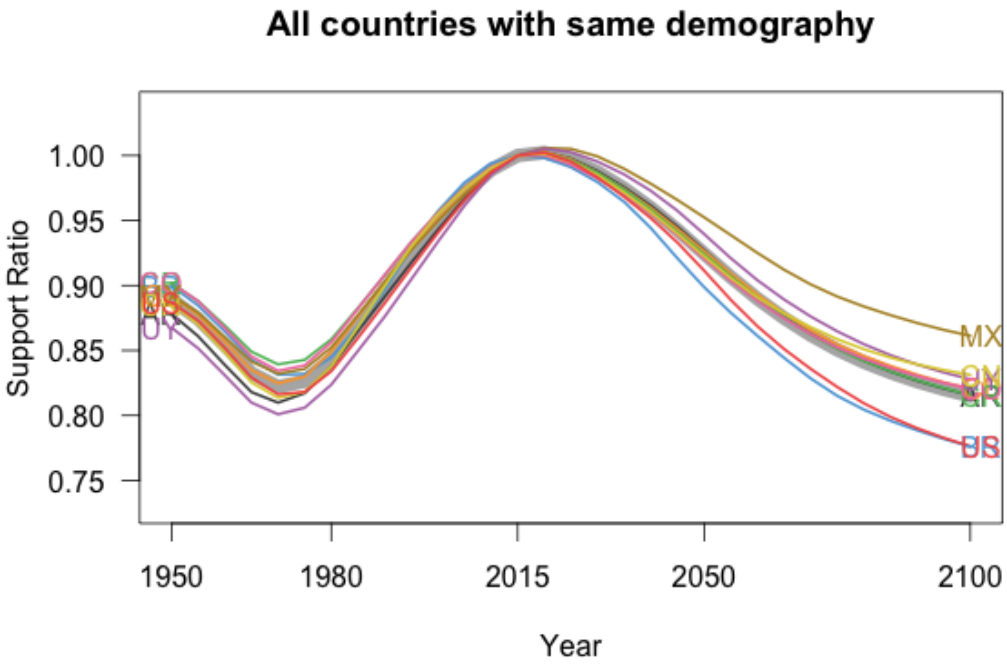
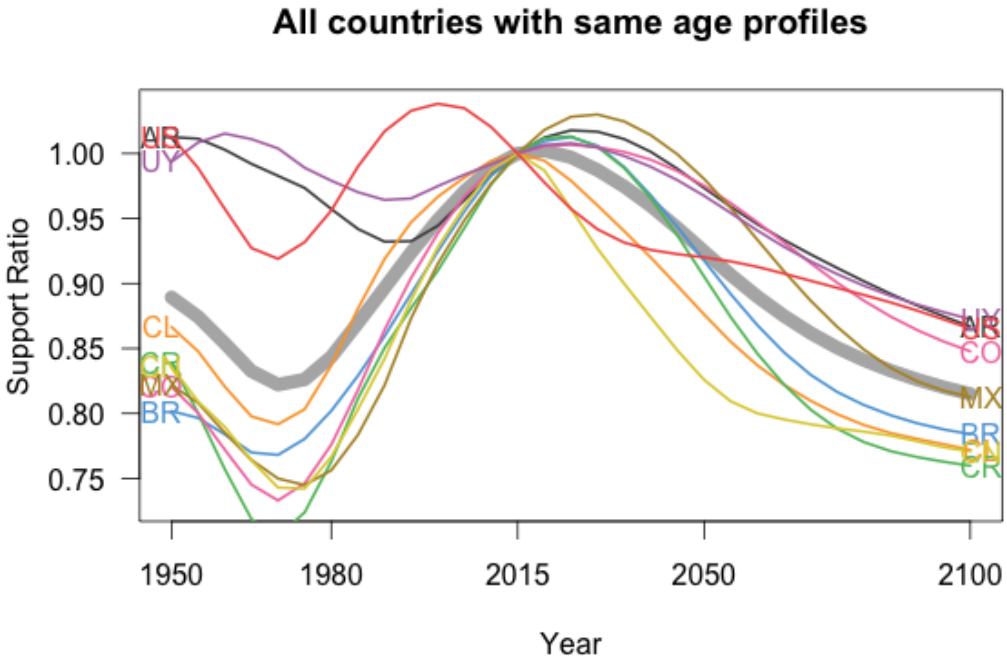


Figure 7



We can summarize these results by examining the near future (2015-2050) and the distant future (2015-2100). Figure 8 compares the results for each country to the "typical" pattern and assesses the contribution of the country's unique economic profiles (Figure 6) and unique demography (Figure 7) to the change in the support ratio over the period 2015-2050. Here we see that the performance of countries with higher support ratios in the near future (like Mexico, Uruguay, Argentina, and

Colombia) is mainly due to their favorable demography. Likewise, countries that do worse in the near future such as China and Chile, mainly do worse because of their unfavorable demography. Brazil and the US are exceptions in this regard. Their poor performance in the near future is mainly a product of economic age profiles that reflect very high levels of consumption among the elderly.

Figure 8

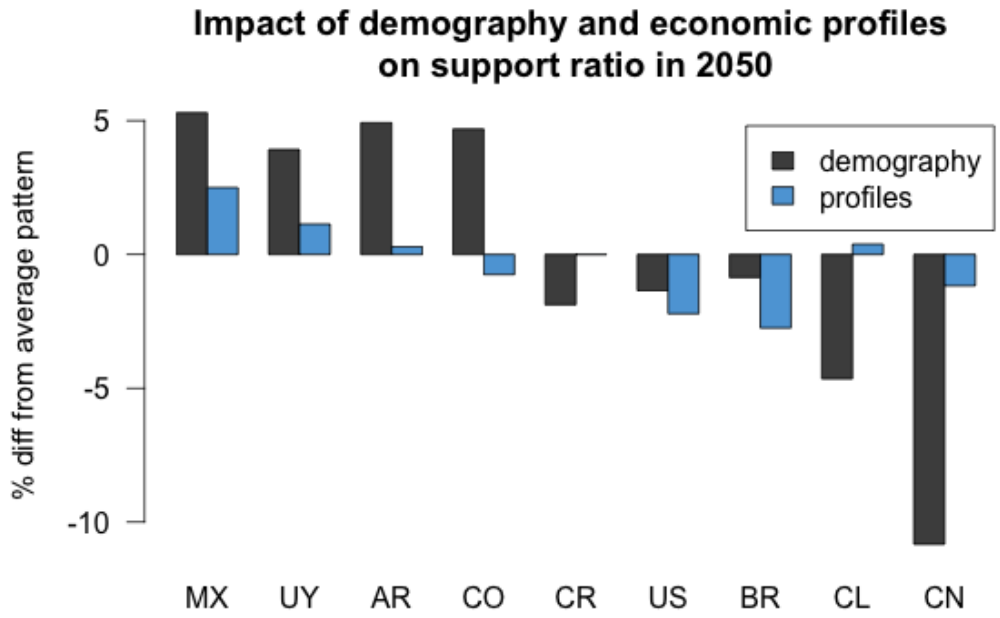
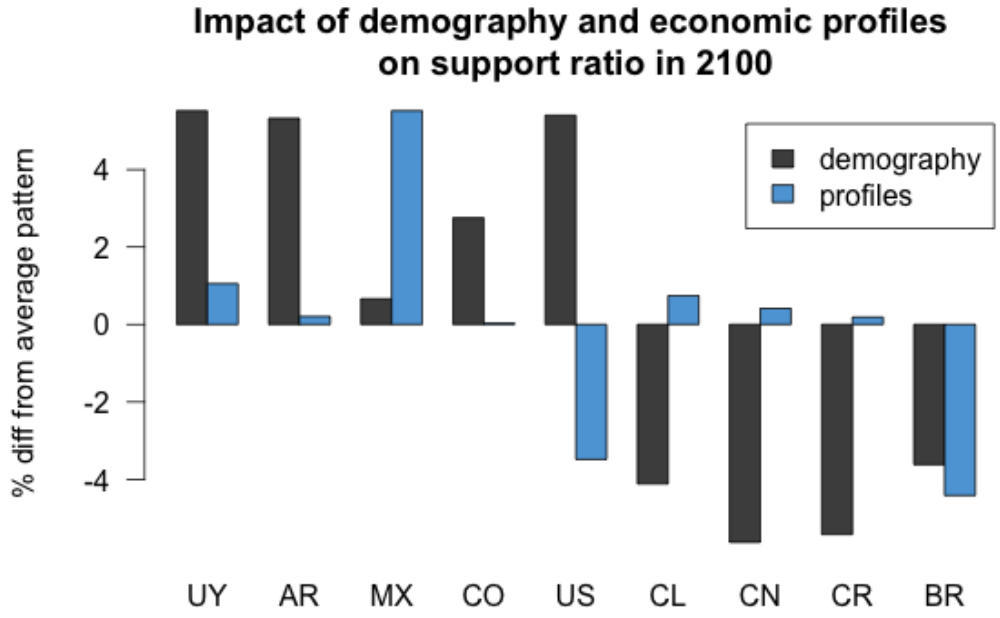


Figure 9 shows the results of the same analysis for the distant future, 2015-2100. Compared to the near future, we see that demographic effects are much more dominant in the distant future. The countries that do well do well because of their demography. Those countries that do poorly do poorly because of their demography. There are three exceptions which should be highlighted: Mexico, the US, and Brazil.

In the case of Mexico, the high support ratio observed in 2100 relative to the other countries is mainly due to Mexico's unique economic age profiles – in particular due to its low levels of average consumption among elderly. Here it appears that the impact of population aging on the economy would be relatively moderate – a decline in the support ratio of 11%. This result is driven by the relatively low levels of consumption among Mexico's elderly population. As noted earlier, the countries in the region face a double challenge – how to respond to population aging while at the same time increasing coverage of health and pension systems. Mexico is likely to reach OECD levels of per capita income within the coming decades. It is therefore likely that its consumption and earnings patterns by age might also come to resemble those of an OECD country (reflecting increases in health and pension coverage among the elderly). If Mexico had the consumption and earnings patterns of a typical OECD country, then its support ratio would fall by 20%.

In the case of the US, its unique features have opposite impacts. The demography of the US is more favorable than that seen in the other countries, but this is offset by its unique economic age profiles – which show very high levels of average consumption among the elderly. These factors offset one another and the US lies in about the middle of the 9 countries in terms of the long-run economic impact of population aging. Brazil, like the US, has unique economic age profiles which show very high levels of consumption among the elderly. This is one factor which leads Brazil to have the most severe economic impact of population aging of all 9 countries we consider in this paper. However, unlike the US, Brazil's demography is less favorable than that seen in the other countries, and this impact re-enforces the negative consequences of its unique economic profiles.

Figure 9

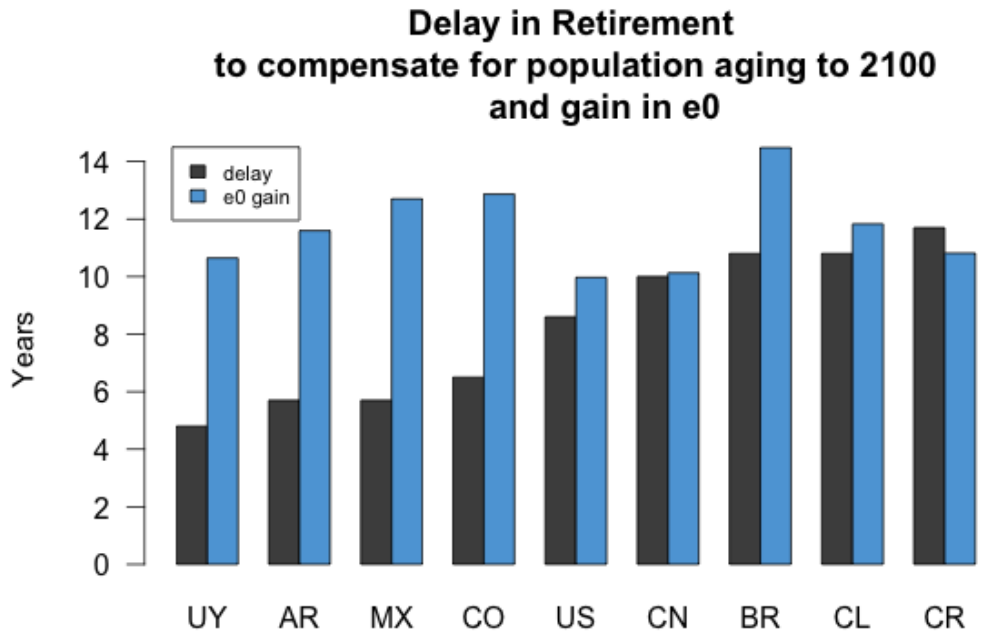


4d. Response 1: Extending working life

We now turn to evaluate two responses to population aging aimed at maintaining the support ratio at its 2015 level. The first is delaying the average age of retirement. That is, we examine the impact of extending working life as a means of counteracting the effects of population aging on the economy. As discussed in the methodology section, this calculation is done by shifting the age-specific labor earnings curve to the right from the peak age of earnings (usually in the mid-40s). Figure 10 shows the number of years average retirement must be delayed (shown in grey) to negate the impacts of population aging. The largest response is seen in Costa Rica where retirement must be delayed by nearly 12 years to generate enough producers in the economy to balance the number of consumers. The smallest response is seen in Uruguay where retirement must be delayed by about 5 years.

Also shown in the figure are the gains in life expectancy over the same period, 2015-2100 (the blue bars). With the exception of Costa Rica, the gains in life expectancy are all larger than the required delay in retirement. It is striking that in the US, China, Brazil, Chile, and Costa Rica, the years gains in life expectancy are nearly equal to the years of additional work life needed to offset the impacts of population aging.

Figure 10



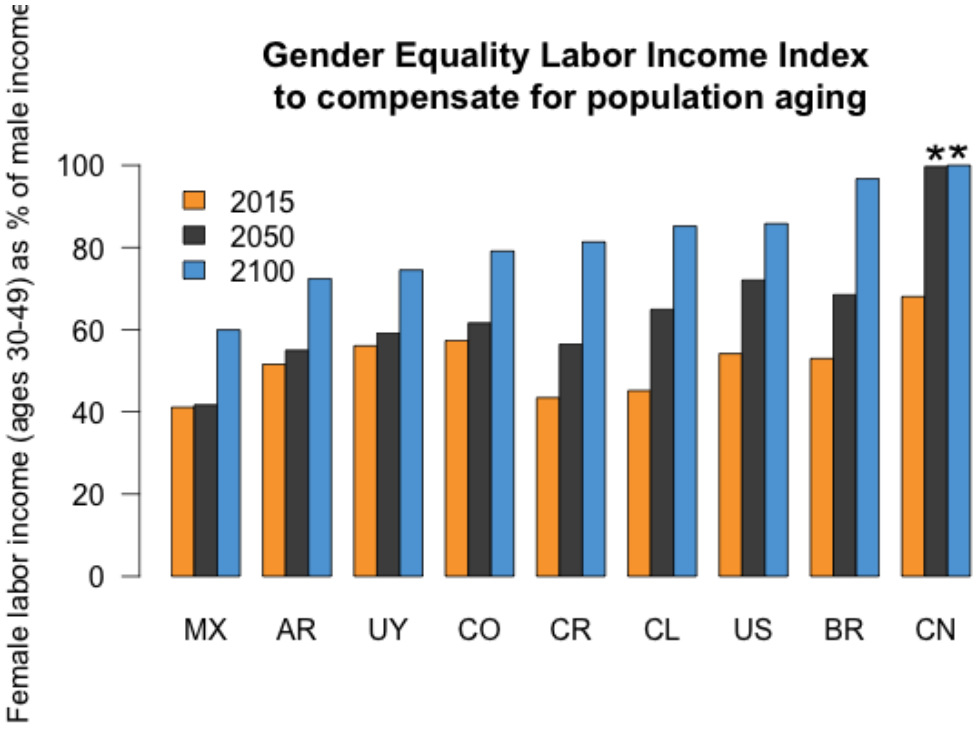
4e. Response 2: Increasing participation of women in economic life

The second response we analyze in this paper is the closing of the gender gap between men and women. As explained in the methodology section, the gap in labor earnings between men and women is assumed to be closed by moving the labor earnings of women proportionally closer toward that of men at every age. Figure 11 summarizes the existing gender gap by a Gender Equality Labor Income Index which varies from 0 to 100%. It is calculated as women's average labor earnings at ages 30 to 49 as a percent of the men's average. Recall that labor earnings are the product of labor force participation rates, the number of hours worked, and the wage per hour. The observed Gender Equality Index is a reflection of differences between men and women in all 3 factors. In the base year, Gender Equality Index (shown in gold bars) varies from a low of 41% in Mexico to a high of 68% in China.

In order to compensate for the declining number of producers relative to consumers which accompanies population aging, the number of producers in the economy can be increased by closing the gender gap in labor markets between men and women. The size of the adjustment necessary is shown in Figure 11 for the near future (2015-2050) in grey bars and for the distant future in blue bars. The adjustment in the gender gap needed to compensate for population aging in the near future seems feasible in that the Gender Equality Index by 2050 reach levels below that observed currently in China. It is harder to assess the feasibility of reaching gender equality indexes above 70%. There is likely to be some limit in the feasible amount of increase in market

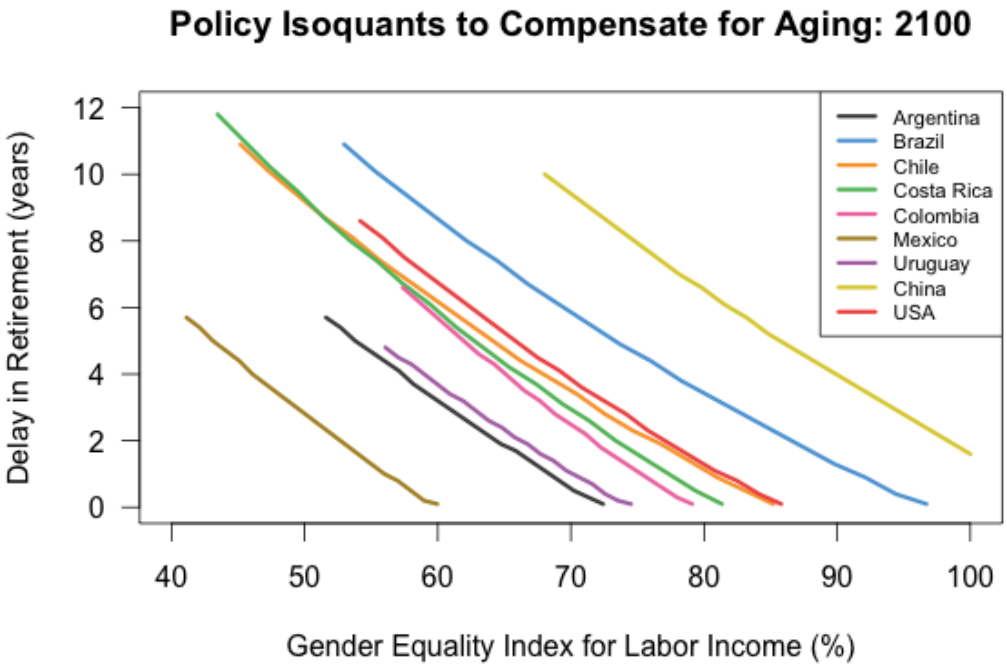
labor imposed by the time spent in childbearing and then the longer time spent in childrearing (whether this care is provided by men or women). As a rough calculation, imagine that 5 years of care must be provided per child, with an average of 2 children per family and an average spacing of 2 years between the children. This leads to a child care period of 8 years. If the average work life is 45 years, then we expect labor earnings of the gender providing the care to be about 18% less than that of the other gender (18% = 8/45). So, in our present calculations which assume the male earnings profile is fixed and the female earnings moves toward the male earnings, we would expect that 82% might represent the upper limit of the scale defined in this exercise. All countries with the exception of Brazil and China fall below this feasible limit in 2100. We would conclude therefore that promoting gender equality is a feasible strategy for confronting population aging in both the short and long run.

Figure 11



Finally, we recognize that these two economic responses of delaying retirement and increasing participation of women in economic life are not mutually exclusive. In Figure 12, we evaluate combinations of the two responses as "Policy Isoquants"—the combinations of the Gender Equality Index and Delays in Retirement which would be necessary to generate sufficient increases in the number of producers relative to consumers in order to offset population aging.

Figure 12



5. Conclusions

The key conclusions of this work:

(a) Most of our 9 countries are at or are nearing a turning point in their economic history in which the age structure of the population is at its most favorable pattern – maximizing the number of producers relative to consumers in the economy.

(b) The economic impact of population aging is projected to be most severe in Brazil and Costa Rica – more so than in China and in the US.

(c) Differences in the pace of population aging are the main source of differences in the economic impact of population aging – though unique economic age profiles play an important role in Brazil, the US, and Mexico.

(d) Delays in retirement ranging from 5 to 12 years would be sufficient to offset the impact of population aging during this century. For many countries, this extension of working life is almost as great as the increase in life expectancy.

(e) Increasing the participation of women in economic life so that their labor earnings reach 60% to 80% of men would be sufficient to offset the impact of population aging in this century.

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