Demographic Transition, Consumption and Capital Accumulation in Mexico

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As age distribution of the population change, the ratio of income to consumption, the support ratio, varies along the demographic transition period. A transitory gain results when the proportion of prime-age adult population increases more rapidly than both young and elderly groups. A sustained period of high consumption, a second dividend, could be maintained even after the period of favorable support ratio vanishes, provided the consumption of elderly relies on capital deepening rather than on transfers. The decision on which mechanism followed to sustain consumption of the elderly is a matter of public policy. We analyze these hypotheses for the case of Mexico, based on estimates obtained from an interdependent altruistic sharing theoretical approach. We report evidence for a second demographic dividend, its timing and magnitude when we assume changes in current and future policy decisions.

Introduction

Changes in age population structure along the demographic transition opens a window of opportunity because there is a period when the effective number of producers increases more rapidly than the effective number of consumers. However, this phenomenon, also known as the first demographic dividend, is transitory because reduced fertility rates and increments in life expectancy, that lead to population aging, will contribute in the extinction of the window of opportunity. A second demographic dividend would appear if adequate policy is followed, where accumulation of assets is privileged upon familial or governmental transfers as a mechanism for supporting the elderly. When this condition holds, the second dividend will not have the transitory condition of the first dividend in that sustained consumption would be possible for a long period of time (Mason and Lee, 2006b).

Recent evidence shows that only few countries have taken advantage of the demographic transition period and they have translate it into sustained economic growth rates. Investment in human capital, proper policies to incentive employment and technological progress have made this possible. The most prominent cases reported in the literature are countries within the south-east Asia (Bloom y Williamson, 1998; Mason, Merrick y Shaw, 1999; Mason, 2001). For the Latin America region, the evidence suggests that, although its demographics resembled those of east Asia, its economic performance lagged well behind (Bloom and Canning, 2004). The authors argue that the lack of proper economic and political conditions have prevented many countries of the region *from exploiting its demographic window of opportunity*. The Mexican case is a good example, since the first dividend has been substantial but, low productivity,

recurrent economic crisis, and the proliferation of the informal economy in recent years, have impeded the country to take proper advantage of it (Mejia-Guevara et al., 2010).

Concerning the second dividend, Mason and Lee(2006a) present evidence showing that changes in the population age structure can lead to a substantial and permanent increase in assets *per capita* and, for a closed economy, in capital per worker, leading to higher *per capita* income and higher consumption than otherwise, although differences among countries might have different impacts depending on several factors. The authors support these findings using evidence from Nigeria, Taiwan and the United States, three countries that represent different degrees of development.

In this article, we elaborate on Mason and Lee (2006a) to find evidence about how present conditions and prospectives for Mexico would be favorable for the arise of a second demographic dividend. We estimate the future accumulation of capital relative to expected income levels and the conditions for which a long period of sustained consumption is possible when population aging accelerates in Mexico. The analysis is based mainly on the results of an interdependent altruistic sharing approach, as well as inputs and estimates derived from a National Transfer Account (NTA) analysis for Mexico.

Methodology

Labor income and consumption
In the methodology for estimating the first and second dividends, labor income and consumption age profiles are the key elements. We take estimates of these profiles from Mejía-Guevara (2001), which follows the methodology of the NTA project (http://www.ntaccounts.org). Trajectories of labor income and consumption are constructed for simulations where, in the trajectory of labor income, the model assumes that income will be increased at a rate of technological progress; whereas, the trajectory of consumption is consider endogenous.

Labor income: In the NTA framework, labor income represents a comprehensive measure of output attributed to labor, which is defined as all compensation to workers, including earnings, the portion of entrepreneurial income which is a return to labor (assumed to be two-thirds), fringe benefits, and taxes paid to the government by employers on behalf of employees.

Consumption: Under the same framework, household consumption is allocated by each member of the household and distributed by age over the lifecycle. The consumption by an individual is defined as the sum of private and public consumption, each of which is further disaggregated into education, health care and other consumption.

The model
Using labor income and consumption age profiles we can compute the effective number of producers and the effective number of consumers. The effective number of producers

(consumers) result from the sum of the labor income (consumption), weighted by the age structure of the population. The first dividend arises when the number of producers is growing faster than the effective number of consumers. A second dividend arises when changes in age structure and the increase in life expectancy lead to a more rapid accumulation of assets. However, the central condition for the realization of the second dividend consist on sacrificing consumption in the present in order to increase wealth and consumption in the future.

In this model, a trajectory of labor income and consumption is constructed, where an index of consumption, c(t), is defined as the ratio of the consumption to labor income. The support ratio is defined as well as the number of effective producers per effective consumer. Then , the first dividend is defined as follows: an increase in the support ratio would lead to higher consumption during the demographic transition period, but population aging would lower the support ratio and, consequently, reduce the consumption.

Mason and Lee (2004a) argue that if the index of consumption declines as the support ratio increases, "[c]urrent per capita consumption would rise by less than the support ratio, but saving rates would increase, assets held by future generations would rise, and, if assets were domestically invested, labor productivity and wages would increase... But whether assets were invested domestically or abroad higher levels of consumption could be sustained in the future. In this response rests the possibility for a second demographic dividend...".

We elaborate under this hypothesis for the case of Mexico. The central idea is that future consumption is not possible without the creation of wealth, defined as net claim of future consumption, which can be generated in the form of assets (e.g. private savings, funded pensions, etc.) or transfer wealth (present value of net transfers received from familial support systems and public programs). The lifecycle wealth of adults can be disaggregated into child wealth (present value of the net cost to supporting children) and pension wealth (wealth used to fund consumption at older ages). Pension wealth consists of assets and pension transfer wealth. The key assumption is, then, to keep the ratio of assets and pension wealth constant throughout the period of prospective (a constant *tau*), since it is not possible to know exactly how the consumption needs of the aged population will be financed in the future: through transfers or through contributory systems or private savings?. This will depend on how policies and institutions develop over coming decades. Therefore, for an exogenous transfer policy (assuming a constant *tau*) and for each endogenous path of consumption, the model will find a trajectory of assets. The rate of return on assets will determine the feasibility of the trajectory of consumption (Mason and Lee, 2004a).

Preliminary results

Preliminary results are shown in Figures 1 to 4 below. A baseline consists on assuming that the consumption of elderly will rely 50% on assets and 50% on transfers (*tau*=0.5). Under this

assumption, the index of consumption will be always above the support ratio, which will start declining around 2026; in other words, the first demographic dividend would vanish around that time. The index of income also supports this evidence. The trajectory of consumption will start accelerating just before the declining of the support ratio and, after the declining in the consumption, it will maintain a constant difference with respect to the support ratio along the period of analysis (Figure 1).

As aging process accelerates in Mexico, life-cycle wealth follows an increasing trajectory which reach its maximum around 2060, then declining steadily until the end of the period. The maximum value reached by the lifecycle wealth is around 3.5 times of labor income, which declines later on to stay at the level equivalent to 3 times of that figure. The trajectory of assets also increases during the transition process, but on an slower rate, to reach a level slightly above 1.5 times the labor income around 2060, to remain constant from there. The declining of fertility and the aging process will be the reason for a decrease in the demand for lifecycle wealth of children, which starts declining since the beginning of the XXI century to reach a minimum, just below 1 time the labor income, around the year 2100, keeping similar levels, with small variations, afterwards (see Figure 2).

By measuring the rate of consumption to labor income during the period of analysis, we observe a steady increase until 2050, where consumption reaches levels 10% higher than labor income, a value that is held for 50 years and then decreased to a value of 5% above the same figure. When consumption is measured as a proportion of the GDP, we observe the same pattern of increment, where consumption will peak close to 100% of GDP, and then decreased slightly afterwards. National savings, in turn, will follow an opposite path, starting at levels around 6% of national output at the beginning of the XXI century, to systematically reduce until reaching values close to zero around the year 2075, rising again thereafter, to reach a steadily 2% of GDP over the next 100 years (Figure 3).

Figure 4 shows three scenarios for how the consumption of the elderly could be supported. In the first scenario, 65% of this consumption relies on transfers (blue line). The baseline scenario represents the case where half of the consumption is financed by assets and the remaining half through transfers (green line). The third scenario represents the case in which 35% of consumption is financed through transfers (red line). It is clear in the graph that the policy in which the accumulation of assets is privileged over transfers leads to higher outcomes in the long run.

Results are expected to be more refined in the final version of the article. We also expect to have a deeper analyses that consider specific conditions and better assumptions of the Mexican economy, mainly related to changes in productivity and labor markets from recent times and in the future.

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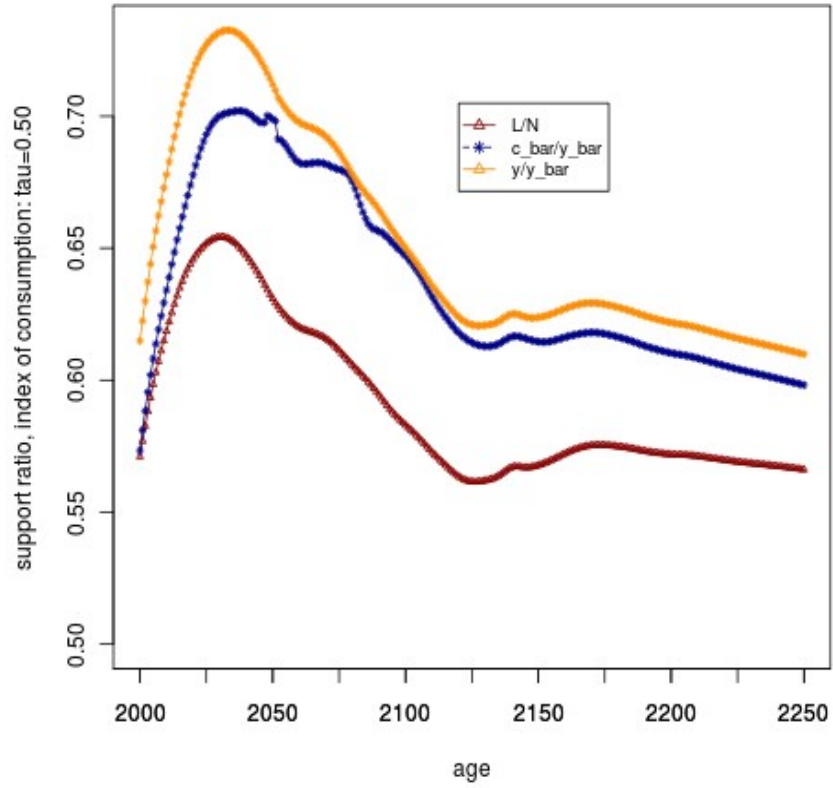**Figure 1.** Support ratio, index of consumption, income in Mexico.

Figure 2. Simulated support ratio, index of consumption, income in Mexico
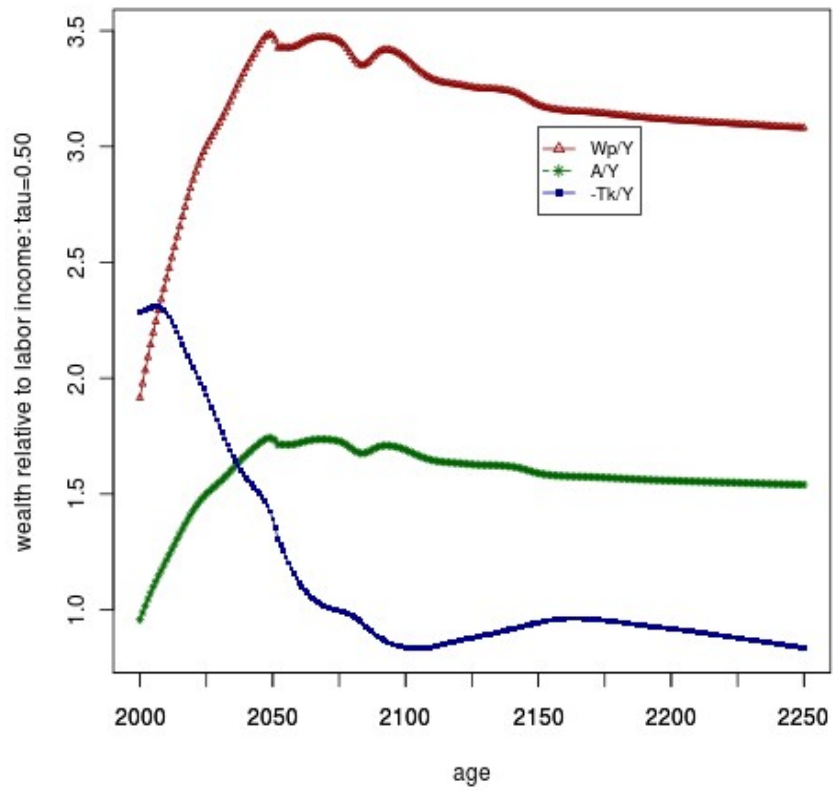
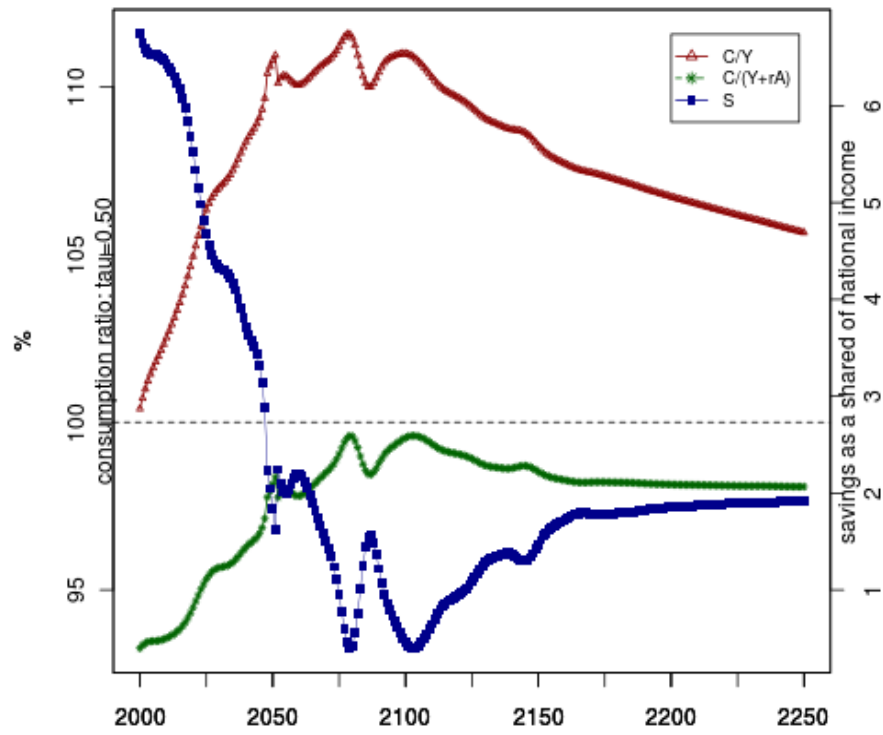**Figure 3.** Simulated support ratio, index of consumption, income in Mexico

Figure 4. Simulated support ratio, index of consumption, income in Mexico