Female Labor Force Participation, Inequality, and Economic Growth in an Aging Society: Evidence from Mexico

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Short Abstract [143/150 words]

The agenda for Sustainable Development is calling for substantive progress in reducing inequalities across population groups by 2030. We bear this in mind and build on the recent literature of the demographic dividend to analyze the combined effects of changes in the female labor supply and education expansion on the demographic dividend (DD) of Mexico. We use age profiles of labor income and consumption to estimate the Economic Support Ratio and the Total Support Ratio, following the methodology of National Transfer Accounts. We disentangle the age- and sex/education-effects on the DD. We hypothesize that generalized low education levels have pernicious effects on the productivity and economic growth, regardless of the sex distribution of income. However, the full potential of the DD can be achieved with the combined effect of higher female labor supply and education levels, contributing to overcome the negative impact of population aging.

Extended Abstract

The Sustainable Development Goal 5 (SDG-5) calls for substantial improvements in equality and empowerment of women, including the recognition and value of unpaid care and domestic work, as well as to ensure their effective participation and equality of opportunities. The SDG-10 calls for a reduction of inequality between- and within-countries, recognizing the limitations of non-inclusive economic growth to reduce poverty. We bear these specific goals in mind to assess the economic effects of ageing in Mexico, where important gender and economic inequalities persist in the labor markets. We build on the recent literature (Bloom et al. 2009; Mason and Lee 2005; and Rentería et al. 2016) to analyze the combined effects of changes in the female labor supply and the expansion of education on the demographic dividend of Mexico. We use age profiles of labor income and consumption to estimate the *Economic Support Ratio* (ESR), as well as the *Total Support Ratio* (TSR) by adding the monetary value of age profiles of unpaid household labor/consumption to market labor/consumption. Age profiles of market labor income and consumption are estimated (panel a, **Figure 2**), and distributed by sex (panel b, **Figure 2**) and education (**Figure 3**), following National Transfer Accounts (NTA) methods. The monetary value of care and housework activities are imputed at market prices, and distributed by age, sex, and education using the methodology of the National Time Transfer Accounts (NTTA) (**Figure 4**). We decompose the ESR to disentangle the age- and sex/education-effects on the demographic dividend (**Figure 5** and **Appendix**). We apply the same decomposition to the TSR to assess the counterfactual effect of an increase in the female labor supply on the demographic dividend. We hypothesize that generalized low education levels have pernicious effects on the productivity and economic growth, regardless of the sex distribution of income; however, the full potential of the demographic dividend can be achieved with the combined effects of an education expansion and higher labor force participation, both contributing to overcome the negative impact of population ageing.

Preliminary Results

Figure 1 illustrates the educational expansion in Mexico from 1970 to 2100. In 1970, nearly 35% of men or women of working age (20-64) had less than primary education, and only 3 to 5% had more than tertiary education. As the percentage of less educated people decreased across time, expecting to reach around 5% between 2025 and 2030, the percentage of working age

people with more than tertiary education increased monotonically to reach 20-23% at the end of the same period. Further, men always experienced higher levels of education compared to women (a lower percentage of men with less than primary education or a higher percentage with more than tertiary education) between 1970 and 2025, but they converge to similar levels during 205-2030, and the patterns would reverse afterwards. However, in either case the gap was not (or not expected to be) larger than 3%.

The average age patterns of labor income and consumption for Mexico in 2014 are shown in **Figure 2**. Young people start producing labor income around age 14, which increases rapidly until age 30, it decelerates from then until reaching its highest level around age 50 to decrease afterwards until very late ages (~80). Consumption is low for very young children but increases rapidly until around age 20, remaining flat for around 20 years, but increasing slightly again during another 20 years to decrease smoothly during and after retirement age. The surplus period, the age groups where the average labor income by age is higher than consumption is getting shorter with time and the age where labor income surpasses consumption for the first time is increasing in comparison with estimates from previous years (Mejía-Guevara 2011) (panel a of **Figure 2**). In panel b of **Figure 2**, we show the average age patterns of labor income and consumption disaggregated by sex for the same year. We found that labor income of men is around two times bigger than women's for working age groups. Labor income of women is not only lower than men's, but substantially lower than the national average. Regarding consumption, we did not identify substantive differences in the age distribution by sex, and with respect to the national levels.

We also identified important heterogeneities in the distribution of labor income across educational groups. Labor income and consumption of people with post-secondary education is around 4 times larger than those of people with less than primary education (at all ages in the case of labor income) –see panel a of **Figure 3**. After further desegregating these profiles by sex, the differences across educational levels remain, but the differences by age across education groups widens significantly, even among people with the highest level of education, where labor income of men is around two times higher than women's, and the surplus generated by men in that educational group is the largest observed for any group (panel b of **Figure 3**).

Figure 4 illustrates the distribution of production and consumption in the home, disaggregated by age and sex. Household production of women is substantially higher than the production of

men at all ages, provided that women spend more time in household and care activities. The difference is particularly striking for working age groups, where the monetary value of the activities increases substantially for women (between 40 and 50% of the maximum labor income), but remains constant for men practically across their adult life. As in the case of the market consumption, we practically do not observe any difference in the time consumption between men and women (panel a of **Figure 4**). The disaggregation of these profile reveals no substantive differences in the distribution across age across groups with less than primary education (panel b) and those with more than tertiary education (panel c). We hypothesis that even in high strata, women still dedicate more time to household production, as women with less education (socioeconomic status) are usually hire by educated families to perform household work and care.

Figure 5 shows important differences in the demographic dividend for men and women under distinct scenarios of educational expansion. The rate of growth of the support ratio for men was substantially greater than women's and we observe a clear gradient across different scenarios of educational expansion. That is, a rapid expansion in the educational attainment of men has a greater impact in the rate of growth in per capita income (the number of effective producers increases more rapidly than the number of effective consumers –demographic dividend) in comparison with the effect of an educational expansion under the medium scenario. We observed the opposite effect when the educational expansion of men stalls (blue line in panel a). We did not see that effect among women, the effect of the demographic dividend is substantially lower (around one half) in comparison to men's dividend under the medium scenario, and we did not observe a clear effect across different scenarios of educational expansion, at least not in the magnitude observed for men. This last result may be attributed to the lower levels of labor income observe for women in relation to men at all ages and educational groups.

Figure 1. Percentage of female and male working age population (20-64) with less than primary and more than tertiary education in Mexico (2970-2100)
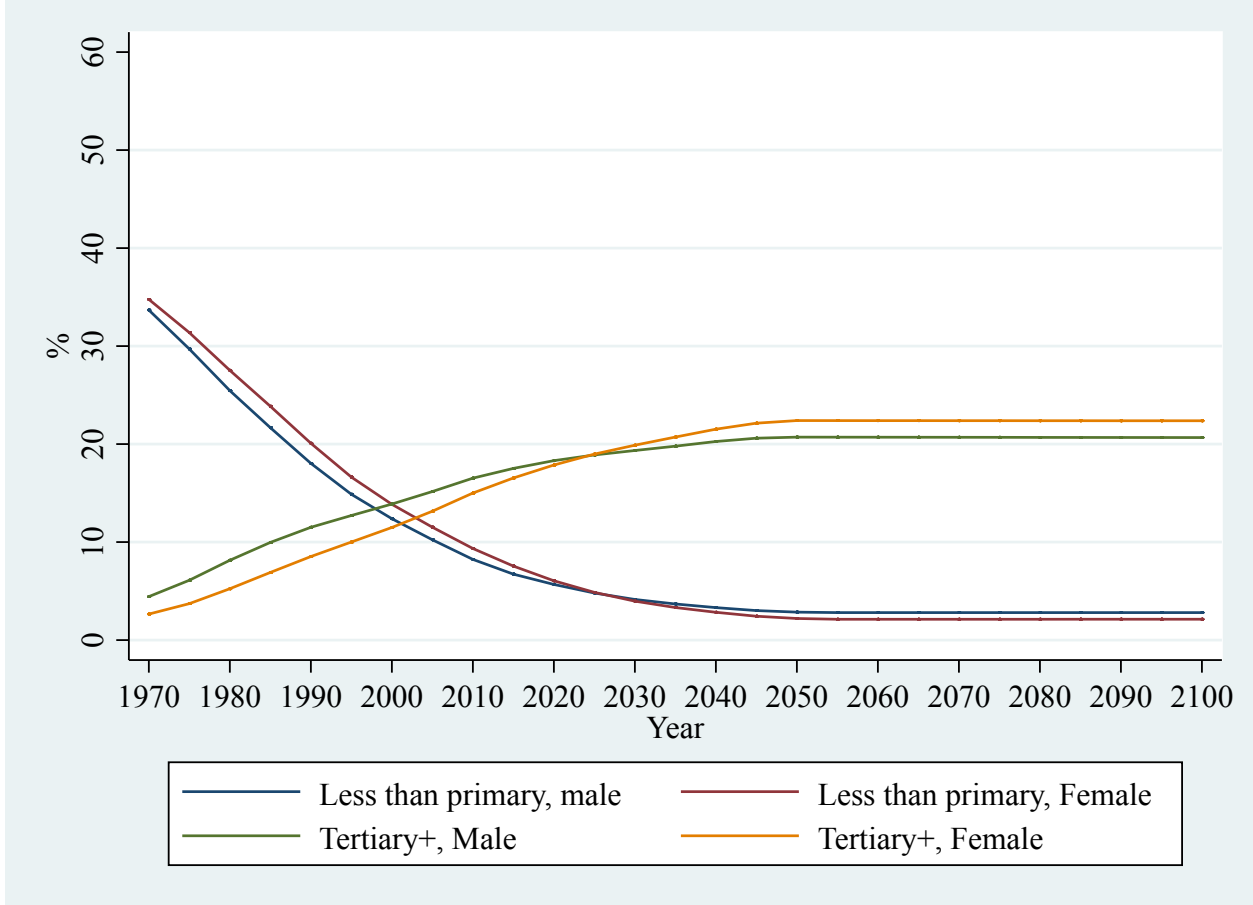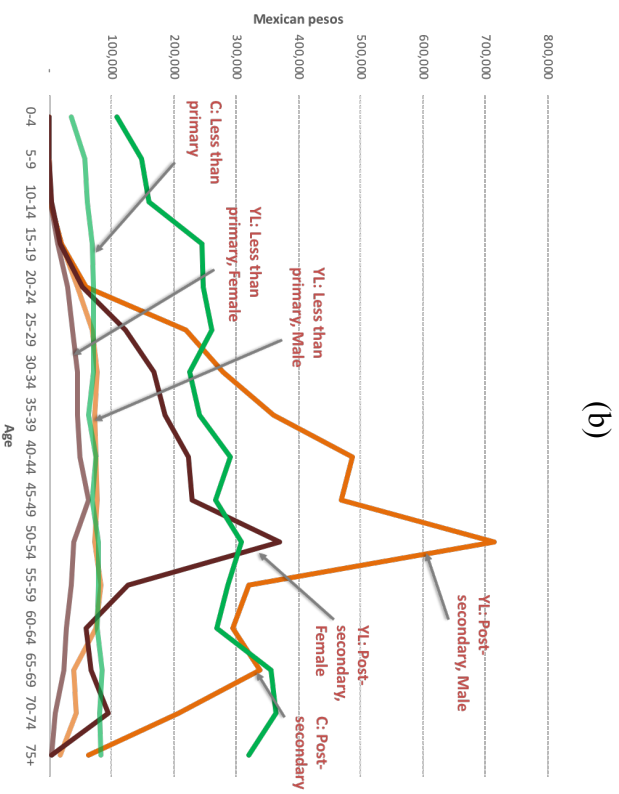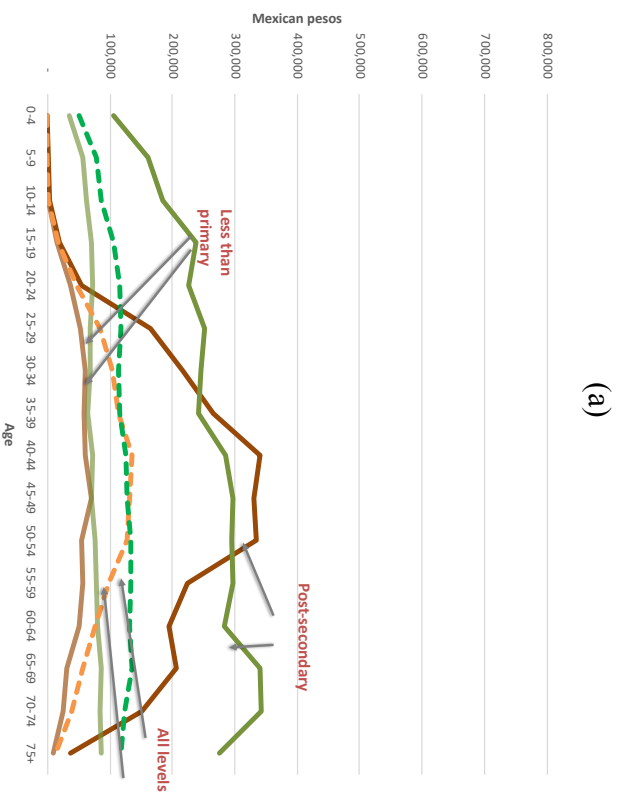
Figure 2. Average labor income and consumption by age (a), and by age and sex (b).
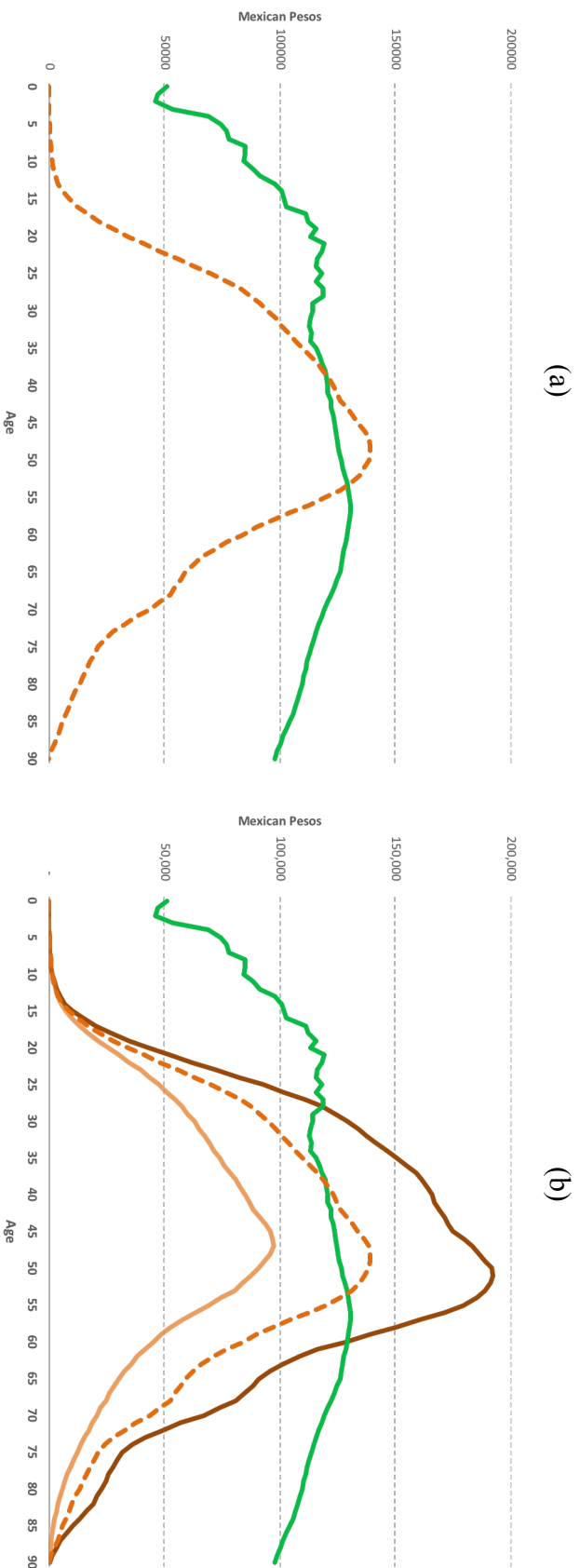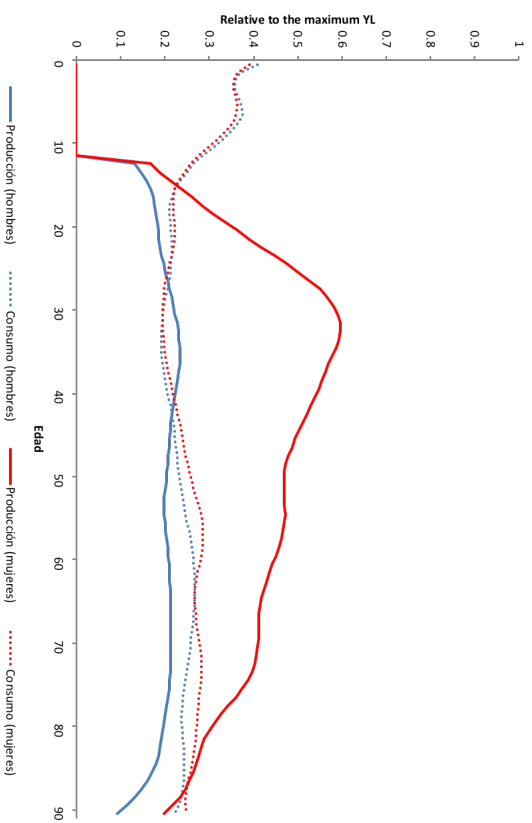
Source: Authors' estimates with information.

Figure 3. Average labor income and consumption by age-education (a), and by age-education-sex (b).
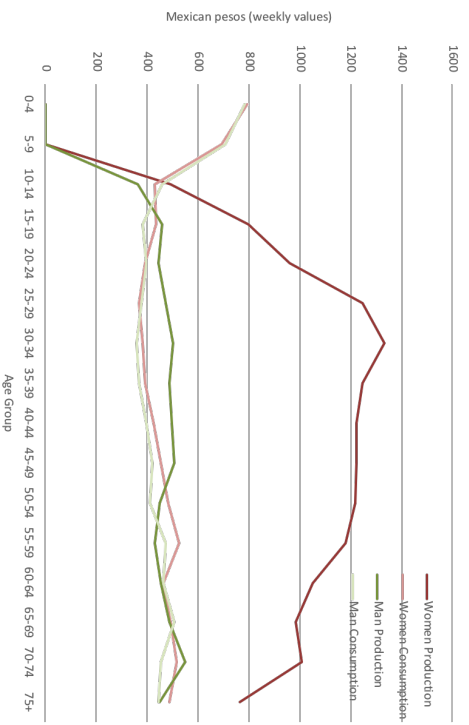
(a)

(b)

Source: Authors' estimates with information.

Figure 4. Production and consumption in the home, by age, gender (a) and education level (b)-(c)

(a) National average

(b) less than primary education
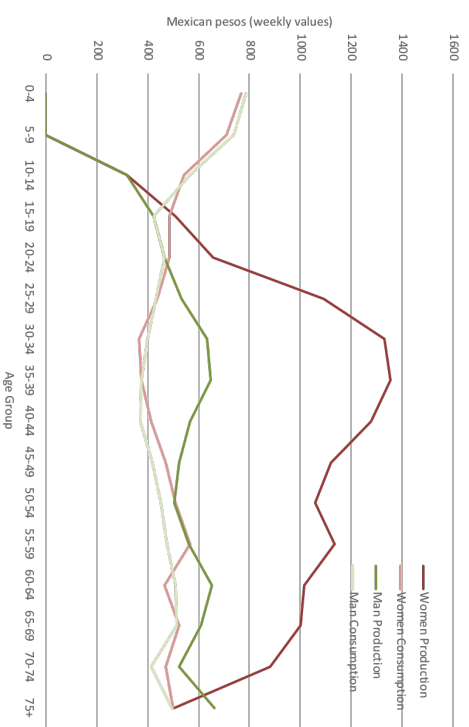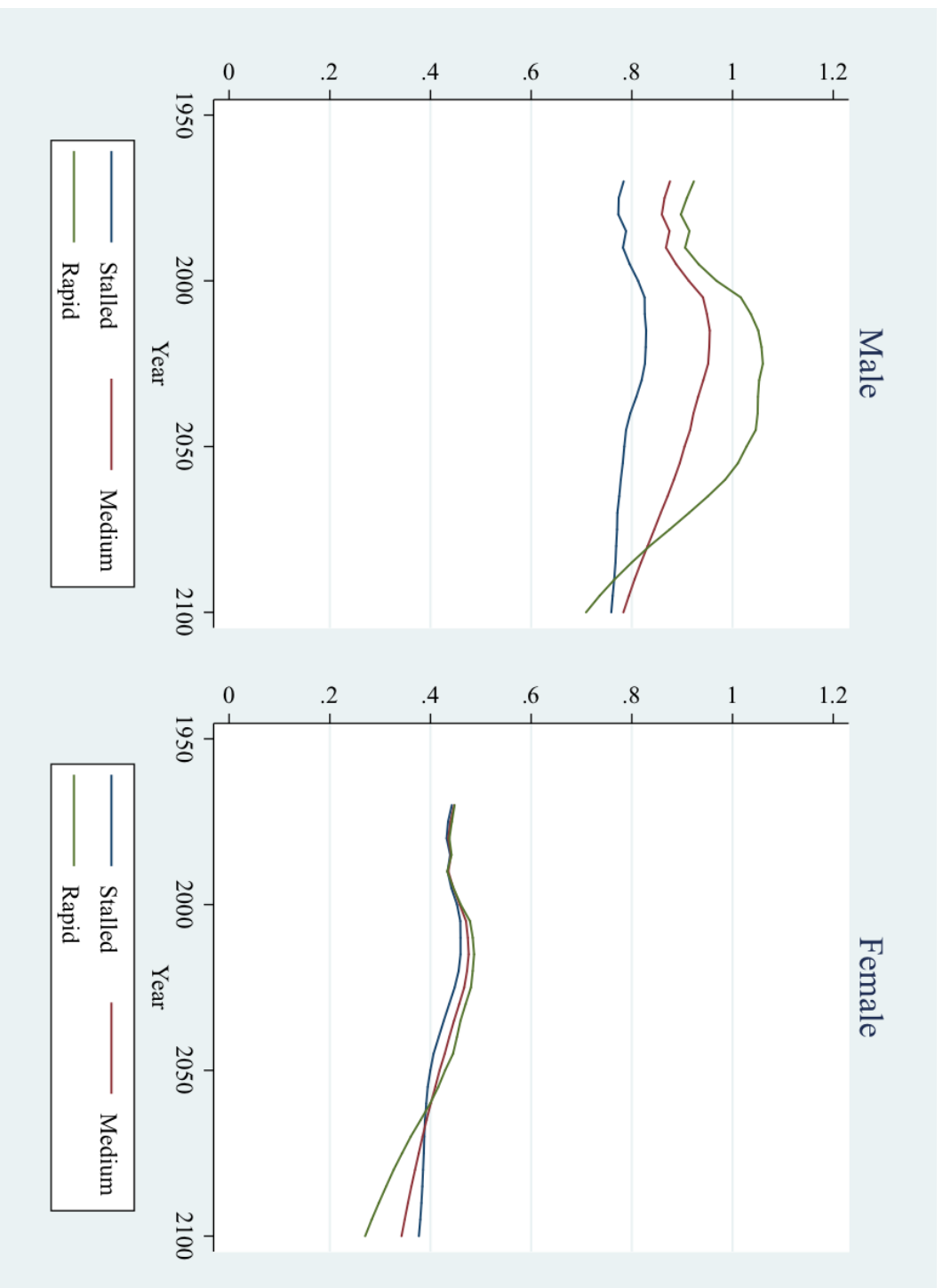

(c) more than tertiary education

Figure 5. Rate of growth of the support ratio (demographic dividend) by sex under different scenarios of educational expansion.

APPENDIX: Female Labor Force Participation, Education, and Economic Growth: Evidence from Mexico

Abstract

1 Decomposition of the Support Ratio by Age, Sex, and Education Effects

$$
\begin{aligned}
g(SR) &= g(L) - g(C) \\
&= \frac{L(T) - L(t)}{L(t)} - \frac{C(T) - C(t)}{C(t)}.
\end{aligned}
\tag{1}
$$

By applying the decompositon of Das-Gupta (1993) to (2), we can separate the effect of age, education, and sex in the rate of growth of the effective producers and effective consumers. That is, the change in the number of producers from time t to time T (where $T = t + x$) can be expressed as:

$$
\begin{aligned}
L(T) - L(t) &= \underbrace{[R_L(T) - R_L(t)]}_{\text{Rate-effect}} + \underbrace{[A_L(T) - A_L(t)]}_{\text{Age-effect}} + \underbrace{[E_L(T) - E_L(t)]}_{\text{Education-effect}} + \underbrace{[S_L(T) - S_L(t)]}_{\text{Sex-effect}} \\
&= R_L + A_L + E_L + S_L,
\end{aligned}
$$

where R_L, A_L, E_L, S_L represents the rate effect in the change from, and they are defined as follows:

$$
R_L(t) = \sum_{ijk} \frac{\frac{N_{ijk}}{N}(t) + \frac{N_{ijk}}{N}(T)}{2} yl_{ijk}(t)
$$

$$
A_L(t) = \sum_{ijk} \frac{yl_{ijk}(t) + yl_{ijk}(T)}{2} \left[\frac{e_{ijk}(t)s_{ijk}(t) + e_{ijk}(T)s_{ijk}(T)}{3} + \frac{e_{ijk}(t)s_{ijk}(T) + e_{ijk}(T)s_{ijk}(t)}{6} \right] a_{ijk},
$$

$$
E_L(t) = \sum_{ijk} \frac{yl_{ijk}(t) + yl_{ijk}(T)}{2} \left[\frac{a_{ijk}(t)s_{ijk}(t) + a_{ijk}(T)s_{ijk}(T)}{3} + \frac{a_{ijk}(t)s_{ijk}(T) + a_{ijk}(T)s_{ijk}(t)}{6} \right] e_{ijk},
$$

$$
S_L(t) = \sum_{ijk} \frac{yl_{ijk}(t) + yl_{ijk}(T)}{2} \left[\frac{a_{ijk}(t)e_{ijk}(t) + a_{ijk}(T)e_{ijk}(T)}{3} + \frac{a_{ijk}(t)e_{ijk}(T) + a_{ijk}(T)e_{ijk}(t)}{6} \right] s_{ijk},
$$

yl_{ijk} is the labor income for an individual aged i, with educational level j and with sex k. The expressions a_{ijk}, e_{ijk}, and s_{ijk} stand for ??? and they are defined by:

$$a_{ijk}(t) = \left(\frac{N_{ijk}(t)}{N_{.jk}(t)}\right)^{\frac{1}{3}} \left(\frac{N_{ij.}(t)}{N_{.j.}(t)}\frac{N_{i.k}(t)}{N_{..k}(t)}\right)^{\frac{1}{6}} \left(\frac{N_{i..}(t)}{N_{...}(t)}\right)^{\frac{1}{3}},$$

$$e_{ijk}(t) = \left(\frac{N_{ijk}(t)}{N_{i.k}(t)}\right)^{\frac{1}{3}} \left(\frac{N_{ij.}(t)}{N_{i..}(t)}\frac{N_{.jk}(t)}{N_{..k}(t)}\right)^{\frac{1}{6}} \left(\frac{N_{.j.}(t)}{N_{...}(t)}\right)^{\frac{1}{3}},$$

$$s_{ijk}(t) = \left(\frac{N_{ijk}(t)}{N_{ij.}(t)}\right)^{\frac{1}{3}} \left(\frac{N_{i.k}(t)}{N_{i..}(t)}\frac{N_{.jk}(t)}{N_{.j.}(t)}\right)^{\frac{1}{6}} \left(\frac{N_{..k}(t)}{N_{...}(t)}\right)^{\frac{1}{3}}.$$

The decomposition of the change in the number of effective consumers can be defined similarly. Thus, the equation (2), can be reexpressed as:

$$g(SR) = \frac{R(L) + A(L) + E_L + S_L}{L(t)} - \frac{R(C) + A(C) + E_C + S_C}{C(t)}. \tag{2}$$

The specific effect of one component in the support ratio is then defined as the differences of the corresponding effect in the production and consumptio. For, instance, the age effect on the total support ratio is defined as $A_L - A_C$, and similarly for the education, and sex effects.