

Women's Labor Potential in an Aging Taiwan: Population and Labor Force Projections by Education up to 2050

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Motivation

While discussions about the consequences and implications of an aging society has largely focused on increases of medical expenses for an expanding old-age population and shortage of labor supply, changes in the educational composition in a fast-aging Taiwan is absent from scholarly literature or the public attention. Empirical research and policy recommendations have often focused on incorporating more middle- and mature-aged men and women into the labor market (Tsay 2003, Wang et al. 2009), while some have suggested extending the official retirement age, importing more foreign labors, or implementing pension reforms to alleviate dependency burdens (Chen 2005, Hseuh 2003, Tsay 2003). Policies aimed for progressively raising women's labor force participation, as a crucial measure for the "Abenomics" proposed by the Japanese prime minister Shinzo Abe (Fifield 2014), have not been put forth in Taiwan. The current level of labor force participation rates of women in Taiwan leaves room for further improvement at almost all age-groups, as figure 1 clearly shows.

Population aging is a pressing demographic issue in many advanced Asian economies, and Taiwan is no exception. Industrialization that took place in the 1970s and 1980s has been accompanied by a rapidly progressing pace of population aging in Taiwan. The period total fertility rate of Taiwan used to be as high as 7 children in 1950, and it first dropped below the replacement level of 2.1 in 1984. As Taiwan made the transition to a post-industrial society since the late 1990s, population aging has been further accelerated due to dramatic fertility decline from 1.68 in 2000 to a record-low of 0.9 children in 2010, with a slight rebound to 1.07 as of 2013. Meanwhile, life expectancy at birth used to be 53.1 for men and 55.7 for women in 1950. Over a span of six decades, life expectancy at birth has greatly improved to 76.4 for men and 82.5 for women in 2010 (Department of Household Registration 2014).

Since the 1970s, educational expansion has taken place along with industrialization in Taiwan, which has led to large differences in the educational compositions across cohorts: among the 25-29 year-olds more than half have at least a junior college degree, whereas more than three fourths of the over 60 year-olds have less than high school education (Ministry of the Interior 1975-2012). In particular, increasingly more women have advanced to tertiary education after finishing high school (cf. figure 2). The proportion of female students among all college students

has risen from 21% in 1960 to 36% in 1970 and further to 50% in 2010 (Ministry of Education 2012).

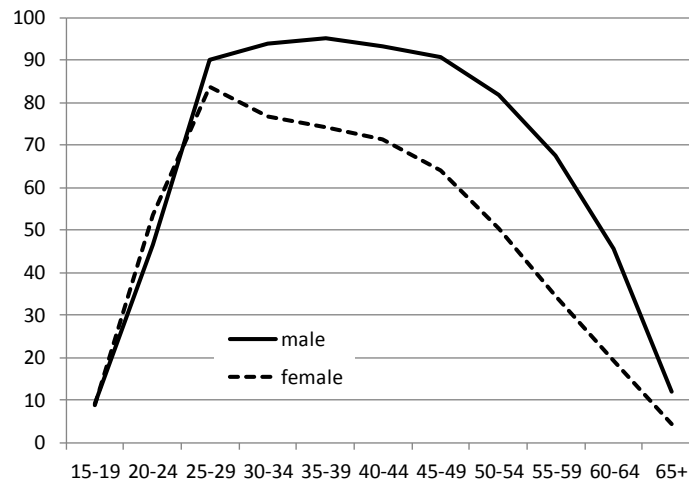


Figure 1: Labor force participation by age and sex, 2010 (source: (DGBAS 1987-2010))

The improvement in human capital among women has propelled a surge in labor force participation rates at prime working ages—a tremendous increase from 56% to 84% at ages 25 to 29 and from 55% to 77% at ages 30 to 34 between 1987 and 2010 (DGBAS 1987-2010). Although the average educational level of women in Taiwan is among one of the highest in Asia, women’s labor force participation rate (LFPR) for ages 15 and above in 2012 (50.2%) is only slightly higher than Japan and South Korea and lags behind several neighboring societies like Hong Kong, Singapore, Thailand, China, and Vietnam, as well as many developed western countries like the UK, France, Germany, and USA (Ministry of Labor 2013, Ogus and Hedrick-Wong 2013).

The total LFPR for Taiwanese women is lower than these societies due to the phenomenon of “late entry and early exit.” That is, women in Taiwan started working at an older age than their counterparts in other nations, which is due to extended education and family financial support for children in schools. Women in Taiwan also tend to drop out of the workforce or retire earlier due to various reasons such as marriage, childbirth, and generous pension plans for public servants. Hence, assuming the shrinkage of labor force is an inevitable reality in the foreseeable future, there is still plenty of room to incorporate more women into the labor market to raise the total productivity. As a growing share of young Taiwanese women have received tertiary education (e.g., 67% of women aged 25-29 in 2012 had at least junior college education), their estimated labor output will certainly surpass that of the older generations, which can potentially offset part of the downward pressure in total productivity due to labor shortage from shrinking cohort sizes. Increasing productivity output is crucial for a society that has to prepare itself for a steep rise in old-age dependency, as shown in Figure 3.

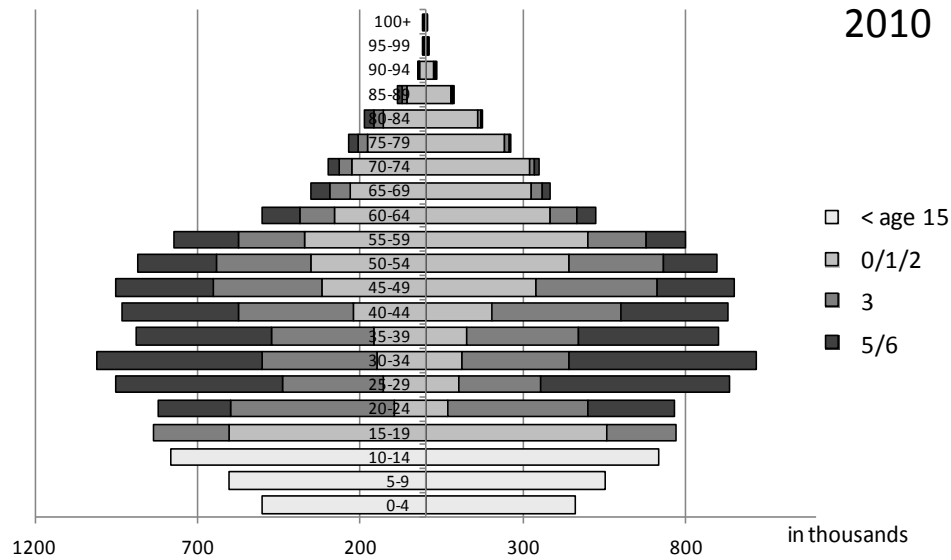


Figure 2: Population pyramid by highest level of educational attainment (ISCED 1997 level), Taiwan, 2010 (source: (Ministry of the Interior 1975-2012)).

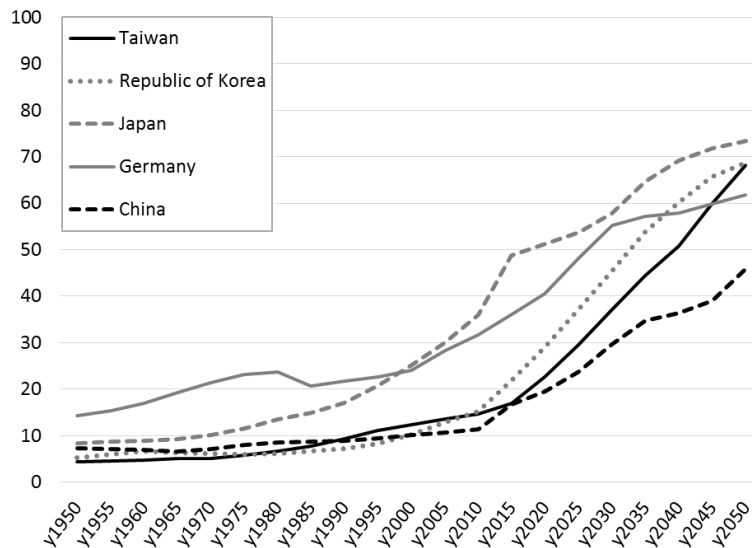


Figure 3: Development of the old-age dependency ratio (population ages 65+/(population ages 15-64)) for Taiwan in comparison to China, Japan, South Korea, and Germany. 1950 to 2050. (Source: Taiwan: data acquired from the Population Statistics Database (http://www.ris.gov.tw/zh_TW/346) for 1950 to 2010; data for 2015 to 2050 are from the National Development Council (2014), medium variant. All other countries: UN (2013), estimates (past) and projections (medium variant)). (United Nations 2013)

Knowing not only the size but also the potential skill level of a population’s future workers is crucial, yet the incorporation of education as an important aspect of population projections is a rather recent practice (Lutz, Goujon and Doblhammer-Reiter 1998). Population projections are typically done with data for sex and age. As Taiwan is not a member of the United Nations, population projections have never been carried out by the UN experts for Taiwan. Projections of Taiwan have been done by the National Development Council (i.e., the former Council for Economic Planning and Development) and education has never been considered in the projection procedures (Council for Economic Planning and Development 2010, National Development Council 2014). As shown in Figure 4 below, female labor force participation shows distinct patterns by education level. This study plans to make use of the multi-state cohort component method (Land and Rogers 1982) and detailed vital statistics data to project the future population by age, sex, and education forward to 2050 in Taiwan. Incorporating education as an extra dimension in the labor force projections allows us to make inferences about the quality of future labor supply in a rapidly aging Taiwan and the effect of recruiting more women into the labor force to maximize productivity.

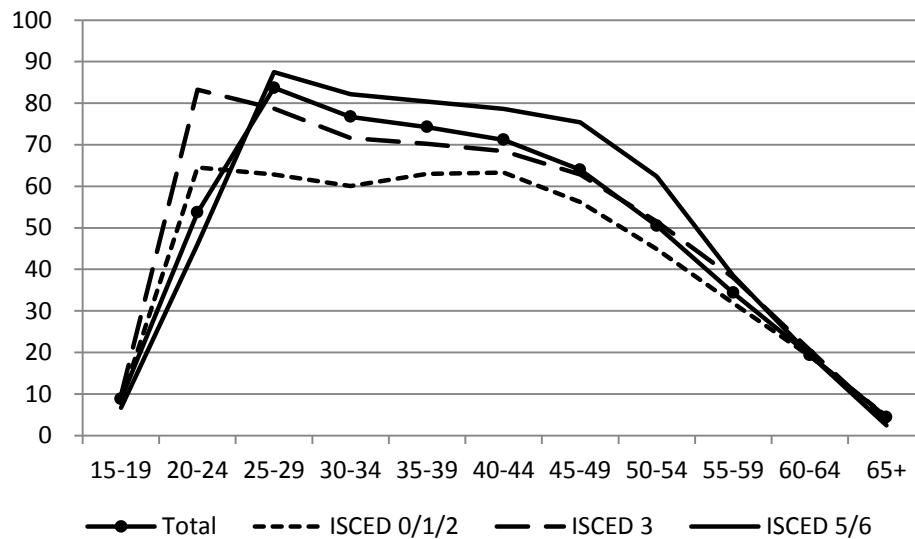


Figure 4: Labor force participation rates by educational attainment for women in Taiwan, 2010 (Source: Yearbook of Manpower Survey Statistics, 2010. Taipei, Taiwan: Directorate General of Budget, Accounting and Statistics, Executive Yuan.)

Methods and data

We project the population using the multi-state cohort component method (Land and Rogers 1982). This allows us to incorporate differentials in demographic parameters not only by age and sex, but additionally by highest level of educational attainment:

- Taiwanese women with less than a high school degree had a TFR of 1.23 in 2010, whereas women with a college degree have a TFR below 1, namely 0.87 (Ministry of the Interior 1975-2012). With time-series age-specific fertility data from 1975 to 2010, we then adopt the 5-year limited extrapolation method proposed in Myrskylä and colleagues' recent work to project the development of age-specific fertility rates forward in our analyses (Myrskylä, Goldstein and Cheng 2013).
- In terms of mortality, men and women show distinctly different levels when comparing their education-specific life-expectancies. In 2010, the difference in life-expectancy between men with less than a high school degree and men with a college degree is almost 11 years. The respective difference for women is half of that value (authors' own education- and sex-specific death rates and life table calculations based on education-specific death counts requested from the Department of Household Registration).
- When it comes to migration, Taiwan is an interesting case where the number of female net-migrants is many times higher than that of their male counterpart. Though we do not have directly observed data on the education structure of in- and out-migrants, we make educated assumptions based e.g. on information about the education structure of the population in sending countries.
- Our assumptions about the future development of education transitions are based on the analysis of past trends. We have population data by age, sex, and education for the years 1975 to 2010.

Labor force participation does not enter our population projections directly. Instead, we project these age-, sex- and education-specific rates separately and apply them in a second step to the population projections. Table 1 shows differences in economic activity by education level for Taiwanese men and women in 2010, aggregated for ages 15+. The gap between men and women with a university degree (ISCED 5/6) are smallest, and largest for those who have at most completed junior high school (ISCED 0/1/2).

	overall	ISCED 0/1/2	ISCED 3/4	ISCED 5/6
men	66.5	56.0	70.9	71.2
women	49.9	28.7	53.8	65.6

Table 1: Labor force participation by sex and highest level of educational attainment for ages 15+ population in Taiwan, 2010 (Source: (DGBAS 1987-2010))

We plan to run several scenarios of labor force participation, where we vary the overall level of participation, particularly of women and persons above age 50, and also change the educational differentials in participation rates. The results will not only allow us to assess the future labor pool in terms of size and age-structure but at the same time offer insights about the future composition of workers by their education level. In particular, the impact of incorporating more women into the labor market can be more precisely gauged, which bears important policy implications because developed nations where women are most integrated into the labor force are also those with near-replacement-level fertility. Both more working women and more births can

ameliorate the undesirable consequences brought by a graying population and potentially slow down the trend of aging.

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