Global Trade Analysis Project
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This paper is from the
GTAP Annual Conference on Global Economic Analysis
https://www.gtap.agecon.purdue.edu/events/conferences/default.asp

Care in an Aging East Asian Economy: Policies and impacts on households and labor markets

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Incomplete draft – not for citation

April 15, 2018

1. Introduction[1]

Gender is at the center of wide range of policy debates in many parts of the world, pointing to the need for analytical tools with a gender dimension. Drawing on the emerging literature of gendered computable general equilibrium (CGE) analysis, this paper takes a first step toward an analysis some of the gender-related challenges faced by aging high-income economies in East Asia (like Japan, South Korea, and Taiwan) in relation to care (of young and elderly) and time use. Its more specific purpose is to develop and test a prototype CGE model, accompanied by a stylized East Asian high-income country database. The model is designed for analysis of care policy with a focus on the expansion of care services for young and elderly, which may be provided by government and private services, and the distributional consequences this may have in terms of household wellbeing, inequality, and the incomes, employment, and time use for males and females. Compared to standard economic analysis, the model and the database is extended beyond GDP to cover leisure and household production of care and other services.

In outline, the paper consists of a literature review (Section 2), a presentation of the model and its database with a focus on the extensions to a standard CGE model that are introduced to address the care economy and time use (Section 3), presentation and analysis of simulations (Section 4), and conclusions (Section 5). The paper appendices present additional simulation results.

2. Literature review

The small but growing literature on gendered SAM-based CGE models has demonstrated the ability of the CGE approach to generate important insights about gender issues. This section briefly surveys major contributions, taking note of their treatment of gender, data needs, and policy coverage. It also situates the model and analysis of this paper in the context of this literature and takes note of some of the outstanding challenges for gender-sensitive CGE modeling.[2]

Table 2.1 summarizes the features of key contributions to the literature. The gendered CGE models may be split into two groups. The first introduces a gender disaggregation of labor in the production sphere that, according to the System of National Accounts (SNA), is part of GDP. The second group goes beyond GDP by extending the model to cover household service production for own consumption, also in this sphere with a gender disaggregation of labor. The latter services include what often is referred to as care or social reproduction. Given that the second group of models views the time that is available to different household members more comprehensively, they also tend to cover leisure. The coverage of the databases (most importantly the SAMs) that accompany the models in each of these two groups reflect whether they are limited to or go beyond the GDP sphere.

[1] The paper is work in progress; the different sections will be expanded.
[2] For a more detailed review of the literature, see Fontana (2014).

Table 2.1. Selected contributions to gendered CGE modeling			
	Arndt and Tarp (2000)* **	**Fontana and Wood (2000)**** **	**Ruggeri Laderchi et al. (2010)**
Country	Mozambique	Bangladesh	Ethiopia
Time treatment	Static	Static	Recursive dynamic
Household sectors*	--	Reproduction and leisure	Household home services and leisure
Market sectors**	Explicit gender roles in agriculture	Explicit gender distinction in all sectors	Explicit gender distinction in all sectors
Labor	Gender disaggregation within agriculture but not for non-	Disaggregated by gender in all sectors	Disaggregated by gender and education in all sectors
Households	Rural and urban	Aggregate household	Aggregate household
Policy issues	Changes in agricultural productivity and marketing costs	Changes in food import prices, capital inflows, and manufacturing export incentives (with and without gender targeting)	Expanded public education with alternative scenarios for financing sources, household service productivity, and male-female subsitutability in
*Household service production for own consumption that is not part of GDP. Leisure is also in this category.			
**Marketed production that is part of GDP. (For goods, some of these sectors may be produced by households for own consumption.)			
***The models in the first group with gender disaggregation within the GDP sphere, also includes Thurlow (2006) on South Africa, Arndt et al. (2006) on Mozambique, Cockburn et al (2009) on multiple countries, and Arndt et al. (2011) on Mozambique.			
**** The models in the second group, which cover gendered non-GDP household production, also include Fontana (2001) on Bangladesh, Fontana (2002) on Zambia, Fofana et al. (2005) on Nepal, Cockburn et al. (2007) on South Africa, Siddiqui (2009) on Pakistan, and Filipski et al. (2011) on the Dominican Republic.			

As shown in Table 2.1, Arndt and Tarp (2000) is the pioneering paper in the first group. Their gender disaggregation of labor, which is limited to agriculture, makes it possible to analyze the impacts exogenous shocks (in their case affecting productivity and marketing costs) on labor incomes by gender as well as standard non-gendered indicators. Their analysis also considers the role that risk aversion may play in generating an overallocation of female labor to one of the agricultural sectors (cassava). To make it possible to address gender aspects, the database for the Arndt-Tarp model has more detail than contained in standard national accounts for agriculture, an example of what in the context of the SNA is referred to as "internal satellite accounts."

Fontana and Wood (2000) were the first to extend a gendered CGE model to household production, i.e. going beyond GDP production. This adds to data requirements, in SNA terms requiring "internal satellite accounts," but has the analytical advantage of transcending the artificial boundary between time spent on GDP production and (often larger amounts of) time spent on production of household services for own consumption and leisure. As a result, it becomes possible to consider the impact (including gender aspects) of changes in market work on time spent on leisure and household work, all of which in different ways contribute to household and individual well-being, including various trade-offs. The terminology for and extent of disaggregation of household work have varied but reference is often made to social reproduction, an activity that may be further disaggregated into activities like different types of care, cooking, cleaning, washing, and shopping. Both the initial contribution by Fontana and Wood and subsequent contributions (see note below Table 2.1) have focused on trade-related issues.

This narrow focus suggests that studies on other issues, like care policies in this paper, could yield new insights at the same time as they may lead to enriched model formulations and impose new data requirements.

In an analysis of Ethiopia, Ruggeri Laderchi et al. (2010) developed a gendered version of MAMS (Maquette for Millennium Development Goal Simulations), a recursive dynamic CGE model designed for medium- and long-run policy analysis that covers indicators related to the Millennium Development Goals (MDGs). The model applies the Fontana and Wood approach to household production and gender. Its innovative aspects lie in its treatment of the educational system: it is split into three levels with endogenous and gendered entry, graduation, dropout, and repetition. Students exiting from the educational system enter the segment of the labor market that corresponds to their educational attainment in shares that reflect data on labor force participation. Those who leave school early wait until they reach labor force age. Model simulations analyzed the impact of rapid expansion in the educated female labor force on wages, employment and household services and how these impacts are conditioned by labor market segmentation and productivity growth within household services.

Future research will likely generate methodological advances that help analysis based on gendered CGE models contribute to emerging debates on policies with a clear gender dimension. One broad area is related to policymaking in the of a global rise in female labor force participation – what impact may different policies have on wages, household production, welfare, and inequality, including both gender-specific and more aggregate indicators? The analysis in the rest of this paper is an example of this: East Asia faces important gender-related policy challenges in the context of little (or no) growth for the working-age population, low rates of female labor force participation, rapid growth in an elderly population that needs care, and gender inequalities both in the household and market spheres.

Another broad and generally more challenging area revolves around the impact of different types of consumption and investment on the accumulation of human capital and growth. The education analysis in the Ethiopia MAMS application touches on this aspect. However, this analysis could be extended to consider the links between, on one hand, growth and human capital accumulation and, on the other hand, the consumption of prepared food, care, and education services, supplied by the market and households?

3. Model structure and database

As noted, the purpose of the analysis is to guide the design of policies for child and elderly care in East Asia for the period up to 2030. A model and database appropriate the purpose need to capture key features of child and elderly care in East Asia, taking into consideration gender roles, the functioning of the labor market, demographic developments, and available policy tools. Section 3.1 addresses model structure with emphasis on the distinguishing features while Section 3.2 describes the stylized database.

3.1. Model structure

The gendered CGE literature, briefly reviewed in Section 2, provides the starting point for the stylized East Asia gendered CGE model of this paper, which has the disaggregation shown in Table 3.1. Thus, in common with most other gendered CGE models, production sectors (activities and their outputs, referred to as commodities) cover not only the production that is part of GDP, referred to as market sectors, but also household production for own consumption and leisure. Furthermore, time use (for labor factors) is gendered and extended to cover household services and leisure. Leisure demands are specified for the adult population, disaggregated by household and gender (i.e., leisure cannot be delegated). While time allocation to leisure and production (inside or outside the household) is endogenous, the time needed to meet minimum personal maintenance needs (like sleeping and personal hygiene) is exogenous.

In order to address care issues in East Asian context, a topic that hitherto has not been addressed in the CGE literature, the model of this papers includes various novel elements:

- The disaggregation of both the household and market spheres of the economy separate child and elderly care from other sectors.
- Service commodities produced by the household and the market are treated as imperfect substitutes in household demand, using a nested structure.
- In order to capture income inequality, the labor force is disaggregated into regular and non-regular workers, with the latter often performing the same tasks as regular workers but with lower wages (and temporary contracts). In the context of the highly educated workforces of East Asia, this distinction appeared more relevant than disaggregation by level of education. Similarly, the model formulation makes it possible to capture wage differences between male and female workers, including a part that is ascribed to profit-reducing discrimination against female workers (i.e. erroneous perceptions that underestimate the marginal productivities of women relative to men).
- The households are disaggregated into three categories in order to capture differences in care needs and per-capita incomes: To capture income inequality, the working age households are split into two groups depending on whether the workers have regular and non-regular employment. In order to capture different care needs, these two household types, which both have children, are distinguished from a category of elderly households, which have their own distinct care needs.

Table 3.1. Disaggregation of Stylized East Asia CGE Care model	
Production activities and commodities (1-1 mapping)	
Household	Household child care services, by household type
	Household elderly care services, by household type
	Other household services, by household type
	Leisure, by household and labor type
Market*	Private child care services
	Private elderly care services
	Other private services to households
	Other private production (goods and services)
	Government child care services
	Government elderly care services
	Other government services
Institutions**	
Government	
Enterprise	
Households	Non-regular worker (with children)
	Regular worker (with children)
	Retired
Rest of world	
Factors of production	
Capital	Private and government (the latter disaggregated by sector)
Labor	Male, non-regular, by household category
	Male, regular, by household category
	Female, non-regular, by household category
	Female, regular, by household category
	Male, retired, non-regular
	Female, retired, non-regular
Auxiliary government accounts	
Taxes	Direct
	Domestic indirect (VAT and other)
	Import tariffs
	Subsidies (care, other)
Investment	
Private	
Government	Disaggregated by government sector
*Part of GDP	
**Each institution has current and capital accounts	

- Household demands for care services are linked to demographic changes for each household category. For households in working age, the demand for child care depends on the child population whereas, for elderly households, care demand depends on population size.[3]
- In addition to standard policy tools, the model will include government subsidies of child and elderly care, both of which may be targeted to specific services and household groups. The subsidies may be used to make it more attractive for households to satisfy their care demands.

In other respects, the features of the model are typical of many others in the literature.[4] In order to capture demographic change over time, the model is recursive dynamic. Household and producer decisions are driven by utility and profit maximization, respectively, while the government has no objective function but follows explicit rules and, like other agents, is subject to a budget constraint. Within this structure, households satisfy demands for commodities (goods and services) and leisure with the features described above. The households are endowed with capital and labor, the latter disaggregated by gender and employment states. The time available to each labor type is defined to cover time spent on work outside the household, household service production and leisure. For the production activities (both household and non-household), the substitutability between multiple labor factors (by gender, age, and employment status) is imperfect to reflect empirical evidence of labor market segmentation. Unless otherwise noted, prices and wages are flexible, playing the role of clearing markets, with exogenous relative wage differences between production activities. Similarly, a real exchange rate variable clears the balance of payments. The government spends on consumption, investment, subsidies, and transfers, drawing on receipts from taxes, transfers, and net financing from other institutions.

3.2. Database

A 2014 East Asia database with the disaggregation presented in Table 3.1 was constructed drawing on supply and use tables, complementary fiscal and balance of payments data, time use surveys, employment and time-use data, as well as data on wage differences by gender, employment status, and sectors. Elasticities for production, consumption and trade are based on other CGE applications, considering the need to replicate observed rigidities in different parts of the economy.

[3] For elderly households, the specification of elderly care demand (met from by supplies from outside the household) may consider the age profile of its population; they may also produce child care that is provided to linked working-age households. For working-age households, the demand for child care may similarly consider the age profile of the child population; working-age households may also provide elderly care to linked elderly households.

[4] The starting point for the model is SDGSIM, a model that may be used to address a wide range of issues related to the global sustainable development goal (SDG) agenda. SDGSIM is a further development of an earlier model, MAMS (Maquette for millennium development goal simulations) that, as indicated by its name, was focused on the preceding agenda of millennium development goals (MDGs).

4. Simulation analysis

The policy simulations cover a range of care policies, including public investment and subsidies, designed to help households meet their growing care needs and redistribute the burden of care provision from unpaid household labor (primarily performed by women) to a broader set of actors and institutions (where care provision will be paid), with alternative financing options (direct or indirect taxes).

The impact indicators of interest include changes in (a) disaggregated household wellbeing, incomes, and time use, the latter disaggregated by labor type; (b) spending and receipts in the government budget; and (c) aggregate wellbeing (which may benefit given higher efficiency of care services provided via the market. It is hypothesized that the differentiated impacts across household types will depend on care needs and ability to benefit from changed opportunities for market work, particularly for women. The potential impact on fertility rates will also be considered.

Sensitivity analysis will address the roles played by substitutability between (a) household and market services in the satisfaction of part of household care needs; and (b) male and female labor in household and non-household production. The simulations will also explore how the results are impacted by profit-reducing male-female wage discrimination (which is quite severe in some East Asian countries), and the ability of the economy to absorb and benefit from increased female market work (which also depends on rigidities in the distribution of employment across males and females in different sectors).

5. Conclusions

The conclusions will comment on:

- Empirical insights relevant to East Asia: In relative terms, what is importance of different policy interventions and rigidities (both in the labor market and the allocation of household work) in terms of their impact on wage and income equalities (between households and gender groups) and more aggregate welfare indicators? What may be the impact of activist policies combined with success in tackling economic rigidities?
- Methodology: Lessons for future applications of gendered CGE models in general and those applied to address care in particular, including how issues and policies may differ in other country contexts, including low- and middle-income countries.

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