



Enriching U.S. labor results in a multi-regional CGE model[☆]

Caitlyn Carrico¹, Marinos Tsigas^{*}

U.S. International Trade Commission, USA



ARTICLE INFO

Article history:

Accepted 17 September 2013

JEL classification:

C68

F16

J31

Keywords:

Labor

Trade

CGE model

GTAP

Wage

Labor structure

Labor disaggregation

ABSTRACT

This paper proposes a new approach for enriching results for U.S. labor markets from the leading multi-regional CGE model, the GTAP model. Departing from the usual approach of expanding labor data in all economies in a model's database, our method expands only the U.S. labor data. Additionally, we introduce a novel modification to primary factor demands, generating more realistic labor markets in which lower-skilled jobs substitute more easily with other primary factors than higher-skilled jobs. The advantages of our approach are that we can rely on the most recent and the most disaggregate U.S. labor data available; we build upon the most recently available GTAP database; and, when applied to other economies, our approach is the initial contribution to a database of detailed labor statistics for several economies.

Published by Elsevier B.V.

1. Introduction

Multi-regional computable general equilibrium (CGE) models and their datasets are established analytical tools for international economic issues. Their data requirements, however, can be significant for large scale analyses, for example global trade negotiations, climate change, and immigration. The Global Trade Analysis Project² (GTAP) database, a collaborative effort among many institutions and researchers, has reduced the costs of assembling large datasets and has contributed to its wider usage, such as by research teams using non-GTAP models. The central component of the GTAP database is a comprehensive and

balanced set of bilateral trade statistics for 57 aggregate sectors for a particular base year. Input–output accounts for 129 economies, contributed by several researchers, are adjusted to conform to the trade statistics.³

As policymakers and economists alike have shown a continuous interest in acquiring disaggregate information from GTAP-based analyses, the dimensions of the GTAP database have expanded since its first release in 1993: the number of economies has increased from 15 to 129 in 2007; and the number of sectors has increased from 37 to 57 in 2002.⁴ One area of the GTAP database that has not expanded significantly is that of its labor statistics. Published input–output accounts provide the minimum amount of labor data, that is total payments to labor by sector, and it is a labor-intensive exercise to access and process labor-specific national datasets for all economies in the GTAP database.

Recently, at a roundtable hosted by the United States International Trade Commission on quantifying the effects of trade agreements, speakers identified the disaggregation of labor categories beyond the standard unskilled and skilled labor types as a necessary advancement of economic models (Carrico, 2012). Responding to these demands, this work expands the U.S. labor data within the GTAP model. The U.S. Department of Labor and the Department of Agriculture collect

[☆] The authors thank the BLS/OES staff for their helpful advice in working with the datasets and Michael Ferrantino, Alan Fox, Robert Koopman, Linda Linkins, Bill Powers, Matthew Reisman, David Riker, and Nathanael Snow for their comments and suggestions. The views expressed in this paper are those of the authors alone. These views do not necessarily reflect the views of the U.S. International Trade Commission or any of its individual Commissioners. All CGE results presented in this paper are from hypothetical simulations intended to illustrate the technical modifications introduced into the model. None of the CGE simulations or any of the CGE results should be considered indicative of any real-world situation, past, present or future.

^{*} Corresponding author at: Office of Economics, U.S. International Trade Commission, 500 E Street, SW, Washington, DC 20436, USA. Tel.: +1 202 708 3654; fax: +1 202 205 2340.

E-mail address: marinos.tsigas@gmail.com (M. Tsigas).

¹ Caitlyn Carrico is a doctoral student in the Department of Agricultural Economics, Purdue University, West Lafayette, Indiana, USA. This work was conducted when she was working at the U.S. International Trade Commission.

² Information about GTAP can be found at <https://www.gtap.agecon.purdue.edu/about/project.asp>.

³ More information about the GTAP database can be found at <https://www.gtap.agecon.purdue.edu/databases/v8/default.asp>.

⁴ For the evolution of the GTAP database see <https://www.gtap.agecon.purdue.edu/databases/archives.asp> and Narayanan et al. (2012a, 2012b).

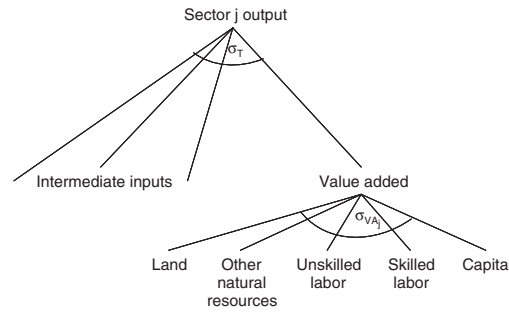


Fig. 1. Input substitution possibilities for producing sectors in the standard GTAP model. Source: Hertel and Tsigas (1997).

extensive data on the labor force. Though nuanced, the data that these agencies provide are an up-to-date resource which may be used to provide a more detailed analysis of U.S. labor markets. In addition, we modify the specification of primary factor demands in GTAP, generating more realistic labor markets in which lower-skilled jobs substitute more easily with other primary factors than higher-skilled jobs. The advantages of our approach are that we can rely on the most recent and the most disaggregate U.S. labor data available; and we build upon the most recently available GTAP database.

There are many GTAP-based analyses where authors have changed the standard GTAP database in a symmetric way, that is for all economies in the analysis. Thus our focus on the U.S. labor data in the GTAP database while we do not change labor data for all other economies might appear controversial. There are, however, several GTAP-based analyses where the authors introduced new concepts in the GTAP database focusing on just a few economies. An example is analyses of non-tariff measures (NTMs). The standard GTAP database does not include NTMs. Yet authors have introduced NTMs for a small number of economies in the GTAP database and analyzed their effects. One report for the European Commission assessed NTMs affecting bilateral trade and investment between the United States and the European Union; here, the authors only introduced NTMs for the U.S. and the E.U. in the GTAP database without introducing NTMs for the rest of the economies (Berdin et al., 2009). Our approach is similar in spirit to their approaches in that we choose to focus on a single economy as opposed to all economies in the GTAP database. However, we are not aware of any other work that has expanded the coverage of labor as well as the theory of primary factor demands for a single economy in a multiregional CGE model based on published statistics.

The following section provides an overview of the relevant components of the GTAP framework and presents a benchmark set of simulations against which we compare simulated results from the revised GTAP data and model. Section 3 documents the datasets that we use, the procedures employed to compile extended labor statistics, and the implementation of these statistics within the model. Section 4 discusses the expansion of primary factor demands and its integration within the model. Section 5 provides a conclusive discussion.

2. An overview of labor in the standard GTAP model

The first version of the GTAP database and model were developed during 1992–93. In the original GTAP database, for every economy, one value for payment to labor was reported for each of the 37 GTAP sectors that were available at the time. Liu et al. (1998) proposed breaking out each of these total labor payments to skilled and unskilled labor payments. Their paper draws from wage and employment data on 12 countries (including the United States) and the European Union to compute payments to labor for skilled and unskilled jobs. From these labor payments, they generated labor payment shares for skilled and

unskilled workers within each industry. For their paper, U.S. data were obtained from the 1970 Census of Population and the 1992 Current Population Survey. They used a regression to estimate labor payments for the remaining regions of the GTAP version 4 database. Their work was incorporated into the GTAP version 4 database and into each subsequent database. Most recently, Dimaranan and Narayanan (2008) mapped the results of Liu et al. to all standard countries and 57 GTAP sectors in version 7 of the GTAP database. These labor statistics remained unchanged for the release of GTAP version 8.

Weingarden and Tsigas (2010) produced updated wage and employment data for the GTAP database over the average of years 2004 and 2005. They used a constrained optimization model to impute from ILO data from the *ILO Yearbook*, and produce complete wage by ISCO occupation and industry datasets for 48 countries across 18 1-digit ISIC Revision 3 industry categorizations. They used five wage groupings based on the ISCO 88 classification system. Currently, researchers at the Center for Global Trade Analysis of Purdue University are working to expand their findings to all standard GTAP countries.

2.1. Modeling labor markets in standard GTAP

The standard GTAP model employs a two-level nested-CES (constant elasticity of substitution) production function for each producing sector. Fig. 1 sketches the substitution possibilities among inputs in the standard GTAP model. At the first level of the nest, demands for primary factors are derived from a CES production function with elasticity of substitution σ_{VAj} . In the standard GTAP database, the values of the parameter σ_{VAj} are positive and less than 1 for agricultural sectors; σ_{VAj} is larger than 1 for services and manufactures. At the second level of the nest, demands for intermediate inputs and value added, that is the composite of all primary factors, are derived from a CES production function with elasticity of substitution σ_T . In the standard GTAP database, the values of the elasticity of substitution σ_T are zero, that is intermediate inputs are complementary to value added and they are both employed in fixed proportions.⁵

Two other important economic assumptions in the standard GTAP model complete the specification of labor markets. First, each region has fixed endowments of skilled and unskilled labor. This assumption implies that the standard GTAP model does not allow the transformation of an unskilled worker to a skilled worker and vice versa. Additionally, this assumes that employment is fixed; for practical purposes this translates to a fixed level of employment for each labor type, skilled and unskilled. Second, labor services are assumed to be intersectorally perfectly mobile, but region specific. This assumption implies that all sectors in a region face the same market price for labor services. Together these two assumptions can be understood as meaning that within each economy, the total

⁵ For a review on alternate nestings of CES functions and labor splits in CGE models, see Section 4 in "The Labor Market in CGE Models," by Boeters and Savard (2011).

Download English Version:

<https://daneshyari.com/en/article/5054296>

Download Persian Version:

<https://daneshyari.com/article/5054296>

[Daneshyari.com](https://daneshyari.com)