CHIOT: Estimating Historical Input-output Tables of China

Chen LIN[a,*], Lei SHI[b], Qian WEI[a]

[a] *The Center for Economic Research, Shandong University*
[b] *State Environmental Protection Key Laboratory of Eco-industry, Tsinghua University*

Abstract

The objective of the project called China historical input-output tables (CHIOT) is to estimate input-output tables (IOT) of China for every five years from 1958 to 1968. Because the economic growth theory is about long-term issues, analyzing only the post-reform-and-open era is hard to give a panorama of the base of economic growth of China. However, except for a trial version of IOT compiled for the year of 1973, there exist only IOTs of China for the years after the beginning of economic reform. Based on this background, we initialized the CHIOT project. The project starts from the estimation of sectoral direct input coefficients. The estimation is mainly based on firm-level technical data that we obtained from representative firms of each industry. By adding few reasonable assumption, we obtain average direct input coefficients at the national level. Based on this, the flow tables are generated by using national statistical data. In order to understand the environmental impact of production and consumption in the early period of the P.R.C., we also estimate several key environmental pollutions by IO

*Corresponding author address: Institute of Financial Studies, Shandong University, 27 Shanda Nanlu, Jinan, China 250100. E-mail address: c_lin@sdu.edu.cn (C. Lin).

sectors, which make our tables be environmentally extended IOTs.

Keywords: Input-output table, Historical, Environmentally extended

1. Introduction

Current status of an economy is not only determined by economic activity, but also by the motion of certain stock variables, such as capital and resource reserves, which are in turn determinated by the historical activities of an economy. In other words, to understand the current status, we must discuss the historical origin of an economy. In the economics theory field, ardent debates focus on the question of "Chinese miracle of economic growth"(Song et al., 2011). Among these debates, some scholars argue the rapid growth during the era of economic reform is partly due to the capital accumulation in heavy industries achieved in the pre-economic-reform era (Chen and Lin, 2013). Meanwhile, Input-output analysis (IOA) is a powerful tool to analyze the economic structure and inter-sectoral linkage, while input-output tables (IOTs) show unique information at sectoral level (Miller and Blair, 2009). Analyzing the economic structure and intersectional linkage of the pre-reform-and-open era can help us to understand the relationship

The first IO table of China is for the year of 1973 compiled by National Bureau of Statistics and China Academy of Science (Liu and Chen, 2005). The year of 1973 is one year later that Deng Xiaoping's come-back, so its economic state is different with the early stage of culture revolution and pre-culture revolution era. Therefore, we still need the IOTs for earlier years to trace to the source of the economy of P.R.C.

2. Framework

The objective of this study is to compile SUT tables and industry-by-industry IO tables every five years from 1958 to 1968. The SUT tables consist of 29 products and 19 industries. Each systemic table include 18 intermediate sectors as follows: Agriculture, Coal mining and selection, Crude oil and natural gas mining, Other mining activities, Food, textile, paper, & furnitures, Petroleum processing & coking, Chemical industry, Construction materials, Metal smelting & metal products, Machinery industry, Transportation equipment, Electronic & electric equipment, Instrument, office machinery, & other machinery, Production and distribution of electricity, gas, and water, Construction, Transportation, post, & storage, Commerce & restaurants, and Other services. We do not disaggregate the final demand and value added into specific classification due to data limitation.

3. Compilation methods

The study starts from the estimation of sectoral direct input coefficients. The estimation is mainly based on firm-level technical data that we obtained from representative firms of each industry. Take the direct input coefficients for the sector of Metal smelting & metal products as an example. We first make a make-use table as shown in Table 1 and 2 for each of the representative firm by using the make-use data from statistical books of representative firms in the sector of Metal smelting & metal products, such as Compilation Committee of Chronicle of Jinan Steel and Iron Complex (1991). after aggregating the make-use tables, we obtain coefficient matrices at national average level. Based on this, the flow tables at national average level are

branch / output	coking	firing	Ironmaking	Steelmaking	Medium plate	Steel rolling	Power	Machine repair	Transport	Car brigade	Construction department	Steel raw materials	Portland	Production Services
Coke (t)	356785													
Crude tar oil (t)	28786													
Light benzol (t)	16													
Ammonia (t)	476													
Pure benzol (t)	1734													
Bitumen (t)	1764													
Methylbenzene (t)	224													
Dimethy (t)	37													
Tar phenol (t)	28													
Solvent (t)	•													
Coumarone (t)	9													
Heavy benzol (t)	•													
Crude carbolic acid (t)	•													
Lightoil (t)	•													
Washing oil (t)	•													
Technical naphthalene (t)	•													
Miscella (t)	497													
Net oil (t)	15													
Sinter (t)		203542												
Pellets (t)		148788												
Ore (t)		155232												
Pig iron (t)			252938											
Steel (t)				131907										
Water (m3)							4165.43							
Soft water (m3)							303812							
Electricity (10 mwh)							8682.54							
Steam (10 kt)							233710							
Oxygen in bottle (10k m3)							34.02							
Oxygen pipeline (10k m3)							2713.75							
Iron smelting gas (10k m3)							75155							
Coke-oven gas (10k m3)							11620							
Large pieces of iron depletion (t)								10682.8						
Iron shaped pieces (t)								809.24						
Steel Castings (t)								81.5.7						
Bronze pieces (t)								89.64						
Forging (t)								577.37						
Riveting pieces (t)								302.67						
Airport Cargo (t)									1209089					
Issued cargo (t)									417594					
Factory traffic (t)									1003883					
Total traffic (t)									2669862					
Steel (t)												•		
Silicate brick (t)													•	

Figure 1: Make table for Jinan Steel Complex in 1968

generated by using gross output data for each years from national statistical data, such as National Bureau of Statistics (2010) and matrix completion methods (Wen et al., 2014). Finally, industry-based technology is used to convert the make-use table into a symmetric table. .

投入表 (use table)

branch / output	coking	firing	Ironmaking	Steelmaking	Medium plate	Steel rolling	Power	Machine repair	Transport	Car brigade	Construction department	Steel raw materials	Portland	Production Services
Washing oil (t)	*													
Acid consuption (t)	*													
Alkali consuption (t)	*													
Sry coal (t)	467388.4													
Standard Mine (t)		*												
Labor force (t)		233.91												
Coke (t)			31914.818											
Lime (t)			13336.284											
Cost (10k Yuan)			624.03744	282.54										
Molten iron (kg)				1.74E+08										
locomotive coal consumption (kg)									*					
Iron scrap (t)												*		
Slag (t)													*	

Figure 2: Use table for Jinan Steel Complex in 1968

4. Discussion

The CHIOT estimates input-output tables of China for every five years from 1958 to 1968, in the forms of both SUT and systemic tables. It can help us to understand the historical origins of current economic and environmental problems. We end this paper by pointing out few future directions. First, to increase the accuracy of the estimation, we are planning to increase the size of sample firms for each sector, as well as the sources of statistical data. Second, sector and product classification needs to be adjusted to increase the degree of resolution. Finally, considering more types of emission is another important future direction.

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