Chapter 8
Backward and Forward Linkages in Chinese Steel Industry Using Input Output Analysis

Lafang Wang
Hunan University, China

Rui Xie
Hunan University, China

Jun Liu
Hunan University, China

ABSTRACT
This paper measures the direct and indirect contribution made by iron and steel industry in the economy of China and assess the differences between China and other steel producing countries. With this aim in view, the input-output modelling is used to detect the industrial linkages known as backward and forward linkages of eight iron and steel producing countries, including China, USA, Japan, Germany, Italy, Brazil, Korea, and India. The induction effect of export demand on steel industry in China is shown to be less than several OECD countries, such as Japan.

1. INTRODUCTION
Chinese steel sector has made quiet great progress after China implements its reform and opening to the outside world. Output of crude steel had risen from 0.158 million tons in 1950 to 31.78 million tons in 1978. In 2008, it reached to 502 million tons, accounting for 37.8% of the world output, which is equal to the total steel output of Top.2 to Top.9 countries’ in the world (it was almost four times the size of Japan’s, five times of USA and eleven times of Germany). China became the world’s largest steel producer since 1996, and had been the world’s largest steel exporter in 2006 for the first time, surpassing Japan, Russia, and the European Union.

DOI: 10.4018/978-1-4666-2473-3.ch008
Steel industry is in the middle of the manufacturing value chain. On the one hand, it will influence on up-stream industry, such as mining industry, energy industry, etc. On the other hand, the steel products are the raw and processed materials for many down-stream industries. The steel industry now has driven a very long chain, it can be used as a way to restrict or accelerate the development of the national economy by adjusting the scale of input and output, the ripple effects on employment and economic activity on other sectors of the economy is sizeable. Although the scale of Chinese steel industry is sizable, it’s push and pull effect on national economy mostly depends on the extent of linkage effect between steel industry and its up-stream & down-stream industries. Policy makers need to recognize and assess the effects of these two impacts in the economy.

In recent years, many scholars have examined the economic effects of Chinese steel industry. Gao (2004) has probed into the pull effect which economic increase exert on the demand of steel industry with Variation Coefficients model. The result shows that the demand of steel products can be pulled significantly by the investment of infrastructure construction and real estate. Export can pull the demand of steel products obviously before China attended the WTO, but this pull effect trails off after China attended the WTO. Based on the research of Gao (2004) and Tan (2007), we chose different variables to evaluate the dynamic effects which the macro economy exerts on the demand of steel industry. The result shows that the industrial added value, the infrastructure investment, the real estate investment and export can pull the demand of steel remarkably. Using VAR model, Dou (2007) has gotten the similarity result. Above-mentioned researches mainly analyzed the key pull factors of steel industry from the demand aspect. The backward linkage and forward linkage effects of steel industry had not been examined. Also the induction effects exerted on steel industry by the final demands had not been fully touched. Input output (IO) was introduced by Leontief (1936) and since then has become a powerful tool in economic planning. Applications of IO models on the linkage effect of the industries issues can be found in many papers. Khan (2009) discussed the backward linkages in readymade garment industry in Bangladesh. San Cristobal et al. (2006) used IO tables to estimate the inter-industry linkages of mining industry in European Union. Karkacier et al. (2005) analyzed the structural interdependence of the agricultural sector and energy sectors in Turkey. Kawk et al. (2005) examined the role of the maritime industry in the Korean economy. Lin et al. (2007) discussed how the nature of contractual relationships between a multinational and its local suppliers affect backward linkages and welfare in the local industry. Lydall (2009) presents a case study of backward linkage development in the South African platinum group metals (PGM) industry and draws on the findings from a quantitative and qualitative analysis of the sector undertaken in 2007. Han et al. (2004) analyzed the linkage effects of the electric power industries in Korea in 1998. Cai et al. (2005) develop a methodology to calculate tourism’s forward and backward linkages using information from national, regional, or local input-output tables and demonstrate its utility by applying it to Hawaii. Lenzen (2003) analyzed the interdependencies of industries in the Australian economy in terms of environmental pressure and resource depletion. Azad (2002) estimated the direct and indirect linkages of services in the economy of Bangladesh. Claus (2002) investigated the production structure of the New Zealand business sector using the recently released 1996 input output tables. Monks et al. (2005) provided a comprehensive qualitative assessment of the risks to financial stability arising from other UK-resident financial sectors. Midmore (2006) assessed industry linkages using regional Input--Output tables. Desrochers (2002) examined the processes leading to the spontaneous development of industrial recycling. Li et al. (1998) using Chinese I-O table of 1987 and 1992