Forest Policy and Economics 39 (2014) 43–53

Contents lists available at ScienceDirect

Forest Policy and Economics

journal homepage: www.elsevier.com/locate/forpol

Recent growth in China's roundwood import and its global implications

Changyou Sun [1]

Department of Forestry, Mississippi State University, Mississippi State, MS 39762, USA

ARTICLE INFO

Article history:
Received 9 July 2013
Received in revised form 1 October 2013
Accepted 18 November 2013
Available online 7 December 2013

Keywords:
Demand elasticity
Export tax
Import demand
Rotterdam model
Source differentiation

ABSTRACT

In recent years, China's booming economy has resulted in a rapid growth of its roundwood consumption. China has become the largest roundwood importer worldwide, with annual spending on imports over $10 billion and the share in total world exports up to 38%. In this study, a Rotterdam demand system is employed to assess China's roundwood import demand by supplying source and product type between 1995 and 2012. Major findings are that the average expenditure share of China between 1995 and 2012 is 36% for coniferous roundwood, 17% for tropical roundwood, and 38% for other nonconiferous roundwood. China's imports have become diversified with more roundwood suppliers, including Russia, Malaysia, New Zealand, Gabon, and the United States. The estimates of expenditure and own-price elasticities for coniferous roundwood are small for most supplying sources. There is little competition within the coniferous roundwood group, but substitute or complementary relations exist across the four product groups by source. These findings are helpful for policymakers, industrial firms, and environmental groups to evaluate the impact of China's strong roundwood demand on economic development and environmental protection on a global scale.

1. Introduction

China has experienced rapid economic development in recent decades. This has been accompanied by huge demand for resource commodities and large imports of raw materials. The shares of China's imports in total world trade during recent years have been more than, for instance, 10% for coal, 25% for cotton, and 80% for metal ores (Muhammad et al., 2012; Roberts and Rush, 2012). In particular, roundwood, also referred to as unprocessed wood or logs, has been one of the major commodities on the importation list for China. Roundwood imports by China were over $10 billion in 2012, accounting for 38% of total world exports (UN Comtrade, 2013). Both softwood and hardwood logs have been imported by China, and furthermore, these products have been supplied by a number of countries worldwide. Russia has been the leading supplier, as it is rich in forest resources and geographically close to China. Other major suppliers include Myanmar, Malaysia, Papua New Guinea, New Zealand, Gabon, and the United States of America.

A number of studies have analyzed the roundwood market in China from different perspectives. China's forest acreage accounts for about 5% of the world total and ranks the fifth in the world (after Russia, Brazil, Canada, and the United States) (Food and Agriculture Organization, 2013). However, China is very poor in forest resources on a per capita basis because the Chinese population is about 20% of the world total. Forests in China are public, owned by state farms or collective forest farms (Sun et al., 2005). Roundwood production and distribution in China were monopolized by governments prior to the 1980s, and a gradual transition from state allocation to market liberalization occurred during the late 1980s and early 1990s. At present, roundwood harvesting and transportation remain heavily regulated by governments, while producers have more freedom in product marketing than before. As roundwood demand is derived from the forest products manufacturing, both domestic needs (e.g., housing and construction) and exports of forest products (e.g., furniture) have contributed to strong roundwood consumption in China (Zhang and Gan, 2007). He and Xu (2011) analyzed the demand and supply in China with panel data for 30 provinces from 1989 to 2006, and projected that roundwood consumed by China would triple between 2008 and 2020.

The Chinese government has attempted to reduce the amount of roundwood imports by managing commercial forest resources, particularly fast-growing plantations (Sun et al., 2005). However, these plantations are heavily skewed toward young and middle aged forests, and stand quality is generally low from the perspective of fiber supply. As a result, insufficient forest resources, harvesting restrictions, and the booming economy in China together have continued to widen the gap between domestic roundwood supply and demand. Yang et al. (2010) presented a descriptive analysis of China's roundwood shortage and import patterns of roundwood between 1998 and 2008. Over the long term, importation has still been perceived to be the primary solution to roundwood shortage in China. To summarize, previous studies have reported useful information about the structure of China's roundwood market and general import trends in recent years. There has been, however, a lack of assessment on the competition of imports by roundwood product and supplying source in China through a rigorous demand system.

E-mail address: csun@cfr.msstate.edu.
[1] Tel.: +1 662 325 7271; fax: +1 662 325 8726.

1389-9341/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.forpol.2013.11.006

The objective of this study is to evaluate China's import demand for roundwood by type and source between 1995 and 2012. More specifically, this study seeks to analyze the impact of economic factors and non-economic factors on the demand for source-differentiated roundwood products. The model employed is a Rotterdam demand model. Roundwood demand is differentiated by product and source, theoretical properties of the demand system can be tested and imposed during the estimation, and economic and non-economic factors can be considered simultaneously in the system. Roundwood is classified into four types: coniferous, tropical, other nonconiferous, and the others. Coniferous roundwood is called softwood, and tropical and other nonconiferous roundwood is also referred to as hardwood. Up to six countries or supplier groups are considered for each roundwood type. Main findings are that the large demand for roundwood in China has resulted in inelastic expenditure and own-price elasticities for coniferous roundwood imports from most sources. There is little competition within the coniferous roundwood group, but substitute or complementary relations are found across the roundwood product groups and supplying sources. These findings should be helpful to policymakers, industrial firms, and environmental groups in comprehending China's roundwood market, and furthermore, tackling the economic and environmental impacts of China's rising roundwood imports.

2. Roundwood trade patterns and issues

2.1. Roundwood imports by China

In assessing trade significance of a commodity, the volume of production, consumption, and trade in a country can be compared to reveal relative magnitudes (Table 1). For roundwood production, China has experienced a big U-shape pattern between 1995 and 2011, with 108.3, 92.7, and 103.0 million m^3 produced in 1996, 2002, and 2011, respectively (Food and Agriculture Organization, 2013). The main reason for the decline was a large flood along China's Yangtze River in 1998. Since then, China has implemented the Natural Forest Protection Program and reduced roundwood harvesting dramatically. In recent years, roundwood production has recovered gradually, but it is still about 5% lower than the peak volume in 1996. By species, both coniferous and nonconiferous roundwood had similar decline and recovery, but nonconiferous roundwood experienced an even larger percentage decline from 1996 to 2002. Overall, roundwood production in China since 1995 has been volatile and declining.

Roundwood imports by China have increased rapidly in recent years, with 6.1, 15.7, 30.7, and 43.4 million m^3 in 1995, 2000, 2005, and 2011, respectively (Table 1). By species, China imported more nonconiferous roundwood than coniferous roundwood before 2001. The corresponding import quantity in 2000 was 9.2 and 6.5 million m^3 for nonconiferous and coniferous roundwood. In recent years, however, only about 25% of the imports are nonconiferous. In 2011, China imported 11.5 million m^3 of nonconiferous roundwood and 31.8 million m^3 of coniferous roundwood. By supplying source, China has been importing roundwood from all over the world. These countries include Myanmar, Russia, Indonesia, the United States, and central African countries (e.g., Congo). In particular, Russia has been the main supplier of softwood and some hardwood. African countries are the main suppliers of tropical nonconiferous roundwood.

The share of imports in total consumption has been steadily growing in China over time. In 1995, only 2% of the total roundwood consumption in China came from imports (Fig. 1). That share has been constantly increasing over time: 10% in 2000, 23% in 2005, and 33% in 2011. The individual patterns are similar for coniferous and nonconiferous roundwood. Furthermore, total world roundwood exports have increased by a moderate and steady pace over time, with 88.7, 114.1, 129.1, and 115.0 million m^3 in 1995, 2000, 2005, and 2011, respectively. The rapid growth of China's imports has resulted in an even larger share of world exports going to China. In 1995, 7% of world roundwood exports were sent to China, and the corresponding share in 2000, 2005, and 2011 has increased to 14%, 24%, and 38%, respectively. To summarize, China's demand for global roundwood occurs at the same time that its domestic production has been declining and economic growth has been strong for the past one and a half decades. Roundwood imported by China was composed of up to 33% of China's total consumption, and up to 38% of world total exports. These imports are diversified with various product types and supplying sources.

Table 1
A comparison of roundwood production and import quantities by China and total world exports between 1995 and 2011.

Year	Production by China		Import by China		World export	
	C	N	C	N	C	N
1995	64.9	36.3	1.1	5.0	48.1	40.6
1996	69.5	38.9	0.8	5.1	44.3	33.6
1997	68.7	38.0	1.1	5.7	47.5	36.6
1998	68.7	38.4	1.6	5.3	47.7	38.1
1999	64.1	35.8	4.7	7.5	59.0	39.8
2000	61.8	34.2	6.5	9.2	68.3	45.8
2001	60.0	33.5	9.3	9.2	68.8	42.0
2002	59.5	33.2	16.1	9.8	72.9	43.6
2003	60.8	33.9	15.2	11.5	72.4	42.8
2004	60.8	33.9	16.2	11.2	73.9	43.3
2005	60.8	33.9	18.4	12.3	81.2	47.9
2006	60.8	33.9	19.9	13.2	81.8	48.3
2007	58.3	32.6	23.5	14.8	82.6	50.6
2008	64.6	36.3	18.9	12.2	69.4	44.9
2009	64.4	36.2	20.5	8.4	61.6	30.3
2010	65.4	37.0	24.6	10.8	67.9	36.8
2011	65.8	37.3	31.8	11.5	76.9	38.1

Notes: The quantity unit is million m^3. C is coniferous roundwood and N is nonconiferous roundwood. All data are collected from the Forestry Statistics by Food and Agriculture Organization (2013). The database also reports data for all roundwood, which is the sum of industrial roundwood and fuel wood data (e.g., cooking, heating, or power production). The present study focuses on industrial roundwood only, so fuel wood is excluded in the comparison. Softwood or coniferous roundwood are derived from trees classified botanically as Gymnospermae. Hardwood, broadleaves or nonconiferous roundwood are derived from trees classified botanically as Angiospermae.

2.2. Major trade issues

Forestry is a unique sector because it offers both economic and environmental functions that are imperative to human wellbeing. The forest products industry utilizes roundwood as an essential material to produce lumber, furniture, and paper products, and accordingly, the manufacturing activities are a vital component of many national economies. The environmental functions of forests are associated with many basic public goods that a society needs. Forests are known for their role in protecting biodiversity, preventing climate change, conserving soil and water, maintaining clean air, and alleviating pollution. Therefore, China's large roundwood import seems like a pure trade issue on the surface, but in reality, it has caused widespread concerns from the perspectives of economic development and environmental degradation in a number of trading partners. Analyzing the global roundwood trade is always a challenge, as these mutually conflicting functions of forests are often mixed in the discussion (Uusivuori and Kuuluvainen, 2001; Simeone, 2012).

China's roundwood imports have caused widespread concerns on economic growth in roundwood exporting countries. Exporting roundwood directly is widely perceived as reducing availability of raw materials for the domestic forest products industry, and consequently, reducing opportunities for job and income growth in many forest-dependent communities (Zhang and Gan, 2007). Thus, a number of countries have adopted trade policies (e.g., ban or tax on roundwood trade) to encourage a shift in exports from unprocessed roundwood to value-added forest products. In particular, Russia has been most aggressive in imposing an export tax to protect its domestic industry in recent years (Simeone, 2012). Russia contains almost one-quarter of the