China Economic Review 23 (2012) 434–444

Contents lists available at SciVerse ScienceDirect

China Economic Review

Estimation of China's disaggregate import demand functions

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ARTICLE INFO

Article history:
Received 10 February 2011
Received in revised form 20 November 2011
Accepted 10 March 2012
Available online 16 March 2012

JEL classification:
C50
F10

Keywords:
Disaggregate import demand
China
Cointegration

ABSTRACT

We estimate the disaggregate import demand functions for three basic classes of goods as defined in the System of National Accounts (SNA): capital goods, intermediate inputs, and final consumption goods, and use the findings to shed light on the effects of China's economic growth on its current account. The results showed that as China switches from exports to domestic demand as a key driver for economic growth, China's trade surplus would be expected to shrink rather quickly.

1. Introduction

In this paper, I estimate China's import demand functions for three basic disaggregate classes of goods as defined in the System of National Accounts (SNA): capital goods, intermediate inputs, and final consumption goods, and use the findings to shed light on the effects of China's economic growth on its current account. Until now China's import demand functions have been estimated at the aggregate level by Moazzami and Wong (1988), Senhadji (1998) and Tang (2003). By considering disaggregate imports, this study attempts to improve upon the previous studies of China's aggregate import demand functions.

Aggregate import demand functions have received considerable attention and have been investigated using a variety of model specifications and estimation methods for different countries. According to Goldstein and Khan (1985), the empirical investigation of import demand and export supply functions has gained much popularity because of a number of reasons including the availability of relevant data in sufficiently long time-series, a theoretical framework which is readily amenable to empirical testing, and a wide range of macro-economic policy applications of the theory. The estimated income and price elasiticites provide answers to many important factual and policy questions such as: (a) how does economic growth affect the volume of trade? (b) how do restrictive trade policies, such as import duties, influence the growth of imports?[1] and (c) how should domestic policies be designed in order to reduce the trade deficit?

An important question, particularly highlighted by recent studies, has been the effectiveness of devaluations for improving the balance of trade. In the context of the reduction of trade deficits through devaluations, studies by Moazzami and Wong (1988), Bahmani-Oskooee and Niroomand (1998), and Tang (2002, 2004) examine whether the Marshall–Lerner condition[2] has been

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[1] For example, Santos-Paulino (2002), by analyzing 22 selected developing countries with panel data, provides evidence that import duties dampen import growth.

[2] If the sum of import and export demand price elasticities exceeds unity, then the Marshall–Lerner condition is said to be satisfied, under which currency devaluations improve trade balance, i.e., reduces trade deficit or increase trade surplus. See "The Marshall–Leaner Condition," in Kindleberger (1963), *International Economics*, Appendix E, pp. 610–612.

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doi:10.1016/j.chieco.2012.03.002

satisfied by estimating the import demand and export demand equations for a number of countries.[3] In another study, based on estimated import equations using Korean data, Tang (2005) concludes that devaluation could improve Korea's trade balance when the criteria suggested by Heien (1968) are used.[4]

The model behind most of the studies of import demand is based on traditional price theory that makes real imports a negative function of the relative price of imports (i.e., the import demand curve) and also a function of important non-price variables that shift the position of the import demand curve, such as real domestic income. Prior to the developments of analytical tools in time series capable of dealing with the issue of unit root and cointegration, the ordinary least squares (OLS) method and two stage OLS method were typically used to estimate the import demand functions. Since most macroeconomic variables have unit roots, recent studies apply the bounds testing approach to test the long-run relationship of the variables.

In addition to debates about appropriate econometric methodologies, there have also been some discussions concerning the appropriate macroeconomic variables that are important in determining the position of the import demand curve. In general, real GDP is used to represent real domestic income as the most relevant macroeconomic variable. However, several studies suggest alternative variables. Giovannetti (1989) considers the components of major final expenditures, namely, consumption, investment and exports since each expenditure component tends to have a different impact on import demand.[5] Senhadji (1998) shows that the appropriate macroeconomic variable should be GDP minus exports, instead of GDP alone. Using a dynamic-optimizing approach, Xu (2002) derives "national cash flow"[6] as the correct macro-economic variable. He concludes that national cash flow, relative price and a time trend are the necessary and sufficient variables for explaining long-term import behavior.[7]

The import demand function can also be estimated on the basis of GDP function which is more suitable in a general equilibrium setting, since aggregate factor income and welfare are endogenously determined by prices and endowments. Kee, Nicita, and Olarrega (2008) attempt to estimate import demand elasticities using a translog GDP function for over 4625 goods at the six level digit of the Harmonized System (HS) in 117 countries, and construct the trade restrictiveness (TRI) index and its associated welfare losses. As Kohli (1991) points out, GDP function provides a more solid theoretical foundation than partial equilibrium model in estimating import demand functions.[8] However, the data requirements for estimating a general equilibrium model over time are difficult to be met, and thus it is often assumed that the structural parameters including own price effect of the GDP function is invariant with respect to time and country, which may not be a reasonable assumption when observations are pooled across low-income and high-income countries. In contrast, partial equilibrium micro model take aggregate income as given. Such a set up can be acceptable if the objective is to estimate income elasticities, particularly for disaggregate imports compared to the standard equilibrium approach and aggregate imports because different imports have different determinants besides their respective relative prices, real income, real GDP and total exports.[9] Furthermore, the general equilibrium approach assumes balanced trade, a condition that is not always met in reality, while the partial equilibrium analysis does not depend on any such assumption. Thus, although our import demand function treats aggregate income as given, it appears to make better sense for disaggregate imports than for total imports.

Although various studies have examined the determinants and implications of the import demand functions, only a few studies have focused on China's import functions. Moazzami and Wong (1988) estimate China's aggregate import demand function using a partial adjustment model with 17 annual observations from 1970 to 1986. In addition to domestic GNP and the relative price of imports, the other regressors in this study include the trade account balance, which is used as a proxy for import restrictions, and a dummy variable to capture a structural break in import demand. Their OLS results show the short and long term price elasticities to be −0.52 and −2.26, and the short and long-term income elasticities to be 0.87 and 3.78, respectively. A two-year lag of the trade account has a significantly positive effect on China's import demand but the structural break does not have any significant effect. However, Tang (2003) raises questions about the reliability of Moazzami and Wong's estimation results because the latter apply the partial adjustment model to a relatively short time series.

The OLS estimator of a co-integrating equation is biased due to serial correlation and endogeneity among the explanatory variables. Phillips and Hansen (1990) develop fully-modified (FM) estimators to correct for these biases. Senhadji (1998) analyzes these FM estimators to examine a structural import demand function for 66 countries including China.[10] As in Moazzami and Wong, he also adopts a partial adjustment model, but uses a longer time series of 34 annual observations from 1960 to 1993. GDP minus exports, instead of GDP, is used as the relevant domestic macroeconomic variable. The "income" (GDP-Exports which represent total domestic expenditure on domestic output) and price elasticities in the long run are estimated to be

[3] Moazzami and Wong estimate the demand equations for China, Bahmani-Oskooee and Niroomand estimate import and export demand equations for 30 countries, and Tang estimates Hong Kong and ASEAN's (Indonesia, Philippines, Thailand, Malaysia, Singapore) import demand equations.

[4] According to the study, it is necessary for import price elasticities to be between 0.5 and 1.0 for devaluations to have a favorable effect on trade balance. When import price elasticities fall within this range, devaluations could be an effective measure to correct trade deficits.

[5] For other studies using components of GDP, see Abbott and Seddighi (1996), Mohammad and Tang (2002), Min, Mohammad, and Tang (2002), Tang (2003), Tang (2005), and Narayan and Narayan (2005).

[6] Defined as GDP-I-G-EX where I is investment, G is government spending and EX is exports.

[7] However, Barrell and Velde (2002) show that when parametric instabilities exist, the inclusion of other variables in the traditional import demand equations can improve the explanatory power of the model. Their study expands the list of explanatory variables by including FDI and technology, and provides evidence of positive relationship between these two variables and imports.

[8] Kohli (1991) provides technical details about GDP functions and its derivations of trade equations.

[9] The GDP maximizing import demand functions would estimate the Rybczynski elasticities instead of income elasticities (Kee et al., 2008).

[10] Senhadji (1998) points out that imports and the relative price of imports are endogenously determined via import demand and import supply interactions and thus OLS provides biased estimates of price and income elasticities. His results, however, show that the differences between OLS and FM estimates are relatively small.