Available online at www.sciencedirect.com
ScienceDirect
China Economic Review 19 (2008) 336–344
China Economic Review

On the measurement of product quality in intra-industry trade: An empirical test for China

Abdul K.M. AZHAR[a], Robert J.R. ELLIOTT[b,*], Junting LIU[c]

[a] *Graduate School of Management, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia*
[b] *Department of Economics, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK*
[c] *School of Economics, Liaoning University, Shenyang City, Liaoning Province, 110036, China*

Received 13 March 2006; received in revised form 28 July 2006; accepted 26 October 2006

Abstract

A relatively recent development in the intra-industry trade (IIT) literature is the measurement of the simultaneous import and export of quality-differentiated products, commonly known as vertical and horizontal IIT. A recent paper from Azhar and Elliott [Azhar, A. K. M. & Elliott, R. J. R. (2006), On the Measurement of Product Quality in Intra-Industry Trade, *Review of World Economics*, Vol 142 no 3, pp 476–495] analyses various approaches for disentangling vertical and horizontal IIT and suggests a complementary methodology. To investigate the robustness and sensitivity of the existing approaches we examine data on the nature of trade flows between China and its East Asian neighbours and show that in 2002 China tended to export low quality versions of its manufactured goods to Malaysia, Thailand and the Philippines.

JEL classification: F19
Keywords: International trade; Intra-industry trade; Product quality; China

1. Introduction

The evolution of trade patterns remains an important area of international economics with national economies increasingly uncertain how the emergence of a competitive and rapidly growing China will impact on existing patterns of comparative advantage. Such fears are of particular concern to the near neighbours of China who face increases in competition in their traditional export markets. However, the size of the Chinese market also provides other countries in the region with an opportunity to expand their exports to China as well as China providing a potential source of cheap intermediate products. Understanding and interpreting developments in current and future trade patterns is therefore of increasing interest to policy makers in this region.

One accepted empirical observation in international trade is that much of the post-war expansion of trade took the form of intra-industry trade (IIT), commonly defined as the simultaneous imports and exports of goods from the same industry. It is expected that trade within the East Asian region will follow a similar pattern. One strand of the research

* Corresponding author. Tel.: +44 1214147700.
E-mail address: r.j.elliott@bham.ac.uk (R.J.R. Elliott).

1043-951X/$ - see front matter © 2006 Elsevier Inc. All rights reserved.
doi:10.1016/j.chieco.2006.10.003

into the general prevalence and determinants of IIT is concerned with the simultaneous import and exports of quality-differentiated goods related to the theories of Falvey (1981), Falvey and Kierzkowski (1985) and Flam and Helpman (1987). This work demonstrates that, even without increasing returns to scale, large numbers of firms will produce varieties of different quality. An understanding, therefore, of whether China imports or exports high or low quality goods to East Asia is of particular interest.[1]

Empirically, the first stage is to develop a methodology for differentiating between qualitatively different bilateral-trade in goods from the same industry (the so-called disentangling of vertical from horizontal IIT). The second stage is to document the levels, and test for the determinants of, vertical and horizontal IIT for various multilateral and bilateral trade relationships. Existing empirical papers have employed one of two, broadly similar, disentangling methods. The first, suggested by Greenaway, Hine and Milner (1994) (hereafter GHM), builds upon a methodology proposed by Abd-el-Rahman (1991); the second, developed by Fontagné and Freudenberg (1997) (hereafter FF) extends the work of Abd-el-Rahman (1984, 1986). More recently, Azhar and Elliott (2006) (hereafter AE) have suggested a third methodology based on a share measure approach more closely aligned with the Grubel and Lloyd (GL) index that measures the dispersion of product quality in IIT.

The main advantage of the AE approach is that, in addition to providing a geometric framework to present information on bilateral trade flows, the resulting index has symmetrical limits and is scaled equally in both upper and lower bounds (and is thus able to distinguish between high and low quality IIT from the perspective of a "home" and "foreign" country). More details on the characteristics of the AE approach are provided in Section 2.

All three measures start from the calculation of the ratio of crude unit values as the basis for revealing quality differences. For each product a unit value (UV) is calculated by dividing the monetary value of trade by the quantity to give a price per tonne. A ratio of export to import (or import to export) UVs is then generated and a dispersion percentile (α) chosen to separate the horizontally, from the vertically, differentiated products.[2] One of the main differences between the FF and the GHM approach is how they define IIT, (related to the degree of trade overlap (λ) required for the structure of trade to be considered IIT). Azhar and Elliott (2006) is independent of the definition of IIT.

The GHM approach has been employed by Greenaway, Hine and Milner (1995), numerous country studies in Brülhart and Hine (1999), Greenaway, Milner, and Elliott (1999) and in more recent studies by Aturupane, Djankov and Hoekman (1999), Hu and Ma (1999), Celi (1999), Blanes and Martin (2000), Gullstrand (2002) and Sharma (2004). The European Commission (1996) and Fontagné, Freudenberg, and Péridy (1998) use the FF approach while the two are compared in Crespo and Fontoura (2004). The AE approach has yet to be taken to the data.[3]

To date, tests for the determinants of horizontal and vertical IIT have resulted in a rather fuzzy set of conclusions. In addition to the statistical behaviour underlying the GHM and FF approaches, some of the ambiguity in the econometric evidence may be due to the choice of λ and α as well as the standard issues related to categorical aggregation (see Nielsen & Lüthje, 2002 for further discussion).

In this paper we summarise the key characteristics of the AE, GHM and FF approaches and then employ data for Chinese trade with three of her most important East Asian neighbours to compare the results from the three measurement approaches and make some observations on the quality content of Chinese trade with Malaysia, Thailand and the Philippians for a recent year, 2002. To the best of our knowledge this is the first test of the AE approach and the first paper to make a systematic comparison of the three approaches using real data.

[1] Shaked and Sutton (1984) provide an alternative approach to modelling vertical product differentiation with a small number of firms and increasing returns to scale. Dixit and Stiglitz (1977) and Lancaster (1980) describe horizontal product differentiation in terms of "love of variety" and "ideal variety" respectively. Krugman (1979) explicitly models the former. See Helpman and Krugman (1985) for a summary of models of horizontal IIT.

[2] The premise for using UVs is that goods of a higher quality should demand a higher price (Stiglitz, 1987) so that price can be considered, an albeit, imperfect indicator of quality. Other solutions such as hedonic pricing (Cooper, Greenaway, & Raynor, 1993) and price elasticities (Brenton & Winters, 1992) are harder to apply to the data in multi-country, multi-product studies. Torstensson (1992) suggests using unit value per item as an alternative to unit value per tonne although this also suffers from practical limitations. See Greenaway, Hine, Milner, and Elliott (1994) for further discussion.

[3] Brülhart and Elliott (2002) take a step further and link different types of product differentiation to the costs of adjustment associated with changing trade patterns where it is assumed that factors are relatively less mobile between vertically differentiated rather than horizontally differentiated industries (known broadly as the smooth adjustment hypothesis). One explanation is that labour requirements are more likely to be significantly different between vertically differentiated industries, hence job movers require greater retraining to undertake such a move resulting in higher trade induced adjustment costs. See Lovely and Nelson (2002) and Azhar and Elliott (2003) for further discussion.