

INTERNATIONAL SPECIALIZATION AND VERTICAL DIFFERENTIATION

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During the last decades, market segmentation and intra-industry trade have become increasingly relevant. The underlying hypothesis of our work is that distinct articles have heterogeneous potential for vertical differentiation, implying that different patterns of international specialization should be identifiable. We carry out an analysis on revealed comparative advantage (through the Lafay Index) in specific sectors of interest. Then we highlight the emergence of diverse degrees of product quality differentiation among sectors (through the Relative Quality Index). Results confirm our hypothesis. Indeed it appears that only certain goods, for which the pace of either creative or technological innovation (or both) is particularly fast, present a high degree of vertical differentiation and market segmentation. This allows countries to specialize in a particular product variety and gain market power position for that variety. These findings should be taken in due consideration when designing trade policies.

Keywords: international specialization, Lafay Index, Relative Quality Index, creative sectors

JEL code: F1, F59, D4, Z1

Introduction

European countries are facing increased economic competition, resulting both from the overall globalization dynamics and from the European integration process. These phenomena are often considered as threats. However, a better understanding of international trade patterns and specialization trajectories could contribute to properly assessing these dynamics, so that to prevent us from drawing hurried conclusions about the presumed competitive pressures that high income countries face from emerging economies.

The analysis of international specialization patterns is essential in order to examine the revealed comparative advantages of countries and, therefore, their competitive potential in particular markets. However, given the increasing importance of differences in products’ quality as a driver of countries’ success in the global market (Bernard and Jensen, 2001; Bernard et al., 2003), it could be ambiguous to only take into account measures of international specialization based on export and import values (Baldwin and Harrigan, 2007), without considering the qualitative characteristics of traded goods.

For “quality”, we intend not only the physical features of the product (such as materials or technology embedded), but all features, tangible and intangible, influencing consumers’ economic valuation (Aiginger, 2001; Borin and Lamieri, 2008). For this reason, it is possible to measure perceived quality through the price that the consumer is willing to pay (Stiglitz, 1987). The most frequently adopted proxy of price in international trade studies is the Unit Value (UV)

of trade flows, defined as the ratio between the value and the quantity of imports/exports of a given product (or group of products).

The UV is often used as a quality indicator, though this approach has some limits (Mannarino et al., 2008). Firstly, products with the same price but different physical weight might show different UV independently from their relative qualities; despite that, it is often possible to find product-specific correlations between weight and quality. Secondly, a higher UV may also depend on a lower productivity level of a country; however this can only be true in the short run, while it is reasonable to think that in the long period countries may continue to be internationally competitive with a high UV only if it is justified by higher quality characteristics. Lastly, a country gaining a market power position in a specific product could increase its UV even without improving the product quality.

In our analytical framework, we consider vertically differentiated products and consumers preferring higher quality varieties. These hypotheses allow for: a) market segmentation and intra-industry trade; b) advantages in terms of productivity, resulting in exports which have higher unit values (Baldwin and Harrigan, 2007).

Accordingly, we carry out our analysis first by examining which countries are internationally specialized in particular products of interest and then by investigating the revealed quality characteristics of the various products for different specialized countries.

International Specialization and Relative Quality Measures

We are interested in finding out which countries are specialized in given products. These have been selected with the aim of representing different macro-typologies of products, in order to be able to assess if a correlation exists between the possibility for a given product to be vertically differentiated (hence allowing for market segmentation and intra-industry trade) and significant difference in quality levels.

We carry out this analysis, adopting the Lafay Index (Lafay, 1992) as an index of international specialization and a Relative Quality Index as a measure of differences in quality levels.

We choose to adopt the Lafay Index, rather than other indices as popular as this one (such as Balassa, 1965), since an appropriate investigation on international specialization patterns has to take into account both exports and imports, if we consider the increasing weight of intra-industry trade and “international fragmentation of production”¹²⁷ in the global context.

For a given country i and for any given product j , the Lafay Index takes the following form:

$$LFI_j^i = \left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^N (x_j^i - m_j^i)}{\sum_{j=1}^N (x_j^i + m_j^i)} \right) \frac{x_j^i + m_j^i}{\sum_{j=1}^N (x_j^i + m_j^i)}$$

where x_j^i and m_j^i are respectively exports and imports of product j for country i towards and from the rest of the world, and where N is the number of products.

The Lafay Index considers the deviation of product j normalized trade balance from the overall normalized trade balance, weighted by the share of trade (imports plus exports) of product j on trade balance. Given this definition, the sum of Lafay Indices for all sectors of a given country must be zero.

The existence of a comparative advantage is revealed if the index assumes positive values, whereas negative values show de-specialization. The greater the absolute values, the higher the degree of specialization/de-specialization.

Different countries having the same Lafay Index for a given product could nevertheless be specialized in different varieties, that is in vertically differentiated typologies of that product.

In order to add this information to our analysis, we introduce the Relative Quality Index, measured as:

¹²⁷ The mechanism by which firms delocalise part of their production to foreign countries, thus generating trade flows of intermediate goods.

$$RQ_j^i = \frac{UV_j^i - UV_j^W}{UV_j^W}$$

where UV_j^i is the unit value of product j exports for country i and UV_j^W is the average unit value of product j exports for the world. RQ_j^i takes positive values if the UV of the exported goods from country i to the world market is higher than that of the world.

Methodology and data

The underlying hypothesis of our work is that distinct items show heterogeneous potential for vertical differentiation, which permits producers to carry out strategies of price discrimination and market segmentation and hence, at an international level, allows countries to specialize in producing and trading qualitatively differentiated varieties of the same product.

This hypothesis implies that different patterns of international specialization should be identifiable. Some sectors should be coherent with the traditional international trade theories, which predict that specialized countries, enjoying higher productivity level, will trade low-price products. Other sectors should conflict with this conclusion, since, when a specific market is vertically differentiated, some specialized countries may have a comparative advantage in producing and trading low-quality and low-price varieties, while other countries may specialize in high-quality varieties. And that results in exports that have higher, not lower prices (Baldwin and Harrigan, 2007).

For that reason we use a thumb rule (qualitative, descriptive criteria) to select various articles (corresponding to the HS four-digit level codes¹²⁸) which in our opinion correspond to products representative of sectors with diverse vertical differentiation potential.

We analyze data through the indices introduced in the preceding paragraph. For each chosen item (HS four-digit code), we identify international specialized countries, through the Lafay Index¹²⁹. For these countries, we highlight the quality characteristics of their traded goods, by calculating the relative quality index¹³⁰. Then we draw some conclusions about our hypothesis that particular sectors have a great vertical differentiation potential and we try to make some considerations about the possibility to define common characteristics of these sectors.

Since this paper represents just the first step of a more comprehensive work, we carry out the measurements only on a few items, taken as examples within their respective categories of products. We intend to further develop this analysis, in a more systematic and detailed way, in order to find more robust empirical results for our future work on this topic.

We then present graphics which show how, for various items, we find different forms of correlation between the Lafay Index and the Relative Quality Index.

¹²⁸ As our source of data, we use the International Trade Statistics of the International Trade Center (UNCTAD/WTO), which classifies goods through the Harmonized Commodity Description and Coding System (2002), a six-digit code system, comprising approximately 5,300 article/product descriptions, arranged in 99 chapters, grouped in 21 sections.

¹²⁹ In order to single out only countries that have an higher degree of specialization, we set a threshold for the Lafay Index equal to the average value of the LFI for each item.

¹³⁰ Even though we have conducted a full analysis on all of the countries for both LFI and RQ, we use the resulting data only for countries which result specialized in each sector (countries above the LFI threshold).

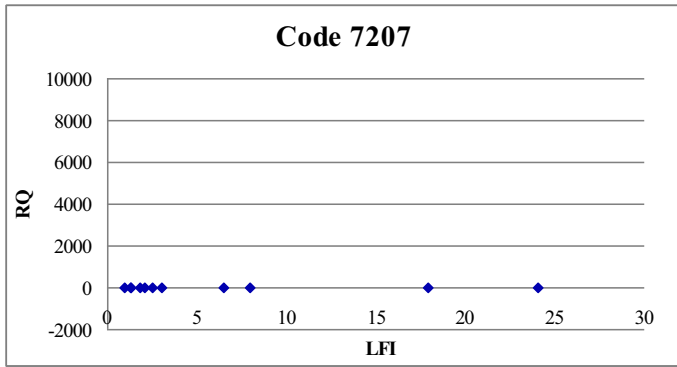


Fig. 1: Code 7207 - Semi- finished products of iron or non-alloy steel

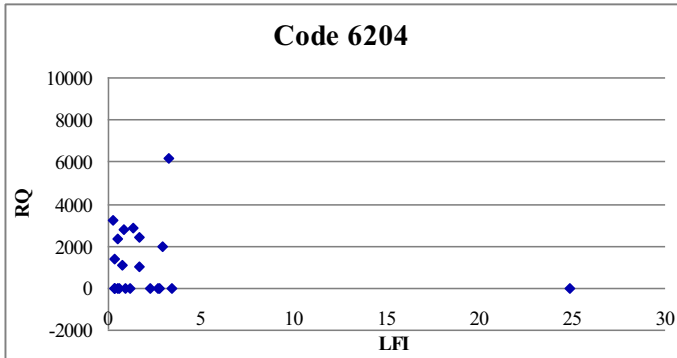


Fig. 2: Code 6204 - Women's or girls' suits, ensembles, jackets, blazers, dresses, skirts, divided skirts, trousers, bib and brace overalls, breeches and shorts

Note: Viet Nam, Bangladesh, Cambodia, Thailand and the former Yugoslav Republic of Macedonia are among the specialized countries. However we are not able to calculate the RQ because the data of their exports in quantities are not available

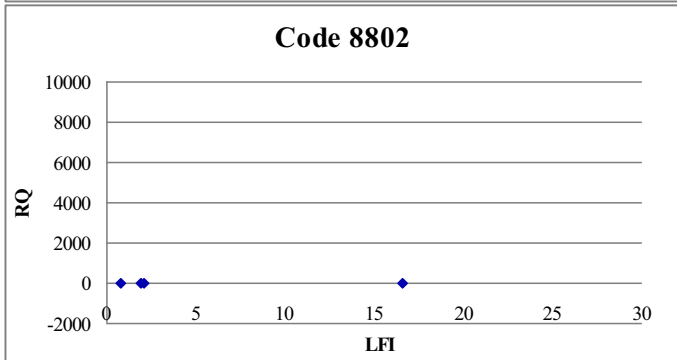


Fig. 3: Code 8802 - Aircraft and spacecraft

Note: USA, Canada and Saudi Arabia are among the specialized countries. However we are not able to calculate the RQ because the data of their exports in quantities are not available.

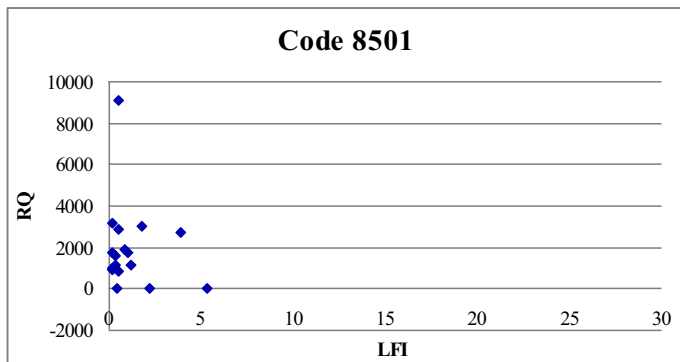


Fig. 4: Code 8501 - Electric motors and generators

Data analysis

Even though the analysis is conducted on a few items, we think that some interesting considerations could nevertheless be made about how different patterns of international specialization emerge from the analyzed sectors.

Figure 1 reveals the specialization pattern for item “Semi- finished products of iron or non-alloy steel”, which is representative of groups of products which are characterized by neither a high level of technological or scientific content nor by creativity and innovation skills of human capital. This item shows that all specialized countries, independently from the value of the LFI, have an homogeneous degree of quality. No country carries out a strategy based on quality differentiation and non-price competitiveness.

Figure 2 shows the specialization pattern for item consisting in women’s clothing, which is a typical “creative” sector¹³¹. This group of products exhibits a huge degree of heterogeneity with regard to the RQ, even for similar LFI. There are two particularly interesting cases: the outliers in the graphic are China, which has an extremely high level of LFI (24,83) but a negative RQ value (-0,59), and Italy, which (similarly to others specialized countries) presents a significantly lower LFI (3,23) but the highest level of RQ (6154,87). These evidences permit to infer that the specific characteristics of “creative goods” make them suitable for a high degree of market segmentation, which allows countries to specialize in particular product varieties. For that reason, countries which follow such a different specialization pattern may not be considered in direct competition.

Figure 3 highlights the specialization model of “Aircraft and spacecraft”. This kind of articles represents products for which scientific knowledge and technological skills, as well as a high availability of financial capital, are fundamental. This implies that, first of all, only seven countries result to be specialized (a LFI above the average value) and, secondly, the intrinsic tangible and intangible characteristics of the goods do not allow for qualitative heterogeneity.

Figure 4 points out that item “Electric motors and generators” does not show a marked degree of specialization, but presents a relevant level of RQ heterogeneity. This case represents those sectors in which different paces of technological progress and the possibility for some countries to produce with low factor costs lead to vertical differentiation. The role of a fast-paced technological innovation in international competitiveness is thoroughly analyzed for the Italian case by Furia (2008), who, accordingly to our findings, identifies a high correlation between export performance and the level of investments in R&D and in highly skilled human capital.

Conclusive remarks

The traditional international trade theory predicted that countries revealing a competitive advantage in a given sector should ship those goods at a competitive price. However data often contradict with this assertion. In fact, during the last decades, vertical differentiation, market segmentation and intra-industry trade have become increasingly relevant. In this respect, not only scientific and technological progress, but also creative innovation reveals its importance.

We have found that data are coherent with our hypothesis that intrinsic tangible and intangible characteristics of specific goods (for which creative or technological innovation permits vertical differentiation) make them suitable for a high degree of market segmentation, which allows countries to specialize in a particular product variety and gain market power position for that variety. For this reason, countries which follow such a different specialization pattern may not be considered in direct competition.

Such a shift in our understanding of international specialization should design trade policies, in a way to prevent us from drawing simplistic conclusions about the presumed competitive pressures that high income countries face from emerging economies, even in the European integration context.

¹³¹ For the definition of “creative sector” we make reference to European Commission, 2006.

Since this paper represents the first step of a more comprehensive and ambitious work, our purpose is that of widening this framework, conducting the analysis in a more systematic and detailed way and developing specific analytical tools for a focus on “creative sectors”, in order to assess their potential for vertical differentiation and for guaranteeing a market power position.

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