# The "Sophistication" of Exports: A New Trade Measure

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**Summary.** — Trade data are often classified by product characteristics. We propose a new classification "sophistication" as a means of distinguishing between products. We construct a sophistication index based on the income levels of exporting economies. Sophistication captures a range of factors including technology, ease of product fragmentation, natural resource availability, and marketing. We calculate sophistication scores at the 3- and 4-digit levels and test how far the index relates to existing technological classifications of products. We use the index to examine trade patterns and illustrate how it can be applied in the analysis of export performance of individual economies.
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## 1. INTRODUCTION

Researchers seeking to explain trade flows or to assess the competitiveness of individual economies have long sought ways of classifying and categorizing the vast and ever increasing range of products that enter into world trade. Classification by factor intensity and technological intensity are two popular ways of addressing this issue that has yielded useful insights. A basic problem with both approaches however stems from the relatively high level of aggregation at which both can be applied. Factor input data will normally come from input–output tables or industrial censuses, typically at a 2-digit level, while technology classifications are normally based on R&D expenditure by the manufacturing subsector. Trade data, on the other hand, are available at highly disaggregated levels: for instance, the Standard International Trade Classification (SITC) Revision 2 has 236 items at

the 3-digit level and 778 items at the 4-digit level. In the 2002 version of the Harmonized System, the new trade data recording system, there are over 1,200 items at the 4-digit level and over 5,000 items at the 6-digit level. In contrast, in relation to R&D expenditure, US data are available for only 38 manufacturing industries (NSB, 2002), while the *OECD Science, Technology, and Industry Scoreboard* provides cross-country R&D data for 19 industries.

Given the extensive and disaggregate information on products that enter international trade, it is useful to have a means of distinguishing between similar products produced by different countries and to have a broad indication of product differences at a highly disaggregate level. With this aim we put forward a new method of classifying exports that does not require industry data, but only information on exports of each product and per capita incomes of exporting countries. We term this a "sophistication index" and calculate sophistication scores for 1990 and 2000 for 237 products at the 3-digit level (of SITC Revision 2), and for 766 products at the 4-digit level. [1] We show how the index can be used in comparisons of export structure and in discussions of individual country competitiveness.

Section 2 explains the calculation of our index. Section 3 discusses individual product scores at the 3- and 4-digit levels and relates the index to one well-known set of technology categories. Section 4 discusses the results when product data are aggregated for individual countries and the potential use of the index in discussions of export promotion and competitiveness strategies. Finally, we draw some conclusions.

## 2. EXPORT "SOPHISTICATION": RATIONALE AND METHODOLOGY

We propose a way of classifying traded products, which does not require detailed industry data, but infers product characteristics from the characteristics of the exporter rather than from parent industry data on factor content or R&D activity. We call it export "sophistication": the assumption is that *an export is more sophisticated the higher the average income of its exporter*. The rationale of the sophistication measure is simply that in the absence of trade interventions, products exported by richer countries will have characteristics that allow high wage producers to compete in world markets. These characteristics will include the embodiment of higher-level technology as an important determinant. However, clearly other factors will also work to explain why activities are located in higher-income economies; these include transport costs, natural resource availability, marketing, infrastructure quality, and the degree of fragmentability of production. The latter factor has assumed an increasing importance in recent years so that in activities where production processes are divisible (and logistics suitable) the location of export production can reflect the technical possibilities of separating segments and placing them in low wage countries. [2] Hence, the sophistication index is an amalgam of these influences and not a specific technological measure. The role of technology cannot be readily separated from that of other influences, without specific product-level data. However, the index provides a starting point for product and country-specific analyses that can test why a country's sophistication level differs from its competitors. Here also we provide a simple test of how far "sophistication" in our definition relates to technology.

This index can be calculated at different levels of disaggregation and presented in different ways depending on the purpose at hand. At the most aggregate level, individual product data can be combined into a single sophistication score for total exports. In this case, it becomes a measure of the similarity of a country's exports to those of higher-income economies. Alternatively, an index score can be given for product data grouped by broad product category (e.g., clothing) or by technological classification (e.g., high tech). Arguably, the more disaggregated a level one looks the more likely will it be that differences in our index reflect differences in technological depth rather than other location-specific factors. Hence, it may be that within narrowly defined products categories, the average income of exporting countries can be a useful proxy measure of the technological depth of a product; thus, an electrical good from Japan may be deemed to have a higher technology content than a similar good from the Philippines. Similarly, within apparel, products exported by rich countries—or processes undertaken by them—may be more skill and technology intensive, and yield higher wages and margins, than standardized product categories exported by poor countries. [3]