Economics Bulletin

Volume 29, Issue 2

# A note on using Comtrade for empirical trade research

Masanaga Kumakura
*Osaka City University*

## Abstract

International trade statistics reported in accordance with the Harmonized System (HS) are difficult to compare across time and countries because of frequent amendments to its product classification. To ease this problem, the United Nations Statistics Division (UNSD) converts national trade statistics into older HS classifications and makes these recompiled statistics available through its Comtrade database. This note reviews the nature of HS amendments and the UNSD data conversion method, and considers the circumstances under which recompiled statistics may not serve as a good substitute for original statistics.

**Citation:** Masanaga Kumakura, (2009) "A note on using Comtrade for empirical trade research", *Economics Bulletin*, Vol. 29 no.2 pp. 1330-1344.
**Submitted:** May 01 2009. **Published:** June 05, 2009.

# 1 Introduction

The *Harmonized Commodity Description and Coding System* (HS) is a multi-purpose international product nomenclature developed by the World Customs Organization (WCO). Today more than 200 countries use the HS as the basis for both their customs tariffs and international trade statistics. Since the product codes of the HS are highly disaggregated, HS-based statistics permit more detailed analysis than those based on other product nomenclatures, such as the United Nation Standard International Trade Classification (SITC). Nevertheless, since the HS classification is revised every four to five years, individual countries are compiling their statistics in terms of different versions of the HS at each point in time. Therefore, it is difficult to compare their statistics across time and countries in their original form.

To help ease this problem, the United Nations Statistics Division (UNSD) recompiles original statistics in accordance with earlier HS classifications and makes these secondary statistics easily accessible through its *Commodity Trade Statistics Database* (Comtrade). An extremely user-friendly web-based database, the Comtrade is used widely by trade analysts, who typically rely on recompiled rather than original data.

Nevertheless, since the product codes of different HS editions are often related to each other in a complex manner, the UNSD employs a relatively simple approximation method in making data reported in terms of one edition comparable to those based on earlier ones. Although existing studies pay little attention to the difference between original and recompiled statistics, this note points out that this distinction may matter under certain circumstances.

The rest of this note is organized as follows. The next section reviews the past revisions to the HS and the UNSD's data conversion method. Section 3 discusses a few issues that merit attention when using the Comtrade's secondary statistics. Section 4 assesses the practical importance of these issues using a specific example. Section 5 provides a conclusion.

# 2 HS amendments and Comtrade statistics

The HS product classification has a hierachical structure, starting with the *section* at the highest level and becoming more specific at the *chapter*, *heading* and *subheading* levels. At the highest level, all tradable goods are grouped into 21 chapters that roughly correspond to industrial sectors (Table 1). At the lowest level, these products are organized into about 5,000 subheadings. Each subheading is assigned a unique six-digit code, of which the first two and the middle two digits represent the chapter and the heading to which it belongs, while the last two digits serve as its own identifier.

The HS officially came into effect in 1988 and has so far been revised four times – in 1992, 1996, 2002 and 2007. Although the 1992 revision primarily concerned editorial changes, the other three entailed substantive amendments to headings and subheadings (Table 2).[1] Following the UNSD's terminology, this note will refer to the original and 1992 editions of

[1] The consensus among WCO member countries is that the sections and the chapters are the fundamental building blocks of the HS and should not be altered. Therefore, each round of revisions modifies headings and subheadings only.

the HS as H0, and the 1996, 2002 and 2007 versions as H1, H2 and H3, respectively. The next edition is expected to take effect in 2012.

Figure 1 shows the product classifications according to which the top 100 trading nations and customs territories have reported their statistics to the UNSD since the early 1990s. It is observed that some countries were slower than others in switching from the SITC to H0 and to later editions of the HS.[2] The frequent revision of the HS and the variation in the timing of each country adopting a new edition pose considerable difficulties to researchers wishing to conduct detailed empirical research that involves a long period of time and/or a large number of countries.

To ameliorate this problem, the UNSD recompiles each country's statistics in terms of older HS classifications and makes these data publicly available through its Comtrade website. Most existing studies use the derived rather than original statistics, and rarely pay attention to their differences. Nonetheless, since amendments to HS product codes are often intricate and defy simple backward and forward conversion, it is worth taking time to review the nature of these amendments and how the UNSD conducts the data conversion.

Broadly speaking, amendments to HS subheadings can be categorized into three types: (1) those which split an existing subheading into two or more new subheadings; (2) those which merge two or more subheadings into one subheading; and (3) more complex changes that relate two or more existing subheadings to two or more new subheadings.[3] These amendments are conducted not only to keep the HS up to date but also to accommodate a variety of developments in the international community, including the introduction of new environmental treaties and sectoral trade agreements. When a new HS edition is adopted, the WCO publishes "correlation tables" that explain the relationship between old and new subheadings as a guide for national statistical and customs offices. Figure 2 provides three examples of such correlations, each corresponding to one of the three types listed above.

Now suppose that one has statistics classified according to H3 for a particular country and wishes to convert this statistics into one that would have been reported had this country continued using the H2 classification. As is evident from Figure 2, while this can be done easily for type 1 amendments, it is technically impossible for the other two types, in which at least one new subheading is correlated to more than one old subheading. Under such circumstances, the UNSD's policy is to attribute all trade recorded under each new subheading to only one old subheading. In Figure 2, for example, the UNSD ascribes all trade recorded under H3 6306.30 and H3 6813.20 exclusively to H2 6303.31 and H2 6813.10, respectively, despite the fact that these new subheadings are also correlated with other old subheadings. In principle, therefore, statistics originally reported in terms of one HS classification and those converted into that classification are different objects, as are data converted into the same HS edition from different original classifications.

In general, however, there are reasons to believe that the difference between original and recompiled statistics is modest. First of all, each new HS edition typically introduces a relatively small number of new subheadings and leaves around 90 percent of the existing codes unaffected (Yu 2008). Second, although the UNSD's data conversion method might

[2] In general, countries not included in Figure 1 are even slower in adopting new classifications.

[3] Strictly speaking, there is another type in which the definition of a subheading is modified without changing its six-digit code. This type of amendment is ignored in this note.

seem too crude, it is not easy to develop an alternative methodology that can be applied universally and clearly dominates this method.[4] Third, in type 2 and 3 amendments, in which the UNSD must select the old subheading to which each new subheading is associated, it makes efforts to find the most appropriate one by applying a series of reasonable criteria.[5] Lastly, although the UNSD method will generate larger margins of error if it is applied sequentially, for example by converting H3-based data first into H2 and then into H1, the UNSD avoids such "cascading" conversions and has instead developed the direct conversion tables for all combinations of the existing HS editions.[6]

# 3 Potential pitfalls of converted statistics

Nevertheless, the complexity of HS amendments and the nature of the conversion method employed by the UNSD suggest that the researcher should not simply ignore differences between the original and the derived statistics.[7] The remainder of this note discusses why their differences may matter under certain circumstances and assesses its practical importance using a specific example.

First, each cycle of the HS review process, which typically starts upon the introduction of a new edition and is completed within five years, does not reexamine all existing product codes evenly but instead focuses on specific industries. For example, the second review process, which resulted in H1, was mainly concerned with food, tropical woods, steel and electronic products, whereas the third review primarily focused on wood, paper, waste of chemicals and pharmaceuticals and metals (Yu 2008). Therefore, even if the proportion of subheadings modified by each new HS edition is small in comparison to the total number of existing product codes, the revisions can be extensive in specific sectors and industries.

Table 3 shows the number of subheadings, and the values of trade associated with these subheadings, that will be influenced when data reported according to the classification of each HS edition are converted into that of the preceding edition. In this table, the number of affected subheadings is counted in terms of old rather than new product codes and summed for individual sectors.[8] The trade values in the lower table were computed by aggregating the nominal imports of countries that accounted for at least 0.25 percent of the global trade in

[4] In type 2 of Figure 2, for example, a possible alternative methodology would be to distribute the value for H3 6306.30 to H2 6306.31 and H2 6306.39 according to their shares of world trade in earlier years. However, this method runs into trouble in type 3 amendments.

[5] These criteria include those exploiting trade practice in earlier years and comparing the numerical codes of old and new subheadings (UNSD 2009).

[6] Note that when H3-based data are converted into H2 using the UNSD method, the value for H6306.39 in Figure 2 will become zero for all countries. Converting the data sequentially into earlier classifications increases the number of such empty subheadings.

[7] The UNSD also stresses the distinction between original and converted statistics (UNSD 2009). In March 2009, it modified Comtrade's data retrieval interface in order to assist the user who wishes to avoid mixing these statistics.

[8] According to this calculation, the number of affected subheadings in Figure 2 is one for the type 1 amendment and two for both type 2 and 3 amendments. Although UNSD (2009) performs a similar calculation in terms of new subheadings, doing so makes type 2 and 3 amendments look less frequent than type 1 amendments and hence the backward conversion look easier than is actually the case.

the year when each new edition came into effect.[9] Lastly, the values in parentheses represent the proportion of the relevant subheadings in the total number of subheadings, and the associated share of trade values, within each chapter.

According to Table 3, the share of the subheadings affected by each conversion indeed varies considerably across chapters. Moreover, the share of affected subheadings in each chapter often differs markedly from the corresponding share of transaction values, with the latter occasionally exceeding the former by substantial margins. In addition, in cases where a particular chapter has a disproportionately large share of affected subheadings, this is typically due to a large number of type 2 and 3 amendments. These findings are not surprising, however, since each HS review cycle is naturally focused on industries whose trade is growing rapidly, or those whose trade structure is changing rapidly, due to technological or other reasons. A good example is Chapter 16, which includes information technology (IT) equipment and other electronic goods that have been subjected to extensive amendments during the second and the fourth HS reviews to accommodate rapid technological progress and associated changes in the traded products.[10]

Second, although the majority of existing studies use H0-based statistics simply to maximize the time-series coverage of their datasets, it should be noted that the product classification of H0 is much more outdated than those of the subsequent HS editions. While the WCO started to develop the original HS in 1973 and had completed most of its task by the late 1970s, the HS treaty was not officially ratified until 1983 due to technical and other disputes. The official introduction of the HS was further postponed until 1988 in order to give national customs offices and relevant international organizations sufficient time for preparation. Therefore, H0 primarily reflects the structure of international trade in the 1970s, whereas H1 and other versions incorporate developments in much more recent years. This suggests that the quality of data converted into H0 from later editions is less reliable for both technical and conceptual reasons.

Third, although type 2 and 3 amendments are the primary source of concern when converting statistics into older HS classifications, type 1 amendments may also pose a problem depending on the manner in which the recompiled data are used. For example, recent research stresses the *quality* of a product as a variable with which firms consciously differentiate themselves from their competitors and often assesses the unobservable product quality using the observed transaction price. In most cases, the Comtrade provides data on both trade values measured in nominal US dollars and the corresponding trade volumes, from which one can derive unit import and export values. However, when a new HS edition splits one old subheading into multiple new codes, as in H2 7013.21 in Figure 2, the trade volumes for these new subheadings may be reported in different quantity units, in which case a precise calculation of the volume for the old subheading becomes impossible.[11] Even when all new

[9] The exception is the conversion from H3 to H2, for which data for 2006 rather than 2007 were used. As shown in Figure 1, some countries have not yet reported their data for 2007 to the UNSD.

[10] Amendments to the product structure for electronics in the second review were in part motivated by the International Technology Agreement that went into effect in 1997.

[11] The UNSD allows national statistical offices to report their import and export volumes in the unit of their choice, although weight and the number of items are the two most widely used measures. It should also be noted that the volume statistics in the Comtrade include those estimated by the UNSD using the

subheadings share the same quantity unit, the unit value for the merged old subheading will become a weighted average of their unit values and may be of limited use when there is large variation in those values. These cases may not be a rare occurrence since each existing subheading is not normally split into multiple codes unless there is a strong reason to do so.

# 4 An experiment with intra-industry trade

Let us next examine the practical importance of the previous issues using a specific example. In recent years, *intra-industry trade* (IIT) has been both one of the most actively studied topics in international economics and one for which Comtrade data have been utilized particularly widely. IIT refers to a phenomenon in which a country simultaneously imports and exports similar types of products. Although early empirical studies measured IIT by comparing a country's imports and exports at a broad industry level, it soon transpired that goods produced within a single industry often varied considerably in both factor intensity and functionality (Finger 1975). This finding has led researchers to assess import-export overlaps at a more detailed product level and then aggregate such overlaps to an appropriately defined industry level (Greenaway and Milner 1983).

By far the most popular measure of the sectoral importance of IIT is the so-called Grubel-Lloyd index, first proposed by Grubel and Lloyd (1971). A particularly simple version of this index has the following form

$$IIT_i = 1 - \frac{\sum_{k\in I}\left|X_i^k - M_i^k\right|}{\sum_{k\in I}\left(X_i^k + M_i^k\right)} = \frac{2\sum_{k\in I}\min\left[X_i^k, M_i^k\right]}{\sum_{k\in I}\left(X_i^k + M_i^k\right)}, \tag{1}$$

where $X_i^k$ and $M_i^k$ denote the export and the import of good $k$ by country $i$, respectively. $I$ is an industry identifier defined as a set of goods that are produced by this industry. This index takes on a value between 0 and 1 and becomes larger as simultaneous imports and exports increase relative to one-way trade.[12]

Recent studies have taken the above index a step further, by making a distinction between horizontal and vertical IIT. *Horizontal IIT* (HIIT) refers to the simultaneous import and export of different varieties of a particular product, whereas *vertical IIT* (VIIT) denotes two-way trade in a product of a given variety but with different qualities (Greenaway et al. 1995; Thorpe and Zhaoyang 2005).

---

unit values for other countries and/or proximate years.

[12] An alternative and more complicated version of the Grubel-Lloyd index is

$$IIT_i = \frac{2\sum_{k\in I}\sum_j \min\left[X_{ij}^k, M_{ij}^k\right]}{\sum_{k\in I}\sum_j \left(X_{ij}^k + M_{ij}^k\right)},$$

where $X_{ij}^k$ and $M_{ij}^k$ denote, respectively, the exports and the imports of good $k$ by country $i$ to (from) country $j$. This index is often calculated using country $i$'s statistics for $M_{ij}^k$ and country $j$'s statistics for $X_{ij}^k$, on the grounds that importer statistics are more accurate than exporter statistics. However, when this is done using Comtrade statistics, the computed index will inevitably reflect data that were originally reported in more than one HS classification.

Let us define $Px_i^k$ and $Pm_i^k$ as the prices of good $k$ exported and imported by country $i$. In practice, these prices are approximated by the unit import and export values obtained by dividing nominal trade values by the corresponding volumes. $I$ is then split into two disjoint sets according to the following rule:

$$k \in \begin{cases} I_H & \text{if } \dfrac{1}{1+a} \leq \dfrac{Px_i^k}{Pm_i^k} \leq 1+a \\ I_V & \text{otherwise,} \end{cases} \tag{2}$$

where $a > 0$ is a parameter that determines the range within which export and import goods are judged to be of a similar quality. Once this separation is made, one can disaggregate the numerator of (1) accordingly and define the following two indices:

$$HIIT_i = \frac{2\sum_{k\in I_H} \min\left[X_i^k, M_i^k\right]}{\sum_{k\in I}\left(X_i^k + M_i^k\right)} \tag{3}$$

$$VIIT_i = \frac{2\sum_{k\in I_V} \min\left[X_i^k, M_i^k\right]}{\sum_{k\in I}\left(X_i^k + M_i^k\right)}. \tag{4}$$

However, there are cases in which the Comtrade reports the values of imports and exports for a particular country-product combination with no corresponding volume data. In such cases, the classification of (2) becomes infeasible. As the literature generally excludes these cases from analysis, the sum of $HIIT_i$ and $VIIT_i$ tends to fall short of $IIT_i$ (Fontagné et al. 2006).

In Section 3, it was found that the conversion into earlier editions of the HS was more difficult for industries that have been the focus of past amendments. As noted there, one such example is the IT equipment industry, which also features prominently in the IIT literature because of extensive cross-border production sharing and two-way trade in this industry (Kumakura 2008). Let us therefore compute the above three indices for the IT hardware sector and examine if using recompiled statistics makes any noticeable difference.

In what follows, IT goods are defined as all subheadings under 4-digit HS codes 8469-8473, 8517-8529, 8540-8542 and 9009, which roughly correspond to computer and office equipment, telecommunication equipment and electronic components.[13] While these items constitute only about three percent of all HS subheadings, they account for close to 20 percent of the world trade in manufactured goods and an even larger share of global IIT (Kumakura 2008). However, the indices of (1), (3) and (4) all become close to zero in countries with no meaningful exports of IT goods, irrespective of how these products are classified. Since the production of IT goods is concentrated in a relatively small number of high- and middle-income countries, I focus on those countries whose exports constituted at least 0.25 percent of the world trade in the relevant products in at least one year between 2000 and 2007.

Among these countries, I first limit my attention to those countries which reported their statistics in terms of H3 in 2007, the year when this most recent edition was officially introduced. Since the 2007 statistics converted to older HS editions are already available for the

[13] The revision from H2 to H3 abolished heading 9009 and transferred all subheadings under this heading to 8443. For data reported in H3, therefore, all subheadings under 8443 will be added to the above list.

majority of countries, it is possible to calculate the above indices in terms of H0, H1, H2 and H3. I compute the HIIT and VIIT indices by setting $a = 0.25$, the value most frequently used in the literature (Fontagné et al. 2006).

Figure 3 presents the result of my calculation. In the top panel, it is found that the overall IIT index is not very sensitive to the choice of the dataset, although there are a few notable exceptions such as Korea and Portugal. The large discrepancies in these countries are primarily due to trade under heading 8542 (electronic integrated circuits), a category to which H3 introduced complicated type 3 amendments.[14] Not surprisingly, the index values computed from H1- and H2-based data are very similar, since the revision from H1 to H2 involved few important amendments to the relevant subheadings.

The middle and the lower panels show the HIIT and VIIT indices. Here the distinction between the original and the derived statistics becomes more important, with the alternative datasets generating markedly different values for several countries. Whilst these discrepancies are in part because the data conversion changes the amount of unclassified trade due to the lack of volume data, the more important reason is that, as noted in Section 3, merging multiple new codes into a single old code changes the relative magnitude of the computed import and export unit values. In Figure 3, it is found that the $VIIT_i$ tends to become larger when calculated with the recompiled statistics, while the converse is often the case for $HIIT_i$. This observation is not necessarily puzzling, however, if each country specializes more in terms of the goods it produces than in the quality of these products.[15] To the extent that this is the case, computing the HIIT and VIIT indices using the converted data may make us believe that quality differentiation is more pervasive than is actually the case.

Recent studies often compute the above indices using panel datasets and investigate their dynamic properties. Although H3 data are available only for 2007, a number of countries reported their statistics in terms of H2 between 2002 and 2006 (Figure 1). For these countries, I next compute the above indices for 2002 and 2006 and calculate how much their values have changed between these two years. Although this exercise covers the relatively short period of four years, this is about the longest time for which original statistics are available in terms of the same product classification for a large number of countries. Fortunately, the structure of international trade in IT equipment has changed dramatically in recent years, thanks in part to the emergence of China as the global hub of electronics production (Kumakura 2008).

The result of this calculation is shown in Figure 4. As in the previous figure, the results obtained using H1- and H2-based statistics are essentially the same, suggesting that, at least as far as IT machinery is concerned, the distinction between original H1 statistics and those converted from H2 to H1 is not important. On the other hand, the results from H0 statistics often deviate noticeably from those based on the other two datasets. This tendency

[14] Although the number of the subheadings under 8542 is six for both H2 and H3, the UNSD's conversion merges three H3 subheadings into one H2 subheading and leaves three H2 subheadings empty.

[15] To see why, suppose in Figure 2 that the trade balance of a country is in large surplus for 7013.22 but in large deficit for 7013.33. Assume further that the unit prices are very different between 7013.22 and 7013.33 but similar between exports and imports within each category. Under such circumstances, eq. (2) will designate two-way trade under 7013.22 and 7013.33 as HIIT but that of the merged H2 subheading 7013.21 as VIIT. This type of trade structure arises naturally when, for example, goods in 7013.33 are used as an input to the production of goods in 7013.22.

is particularly apparent in the HIIT and VIIT indices, for which H0-based data even alters the direction of the change for certain countries. This observation suggests that the use of statistics converted into H0 can be misleading when the focus of analysis is industries in which technical progress is particularly rapid and pervasive, such as IT machinery.[16]

# 5 Conclusion

Although the HS is now used widely as the basis for international trade statistics, frequent amendments to its product codes limit the time-series and cross-sectional comparability of national statistics. To ease this problem, the UNSD converts the original statistics into earlier HS classifications and makes them available through its internet-based Comtrade database.

When the exact transposition from a new to older classifications is impossible, the UNSD attributes all trade under each new subheading to a specific old subheading of its choice. While this is perhaps a sensible policy under most circumstances, it may not work well for industries whose product classification has been the focus of past amendments. Moreover, although recent studies frequently compute unit import and export values using Comtrade data, merging multiple new subheadings into a single old code can reduce the information content of these unit values. These concerns are particularly heightened for data converted into H0, whose product codes reflect the pattern of trade in much earlier years than do those of the subsequent editions.

My experiment with IIT in the IT equipment industry suggests that the above concerns can be of practical importance under certain circumstances. Although the distinction between the original and the converted statistics may matter less for other sectors, it is likely that industries that are interesting from the academic point of view are also those whose product codes are revised frequently. To the extent that this is the case, researchers would be wise to be mindful of the difference between the original and the recompiled data and the possibility that using the latter invites unexpected and undesirable consequences.

**Acknowledgement:**

The author would like to thank the Masayoshi Ohira Memorial Foundation, the Japan Economic Research Foundation and the Japan Society for the Promotion of Science Research (Scientific Research C) for financial support.

[16] Some authors investigate the dynamic relationship between the trade structure and IIT using the following "marginal" Grubel-Lloyd index

$$MIIT_i = 1 - \frac{\sum_k \left|\Delta X_i^k - \Delta M_i^k\right|}{\sum_k \left(\left|\Delta X_i^k\right| + \left|\Delta M_i^k\right|\right)},$$

where $\Delta X_i^k$ and $\Delta M_i^k$ denote the changes in the exports and the imports of good $k$ between two points in time (Brülhart 2008). While the result is not shown here, computing this index using the alternative datasets for 2002 and 2006 also generates non-negligible differences for several countries.

# References


[1] Brülhart, M. (2008) "An Account of Global Intra-Industry Trade, 1962-2006" GEP Reseach Paper 08/08, University of Nottingham.

[2] Finger, J. M. (1975) "Trade Overlap and Intra-Industry Trade" *Economic Inquiry* **8**, 581-589.

[3] Fontagné, L., M. Freudenberg, and G. Gaulier (2006) "A Systematic Decomposition of World Trade into Horizontal and Vertical IIT" *Review of World Economics* **142**, 459-475.

[4] Greenaway, D., R. Hine, and C. R. Milner (1995) "Vertical and Horizontal Intra-Industry Trade: A Cross-industry Analysis for the United Kingdom" *Economic Journal* **105**, 1505-1518.

[5] Greenaway, D., C. R. Milner (1983) "On the Measurement of Intra-Industry Trade" *Economic Journal* **93**, 900-908.

[6] Grubel, H. G., and P. J. Lloyd (1971) "The Empirical Measurement of Intra-Industry Trade" *Economic Records* **47**, 494-517.

[7] Kumakura, M. (2008) "Whither IIT?" *Journal of International and Global Economic Studies* **1**, 26-56.

[8] Thorpe, M., and Z. Zhaoyang (2005) "Study of the Measurement and Determinants of Intra-Industry Trade in East Asia" *Asian Economic Journal* **19**, 231-247.

[9] Statistics Division, United Nations Department of Economic and Social Affairs (2009) "Note on HS 2007 Data Conversion in UN Comtrade" available at the Comtrade website.

[10] Yu, D. (2008) "The Harmonized System – Amendments and their Impact on WTO members' schedules" WTO Staff Working Paper ERSD-2998-02.

Table 1 HS classification by section

| Section | Chapter | Description |
|---|---|---|
| 1 | 1 - 5 | Live animals; animal products |
| 2 | 7 - 14 | Vegetable products |
| 3 | 15 | Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes |
| 4 | 16 - 24 | Prepared foodstuffs; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes |
| 5 | 25 - 27 | Mineral products |
| 6 | 28 - 38 | Products of the chemical and allied industries |
| 7 | 39 - 40 | Plastics and articles thereof; rubber and articles thereof |
| 8 | 41 - 43 | Raw hides and skins, leather, furskin and articles thereof; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut) |
| 9 | 44 - 46 | Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw of esparto or of other plastic materials; basketware and wickerwork |
| 10 | 47 - 49 | Pulp of wood or other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard; paper and paperboard and articles thereof |
| 11 | 50 - 63 | Textiles and textile articles |
| 12 | 64 - 67 | Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof; prepared feathers and articles made therewith; artificial flowers; articles of human hair |
| 13 | 68 - 70 | Articles of stone, plaster, cement, asbestos, mica or similar materials; ceramic products; glass and glassware |
| 14 | 71 | Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation jewellery; coin |
| 15 | 72 - 83 | Base metals and articles of base metal |
| 16 | 84 - 85 | Machinery and mechanical appliances; electrical equipment; parts thereof; sound recorders and reproducers. Television image and sound recorders and reproducers, and parts and accessories of such articles |
| 17 | 86 - 89 | Vehicles, aircraft, vessels and associated transport equipment |
| 18 | 90 - 92 | Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; clocks and watches; musical instruments; parts and accessories thereof |
| 19 | 93 | Arms and ammunition; parts and accessories thereof |
| 20 | 94 - 96 | Miscellaneous manufactured articles |
| 21 | 97 | Works of art, collectors' pieces and antiques |

(Note) Chapter 77 is empty and left for possible future use. (Source) WCO website.

Table 2 Number of product codes in different editions of HS

| Hierarchy | Digit | HS88 (H0) | HS92 (H0) | HS96 (H1) | HS02 (H2) | HS07 (H3) |
|---|---|---|---|---|---|---|
| Section | - | 21 | 21 | 21 | 21 | 21 |
| Chapter | 2 | 96 | 96 | 96 | 96 | 96 |
| Heading | 4 | 1,011 | 1,241 | 1,241 | 1,244 | 1,221 |
| Subheading | 6 | 5,019 | 5,018 | 5,113 | 5,225 | 5,051 |
| Subheading (Comtrade) | 6 | | 5,041 | 5,132 | 5,226 | 5,053 |

(Notes) Differences in the numbers of subheadings between WCO's official nomenclature and Comtrade reflect different treatments of petroleum-related products (2710) and residual items (99). (Source) WCO documents and UN Comtrade Reference Tables.

## Table 3 Subheadings affected by backward conversion

[1] Number of subheadings

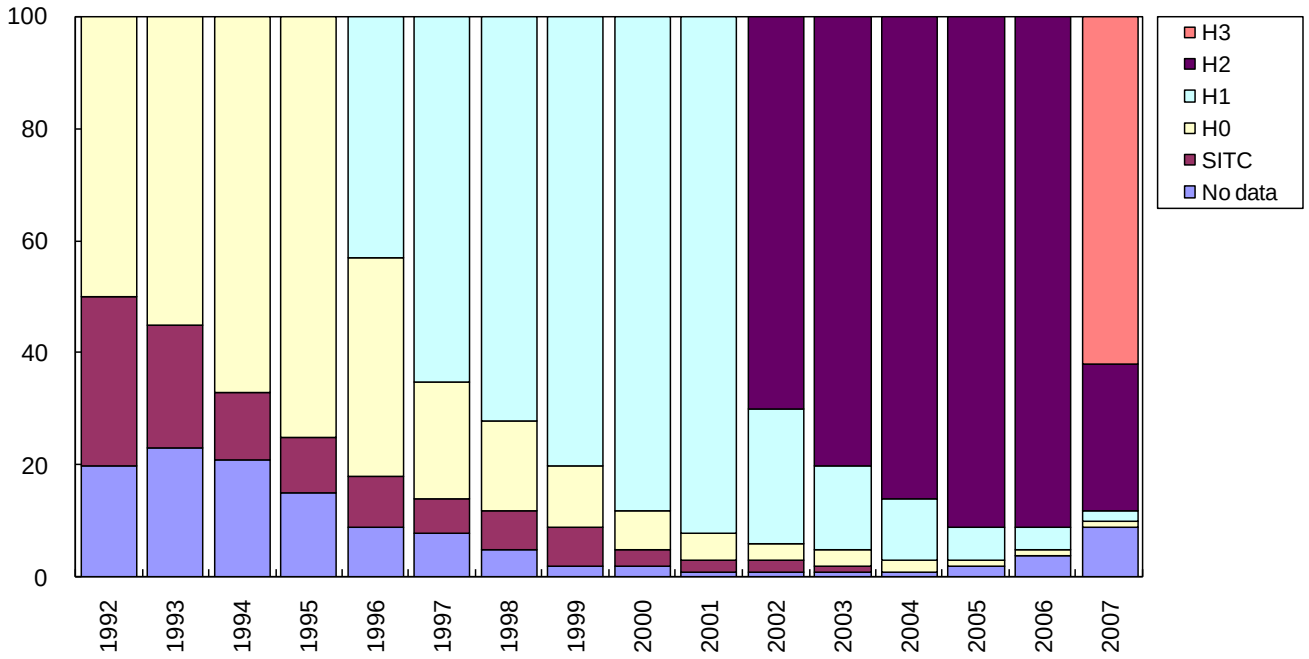
| Chapter | H1 -> H0 | | | H2 -> H1 | | | H3 -> H2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | (1) | (2) + (3) | Total | (1) | (2) + (3) | Total | (1) | (2) + (3) |
| 1 | 194 | 4 (2.1) | 11 (5.7) | 201 | 6 (3.0) | 3 (1.5) | 220 | 6 (2.7) | 7 (3.2) |
| 2 | 270 | 5 (1.9) | 17 (6.3) | 271 | 5 (1.8) | 27 (10.0) | 269 | 3 (1.1) | 32 (11.9) |
| 3 | 53 | 0 (0.0) | 0 (0.0) | 46 | 2 (4.3) | 4 (8.7) | 46 | 0 (0.0) | 2 (4.3) |
| 4 | 181 | 5 (2.8) | 20 (11.0) | 186 | 10 (5.4) | 4 (2.2) | 194 | 1 (0.5) | 4 (2.1) |
| 5 | 170 | 0 (0.0) | 7 (4.1) | 167 | 2 (1.2) | 6 (3.6) | 152 | 1 (0.7) | 10 (6.6) |
| 6 | 760 | 13 (1.7) | 26 (3.4) | 785 | 17 (2.2) | 64 (8.2) | 813 | 11 (1.4) | 128 (15.7) |
| 7 | 189 | 3 (1.6) | 6 (3.2) | 198 | 6 (3.0) | 5 (2.5) | 212 | 1 (0.5) | 28 (13.2) |
| 8 | 74 | 0 (0.0) | 0 (0.0) | 74 | 2 (2.7) | 33 (44.6) | 74 | 0 (0.0) | 11 (14.9) |
| 9 | 79 | 1 (1.3) | 18 (22.8) | 81 | 0 (0.0) | 22 (27.2) | 84 | 8 (9.5) | 25 (29.8) |
| 10 | 149 | 0 (0.0) | 11 (7.4) | 148 | 0 (0.0) | 64 (43.2) | 150 | 1 (0.7) | 26 (17.3) |
| 11 | 809 | 3 (0.4) | 20 (2.5) | 822 | 10 (1.2) | 8 (1.0) | 848 | 5 (0.6) | 123 (14.5) |
| 12 | 55 | 0 (0.0) | 6 (10.9) | 55 | 0 (0.0) | 0 (0.0) | 55 | 0 (0.0) | 14 (25.5) |
| 13 | 138 | 4 (2.9) | 6 (4.3) | 147 | 0 (0.0) | 9 (6.1) | 140 | 2 (1.4) | 15 (10.7) |
| 14 | 52 | 0 (0.0) | 7 (13.5) | 50 | 0 (0.0) | 3 (6.0) | 53 | 0 (0.0) | 0 (0.0) |
| 15 | 587 | 14 (2.4) | 120 (20.4) | 571 | 12 (2.1) | 4 (0.7) | 584 | 6 (1.0) | 48 (8.2) |
| 16 | 762 | 17 (2.2) | 58 (7.6) | 804 | 0 (0.0) | 25 (3.1) | 799 | 2 (0.3) | 149 (18.6) |
| 17 | 132 | 0 (0.0) | 0 (0.0) | 132 | 2 (1.5) | 0 (0.0) | 134 | 0 (0.0) | 14 (10.4) |
| 18 | 230 | 4 (1.7) | 35 (15.2) | 238 | 1 (0.4) | 7 (2.9) | 239 | 0 (0.0) | 46 (19.2) |
| 19 | 17 | 0 (0.0) | 0 (0.0) | 17 | 2 (11.8) | 0 (0.0) | 21 | 0 (0.0) | 2 (9.5) |
| 20 | 131 | 0 (0.0) | 3 (2.3) | 130 | 1 (0.8) | 4 (3.1) | 130 | 2 (1.5) | 16 (12.3) |
| 21 | 7 | 0 (0.0) | 0 (0.0) | 7 | 0 (0.0) | 0 (0.0) | 7 | 0 (0.0) | 0 (0.0) |
| Others | 2 | 0 (0.0) | 0 (0.0) | 2 | 0 (0.0) | 0 (0.0) | 2 | 0 (0.0) | 0 (0.0) |
| Total | 5,041 | 73 (1.4) | 371 (7.4) | 5,132 | 78 (1.5) | 292 (5.7) | 5,226 | 49 (0.9) | 700 (13.4) |

[2] Trade value (USD billion)

| Chapter | H1 -> H0 | | | H2 -> H1 | | | H3 -> H2 | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | (1) | (2) + (3) | Total | (1) | (2) + (3) | Total | (1) | (2) + (3) |
| 1 | 120 | 2 (2.1) | 9 (7.6) | 121 | 3 (2.3) | 1 (1.2) | 185 | 20 (10.8) | 2 (1.0) |
| 2 | 146 | 3 (2.2) | 5 (3.7) | 135 | 4 (3.0) | 3 (2.5) | 206 | 7 (3.3) | 8 (3.7) |
| 3 | 25 | 0 (0.0) | 0 (0.0) | 23 | 1 (5.9) | 0 (1.8) | 37 | 0 (0.0) | 1 (2.0) |
| 4 | 172 | 6 (3.6) | 21 (12.0) | 181 | 9 (4.7) | 1 (0.5) | 285 | 2 (0.7) | 0 (0.1) |
| 5 | 430 | 0 (0.0) | 2 (0.5) | 582 | 119 (20.4) | 2 (0.3) | 1,647 | 0 (0.0) | 3 (0.2) |
| 6 | 379 | 12 (3.3) | 26 (7.0) | 538 | 26 (4.8) | 196 (36.4) | 950 | 8 (0.8) | 115 (12.1) |
| 7 | 204 | 1 (0.7) | 21 (10.3) | 245 | 5 (2.0) | 5 (2.0) | 461 | 6 (1.2) | 72 (15.6) |
| 8 | 44 | 0 (0.0) | 0 (0.0) | 46 | 1 (3.2) | 17 (37.6) | 66 | 0 (0.0) | 3 (4.8) |
| 9 | 68 | 3 (5.0) | 19 (27.7) | 70 | 0 (0.0) | 20 (28.1) | 107 | 11 (10.1) | 32 (29.7) |
| 10 | 134 | 0 (0.0) | 26 (19.2) | 144 | 0 (0.0) | 70 (48.6) | 203 | 1 (0.4) | 33 (16.5) |
| 11 | 303 | 4 (1.4) | 9 (3.0) | 334 | 14 (4.1) | 0 (0.1) | 470 | 4 (0.7) | 21 (4.4) |
| 12 | 49 | 0 (0.0) | 11 (21.6) | 52 | 0 (0.0) | 0 (0.0) | 78 | 0 (0.0) | 43 (54.7) |
| 13 | 60 | 6 (10.3) | 2 (2.9) | 68 | 0 (0.0) | 3 (4.9) | 110 | 2 (1.9) | 6 (5.3) |
| 14 | 93 | 0 (0.0) | 3 (3.5) | 108 | 0 (0.0) | 3 (2.9) | 201 | 0 (0.0) | 0 (0.0) |
| 15 | 345 | 13 (3.9) | 67 (19.4) | 373 | 2 (0.5) | 0 (0.1) | 878 | 21 (2.4) | 25 (2.8) |
| 16 | 1,356 | 123 (9.1) | 359 (26.4) | 1,669 | 0 (0.0) | 189 (11.3) | 2,871 | 6 (0.2) | 1,406 (49.0) |
| 17 | 553 | 0 (0.0) | 0 (0.0) | 743 | 2 (0.3) | 0 (0.0) | 1,178 | 0 (0.0) | 169 (14.3) |
| 18 | 161 | 11 (7.0) | 16 (9.7) | 203 | 6 (2.8) | 9 (4.4) | 366 | 0 (0.0) | 41 (11.3) |
| 19 | 5 | 0 (0.0) | 0 (0.0) | 4 | 1 (18.1) | 0 (0.0) | 6 | 0 (0.0) | 1 (10.4) |
| 20 | 107 | 0 (0.0) | 2 (1.6) | 141 | 0 (0.3) | 5 (3.5) | 223 | 2 (0.8) | 23 (10.2) |
| 21 | 6 | 0 (0.0) | 0 (0.0) | 9 | 0 (0.0) | 0 (0.0) | 14 | 0 (0.0) | 0 (0.0) |
| Others | 123 | 0 (0.0) | 0 (0.0) | 175 | 0 (0.0) | 0 (0.0) | 462 | 0 (0.0) | 0 (0.0) |
| Total | 4,882 | 188 (3.8) | 597 (12.2) | 5,965 | 192 (3.2) | 525 (8.8) | 11,005 | 89 (0.8) | 2,002 (18.2) |

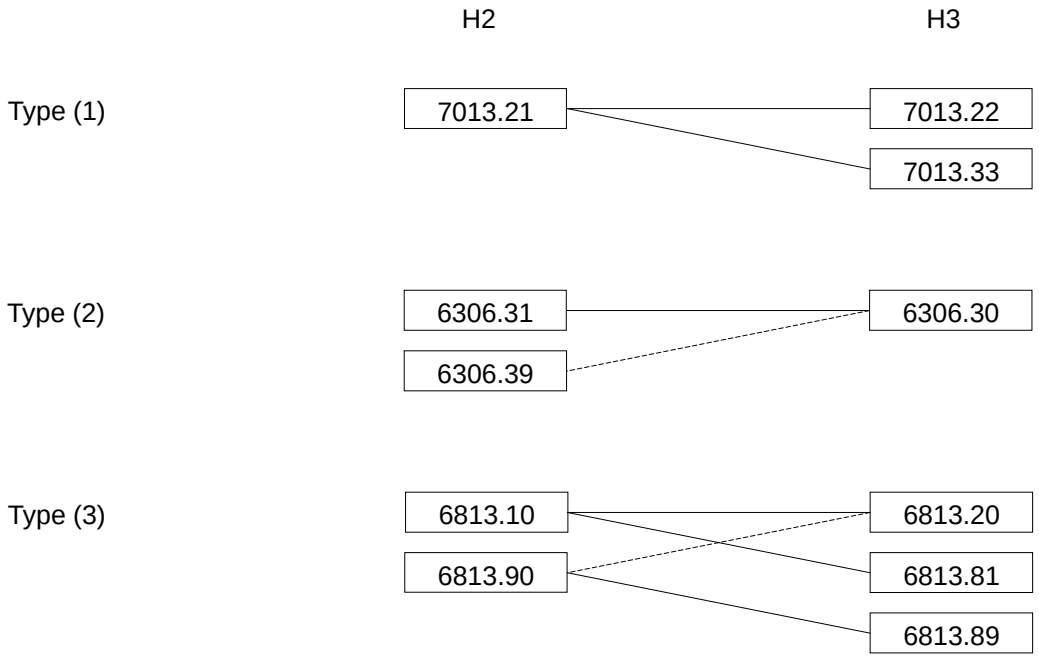
(Note) Values in parentheses are sharse in each chapter. Trade values are the sum of the imports of countries accounting for at least 0.25 percent of the world total and exclude re-imports whenever possible. The values for H1 -> H0, H2 -> H1, H3->H2 are computed using data for 1996, 2002 and 2006, respectively. (Source) UN Comtrade; author's calculation.

Figure 1 Original statistics by commodity classification



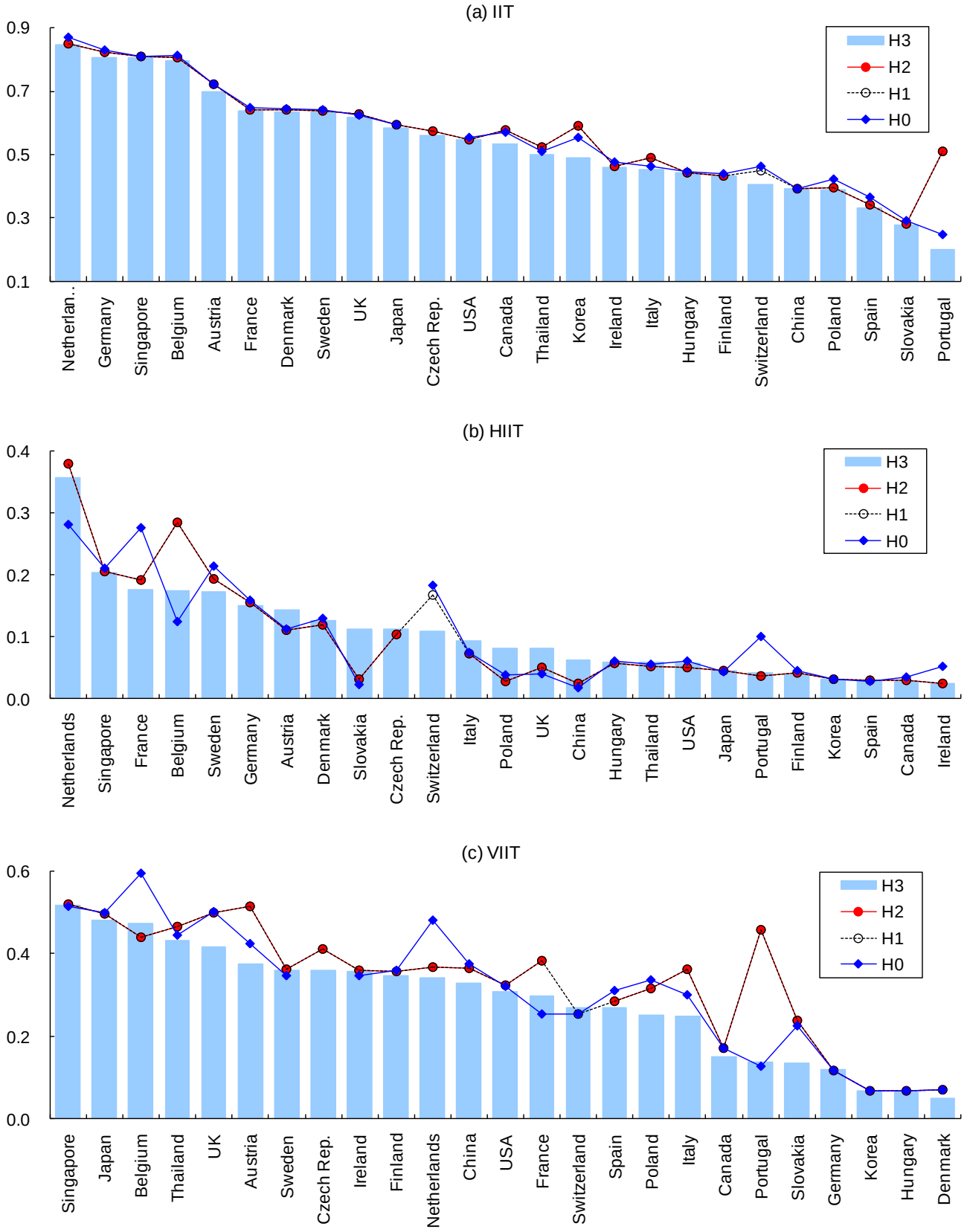

(Note) The share for each year was calculated for top 100 trading countries and customs territories.
(Source) Comtrade metadata; author's calculation.

Figure 2 Correlations between old and new product codes



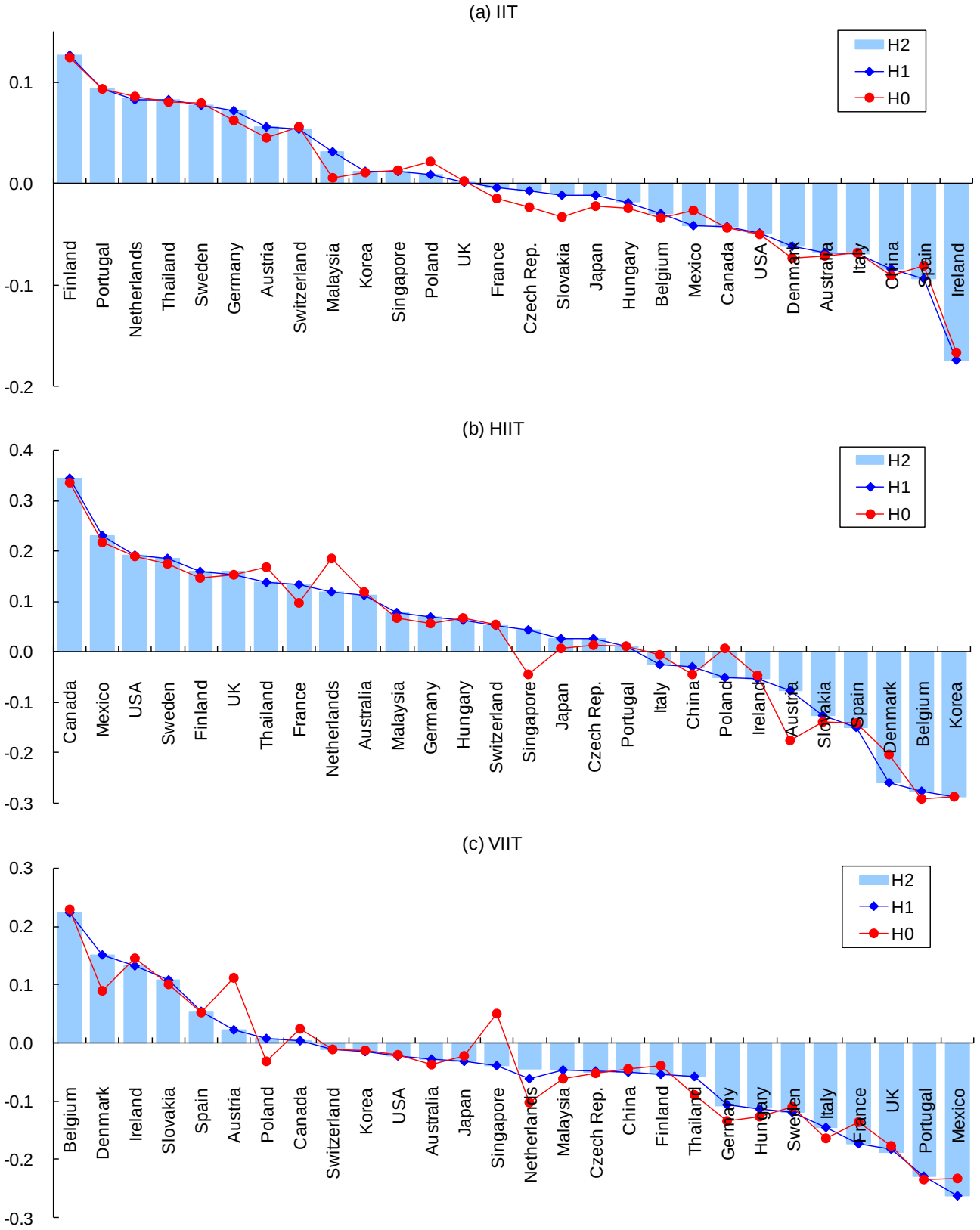

(Note) Solid lines indicate the correlations in the UNSD's conversion table; the actual correlations specified by WCO are represented by solid *and* broken lines. (Source) WCO website and Comtrade Reference Table.

Figure 3 Intra-industry trade indices computed from original and recompiled statistics (2007)




(Note) No data for Czech Rep. (H0) and Switzerland (H2). (Source) UN Comtrade; author's calculation.

Figure 4 Intra-industry trade indices computed from original and recompiled statistics
(change between 2002 and 2006)




(Source) UN Comtrade; author's calculation.