

A Consistent Concordance Among Harmonized System 1996, 2002, 2007, and 2012 Classifications^Ψ

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Abstract

This note creates a consistent concordance among Harmonized System (HS) 1996, 2002, 2007, and 2012 classifications. The main innovation of the concordance is that it consolidates all correlated codes instead of matching, based on product expertise, a single code in a classification to a single code in another classification. Hence, it does not suffer from inconsistency problems, at the expense of a tolerable loss in product detail.

^Ψ This Note replaces Cebeci (2012), which is the author's previous study on the same subject.

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I. REVISIONS TO THE HARMONIZED SYSTEM

The Harmonized System (HS) is the standard classification system used by countries to record the flows of goods traded across countries. The HS classification used by different countries is similar at the 6-digit level of disaggregation, enabling the user to make comparisons across countries in a given year at 6 or less digits. Since the introduction of the HS in 1988, the World Customs Organization (WCO) went through four major revisions, which resulted in the initiation of new classifications in 1996, 2002, 2007 and 2012. The revisions take mainly two forms:

- i. Different codes for similar goods with low trade volume were merged into a smaller number of new and/or already existing codes,
- ii. A code representing a good that had gained importance in world trade was split into various new and/or already existing codes, each representing a finer good within the original good.

As an example of a simple revision, take code 030269 in the HS2002 classification, which included both swordfish and tooth fish. In the HS2007 classification, this code was split into the new codes 030267 (swordfish) and 030268 (tooth fish), and the old code 030269 (for other fish). For the purpose of this study, the codes in the above example are considered to form a 1:3 “network”. The revisions made to the HS classification system create inconsistencies for analyses that use trade data spanning more than one classification period. To illustrate, assume that country A exports swordfish in 2006 and in 2007. Swordfish appears as a new exported product for country A in 2007 relative to 2006, because it is recorded under a new code, 030267, from 2007 onwards.

II. PROBLEM WITH CLASSICAL CONCORDANCES

In order to address the potential problems in time-series analysis created by the revisions to the HS classifications, numerous international organizations and researchers developed concordance/correspondence tables based on product expertise. The concordance tables are methodologically sound in concording 1:1 networks. However, they are structurally deficient

in concording networks that are not 1:1. This is a serious problem because around 80% of all networks are not 1:1.

In fact, the United Nation Statistics Division (UNSD), creator of the most widely used concordance table available, acknowledges in “Note on HS 2007 data conversion” (2009a) that *“The data conversions from HS2007 to earlier HS versions developed by UNSD assign one single code (subheading) of an earlier HS edition to each HS 2007 subheading. Yet, users should be aware that the very nature of a revision of a classification does not allow establishing a clear 1:1 correspondence for all codes (subheadings) of a new to the codes of previous versions of a classification ...”* and *“The data conversions have been developed based on the best judgment of the staff at the International Merchandise Trade Statistics Section of the UNSD but have no binding character whatsoever.”*

To illustrate the inconsistencies created by revisions to the HS classification system and the classical concordance tables, Figure 1 presents average product exit rates based on 6-digit product-level export data for 59 countries in the UN Comtrade database, for which data is consistently available from 2002 to 2010. The product exit rate in each year is computed as the number of HS 6-digit products exported in the previous year but not in the current year divided by the number of HS 6-digit products exported in the previous year. The squares in

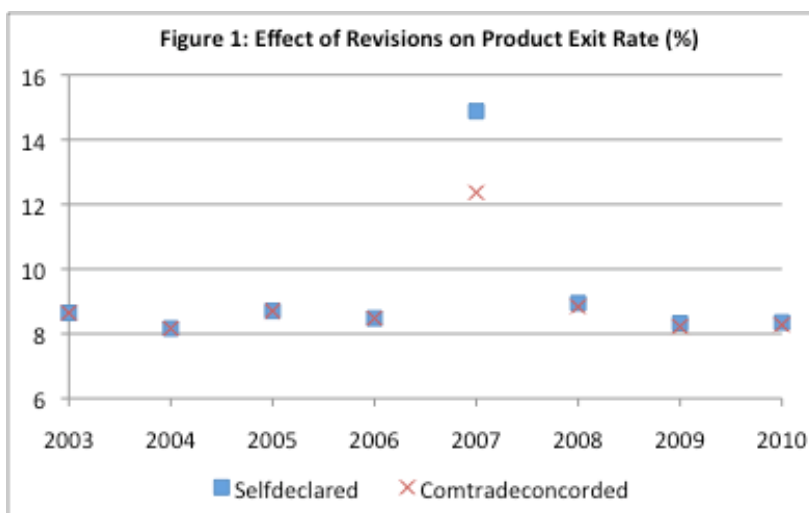


Figure 1 are constructed using the raw export data declared by countries. That is, the export data for the 2002-2006 period is based on the HS2002 classification, whereas the export data for the 2007-2010 period is

based on the HS2007 classification. The crosses are constructed using data concorded by UN

Comtrade based on UNSD (2008) and on UNSD (2009b). That is, the export data based on the HS2007 classification for the 2007-2010 period is transformed into the HS2002 classification.

Figure 1 shows that product exit rates range consistently between 8 and 9% for all years except 2007. In the 2003-2006 period squares and crosses overlap since both make use of the same classification (HS2002). But in 2007 according to the country self-declared data there is a sharp increase in the product exit rate to about 15% which is an inflated rate because many goods exported in 2006 are still exported in 2007 but are no longer recorded under same codes. Using the UN Comtrade-concorded data, the deviation from the path in 2007 is smaller, but is still considerable with a product exit rate of about 12%. That is, using UN Comtrade-concorded data is only a partial solution to the problem, because the concordance is not able to correctly handle the transformations of networks composed of more than one code in either classification.

III. METHODOLOGY OF A CONSISTENT CONSOLIDATION

The methodology we use consolidates all correlated codes within a network into a single code. Therefore, the concordance in this note is more appropriately termed as a “consolidation”. A similar methodology was followed by Pierce and Schott (2012) for concordancing US 10-digit codes over the 1989-2004 period and by Wagner and Zahler (2011) for concordancing HS1992, 1996 and 2002 classifications as an intermediate step for their analysis to identify new exports. The main difference between my concordance and Pierce and Schott’s methodology is that their concordance allows the user to choose the start and end date of the concordance within the 1989-2004 period. This would not be an ideal approach for my study because, unlike in US data, in developing countries’ data HS codes from previous HS classifications are frequently observed in later years. This is likely due to the fact that developing countries are slower to implement the HS classification revisions in their customs recording systems.¹

¹ This issue is frequent in the raw exporter-level customs data of several African countries included in the Exporter Dynamics Database of the World Bank (Cebeci et al., 2012).

In light of this background, I implement the following procedure to consolidate HS1996, 2002, 2007, and 2012 classifications:

1. Combine the HS1996-HS2002, HS2002-HS2007, and HS2007-HS2012 correspondence tables,²
2. Identify the networks of HS codes that are modified across HS classifications and assign an id to each network,
3. Reshape the data by HS code and list all the networks that an HS code belongs to,
4. Reassign the same id to all the networks that include the specific HS code under consideration,
5. Repeat the operations in 3 and 4 above until no further change in network ids remains,
6. Assign a single code (called final code) to all the HS codes that belong to the same network.³

IV. RESULTS OF THE CONSOLIDATION

The output file for my concordance is presented in the Appendix (available online). At the end of the process described above, 2,207 unique codes existing in the HS1996-HS2002, HS2002-HS2007, and HS2007-HS2012 correspondence tables are consolidated into 477 final codes. For example, codes 010513, 010514, 010515, and 010519 belonging to different HS classifications are all transformed into the final code 010513 at the end of the consolidation process.

² A sequential transformation operation across correspondence tables is not a suitable methodology to follow since many HS codes are subject to transformation in more than one revision of the HS classification. Therefore, all correspondence tables need to be handled simultaneously.

³ Note that some 6-digit HS codes may be networked to a final code with a different 2-digit chapter heading than their own.

Table 1: Size of Final Codes by Number of HS 6-digit Codes They Include

Size of the final code (Number of original HS codes covered by the final code)	Frequency	Total Number of Affected Codes
2	197	394
3	160	480
4	35	140
5	20	100
6	15	90
7	10	70
8	6	48
9	8	72
10	1	10
11	1	11
13	1	13
14	2	28
15	3	45
16	2	32
17	1	17
18	1	18
19	1	19
20	2	40
21	2	42
22	2	44
25	1	25
27	1	27
34	1	34
35	1	35
92	1	92
110	1	110
171	1	171
Total	477	2,207

Source: Author's computation using Correspondence Tables

The breakdown of final codes is presented in Table 1. Three quarters of the final codes include either 2 or 3 original HS 6-digit codes. At the other end, one final code includes 92 HS 6-digit codes, another 110 HS 6-digit codes and yet another 171 HS 6-digit codes.

Table 2: Effect of the Consolidation by HS Classification

	HS1996	HS2002	HS2007	HS2012
Original number of HS 6 digit codes	5,132	5,224	5,052	5,205
Number of HS codes replaced by final codes	831	923	751	904
Total number of codes after consolidation	4,301	4,301	4,301	4,301

Source: Author's computation using Correspondence Tables

Table 2 summarizes the effect of the consolidation on the number of product codes. Roughly 20% of codes are transformed into 477 final codes in each HS classification, resulting in a total of 4,301 codes for all HS classifications.

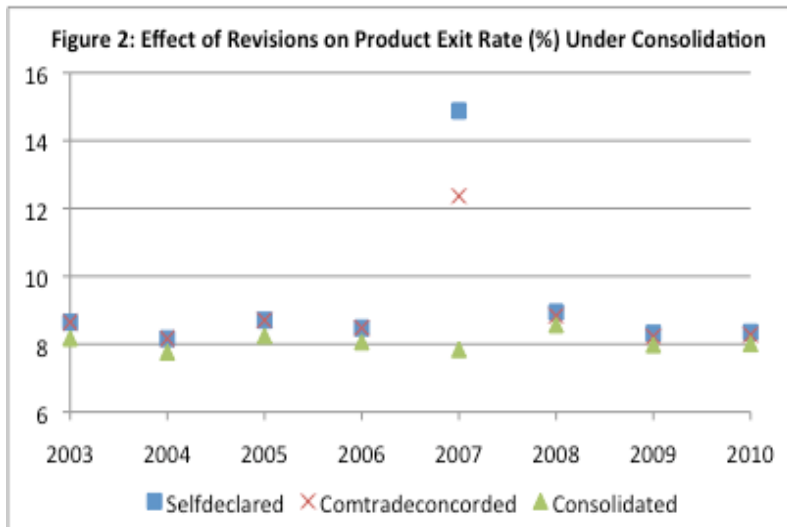


Figure 2 repeats the example in Figure 1 using the consolidated HS codes developed with the methodology in this note. The triangles in Figure 2 show the product exit rates with the consolidated codes. Two important changes emerge. First,

there is no longer a sharp increase in product exit rates in 2007. Second, the product exit rate is slightly lower using the consolidation relative to the other two methods for non-problematic years (i.e., all years except 2007). This slight decrease from the consolidation is due to the fact that we now have broader product categories with a roughly 20% lower number of codes. This slight loss in detail is the cost of addressing the problem of a very large spike in the product exit rates in the year of the HS classification revision.

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APPENDIX

Consolidation file in MS Excel (available online).