

The Similarities and Differences among the Three Major Global Inter-Country Input-output Databases and their Implications for Trade in Value-added Estimates*

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Abstract

This paper compares three inter-country Input-output (ICIO) tables (or databases) constructed by WIOD, GTAP and OECD. We first harmonize the three tables into the same country and sector coverage and check their consistency with each country's GDP (by expenditure accounts) and balance of payments figures. Then, we compute the differences between the three databases in major economic variables, including gross output, direct value-added, domestic and imported intermediate inputs and final demand. Next, we estimate major trade in value-added indicators, decompose each country's gross exports into various value-added and double counted components, using the method proposed by Koopman, Wang and Wei (2012), and discuss the similarities and differences of these estimates among the three databases. We conclude the paper with some suggested directions to further improve ICIO databases.

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*The views in the paper are solely the authors' own opinion. It is not meant to represent in anyway the views of the World Trade Organization or U.S. International Trade Commission or any of its individual Commissioners.

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I Introduction

There has been a growing recognition in the official statistics community that the increasing global production fragmentation requires a new approach of measuring trade, particularly in terms of trade in value-added.¹ Noting that “measuring trade in value-added is very important to understand the supply side, and also the demand side, of international trade and identify the respective sources of competitiveness”,² the OECD and WTO launched a joint Trade in Value-Added (TiVA) initiative in 2012,³ which is designed to mainstream the production of trade in value-added statistics and make it a permanent part of the statistical landscape.

An accurate assessment of trade in value-added has to go beyond a single country’s effort, as it requires information on cross-border input-output relationships. There is a consensus among international statistical agencies that direct measurement of trade in value-added is extremely difficult, primarily because the information is not available in business record-keeping systems. For example, as pointed by Yuskavage (2013), U.S. business firms do not maintain information in their accounting systems that would allow them to readily identify whether their material inputs are from domestic or foreign sources. Firms typically obtain their material inputs from wholesale suppliers and distributors, and are less concerned about the country of origin for these materials. Without such information, the most feasible and promising approach to develop comprehensive and consistent measure for trade in value-added that goes beyond case studies of individual products (such as the iPod) has to involve the use of Inter-country Input-Output (ICIO) tables that link production processes within and across countries.

Therefore, a global input-output table⁴ is the underpinning of measuring trade in value-added. However, due to the tremendous amount of data required and the differences in statistical classifications across countries, constructing such database is a non-trivial task. Most existing global I-O databases are a simple collection of individual country I-O tables,

¹ “International Trade Information Systems in 2020” Global Forum on Trade Statistics, Geneva, 2-4 February 2011, *Background note by UNSD, Eurostat and WTO*.

² “Trade in Value-Added: Concept, Methodologies and Challenges”, JointOECD-WTO Note, 2012.

³ “Measuring trade in value-added,” www.oecd.org/trade/valueadded.

⁴ So-called “global” input-output table includes a set of individual countries, for which national input-output tables are available, plus a “rest of the world” aggregate that estimates input-output flows for all other countries. An “inter-country” input-output table may only cover a certain number of countries, without an endogenous estimate for the “rest of the world”, thus not representing the whole world economy. The three ICIO tables under review in this paper are global ones.

such as various versions of OECD STAIN I-O database.⁵ One available international IO table, the Asian international IO table (AIO), compiled by the Institute of Development Economics (IDE) in Japan, covers only a selected set of nine Asian economies plus the United States, and treats the rest of the world (including EU) as exogenous blocks. In addition, its publication also suffers a significant time delay (the most recent table available is 2005).

Nonetheless, with a growing recognition of the need to have a comprehensive and timely global I-O table in order to measure trade in value-added properly and timely, three ICIO databases have been developed⁶. Currently, they are the most widely known and used, and two of them (GTAP and WIOD) are already publicly accessible to users. They are:

- *The World Input-Output database (WIOD)* is developed by a consortium of eleven European research institutions, and funded by the European Commission. The WIOD is a time series of inter-country input-output tables from 1995 to 2009. It uses supply-use tables from individual country's national account as the starting point to integrate bilateral trade statistics and derive the final symmetric world IO table (WIOT), covering 27 EU members and 13 other major economies (Timmer eds. 2012). Intuitively this approach makes sense as it links trade statistics (which are product based) with the product statistics in the supply-use table in one hand, and value-added/employment data (that is industry-based) with industry statistics in the supply-use tables in the other hand. It also avoids errors inherent in the assumptions imposed when transferring SUTs to symmetric IO tables before the reconciliation process even start. It has become publicly accessible since April 2012.⁷
- *GTAP database (GTAP)* is developed and maintained by the Center of Global Trade Analysis at Purdue University. With 57 sectors, 114 individual countries and 20 composite regions in its most recent version (version 8), GTAP has a broader country and sector coverage than both the Asian IO table and WIOD table. GTAP is

⁵ It provides a bulk of the required data and is regularly compiled for about 60 countries across the globe, but integrating them with bilateral trade statistics into global consistent database still remains as a substantial challenge.

⁶Lenzen et al. (2012) documented another effort to build global MRIO database (Eora). It proposed a method to estimate the standard error for each cell in the global IO tables to assess their reliability and uncertainty using data of constraint violation and discrepancies between balanced IO table and unbalanced initial estimates. UNCTAD has recently used it to produce its own set of "trade in Value Added indicators" that covers all developing countries. It provides a complement to WTO-OECD TiVA indicators..

⁷ Despite many of advantages, such as improved allocation of imports by end use category; closely linked with EU KLEMS and World KLEMS and with better and detailed capital types and labor skill levels breakdown, there are also obvious shortcomings in the WIOD data set need to be further improved, such as exports to the rest of the world is calculated as residuals and could become negative for some products; There is no reconciliation procedure based on data reliability and constrained optimization has been used. In addition, while the coverage of the 27 EU member countries is detailed, less than 10 developing countries are included. Processing trade is also not considered.

benchmarked on the reconciled official trade statistics that are based on data reliability. For example, re-exports through Hong Kong are systemically adjusted to their origin and destination countries. However, since GTAP only benchmarked to adjusted trade statistics, sector level supply and demand data for individual countries may suffer large discrepancies with corresponding statistics in national accounts.⁸ And because there is no consistency imposed for different versions of the database, it is difficult to use the data to make historical comparisons. In addition, the international IO table underlying GTAP database is based on the so called Multi-Region Input-Output (MRIO) table in the literature, there is no distinction between intermediate and final goods and services trade flows in the data. Therefore, transformation has to be made in order to construct the ICIO tables from GTAP data (Wang, Tsigas, and Gelhar, 2012).

- *OECD ICIO database (OECD)* is constructed by the OECD, representing a similar effort as the WIOD. Building on the OECD harmonized individual country input-output tables, it currently covers 58 countries and 37 industries, and serves as the major data source for the first OECD-WTO public database on "Trade in value-added" (TiVA) released on January 16, 2013. The database provides TiVA indicators for years 1995, 2000, 2005, 2008 and 2009; for 57 individual countries plus the European Union (EU) and "Rest of the world" aggregates, and a selection of 18 industrial aggregates. Annual ICIO tables will be produced in the near future.

Because trade in value-added is not readily observable, it is difficult to assess the accuracy of measures estimated from different ICIO tables with different country and sectorial coverage, and construction methodologies. No attempt has been made so far to compare these three global ICIO databases to evaluate their accuracy, as well as the policy implications of indicators estimated from these databases.

This paper tries to fill in this void by comparing the WIOD, OECD and GTAP databases. First, we check how closely the three databases benchmark to official national accounts and balance-of-payments (BOP) trade statistics, such as each country's GDP and total final domestic demand. Then, we measure the differences among the three databases in basic variables, such as gross output, direct value-added, and trade in intermediate and final goods and services. Next, we compare various trade in value-added indicators estimated from the three databases, and evaluate the potential trade policy implications by the discrepancies

⁸ For instance, the imports use by sector in the reference year does not correspond to the benchmark year of import matrix information published by the National Statistics Agencies.

among these estimated trade in value-added measures. The paper ends with some suggested directions to improve the accuracy of these global ICIO databases.

II Discrepancies between the three databases and official statistics

As mentioned, the three original databases have different country and sector classifications. To facilitate the comparison, we first mapped the sectors in the three databases to ISIC (rev 3) codes and aggregated them into 25 industries that have common ISIC codes in the three databases. Then, we further aggregated OECD and GTAP data to 41 countries as the same as what in the WIOD database. This resulted in a set of 10 harmonized ICIO tables from the 3 databases which are used as the major data source in our comparison exercise. These 10 ICIO tables include 2004, 2007 for GTAP and WIOD, and 2005, 2008 and 2009 for OECD and WIOD.

2.1 Differences with National Accounts statistics

Figures 1 to 5 graph the differences between official UN national account statistics with WIOD, OECD and GTAP database in GDP, domestic final demand, total exports and imports for the five years that we have comparable data. There are numerous differences can be notified immediately.

In principle, to derive GDP at market prices from WIOT by adding up industry value added, the net taxes on products should be included and the international trade margins should be excluded. However, none of the three databases under review here treat international transportation as an endogenous industry. Hence, to maintain the WIOT row and column balance condition and get consistent trade in value-added estimates from the three global databases, the international trade margin has been treated as a part of the destination country's domestic value-added in this paper.

Figures 1(a) to 5(a) shows that except rest of the world, GDP computed from OECD ICIO table are slightly higher than what reported under the UN system of national accounts (UNNA), while the GDP computed from GTAP data is consistently lower than what reported by UNNA excepted Slovakia. Except rest of the world and few outliers, GDP computed from WIOD WIOT is fluctuated around what reported by UNNA by a small margin (more than 75% of the difference less than 1%). There are several possible reasons for these discrepancies. First, as previously mentioned, GTAP database is benchmarked to adjusted trade statistics, not statistics from national account, so discrepancies are expected ; Second, there are different vintage of official national account statistics since National Statistical

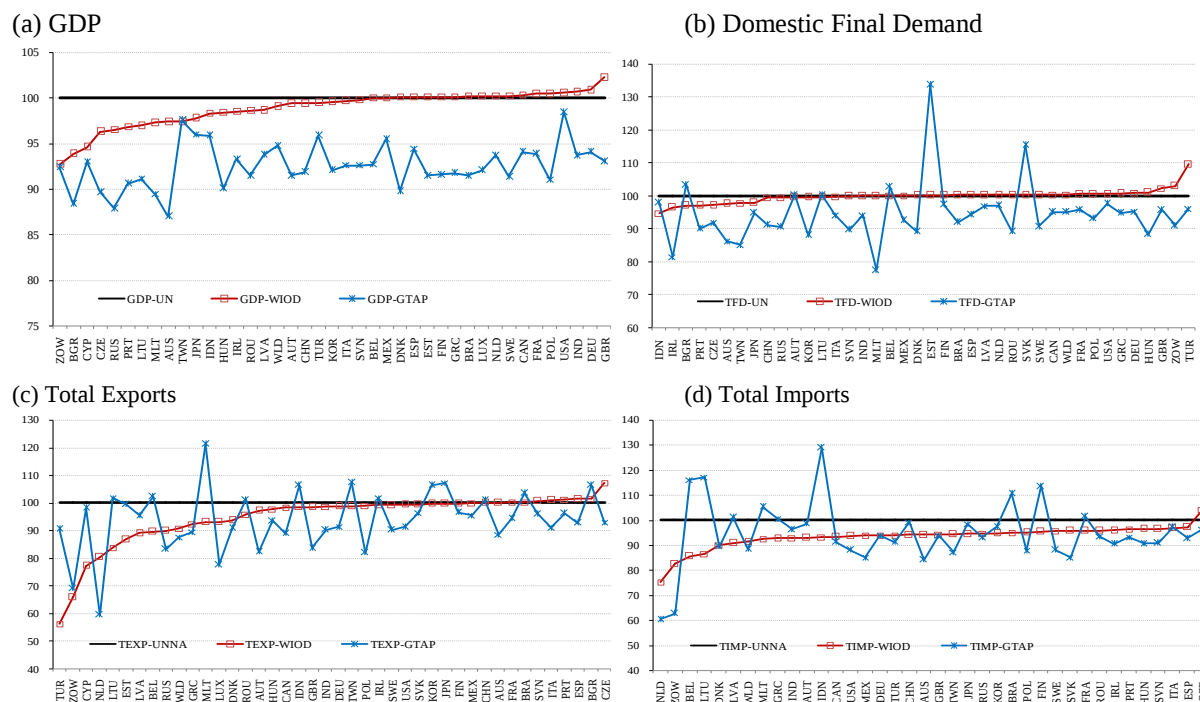
Institutes (NSI) constantly make revisions based on newly available data and improved estimation methodologies. There are differences between UN national accounts data available today, which we used in our comparison exercise, with what was used by WIOD or GTAP teams when they constructed their databases (The later constructed OECD ICIO tables seems match UNNA GDP data better). Finally, both WIOD and GTAP databases chose not to apply constraint optimization techniques in the final stage of their data reconciliation process; this may also raises the likelihood for GDP computed from these databases deviate from the UN national account.

It needs to mention that correctly compute GDP from WIOD WIOT, special attention need to be paid to “residents purchase abroad” and “nonresidents purchase at domestic market” recoded in the cross section of value-added and final demand block. Such terms usually not appear in an industry by industry symmetric IO table (they are not show up in both OECD and GTAP ICIO tables that also under review), but they are included in WIOD WIOT. This causes adjustment for each country’s domestic and foreign final demand and thus its GDP and total trade. Without take into account these additional economic activities, a country’s GDP based on WIOD WIOT could be under or over estimated. Because there is no statistical information regarding the sector and country distribution for such activities, WIOD team chose not to allocate them into final demand by countries and sectors. However, by doing so, an internal inconsistence issue may arise by leaving them in an ICIO table. For example, multiplying Leontief inverse and final demand without such adjustment may not give correct estimates of each country’s gross outputs thus their total value-added. Therefore, efforts have to be made to properly integrate such economic activities into ICIO tables, similar to what Dixon and Rimier (2002) did to U.S. IO tables for the USAGE model.

The total trade numbers computed from the WIOD WIOTs are consistently lower than official trade statistics recorded by UN National Accounts. Based on a note provided by WIOD team, two major reasons may explain this. First, re-exports have been subtracted from each country’s exports and imports statistics, while trade statistics recorded in National Accounts, usually include re-exports. For some countries like the Netherlands and Belgium, re-exports may constitute a significant portion of their total trade. These re-exports can be found in the international Use tables which are also part of the WIOD database and can be downloaded. Users can add the re-exports from the international Use tables to arrive at the total export and import flows consistent to national account if desired. Second, in principle, there should not be net taxes on exports but only on domestic uses. However, to get the RAS procedure used by WIOD team to update the national SUTs to converge, net taxes on exports

were also calculated for some countries such as Bulgaria, Cyprus, Greece, Hungary, Lithuania, Latvia, Malta, Romania and Russia. For some countries, such as Cyprus and Russia, these net taxes can be sizable for over 10% of their total exports.

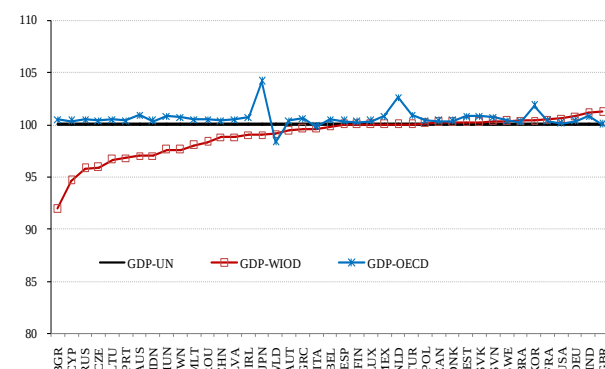
Figure 1. Difference between WIOD and GTAP databases from UNNA, 2004



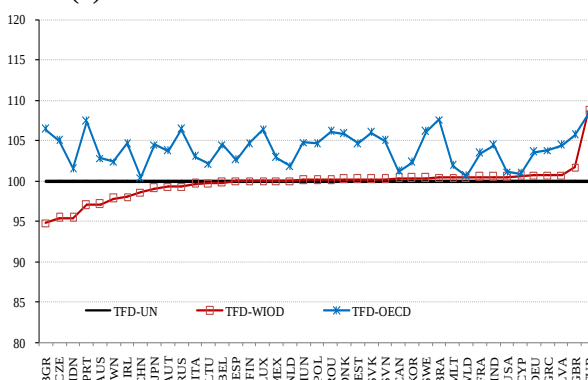
Note: all the different is sorted by WIOD. SVK is deleted in (a), LUX and CYP are deleted in (b); EST, CYP, LUX and BGR are deleted in (d).

Figure 2. Difference between WIOD and OECD databases from UNNA, 2005

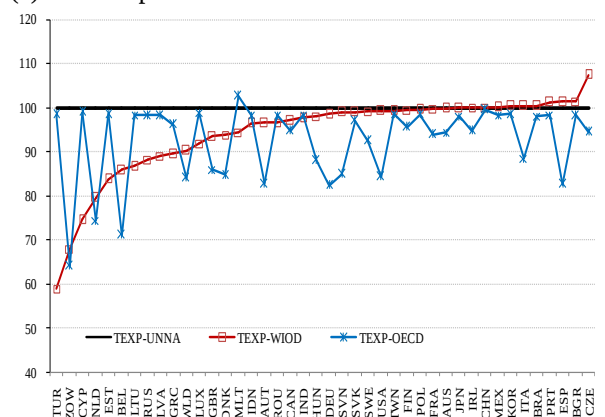
(a) GDP



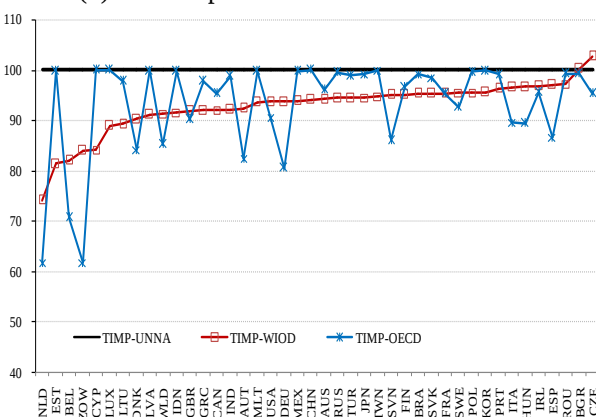
(b) Domestic Final Demand



(c) Total Export



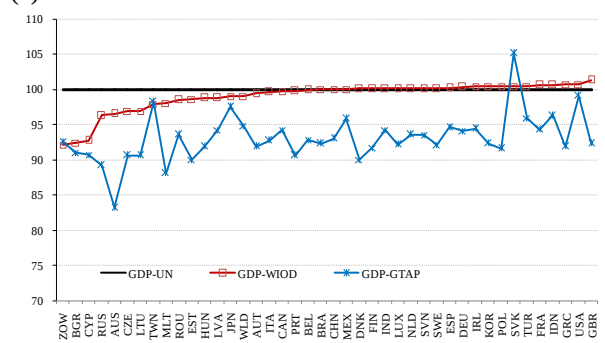
(d) Total Import



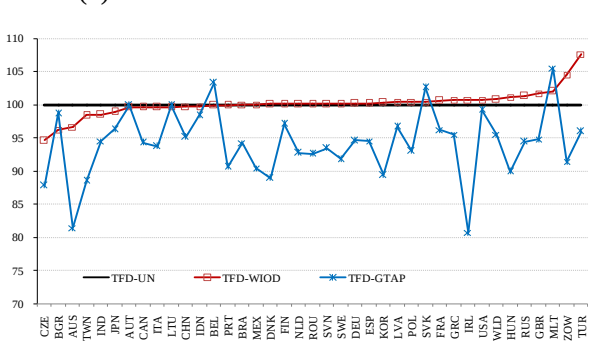
Note: all the different is sorted by WIOD. ZOW, or "Rest of the world", is deleted in (a) and (b)

Figure 3. Difference between WIOD and GTAP databases from UNNA, 2007

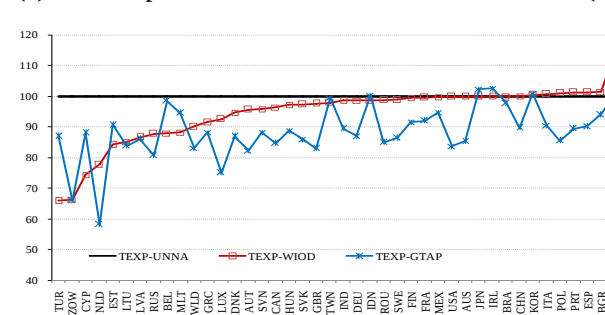
(a) GDP



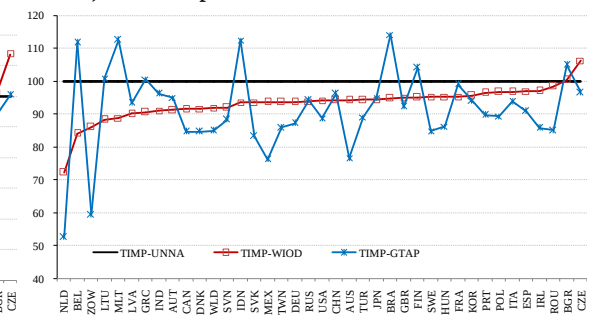
(b) Domestic Final Demand



(c) Total Export



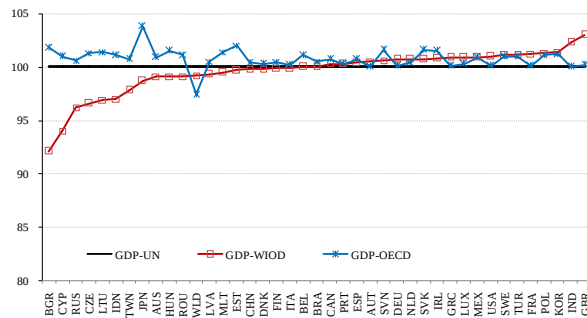
(d) Total Import



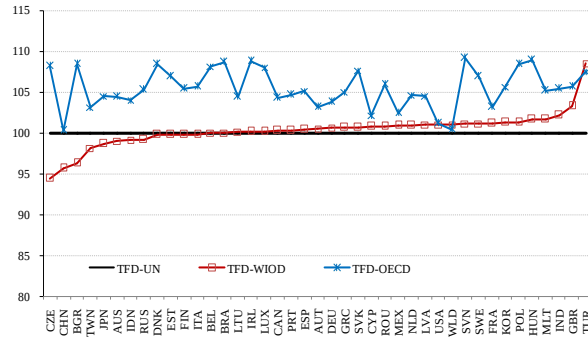
Note: all the different is sorted by WIOD. LUX, EST and CYP are deleted in (b). EST, CYP and LUX are deleted in (d).

Figure 4. Difference between WIOD and OECD databases from UNNA, 2008

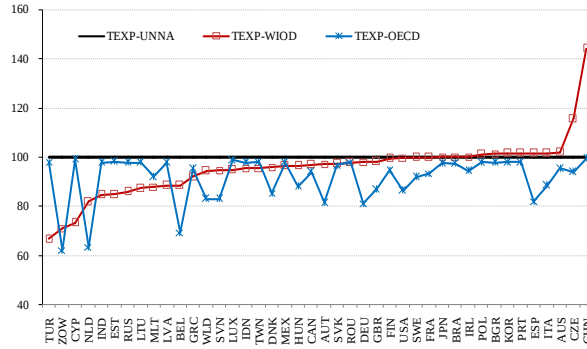
(a) GDP



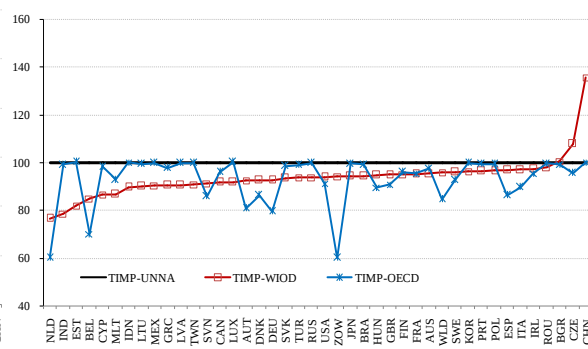
(b) Final Domestic Demand



(c) Total Export



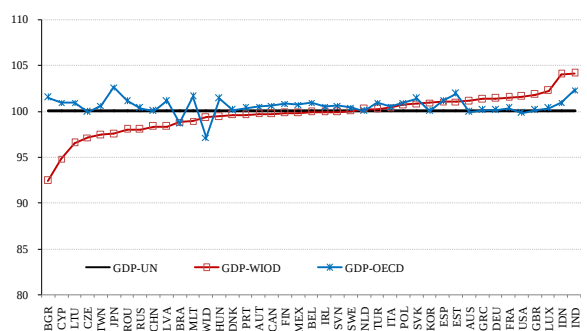
(d) Total Import



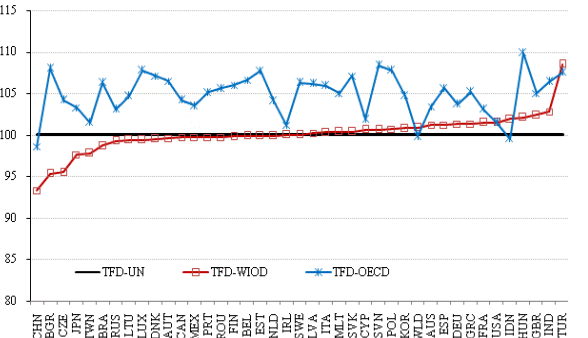
Note: all the different is sorted by WIOD. ZOW is deleted in (a) and (b)

Figure 5. Difference between WIOD and GTAP databases from UNNA , 2009

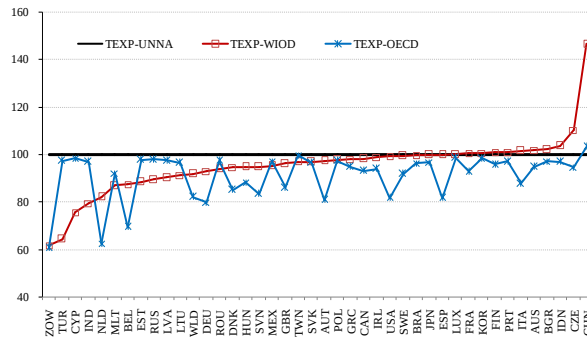
(a) GDP



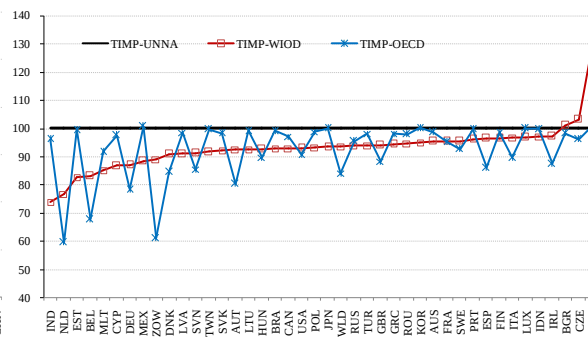
(b) Final Demand



(c) Total Export



(d) Total Import



Note: all the different is sorted by WIOD. ZOW is deleted in (a) and (b).

2.2 Differences with official trade and balance of payment statistics

The comparison of gross trade figures from ICIO tables and Balance of Payments (BOP) data is relevant since BOP data are commonly used by economists and policy makers to analyze international trade flows in goods and services. Theoretically, trade data derived from ICIO tables should either be similar to those from the balance of payments or associated with meaningful metadata to explain the potential differences between the two sources.

The three following tables compare total exports in goods and services between the balance of payments figures and equivalent figures from the three ICIO tables under review.

Table 1 compares BOP and WIOD exports in goods and services for five years. Overall, the two sources present numerous differences. Except for very few exceptions, BOP figures are largely above those derived from the WIOD table.

At the world level, BOP total exports in goods and services exceed WIOD figures by 12.6% for 2009. The highest differences concern primarily EU member countries. This might be attributed to a different treatment of transit trade and re-exports taking place within the EU. For example, the deviation observed across years for the Netherlands stands at a high level and BOP values remain between 22% to 32% above WIOD ones. WIOD trade data do not incorporate the re-export and transit activities taking place in the Netherlands, notably through its port operations like in Rotterdam, while BOP figures cover such activities.

Chinese trade data in the WIOD table include trade from the Special Administrative Regions (SAR) of China, that is Hong-Kong and Macao.⁹ Theoretically, such a specific geographical entity should represent a source of divergence with Chinese BOP data. Surprisingly, China total exports match exactly for historical years (2004, 2005, 2007) but present a high difference between the two sources for 2008 and 2009; the WIOD figures being above BOP ones by around 30%, for the two years¹⁰. BOP figures for the USA are greater by around 8% to 9% than WIOD's, which may be partly explained by the non-inclusion of US re-exports in the later source.

⁹ See "The World Input-Output Database (WIOD):Contents, Sources and Methods" (WIOD, April 2012)

¹⁰ the data for China and to a lesser extent India have been heavily revised for 2008 and 2009 by the UN in the past 2 years. WIOD team has revised WIOTS for these years accordingly. These have been posted at <http://www.wiod.org/database/iot.htm> recently. If use these updated tables, the big differences for China will vanish.

The level of discrepancy remarked for various countries is relatively stable along the years. This suggests that the reasons behind the differences between the two sources rely on structural and coverage issues that last over time. Basically, the construction of international trade data in the WIOD table is based on national accounts and requires the application of specific processing and assumptions to face data availability problems and country-specific issues. Additionally, the concepts behind the above statistical frameworks can slightly differ from the ones prevailing in the BOP.

Table 2 presents and compares the total exports in goods and services from BOP and the OECD harmonized table. Similar remarks as for Table 1 can be addressed. BOP data are generally higher than the ones sourced from the OECD table. In addition, the biggest deviations between the two sources mainly affect EU member countries; as for the WIOD table, a plausible reason is that the OECD table excludes the re-exports and transit trade taking place within the EU. The deviations noted in 2008 and 2009 for the USA and the world as well are nearly twice as high as the ones noticed between WIOD and the BOP source. The level of these differences remains steady for the three years under review, which highlights potential coverage discrepancies, as already mentioned above.

Table 1. Total exports of goods and services, 2004, 2005 and 2007-2009 - Comparison between WIOD and BOP figures (billion \$ and %)

	2004			2005			2007			2008			2009		
	WIOD	BOP	WIOD-BOP Difference	WIOD	BOP	WIOD-BOP Difference	WIOD	BOP	WIOD-BOP Difference	WIOD	BOP	WIOD-BOP Difference	WIOD	BOP	WIOD-BOP Difference
Australia	123	116	5.8	149	138	7.6	195	183	6.4	243	234	3.5	201	196	2.8
Austria	132	148	-12.0	144	162	-12.4	195	217	-11.3	219	242	-10.3	169	189	-11.7
Belgium	239	272	-14.1	247	296	-19.9	325	374	-15.1	370	418	-13.0	292	340	-16.4
Brazil	109	109	0.1	134	134	-0.2	183	185	-1.1	226	228	-1.1	177	181	-2.0
Bulgaria	12	14	-13.7	11	16	-51.3	24	25	-5.6	29	30	-5.4	22	23	-6.3
Canada	375	380	-1.4	416	428	-2.8	480	497	-3.7	511	530	-3.7	377	390	-3.3
China	656	658	-0.4	837	837	0.0	1342	1342	0.0	2277	1582	30.5	1952	1329	31.9
Cyprus	3	7	-121.5	3	8	-133.7	5	10	-122.0	5	11	-119.9	5	9	-103.5
Czecho Rep	74	77	-4.1	86	84	2.6	134	123	7.7	161	146	9.4	122	118	3.3
Denmark	98	111	-13.1	113	126	-12.0	147	162	-10.0	173	187	-7.9	133	147	-10.1
Estonia	7	9	-30.1	8	11	-38.0	11	16	-37.3	13	18	-35.2	10	13	-35.4
Finland	73	76	-4.1	79	82	-4.2	109	113	-3.4	123	128	-4.0	87	90	-3.5
France	493	535	-8.6	518	561	-8.5	636	697	-9.5	705	767	-8.8	565	672	-19.0
Germany	1008	1054	-4.6	1096	1147	-4.7	1510	1573	-4.2	1672	1749	-4.6	1266	1402	-10.8
Greece	36	49	-36.8	36	52	-42.8	50	67	-33.3	59	79	-34.8	46	59	-27.9
Hungary	59	66	-11.2	68	75	-10.5	103	110	-6.7	116	125	-8.2	88	98	-11.7
India	124	116	6.1	158	155	1.9	243	241	0.8	258	306	-18.5	213	261	-22.6
Indonesia	81	83	-1.7	94	100	-6.4	125	131	-4.0	145	155	-6.8	135	133	1.3
Ireland	150	153	-2.0	160	163	-1.8	202	208	-2.8	214	218	-2.1	196	202	-3.1
Italy	405	436	-7.7	428	462	-7.8	575	612	-6.5	620	657	-5.9	468	500	-7.0
Japan	613	637	-3.8	654	679	-3.9	772	806	-4.4	858	897	-4.5	637	672	-5.5
Korea Rep	289	305	-5.4	328	340	-3.6	436	463	-6.1	492	525	-6.7	408	432	-5.7
Latvia	5	6	-15.5	7	8	-14.8	10	12	-18.9	12	14	-16.4	10	11	-15.7
Lithuania	9	12	-28.6	12	15	-23.0	17	21	-23.2	24	28	-18.5	18	20	-13.9
Luxembourg	44	47	-7.1	50	55	-10.7	79	83	-5.2	91	89	1.5	79	73	7.6
Malta	3	4	-31.6	4	5	-28.6	5	7	-26.7	6	8	-25.9	5	7	-37.0
Mexico	191	202	-5.7	218	230	-5.5	276	289	-5.0	283	309	-9.5	220	245	-11.0
Netherlands	314	400	-27.5	342	440	-28.6	436	577	-32.2	526	654	-24.3	433	530	-22.3
Poland	94	95	-1.2	112	113	-0.6	175	173	0.8	213	212	0.8	166	170	-2.2
Portugal	46	53	-16.4	47	54	-15.5	66	76	-14.6	73	84	-15.1	57	67	-18.3
Romania	26	27	-6.1	31	33	-5.2	49	50	-1.9	60	62	-2.9	47	50	-7.2
Russia	175	204	-16.5	227	269	-18.5	327	394	-20.5	424	523	-23.2	287	345	-20.2
Slovakia Rep	30	31	-3.5	35	36	-4.4	61	65	-6.2	74	81	-10.1	57	61	-6.9
Slovenia Rep	18	20	-8.2	20	22	-9.8	29	33	-12.2	32	37	-15.0	25	29	-15.7
Spain	229	271	-18.2	246	291	-18.4	335	391	-16.9	367	426	-16.1	294	351	-19.6
Sweden	159	162	-1.7	171	175	-2.3	227	234	-3.3	248	256	-3.1	183	190	-4.1
Taiwan prov.	206	208	-0.9	227	224	1.1	277	280	-1.0	279	292	-4.7	228	235	-3.0
Turkey	72	91	-27.2	84	105	-25.6	120	144	-20.6	144	176	-21.8	118	144	-22.1
United Kingdom	524	547	-4.5	547	593	-8.3	704	731	-3.9	737	749	-1.5	574	613	-6.7
United States	1073	1165	-8.5	1187	1288	-8.5	1531	1657	-8.2	1696	1845	-8.8	1445	1582	-9.5
World	10001	11380	-13.8	11347	12940	-14.0	15182	17370	-14.4	18175	19879	-9.4	14160	15948	-12.6

Table 2. Total exports of goods and services, 2005, 2008 and 2009 - Comparison between OECD and BOP figures (billion \$ and %)

	2005			2008			2009		
	OECD	BOP	OECD-BOP Difference	OECD	BOP	OECD-BOP Difference	OECD	BOP	OECD-BOP Difference
Australia	141	138	2.2	227	234	-3.1	188	196	-4.3
Austria	136	162	-19.3	200	242	-21.0	155	189	-21.9
Belgium	211	296	-40.4	298	418	-40.4	239	340	-42.2
Brazil	131	134	-2.7	220	228	-4.0	171	181	-5.7
Bulgaria	12	16	-40.7	29	30	-2.1	22	23	-3.2
Canada	406	428	-5.3	495	530	-7.0	357	390	-9.0
China	833	837	-0.5	1570	1582	-0.8	1374	1329	3.2
Cyprus	8	8	0.9	11	11	0.5	9	9	-0.3
Czecho Rep	79	84	-5.8	136	146	-7.0	110	118	-7.2
Denmark	107	126	-17.8	160	187	-16.5	126	147	-16.7
Estonia	11	11	-4.7	17	18	-6.9	12	13	-10.4
Finland	78	82	-5.4	120	128	-6.7	86	90	-5.7
France	529	561	-6.2	711	767	-7.9	567	672	-18.5
Germany	942	1147	-21.8	1412	1749	-23.9	1114	1402	-25.9
Greece	54	52	3.1	78	79	-0.9	58	59	-0.6
Hungary	64	75	-16.6	111	125	-13.4	87	98	-13.1
India	159	155	2.5	298	306	-2.5	260	261	-0.3
Indonesia	96	100	-4.4	148	155	-4.3	126	133	-5.5
Ireland	156	163	-4.2	207	218	-5.4	191	202	-5.9
Italy	409	462	-13.0	580	657	-13.4	439	500	-13.9
Japan	641	679	-5.9	836	897	-7.3	618	672	-8.7
Korea Rep	327	340	-3.9	483	525	-8.8	407	432	-6.0
Latvia	8	8	0.1	14	14	0.1	11	11	-1.0
Lithuania	15	15	-1.4	28	28	-2.3	19	20	-3.5
Luxembourg	58	55	4.8	99	89	10.2	82	73	11.1
Malta	5	5	2.5	7	8	-1.9	6	7	-9.7
Mexico	226	230	-1.8	300	309	-3.2	237	245	-3.3
Netherlands	330	440	-33.1	420	654	-55.7	341	530	-55.4
Poland	111	113	-1.8	206	212	-2.5	165	170	-2.8
Portugal	52	54	-3.4	80	84	-4.6	64	67	-5.6
Romania	32	33	-1.7	61	62	-1.9	49	50	-2.9
Russia	264	269	-1.8	507	523	-3.1	334	345	-3.3
Slovakia Rep	35	36	-2.6	76	81	-6.5	60	61	-2.8
Slovenia Rep	19	22	-17.5	31	37	-20.4	24	29	-19.4
Spain	240	291	-21.4	346	426	-23.2	284	351	-23.7
Sweden	166	175	-5.4	239	256	-7.1	178	190	-6.6
Taiwan prov.	225	224	0.3	286	292	-2.2	235	235	0.0
Turkey	104	105	-1.5	171	176	-2.8	139	144	-3.1
United Kingdom	532	593	-11.4	685	749	-9.3	541	613	-13.2
United States	1100	1288	-17.1	1594	1845	-15.8	1296	1582	-22.0
World	10951	12940	-18.2	16468	19879	-20.7	13085	15948	-21.9

The comparison of total gross exports between BOP and GTAP sources (see Table 3) perpetuates the big deviations noted for EU member countries in the previous tables. Here again, BOP figures exceed largely those based on the GTAP source. Moreover, it is worth noting that the differences increase hugely for most countries in 2007. Such a generalized evolution may reflect a drastic change in the way 2007 GTAP trade data were compiled, compared to the 2004 table

Table 3. Total exports of goods and services, 2004 and 2007- Comparison between GTAP and BOP figures (billion \$ and %)

	2004			2007		
	GTAP	BOP	GTAP-BOP Difference	GTAP	BOP	GTAP-BOP Difference
Australia	109	116	-6.4	167	183	-9.5
Austria	124	148	-19.6	182	217	-19.1
Belgium	281	272	3.0	374	374	0.0
Brazil	113	109	3.5	179	185	-3.4
Bulgaria	14	14	0.2	24	25	-5.9
Canada	340	380	-12.0	422	497	-18.0
China	663	658	0.6	1204	1342	-11.5
Cyprus	7	7	0.6	9	10	-10.3
Czecho Rep	67	77	-14.9	124	123	0.3
Denmark	101	111	-10.0	142	162	-14.4
Estonia	9	9	-0.1	13	16	-16.5
Finland	73	76	-4.6	103	113	-9.4
France	507	535	-5.6	639	697	-9.1
Germany	960	1054	-9.7	1367	1573	-15.1
Greece	47	49	-3.6	63	67	-5.4
Hungary	60	66	-9.2	98	110	-11.9
India	113	116	-2.5	221	241	-9.0
Indonesia	88	83	6.0	128	131	-2.2
Ireland	159	153	3.9	215	208	3.1
Italy	398	436	-9.6	556	612	-10.2
Japan	660	637	3.5	792	806	-1.8
Korea Rep	314	305	3.1	444	463	-4.1
Latvia	6	6	-3.6	11	12	-13.1
Lithuania	12	12	2.0	18	21	-18.9
Luxembourg	41	47	-16.8	69	83	-21.5
Malta	5	4	18.2	7	7	0.6
Mexico	193	202	-4.6	274	289	-5.6
Netherlands	241	400	-65.9	338	577	-70.7
Poland	78	95	-22.1	148	173	-16.8
Portugal	50	53	-5.9	67	76	-13.5
Romania	27	27	1.3	43	50	-17.2
Russia	169	204	-20.3	316	394	-24.4
Slovakia Rep	30	31	-3.4	56	65	-15.7
Slovenia Rep	19	20	-3.9	29	33	-12.6
Spain	251	271	-7.8	350	391	-11.8
Sweden	150	162	-7.8	208	234	-12.8
Taiwan prov.	225	208	7.3	282	280	0.9
Turkey	84	91	-9.3	126	144	-14.5
United Kingdom	470	547	-16.4	633	731	-15.4
United States	1078	1165	-8.1	1391	1657	-19.0
World	10037	11380	-13.4	14484	17370	-19.9

III The differences in the basic economic variables among the three databases

3.1 Mean absolute percentage difference of basic variables among the three databases

Since there are many dimensions in an ICIO table, it is meaningful to compare several measures in order to outline the discrepancies among the three databases. Generally speaking, it is the proportionate deviation and not the absolute deviation that matters; therefore, we compute the "Mean Absolute Percentage difference" for each country among the three

databases. Specifically, we consider the following aggregate index discrepancy measure for gross output, direct value-added, domestic and imported intermediate inputs, and domestic and imported final demands. Using the subscript W, G and O to represent the WIOD, GTAP and OECD database respectively, we have:

Gross output:

$$MAPAG^r = \frac{100 \bullet \sum_{j=1}^N |X_{jr}^W - X_{jr}^l|}{\sum_{j=1}^N X_{jr}^W} \quad l = G, O \quad (1)$$

Direct value-added:

$$MAPAV^r = \frac{100 \bullet \sum_{j=1}^N |V_{jr}^W - V_{jr}^l|}{\sum_{j=1}^N V_{jr}^W} \quad l = G, O \quad (2)$$

Domestic intermediate inputs:

$$MAPADI^r = \frac{100 \bullet \sum_{j=1}^N \sum_{i=1}^N |z_{irjr}^W - z_{irjr}^l|}{\sum_{j=1}^N \sum_{i=1}^N z_{irjr}^W} \quad l = G, O \quad (3)$$

Imported intermediate inputs:

$$MAPAI^r = \frac{100 \bullet \sum_{j=1}^N \sum_{i=1}^N \left| \sum_{s \neq r}^G z_{isjr}^W - z_{isjr}^l \right|}{\sum_{j=1}^N \sum_{i=1}^N \sum_{s \neq r}^G z_{isjr}^W} \quad l = G, O \quad (4)$$

Domestic final demands:

$$MAPADF^r = \frac{100 \bullet \sum_{i=1}^N |f_{irr}^W - f_{irr}^l|}{\sum_{i=1}^N f_{irr}^W} \quad l = G, O \quad (5)$$

Imported final demands:

$$MAPAI^r = \frac{100 \bullet \sum_{i=1}^N \left| \sum_{s \neq r}^G f_{isr}^W - f_{isr}^l \right|}{\sum_{i=1}^N \sum_{s \neq r}^G f_{isr}^W} \quad l = G, O$$

3.2 Observed numerical differences in basic variables among the three databases

The numerical results for the 6 aggregate index discrepancy measures defined above are reported in tables 4a and 4b for the WIOD and GTAP databases, and tables 5a, 5b, 5c for the WIOD and OECD databases respectively.

We focus on the differences for country totals discrepancies to illustrate some key characteristics of the discrepancy of major economic variables among the three databases. There are three noticeable features in the observed discrepancies:

First, generally speaking, the differences in sector level gross outputs are relatively less significant than intermediate inputs between WIOD and GTAP/OECD databases, followed by sector level value-added. The discrepancies between WIOD and OECD are smaller than that between WIOD and GTAP, reflecting the fact that both WIOD and OECD are trying to benchmark their sector level gross output and value-added in consistence with official national account statistics, while GTAP benchmark their data to adjusted official trade statistics.

Second, the discrepancies between domestic transactions is generally less than that of imported transactions, for both intermediate inputs and final demand and all available years, reflecting that the difference on how and where imported commodity were sourced in the three database is larger than the difference on how and where domestic products were used in the three databases, which is not surprising given that the basic input-output statistics in the three databases largely rely on similar sources.

Finally, the discrepancies between domestic intermediate inputs purchase is generally much larger than the difference for domestic final demand, but it is in the opposite for the difference in imported demand, although in a much smaller extent. Looking into the discrepancies at sector level, seems these sectors have large portion of their products could be used as both intermediate and final goods often associated with large discrepancies, reflecting different practice to allocate these dual used product among the three databases. Computing the discrepancy measures similar to equations (1) and (6) by product groups and final demand categories, could help us to identify where the large discrepancies come from, providing a means to identify and solve potential problems in the data.

Table 4a. Mean Absolute Percentage difference between WIOD WIOTs and the ICIO tables based on version 8 GTAP database - 2004

ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value added	Ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added
AUS	28.6	87.8	0.8	82.4	25.1	37.5	ITA	55	73.2	2.5	101.6	40.6	52.4
AUT	60.8	78.3	0.4	110.6	41.1	53.7	JPN	57.3	93.5	6.6	111.7	30.4	44.3
BEL	63.7	118.3	0.6	98.4	50.1	67.6	KOR	57.4	76.3	0.9	152.7	30.7	45.6
BGR	96.6	107.6	0	244.1	49.9	61.7	LTU	107.9	109.5	0	167.2	51.9	61.3
BRA	53.9	85.1	1.1	273.2	33	45.2	LUX	98.5	103.4	0.1	1496.6	60	80.3
CAN	65.3	85	1.6	74.7	34.4	40.4	LVA	68.5	106.2	0	87	56.9	87.2
CHN	45.4	61.3	2.3	129.9	31.4	37.8	MEX	41.9	69.8	0.6	64.7	26.1	30.5
CYP	98.5	178.2	0	331.5	64.2	74.2	MLT	87.1	115.8	0	130.9	69.9	104.3
CZE	63.3	71.5	0.2	97.3	36.3	48.6	NLD	85.6	80.8	1	86.6	52	68.2
DEU	61.8	83.9	3.4	107.7	34.4	38.5	POL	71.4	72.6	0.4	99.1	43.8	67.9
DNK	66.9	95.7	0.4	99.6	55.6	70.2	PRT	65.1	75.6	0.3	76.6	46.4	62.8
ESP	45.5	75.9	1.1	80.7	26	29.6	ROU	77.6	86	0.1	100.8	38.2	52
EST	74.9	118.2	0	294.1	45	56.2	RUS	79.3	112.3	0.8	108.2	42.2	46.7
FIN	71.9	94.4	0.3	164.5	40	53.2	SVK	140.4	80.4	0.1	115.7	73.7	80.6
FRA	57.6	75.5	3.1	115.5	45.1	56.6	SVN	76.6	86.9	0	75.3	40.9	49.6
GBR	64.2	94.2	3.2	94.3	40.2	43.1	SWE	75.2	79.6	0.6	105.9	49	62.7
GRC	83.2	140.7	0.4	94.5	46.4	67.9	TUR	63.8	72.8	0.5	111.4	36.9	45.5
HUN	73.9	75.3	0.1	107.1	38.1	60	TWN	61	63.9	0.4	104.6	28.4	44.2
IDN	89.8	105	0.3	356.1	27.4	29.9	USA	67.6	93.6	24.2	77.3	50.6	63.8
IND	44.6	87.2	0.8	195.5	26	38.9	WLD	62.3	83.7	66.3	104.8	39.3	50
IRL	69.9	83.2	0.3	140.4	43.4	50.4	RoW	81.6	82.5	6.7	107.6	32.5	37.4

Table 4b. Mean Absolute Percentage difference between WIOD WIOTs and the ICIO tables based on version 8 GTAP database - 2007

Ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added	Ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added
AUS	32.9	86.1	0.9	77.1	27.9	39.9	ITA	57.1	72.6	2.4	94.9	40.6	51.6
AUT	64.1	79.2	0.4	105.6	42.6	53.7	JPN	56.1	81.5	5	118.3	31.7	44.9
BEL	69	119	0.6	99.3	50.9	68.4	KOR	54.9	72.2	1.1	147.3	32.4	49.8
BGR	83.9	101.4	0	178.2	41.6	59	LTU	105.6	116.2	0	128.4	48.7	59.8
BRA	55.7	86.5	1.8	255.7	37.6	45.5	LUX	101.6	107.1	0.1	1677	64.4	85.6
CAN	68.8	85.4	1.7	71.2	37	43	LVA	70.9	107.2	0	72.1	59.2	86.5
CHN	38.7	61.3	3.1	135.9	30.4	35.2	MEX	44.9	71.1	0.7	60.3	27.8	33.5
CYP	94.4	190.5	0	288.1	57.5	71.7	MLT	89.1	138.9	0	166.2	45.1	74
CZE	63.3	74.1	0.2	96.7	34.1	48.4	NLD	79.7	81	1	82.3	48.3	64.1
DEU	61.2	82.1	3	99.2	33.6	39.4	POL	68.5	75.1	0.5	97.3	41.9	66.5
DNK	67.9	98.9	0.4	91.7	54.5	71.9	PRT	64.3	79.6	0.3	75.6	45.2	62.7
ESP	50.2	77.1	1.3	84.7	27.6	32.6	ROU	83.5	84.7	0.2	82.7	43	58.6
EST	66.4	113.2	0	281.5	44.9	54.3	RUS	80.3	113.7	1.3	92.5	45	53.4
FIN	72.6	94.4	0.2	146.6	38.6	53.4	SVK	117.5	89.7	0.1	125.3	57.3	64.8
FRA	56.5	81.9	3	106.4	42	57	SVN	73.5	90.6	0	77	39.2	48.9
GBR	67.8	95.7	3.2	89	43.5	44.3	SWE	72.7	76.2	0.6	90.8	46.9	61.3
GRC	99.3	137.2	0.4	102	50.8	75.9	TUR	68.3	71.4	0.7	120	40.9	51.1
HUN	84.1	76.5	0.1	100.1	37.7	56.4	TWN	68.7	59.8	0.3	112.2	26.7	42.3
IDN	89.1	96.5	0.3	257	29.6	28.8	USA	67.2	89.1	22.1	76.5	50.6	65.1
IND	49.7	90.4	1.1	179.6	25.3	36.9	WLD	62.1	82.8	66.1	100.5	39	49.6
IRL	64.1	95.3	0.3	105	43.5	52.4	ROW	88.8	83.1	7.7	94	32.1	35.6

Table 5a. Mean Absolute Percentage difference between WIOD WIOTs and the OECD ICIO tables - 2005

ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added	Ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added
AUS	71.4	89.6	0.8	68	43.5	53.1	ITA	49.4	96.1	1.6	78.6	32	45.8
AUT	71.1	65.7	0.3	44.1	35.3	40.4	JPN	56.2	83.4	5	75.9	39.4	50.4
BEL	61.9	70.8	0.4	60.8	32	42.3	KOR	49.4	79.7	0.7	56	28.9	43.5
BGR	64.1	98.1	0	52.6	46.8	64.7	LTU	67.1	101.7	0	72.5	31.6	34.9
BRA	59	85.5	1	74.9	40.6	52.9	LUX	149	171.4	0	81.8	117.6	84
CAN	65.6	91.3	1.1	64.9	34.6	42.3	LVA	92.3	98.7	0	76.9	43.6	44.9
CHN	35.2	66.2	1.2	55.2	20.7	28.8	MEX	38.2	61.8	0.7	70.2	26.7	35.9
CYP	111	152	0	85.8	48.3	53.6	MLT	100	110.1	0	60.2	45.9	45.6
CZE	57.9	67.9	0.1	63.7	31.3	37.2	NLD	81.4	91	0.6	87.6	39.8	44.5
DEU	66.1	77.3	2.9	49.8	37.2	42.3	POL	47.2	68.2	0.3	46.1	30.8	35.4
DNK	75.7	105.6	0.3	91.3	42.1	46.8	PRT	49.6	76.5	0.2	72	38.7	51.4
ESP	50.1	74.5	0.9	48.6	30.2	38.7	ROU	57.9	78.3	0.1	62.4	30.5	39.7
EST	66.8	110.1	0	65.4	37.3	49.2	RUS	42	127	0.5	62.9	28.1	34.8
FIN	65.3	87.6	0.2	64.3	34.3	40.8	SVK	43.6	69.6	0	66.3	23.6	35.2
FRA	55.3	65.4	2.1	45	37.6	46.4	SVN	52.4	67.2	0	80.3	26.8	38.1
GBR	55.4	86.7	2.3	77.5	39.8	45.6	SWE	66.5	79.5	0.3	49.4	34.7	41
GRC	50.8	96.7	0.2	72.6	38.5	48.7	TUR	29.1	69.6	0.4	73.1	29.6	43.9
HUN	63.4	78.5	0.1	64.8	29.2	41.7	TWN	79.7	62.5	0.3	70.8	39	51.2
IDN	66.7	89.5	0.2	105.5	30.5	34.4	USA	69.1	73.6	14.1	57.9	46.3	51.5
IND	24.9	108.3	0.5	102.3	18.2	29.1	WLD	60.2	80.8	45.1	62.9	38.2	46
IRL	78	125.8	0.2	66.9	44.7	47.2	ROW	85.1	84.4	5.4	62.9	43.1	46.5

Table 5b. Mean Absolute Percentage difference between WIOD WIOTs and the OECD ICIO tables – 2008

ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value - added	Ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value - added
AUS	65.8	69.8	0.8	69.6	45	57.1	ITA	38.2	75	1.5	63.3	30.9	48.4
AUT	80	74.6	0.2	43.3	32.1	36	JPN	54.1	75.6	4.1	82.3	37.5	49.8
BEL	49.8	74	0.4	69.7	29.7	41.9	KOR	47.1	69.4	0.6	69.9	27.5	38.8
BGR	69.9	85.6	0.1	67	48.4	70.9	LTU	62.4	87.4	0	91.7	29.8	36.5
BRA	47.6	76.3	1.2	90.8	37.9	50.1	LUX	147.2	170.8	0	101	119.7	90.9
CAN	49.7	71.3	1.1	56.1	35.8	44.3	LVA	95.3	111.1	0	82.3	46.8	49.2
CHN	34.3	59.5	1.9	54	21.3	32.4	MEX	38.4	60.6	0.6	70	25.2	33.2
CYP	90.5	139.9	0	72.6	52.6	59.4	MLT	65.9	117.9	0	77.7	34.4	37.9
CZE	45	61.6	0.1	58.6	24.6	34.3	NLD	71.7	85.1	0.6	84	33.6	39.8
DEU	75.2	77.3	2.7	52.1	38.4	46	POL	39.3	64.3	0.4	60.6	29.5	39.7
DNK	62.3	113.3	0.3	79.9	41.2	47.7	PRT	69.5	78.8	0.2	46.4	40.7	46.5
ESP	38	71	0.9	57.6	27.5	39.9	ROU	36.7	71.4	0.1	59.7	26.4	34.8
EST	56.4	100.7	0	81.2	38.8	45.3	RUS	43.8	119.2	0.8	55.8	29.2	35.1
FIN	55.6	100	0.2	67	30.4	41.4	SVK	29.7	75.5	0	79.7	20.1	30
FRA	61.6	73	2.3	52.2	39.2	47.1	SVN	40.5	71.9	0	73.2	25.8	39.4
GBR	57.5	81.3	2	69.2	39.9	45.6	SWE	61.8	87.9	0.3	58.1	31.7	37.7
GRC	96.2	101.4	0.2	86.3	43.3	49.7	TUR	32.3	64.4	0.5	71.1	30.7	45.7
HUN	52.3	70.3	0.1	74	27.1	41	TWN	73	69.9	0.3	76.6	34.2	49.2
IDN	36.9	69.4	0.1	94.5	19.8	23.5	USA	65.4	68.6	11.9	62.5	44.2	49.7
IND	25.2	93.9	0.6	99.7	18	28.3	WLD	56.3	76	44.1	63.4	35.9	44
IRL	59.9	115.9	0.2	106.4	38.9	43.6	ROW	87.2	81.2	6.5	59.1	41	39.9

Table 5c. Mean Absolute Percentage difference between WIOD WIOTs and the OECD ICIO tables - 2009

ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added	ctr	Dom. Int	Imp. Int'	Dom Final	Imp Final	Gross Output	Value-added
AUS	60.8	70.8	0.8	78.4	41.5	52.7	ITA	39.5	81.1	1.5	67	32.9	49.7
AUT	49.7	65.3	0.2	64.5	30.1	39	JPN	56.7	83.6	4.4	86.5	39.7	50.5
BEL	49.7	81.3	0.4	72.4	31.4	43.7	KOR	50.5	78.4	0.5	68.7	29.5	39.3
BGR	64	94.6	0	73.7	48.4	69.3	LTU	60.1	91.9	0	93.2	29.7	35.8
BRA	46.6	81.6	1.2	87.7	35.9	48	LUX	152.7	170.8	0	107.9	121.2	92
CAN	51.4	78.2	1.1	64.4	38.1	46.7	LVA	81.3	96.1	0	85.2	49.2	54
CHN	33.7	59.7	2.3	64.7	20.8	33.3	MEX	41.7	61.2	0.5	77.8	29.1	37.7
CYP	85	140.4	0	66	51.3	58.8	MLT	68.4	132.6	0	87	38.3	40.8
CZE	62.7	76	0.1	66.7	34.4	37.1	NLD	73.8	93.5	0.6	82.2	35.3	39.5
DEU	77.3	89.8	2.7	55.8	41.4	47.8	POL	36.9	63.7	0.3	64.9	29.1	37.1
DNK	62.5	117.9	0.3	87	41.9	50.1	PRT	64.9	86.7	0.2	53.8	39.7	45.7
ESP	39.8	75.8	0.9	60.2	28.6	40	ROU	37.5	76.8	0.1	66	27.5	34.9
EST	55.3	101.6	0	83.5	38.9	45.2	RUS	41.6	136.5	0.7	57.8	27.3	35.4
FIN	61.4	107.1	0.2	71.1	33.9	45.6	SVK	31.9	84.8	0	92.5	22.2	32.5
FRA	66.8	84.4	2.4	55.9	43.9	48.8	SVN	42	77.2	0	76.4	29.1	41.6
GBR	57.2	85.3	1.7	72.9	41	46.8	SWE	65.5	96.7	0.3	72	33.9	39.7
GRC	105.5	106.9	0.2	84.2	45.1	48.8	TUR	35.7	76.5	0.5	82.8	34.6	50.3
HUN	56.7	74.7	0.1	72.8	31.9	43.2	TWN	75	72.1	0.3	82.2	35.3	48.8
IDN	32.3	69.1	0.1	82.6	16.6	21.4	USA	72.6	76.8	12	63.8	47.3	52.7
IND	25.8	110.3	0.7	101.3	19.7	30.3	WLD	56.6	81.3	43.9	68.3	37.1	45.9
IRL	53.7	122.8	0.1	130.9	37.7	41.9	ROW	75.8	83.7	6.4	66.5	40.8	44.8

Note: Refer to Appendix Table A1 for the country names corresponding to the country codes mentioned either in the text, tables or graphs.

IV Differences in major trade in value-added indicators

4.1 Value-added to gross export ratio (VAX) and bilateral balance of trade

Two major trade in value-added indicators are estimated and compared among the three global ICIO databases and graphed in figures 6 to 10: the ratio of total value-added exports to gross exports (VAX), and the ratio of bilateral value-added balance of trade (BOT) to gross balance of trade. VAX indicators are compared at country total and 8 aggregate sector levels, as well as by major trading partners. The ratio of value-added and gross BOT is compared by major trading partners.

On average, GTAP and OECD estimates are higher than WIOD on VAX ratio for most countries, though the levels of difference vary by years. Out of 41 countries, in 2004 and 2007, GTAP estimates 30 and 31 countries with higher VAX ratio than WIOD. In 2005, 2008, and 2009, OECD estimates 22, 39, and 23 countries with higher VAX ratio than WIOD.

The differences of VAX estimates for the 5 aggregated merchandise trade sectors among the three databases are pretty small, but are significant for “Electricity, gas, and water

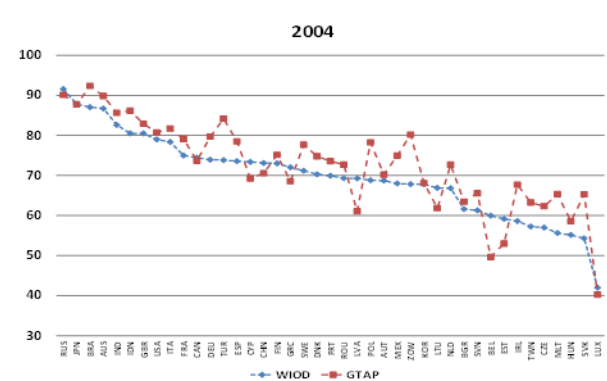
supply”, and “Construction”. GTAP reported higher VAX ratio for “Electricity, gas, and water supply” and lower ratio for “Construction” than WIOD. On the other hand, OECD reported lower VAX ratio for “Electricity, gas, and water supply” and a higher ratio for “Construction” than WIOD.

Overall, the estimates of VAX ratio for major trading partners among the three databases are close, with one noticeable difference in the ratio estimated for US-EU12. In general, GTAP estimates give slightly lower VAX ratios than WIOD, while OECD estimates can give slightly higher VAX ratios than WIOD.

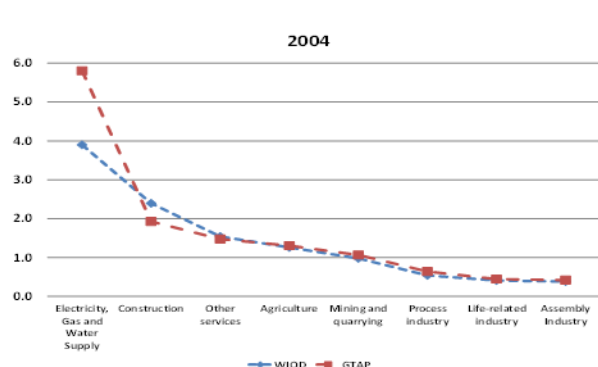
The three databases report consistent value-added to gross BOT ratios for U.S.-Canada, China-U.S., China-EU15, and China-EU12.¹¹ However, there is a large discrepancy for the estimates of U.S.-EU12. In addition, WIOD reported a much higher ratio for China-Japan value-added to gross BOT than GTAP and OECD in 2004 and 2005, but the difference diminished for later years of 2007, 2008, and 2009.

Figure 6. Differences between WIOD and GTAP in VAX ratio estimates, 2004

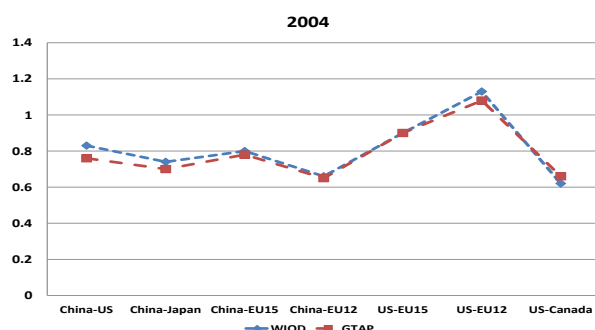
(a) VAX by Country



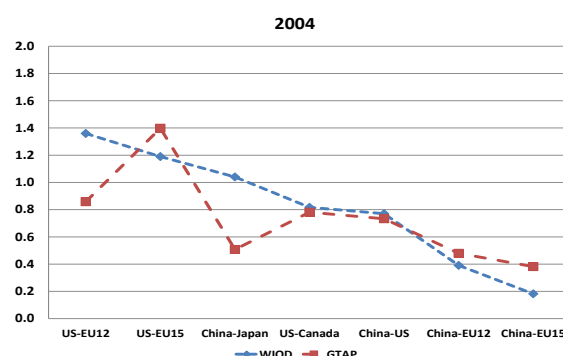
(b) VAX by Major Sectors



(c) VAX by Major Trading Partners



(d) The Ratio of Value-added to Gross BOT by Major Trading Partners



¹¹ "EU15" stands for "Western EU" aggregate and includes the following 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. The "New EU countries" aggregate, or "EU12", includes the 12 countries having joined the EU as from 2004: Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.

Figure 7. Differences between WIOD and OECD in VAX ratio estimates, 2005

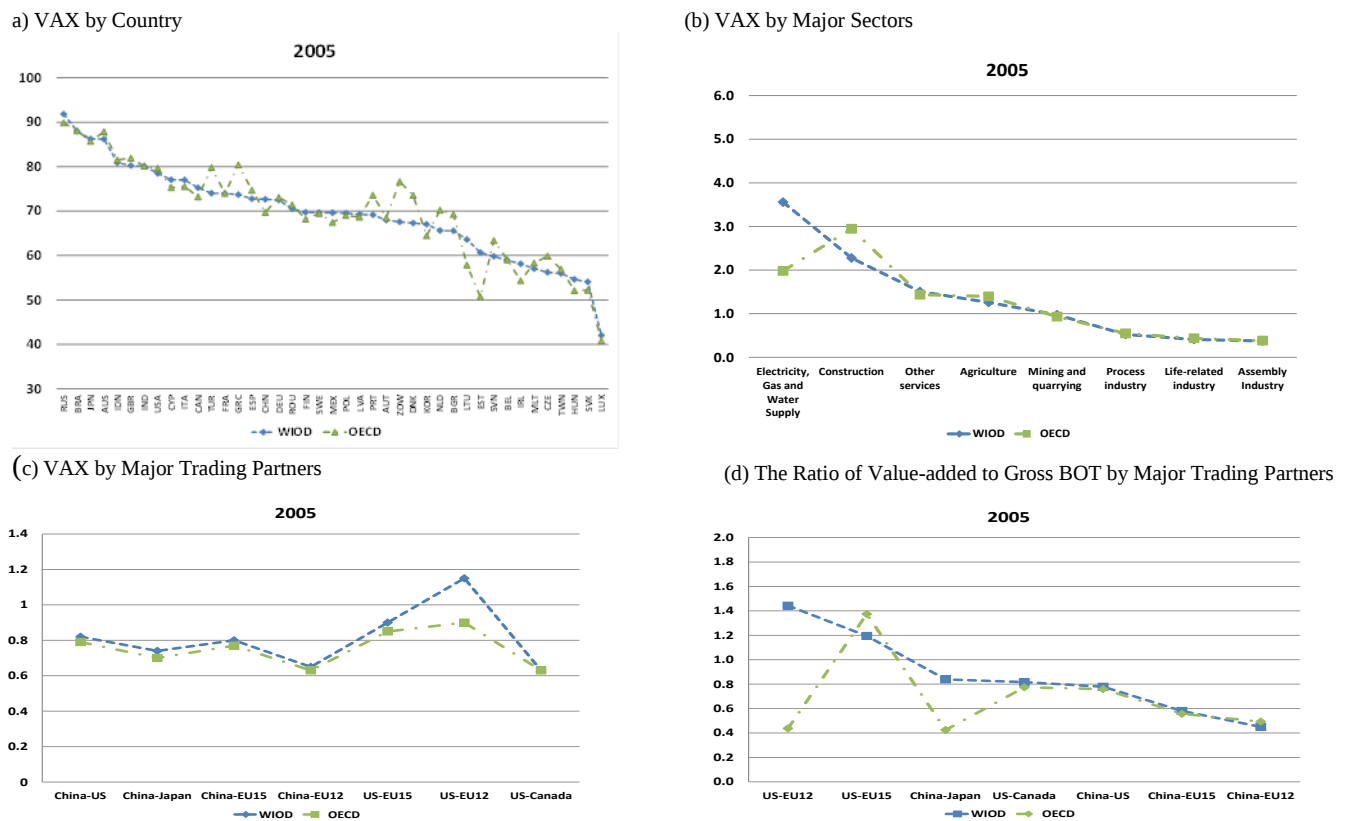


Figure 8. Differences between WIOD and GTAP in VAX ratio estimates, 2007

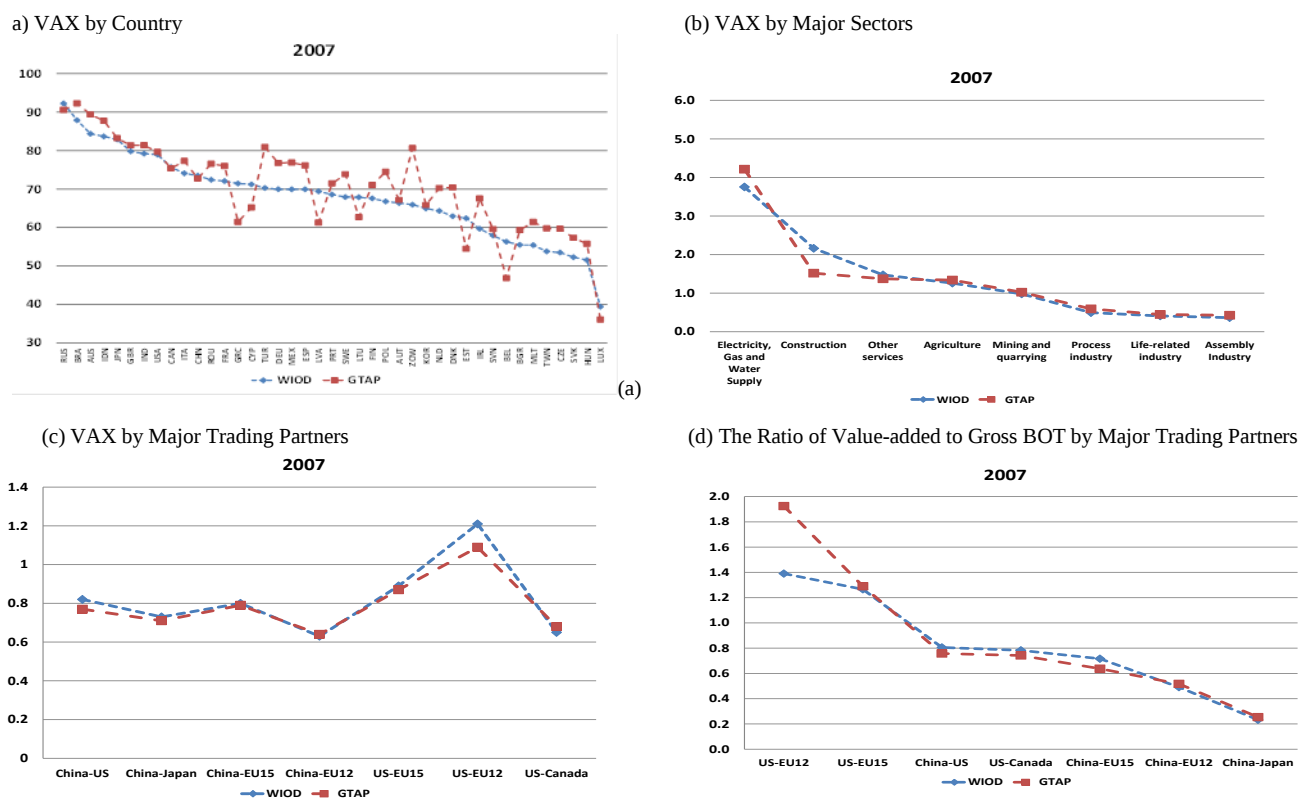
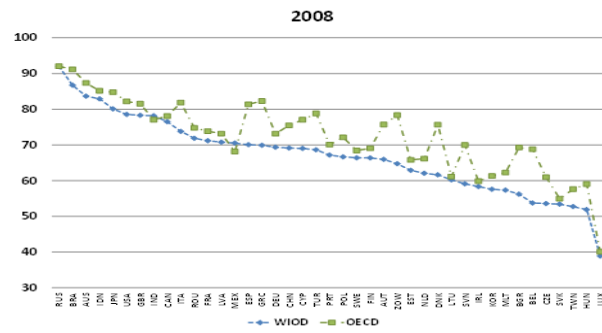
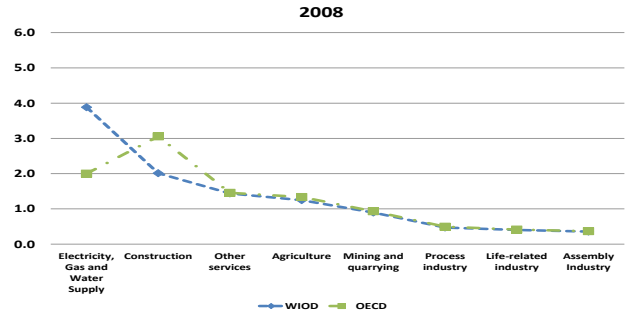


Figure 9. Differences between WIOD and OECD in VAX ratio estimates, 2008

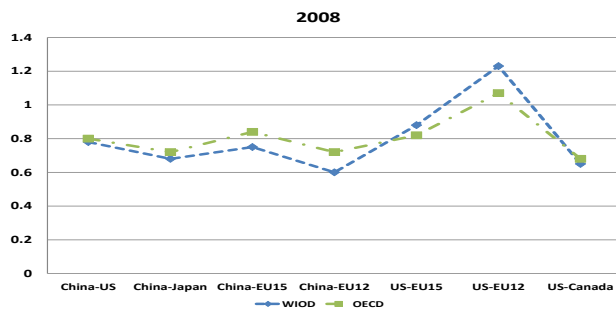
(a) VAX by Country



(b) VAX by Major Sectors



(c) VAX by Major Trading Partners



(d) The Ratio of Value-added to Gross BOT by Major Trading Partners

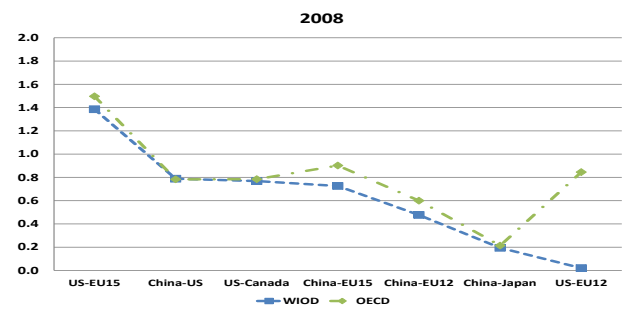
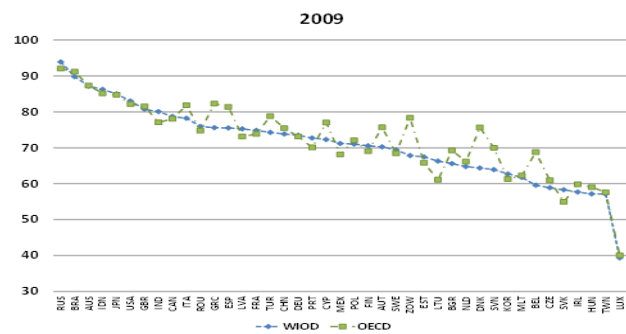
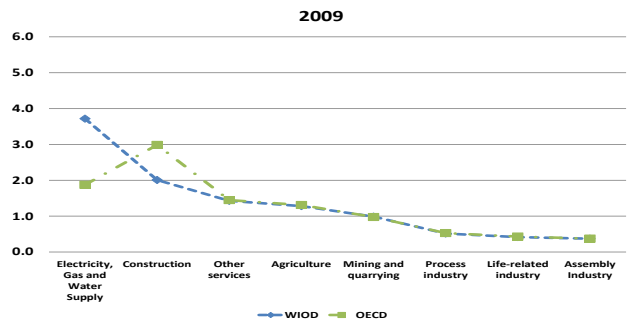


Figure 10. Differences between WIOD and OECD in VAX ratio estimates, 2009

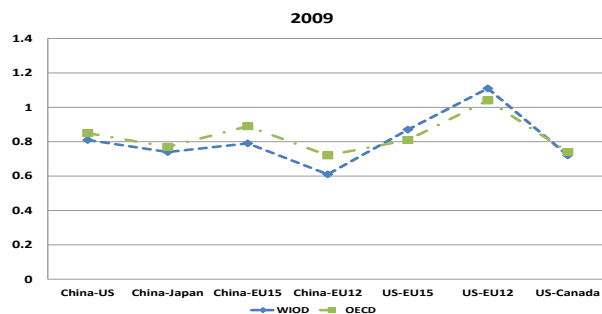
(a) VAX by Country



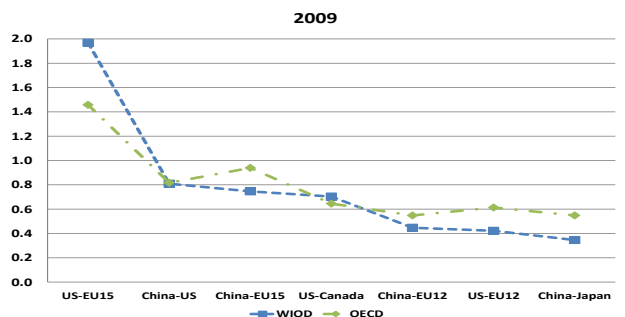
(b) VAX by Major Sectors



(c) VAX by Major Trading Partners



(d) The Ratio of Value-added to Gross BOT by Major Trading Partners



4.2 Major value-added and double counted components in gross exports

4.2.1 Comparison of major value added components in gross exports based on OECD and WIOD ICIO tables

Tables 6, 7 and 8 present the full decomposition of countries' gross exports into their value added components based on both OECD and WIOD data sources, for 2005, 2008 and 2009 respectively. Some country aggregates have been compiled for EU members. Since the components are computed using the same computer programs, the differences noticed within this evaluation are only due to the divergences between the two data sets.

At a first glance, the major differences noticed in the three tables between OECD and WIOD shares are the rest of the world (RoW) aggregate. However, the comparison of this RoW aggregate is hazardous and even not relevant, for several reasons. First, the RoW aggregate often serves as a balancing item within the production of ICIO tables and does not contain as many details as for the individual countries covered in the tables. In addition, to enable the comparison exercise, the three ICIO tables have been aggregated and harmonized to the same country and sector coverage, as we mentioned earlier. While the resulting RoW aggregate necessarily covers the same countries (all countries less 40 countries) in the three harmonized tables, the level of detail in RoW data differs from one table to another. As for the WIOD table, the RoW estimate in the harmonized table is the same as in the original table; indeed, the 40 countries retained for the comparison are the same as those included in the WIOD original table. In the case of the OECD table, which originally contains 57 countries and a RoW aggregate, the RoW estimate present in the harmonized table includes not only the original OECD RoW data but also the detailed data compiled for the additional 17 individual countries not retained within the comparison exercise. Thus the OECD harmonized table includes more precision in the RoW aggregate than its WIOD equivalent, which makes difficult to outline potential reasons for discrepancies between the two sources. Inevitably, the same reasons apply to the comparison between the GTAP and the WIOD tables.

The two EU aggregates, that is "Western EU" (EU15) and "New EU countries" (EU12), do not show major discrepancies for the value added shares between the two sources in 2005. The main difference is observed for the share of value added exports of gross intermediates exports absorbed by the direct importers. The OECD-based estimate is higher than WIOD's by 3.6 % for both EU aggregates. It is worth noting that more deviations between OECD and WIOD value added estimates can be noticed for 2008 and 2009. Both

domestic and foreign value added contents of exports differ by around 2.8 % for 2008 with a higher estimate of the domestic content obtained with OECD data and a higher share of the foreign content of exports obtained with WIOD data. The reason for such a variation might be due to different levels of revisions of EU data between the two tables.

As shown in column 10 in the three tables, the sum of all the individual value added components of exports matches perfectly the gross exports figures. In short, gross exports = domestic value added of exports + foreign value added of exports. Hence, the absolute OECD-WIOD difference observed for one of the two value-added contents (domestic or foreign) is inversely proportional to that shown for the second component. For example, the share concerning the domestic content in Australian exports for 2005 is 1.6% higher when estimate from OECD data than from WIOD's (see column 6), whereas the OECD estimate for the foreign content (see column 9) is lower than WIOD's by the same percentage.

Within individual countries, the biggest absolute differences in value added shares occur for Turkey. The OECD-based share of the domestic value added in Turkish exports is 5.8 % higher for 2005 than that estimate from WIOD figures. Such a big deviation between the two sources persists for 2008 and 2009.

Few countries like China, Korea Rep. and Mexico present important variations in 2005 for value added exports of final goods and services and intermediates absorbed by direct importers(see columns 1 and 2). For example, the OECD-based estimate for Korea is 6.1% lower than the one based on the WIOD table. As for China, the treatment of processing trade, which usually includes a higher share of foreign inputs than non-processing trade, is a core issue for the value added estimate. The reason for the discrepancy between the two sources can be due to different data sources and compilation methods applied to include the production and trade activities taking place within Chinese export processing zones. The OECD data set incorporates detailed data on processing trade from the Chinese Academy of Sciences which were not available at the time the WIOD table was compiled.

Generally speaking, the OECD-WIOD differences noticed for the domestic and foreign value added shares in 2005 are more significant for intermediates than for final goods and services (see columns 2 and 8). This may arise from existing discrepancies at the level of the intermediate demand matrix in the two ICIO tables, which calls for further examination of the intermediate flows reported in the OECD and WIOD data sets.

Less significant differences appear for the shares of indirect value added exports (see column 3) or those of the domestic value added returned back home (see columns 4 and 5).

The main exception is Russia for which the OECD-based share is systematically lower by around 5% (4% for 2009) than the one estimate from WIOD tables.

Overall, the divergences among the shares calculated from OECD and WIOD data are bigger for 2008. There might be few potential reasons for this. Firstly, the national data available at the time of the compilation of the global I-O tables must have been preliminary or limited. Secondly, the level of revision of the raw data may differ as the tables were not compiled during the same period. Indeed, the OECD ICIO tables, compiled one or two years after the WIOD tables, could benefit from better data availability and incorporate more recent revisions.

The differences between the two sources for the 2009 estimates remain in the same range as for 2008. One of the biggest discrepancies can be noticed for India for which the contribution of final goods to value added exports absorbed by direct importers increases significantly with the WIOD estimates, from 29.8% in 2008 to 36.9% in 2009.

Table 6. Decomposition of gross exports into their value added components, 2005 (% of total gross exports) - Comparison of OECD and WIOD results

		Domestic VA content of exports						Foreign VA content of exports				Additional indicators			
		Direct VA exports of final Goods and Services (G/S) (1)	Direct VA exports of intermediate G/S (2)	Indirect VA exports of G/S to third countries (3)	Returned domestic VA in final G/S (4)	Returned Domestic VA in intermediate G/S (5)	Total (= 1 to 5) (6)	Foreign VA in final G/S (7)	Foreign VA in intermediate G/S (8)	Total (= 7+8) (9)	Total of all VA components (= 6+9) (10)	Total multiple counting (= 4+5+7+8) (11)	Value added exports (= 1+2+3) (12)		
Australia	OECD	18.8	60.1	8.9	0.2	0.3	88.4	2.7	9.0	11.6	100.0	12.1	87.9		
	WIOD	17.5	58.2	10.5	0.3	0.3	86.8	2.9	10.3	13.2	100.0	13.8	86.2		
Absolute % difference (OECD VS WIOD)		1.3	1.9	-1.6	0.0	0.0	1.6	-0.3	-1.4	-1.6		-1.7	1.7		
Brazil	OECD	25.5	53.1	9.4	0.1	0.2	88.3	3.6	8.1	11.7	100.0	11.9	88.1		
	WIOD	27.8	49.0	11.2	0.1	0.2	88.3	4.1	7.6	11.7	100.0	12.0	88.0		
Absolute % difference (OECD VS WIOD)		-2.2	4.0	-1.7	0.0	0.0	0.1	-0.5	0.5	-0.1		-0.1	0.1		
Canada	OECD	19.7	49.7	3.8	0.4	0.6	74.2	11.1	14.8	25.8	100.0	26.8	73.2		
	WIOD	23.3	47.3	4.7	0.5	0.7	76.4	10.7	12.9	23.6	100.0	24.8	75.2		
Absolute % difference (OECD VS WIOD)		-3.6	2.5	-0.9	-0.2	-0.1	-2.3	0.4	1.9	2.3		2.0	-2.0		
China	OECD	38.4	26.3	5.0	0.3	1.9	71.9	14.2	13.8	28.1	100.0	30.3	69.7		
	WIOD	34.8	30.5	7.3	0.4	1.6	74.6	12.3	13.0	25.4	100.0	27.3	72.7		
Absolute % difference (OECD VS WIOD)		3.6	-4.2	-2.3	-0.1	0.3	-2.7	1.9	0.8	2.7		2.9	-2.9		
India	OECD	31.4	42.0	6.7	0.1	0.3	80.5	9.0	10.6	19.5	100.0	19.9	80.1		
	WIOD	31.4	40.5	8.2	0.1	0.4	80.6	9.5	9.9	19.4	100.0	19.9	80.1		
Absolute % difference (OECD VS WIOD)		-0.1	1.6	-1.5	0.0	-0.1	-0.1	-0.6	0.7	0.1		0.0	0.0		
Indonesia	OECD	17.7	55.2	8.7	0.1	0.3	81.9	5.1	13.0	18.1	100.0	18.5	81.5		
	WIOD	17.5	52.7	10.7	0.1	0.3	81.3	5.4	13.4	18.7	100.0	19.1	80.9		
Absolute % difference (OECD VS WIOD)		0.2	2.5	-2.1	0.0	0.0	0.7	-0.3	-0.4	-0.7		-0.6	0.6		
Japan	OECD	35.4	41.2	9.0	0.5	0.9	87.1	5.2	7.8	12.9	100.0	14.3	85.7		
	WIOD	32.1	43.2	11.0	0.8	1.1	88.2	4.1	7.7	11.8	100.0	13.8	86.2		
Absolute % difference (OECD VS WIOD)		3.3	-1.9	-1.9	-0.3	-0.3	-1.1	1.1	0.0	1.1		0.5	-0.5		
Korea Rep	OECD	17.4	37.1	9.9	0.2	1.0	65.7	7.4	27.0	34.3	100.0	35.5	64.5		
	WIOD	23.5	33.8	9.7	0.2	0.6	67.8	9.9	22.3	32.2	100.0	33.0	67.0		
Absolute % difference (OECD VS WIOD)		-6.1	3.3	0.2	0.0	0.4	-2.1	-2.6	4.7	2.1		2.6	-2.6		
Mexico	OECD	27.8	36.4	3.3	0.2	0.5	68.1	19.0	12.9	31.9	100.0	32.6	67.4		
	WIOD	22.3	41.2	6.1	0.2	0.5	70.4	13.3	16.3	29.6	100.0	30.4	69.6		
Absolute % difference (OECD VS WIOD)		5.4	-4.8	-2.8	-0.1	-0.1	-2.3	5.7	-3.4	2.3		2.2	-2.2		
Russia	OECD	8.2	69.8	11.8	0.3	0.3	90.5	1.4	8.0	9.5	100.0	10.2	89.8		
	WIOD	9.5	65.6	16.8	0.3	0.4	92.5	1.0	6.5	7.5	100.0	8.2	91.8		
Absolute % difference (OECD VS WIOD)		-1.2	4.3	-5.0	0.0	0.0	-2.0	0.4	1.5	2.0		2.0	-2.0		
Taiwan prov.	OECD	14.9	32.0	10.0	0.2	1.0	58.1	9.6	32.3	41.9	100.0	43.1	56.9		
	WIOD	14.5	30.8	10.6	0.2	0.5	56.7	10.0	33.3	43.3	100.0	44.0	56.0		
Absolute % difference (OECD VS WIOD)		0.4	1.2	-0.6	0.0	0.5	1.4	-0.4	-1.0	-1.4		-0.9	0.9		
Turkey	OECD	42.6	31.1	6.1	0.1	0.2	80.1	11.0	8.9	19.9	100.0	20.2	79.8		
	WIOD	40.7	25.7	7.6	0.1	0.2	74.3	12.5	13.2	25.7	100.0	26.0	74.0		
Absolute % difference (OECD VS WIOD)		2.0	5.4	-1.5	0.0	0.0	5.8	-1.5	-4.2	-5.8		-5.8	5.8		
United States	OECD	28.5	44.6	6.6	4.4	4.6	88.6	4.1	7.3	11.4	100.0	20.4	79.6		
	WIOD	26.2	44.8	7.5	4.5	4.5	87.6	4.5	8.0	12.4	100.0	21.5	78.5		
Absolute % difference (OECD VS WIOD)		2.2	-0.1	-1.0	-0.2	0.0	1.0	-0.4	-0.7	-1.0		-1.1	1.1		
Western EU	OECD	26.7	38.1	7.5	0.6	1.0	73.8	9.5	16.6	26.2	100.0	27.7	72.3		
	WIOD	28.3	34.5	8.6	0.7	1.0	73.2	11.0	15.8	26.8	100.0	28.6	71.4		
Absolute % difference (OECD VS WIOD)		-1.6	3.6	-1.1	-0.2	0.0	0.7	-1.4	0.8	-0.7		-0.9	0.9		
New EU countries	OECD	21.1	32.9	8.0	0.1	0.2	62.4	12.9	24.7	37.6	100.0	38.0	62.0		
	WIOD	23.2	29.3	9.3	0.1	0.2	62.2	14.7	23.2	37.8	100.0	38.2	61.8		
Absolute % difference (OECD VS WIOD)		-2.2	3.6	-1.3	0.0	0.0	0.2	-1.8	1.6	-0.2		-0.2	0.2		
Rest of the World	OECD	18.1	51.6	6.9	1.6	3.2	81.4	5.1	13.5	18.6	100.0	23.4	76.6		
	WIOD	16.4	44.6	6.6	1.4	3.8	72.8	9.6	17.6	27.2	100.0	32.4	67.6		
Absolute % difference (OECD VS WIOD)		1.8	7.0	0.3	0.2	-0.6	8.6	-4.5	-4.1	-8.6		-9.1	9.1		
World	OECD	25.4	41.8	7.2	1.0	1.7	77.2	8.2	14.6	22.8	100.0	25.5	74.5		
	WIOD	25.3	39.2	8.3	1.1	1.8	75.7	9.4	14.9	24.3	100.0	27.2	72.8		
Absolute % difference (OECD VS WIOD)		0.1	2.6	-1.1	-0.1	-0.1	1.5	-1.2	-0.3	-1.5		-1.7	1.7		

 : absolute differences greater than 3% or less than -3%

Table 7. Decomposition of gross exports into their value added components, 2008 (% of total gross exports) - Comparison of OECD and WIOD results

		Domestic VA content of exports					Foreign VA content of exports				Additional indicators		
		Direct VA exports of final Goods and Services (G/S)	Direct VA exports of intermediate G/S	Indirect VA exports of G/S to third countries	Returned domestic VA in final G/S	Returned Domestic VA in intermediate G/S	Total (= 1 to 5)	Foreign VA in final G/S	Foreign VA in intermediate G/S	Total (= 7+8)	Total of all VA components (= 6+9)	Total multiple counting (= 4+5+7+8)	Value added exports (= 1+2+3)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Australia	OECD	13.3	63.7	9.6	0.2	0.4	87.3	2.0	10.7	12.7	100.0	13.4	86.6
	WIOD	12.6	58.6	12.4	0.3	0.4	84.3	2.3	13.4	15.7	100.0	16.4	83.6
	Absolute % difference (OECD VS WIOD)	0.6	5.1	-2.7	-0.1	0.0	2.9	-0.3	-2.7	-2.9		-3.0	3.0
Brazil	OECD	26.3	52.5	9.9	0.2	0.3	89.2	3.4	7.4	10.8	100.0	11.2	88.8
	WIOD	23.8	50.5	12.4	0.2	0.3	87.2	3.9	8.9	12.8	100.0	13.3	86.7
	Absolute % difference (OECD VS WIOD)	2.5	2.0	-2.5	0.0	-0.1	2.0	-0.5	-1.5	-2.0		-2.1	2.1
Canada	OECD	18.9	53.5	4.5	0.5	0.9	78.4	8.3	13.3	21.6	100.0	23.0	77.0
	WIOD	19.0	50.9	6.6	0.5	0.7	77.8	8.3	13.9	22.2	100.0	23.5	76.5
	Absolute % difference (OECD VS WIOD)	-0.1	2.6	-2.1	0.0	0.1	0.6	0.0	-0.6	-0.6		-0.5	0.5
China	OECD	38.8	27.8	5.4	0.5	2.8	75.3	11.7	13.0	24.7	100.0	28.0	72.0
	WIOD	31.9	30.8	6.4	0.5	2.3	71.9	12.7	15.4	28.1	100.0	30.9	69.1
	Absolute % difference (OECD VS WIOD)	7.0	-3.1	-1.0	0.0	0.5	3.4	-1.0	-2.4	-3.4		-2.9	2.9
India	OECD	26.0	42.3	7.3	0.1	0.3	76.1	9.1	14.8	23.9	100.0	24.4	75.6
	WIOD	29.8	40.2	8.2	0.1	0.4	78.7	9.5	11.8	21.3	100.0	21.8	78.2
	Absolute % difference (OECD VS WIOD)	-3.8	2.1	-0.9	0.0	-0.1	-2.6	-0.5	3.1	2.6		2.6	-2.6
Indonesia	OECD	19.9	52.6	8.7	0.1	0.4	81.6	6.6	11.7	18.4	100.0	18.8	81.2
	WIOD	15.2	56.4	11.3	0.1	0.3	83.3	4.9	11.8	16.7	100.0	17.1	82.9
	Absolute % difference (OECD VS WIOD)	4.7	-3.8	-2.6	0.0	0.1	-1.7	1.7	0.0	1.7		1.7	-1.7
Japan	OECD	29.0	41.4	9.9	0.4	0.8	81.5	5.8	12.7	18.5	100.0	19.8	80.2
	WIOD	27.9	40.9	11.2	0.6	1.0	81.7	5.4	12.9	18.3	100.0	19.9	80.1
	Absolute % difference (OECD VS WIOD)	1.1	0.4	-1.3	-0.2	-0.2	-0.3	0.4	-0.2	0.3		-0.1	0.1
Korea Rep	OECD	16.5	32.7	8.3	0.3	0.9	58.7	8.8	32.5	41.3	100.0	42.5	57.5
	WIOD	18.4	30.3	8.9	0.2	0.6	58.3	10.8	30.9	41.7	100.0	42.4	57.6
	Absolute % difference (OECD VS WIOD)	-1.9	2.5	-0.6	0.1	0.3	0.4	-2.0	1.6	-0.4		0.0	0.0
Mexico	OECD	25.4	37.8	4.1	0.2	0.7	68.3	18.0	13.7	31.7	100.0	32.6	67.4
	WIOD	22.5	41.3	6.7	0.3	0.6	71.4	13.2	15.4	28.6	100.0	29.5	70.5
	Absolute % difference (OECD VS WIOD)	2.9	-3.5	-2.5	-0.1	0.1	-3.1	4.7	-1.6	3.1		3.1	-3.1
Russia	OECD	7.6	69.3	13.2	0.5	0.5	91.1	1.2	7.7	8.9	100.0	10.0	90.0
	WIOD	8.9	64.7	18.4	0.5	0.5	92.9	0.8	6.3	7.1	100.0	8.0	92.0
	Absolute % difference (OECD VS WIOD)	-1.3	4.6	-5.3	0.1	0.0	-1.8	0.4	1.4	1.8		1.9	-1.9
Taiwan prov.	OECD	12.2	30.0	9.2	0.1	0.8	52.3	9.1	38.7	47.7	100.0	48.6	51.4
	WIOD	11.3	29.5	11.9	0.1	0.4	53.3	8.7	38.1	46.7	100.0	47.3	52.7
	Absolute % difference (OECD VS WIOD)	0.9	0.4	-2.7	0.0	0.4	-1.0	0.4	0.6	1.0		1.4	-1.4
Turkey	OECD	38.0	29.1	6.5	0.1	0.3	73.9	12.0	14.1	26.1	100.0	26.5	73.5
	WIOD	32.4	28.6	7.7	0.1	0.3	69.0	12.1	18.9	31.0	100.0	31.4	68.6
	Absolute % difference (OECD VS WIOD)	5.6	0.6	-1.2	0.0	0.0	4.9	-0.1	-4.8	-4.9		-4.9	4.9
United States	OECD	27.3	44.6	7.6	2.9	3.4	85.7	4.7	9.5	14.3	100.0	20.5	79.5
	WIOD	24.0	46.3	8.2	3.1	3.7	85.3	5.0	9.7	14.7	100.0	21.5	78.5
	Absolute % difference (OECD VS WIOD)	3.3	-1.7	-0.7	-0.2	-0.3	0.4	-0.3	-0.1	-0.4		-0.9	0.9
Western EU	OECD	28.3	35.5	7.5	0.6	0.9	72.8	10.5	16.7	27.2	100.0	28.7	71.3
	WIOD	25.5	34.0	8.7	0.7	1.1	69.9	11.5	18.6	30.1	100.0	31.8	68.2
	Absolute % difference (OECD VS WIOD)	2.8	1.5	-1.2	-0.1	-0.2	2.8	-1.0	-1.8	-2.8		-3.1	3.1
New EU countries	OECD	24.9	29.6	8.0	0.2	0.3	63.0	15.2	21.8	37.0	100.0	37.4	62.6
	WIOD	22.0	28.5	9.1	0.1	0.3	60.1	15.4	24.5	39.9	100.0	40.3	59.7
	Absolute % difference (OECD VS WIOD)	2.9	1.1	-1.1	0.0	0.0	2.9	-0.2	-2.7	-2.9		-2.9	2.9
Rest of the World	OECD	15.4	55.4	7.0	2.0	4.1	83.9	4.7	11.4	16.1	100.0	22.2	77.8
	WIOD	12.4	45.1	7.2	2.3	5.8	72.9	7.9	19.2	27.1	100.0	35.3	64.7
	Absolute % difference (OECD VS WIOD)	3.0	10.3	-0.2	-0.4	-1.7	11.1	-3.2	-7.8	-11.1		-13.1	13.1
World	OECD	24.9	41.5	7.5	1.0	1.8	76.7	8.4	14.8	23.3	100.0	26.0	74.0
	WIOD	22.5	38.8	8.5	1.1	2.2	73.2	9.6	17.3	26.8	100.0	30.2	69.8
	Absolute % difference (OECD VS WIOD)	2.4	2.7	-1.0	-0.1	-0.4	3.6	-1.2	-2.4	-3.6		-4.1	4.1

absolute differences greater than 3% or less than -3%

Table 8. Decomposition of gross exports into their value added components, 2009 (% of total gross exports) - Comparison of OECD and WIOD results

		Domestic VA content of exports					Foreign VA content of exports				Additional indicators		
		Direct VA exports of final Goods and Services (G/S)	Direct VA exports of intermediate G/S	Indirect VA exports of G/S to third countries	Returned domestic VA in final G/S	Returned Domestic VA in intermediate G/S	Total (= 1 to 5)	Foreign VA in final G/S	Foreign VA in intermediate G/S	Total (= 7+8)	Total of all VA components (= 6+9)	Total multiple counting (= 4+5+7+8)	Value added exports (= 1+2+3)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Australia	OECD	17.4	61.3	8.5	0.2	0.4	87.9	2.4	9.6	12.1	100.0	12.7	87.3
	WIOD	14.5	61.9	10.8	0.3	0.4	87.8	2.2	10.0	12.2	100.0	12.8	87.2
	Absolute % difference (OECD VS WIOD)	2.9	-0.5	-2.2	-0.1	0.0	0.1	0.2	-0.3	-0.1		-0.2	0.2
Brazil	OECD	27.4	54.4	9.4	0.1	0.2	91.5	2.7	5.8	8.5	100.0	8.8	91.2
	WIOD	24.8	53.4	11.6	0.2	0.2	90.2	3.0	6.8	9.8	100.0	10.2	89.8
	Absolute % difference (OECD VS WIOD)	2.6	0.9	-2.2	0.0	0.0	1.3	-0.3	-1.0	-1.3		-1.3	1.3
Canada	OECD	21.6	52.2	4.3	0.5	0.7	79.2	8.6	12.2	20.8	100.0	21.9	78.1
	WIOD	22.1	50.6	6.0	0.5	0.6	79.7	8.0	12.3	20.3	100.0	21.3	78.7
	Absolute % difference (OECD VS WIOD)	-0.5	1.6	-1.7	0.0	0.1	-0.5	0.6	-0.1	0.5		0.7	-0.7
China	OECD	42.8	27.6	5.1	0.6	2.9	78.9	10.7	10.3	21.1	100.0	24.6	75.4
	WIOD	35.7	32.2	5.9	0.5	2.3	76.6	11.1	12.3	23.4	100.0	26.2	73.8
	Absolute % difference (OECD VS WIOD)	7.1	-4.7	-0.8	0.1	0.6	2.3	-0.4	-1.9	-2.3		-1.6	1.6
India	OECD	28.4	42.1	6.5	0.1	0.3	77.5	9.7	12.8	22.5	100.0	22.9	77.1
	WIOD	36.9	36.6	6.5	0.1	0.3	80.5	11.4	8.1	19.5	100.0	19.9	80.1
	Absolute % difference (OECD VS WIOD)	-8.5	5.5	0.0	0.0	0.0	-3.0	-1.7	4.7	3.0		3.0	-3.0
Indonesia	OECD	22.1	54.8	8.2	0.1	0.3	85.6	5.8	8.7	14.4	100.0	14.9	85.1
	WIOD	16.4	59.2	10.6	0.1	0.3	86.6	4.2	9.2	13.4	100.0	13.8	86.2
	Absolute % difference (OECD VS WIOD)	5.7	-4.4	-2.4	0.0	0.1	-1.1	1.6	-0.5	1.1		1.1	-1.1
Japan	OECD	28.6	46.1	10.1	0.4	0.7	85.9	4.3	9.8	14.1	100.0	15.2	84.8
	WIOD	27.6	46.6	10.9	0.7	0.9	86.5	3.8	9.7	13.5	100.0	15.0	85.0
	Absolute % difference (OECD VS WIOD)	1.0	-0.5	-0.8	-0.2	-0.2	-0.6	0.5	0.1	0.6		0.2	-0.2
Korea Rep	OECD	18.9	34.2	8.3	0.2	0.8	62.3	9.1	28.5	37.7	100.0	38.7	61.3
	WIOD	20.6	33.8	8.3	0.1	0.5	63.4	10.2	26.4	36.6	100.0	37.3	62.7
	Absolute % difference (OECD VS WIOD)	-1.8	0.4	0.0	0.1	0.3	-1.0	-1.1	2.1	1.0		1.4	-1.4
Mexico	OECD	28.4	35.9	3.8	0.2	0.5	68.9	18.2	13.0	31.1	100.0	31.9	68.1
	WIOD	25.5	39.7	5.9	0.3	0.4	71.9	13.6	14.5	28.1	100.0	28.8	71.2
	Absolute % difference (OECD VS WIOD)	2.9	-3.8	-2.1	0.0	0.1	-3.0	4.6	-1.6	3.0		3.1	-3.1
Russia	OECD	10.4	69.7	12.0	0.4	0.3	92.8	1.2	6.0	7.2	100.0	8.0	92.0
	WIOD	9.0	68.9	15.9	0.4	0.3	94.6	0.7	4.7	5.4	100.0	6.1	93.9
	Absolute % difference (OECD VS WIOD)	1.3	0.8	-4.0	0.0	0.0	-1.8	0.6	1.3	1.8		1.9	-1.9
Taiwan prov.	OECD	14.7	33.4	9.5	0.1	0.7	58.4	8.8	32.7	41.6	100.0	42.4	57.6
	WIOD	12.0	33.6	11.5	0.1	0.4	57.7	7.6	34.7	42.3	100.0	42.9	57.1
	Absolute % difference (OECD VS WIOD)	2.7	-0.2	-1.9	0.0	0.3	0.8	1.2	-2.0	-0.8		-0.5	0.5
Turkey	OECD	40.9	31.5	6.4	0.1	0.2	79.1	10.5	10.4	20.9	100.0	21.2	78.8
	WIOD	35.0	31.8	7.5	0.1	0.2	74.6	10.3	15.1	25.4	100.0	25.7	74.3
	Absolute % difference (OECD VS WIOD)	5.9	-0.2	-1.1	0.0	0.0	4.5	0.2	-4.7	-4.5		-4.5	4.5
United States	OECD	24.3	49.9	8.0	2.8	3.2	88.2	4.0	7.8	11.8	100.0	17.8	82.2
	WIOD	25.5	50.0	7.6	2.9	3.1	88.9	3.9	7.1	11.1	100.0	17.0	83.0
	Absolute % difference (OECD VS WIOD)	-1.1	-0.1	0.4	-0.1	0.2	-0.7	0.0	0.7	0.7		0.8	-0.8
Western EU	OECD	29.6	36.9	7.1	0.5	0.8	74.9	10.0	15.1	25.1	100.0	26.4	73.6
	WIOD	27.3	36.4	8.0	0.6	0.9	73.2	10.5	16.2	26.8	100.0	28.3	71.7
	Absolute % difference (OECD VS WIOD)	2.3	0.5	-0.9	-0.1	-0.1	1.7	-0.6	-1.1	-1.7		-1.9	1.9
New EU countries	OECD	27.3	30.6	7.8	0.1	0.3	66.2	14.8	19.1	33.8	100.0	34.3	65.7
	WIOD	24.9	31.0	8.8	0.1	0.2	65.1	14.4	20.5	34.9	100.0	35.3	64.7
	Absolute % difference (OECD VS WIOD)	2.4	-0.4	-1.0	0.0	0.0	1.0	0.4	-1.4	-1.0		-1.0	1.0
Rest of the World	OECD	18.5	53.4	6.4	2.1	3.6	84.0	5.0	10.9	16.0	100.0	21.7	78.3
	WIOD	15.5	45.6	6.7	2.0	4.7	74.6	8.1	17.3	25.4	100.0	32.2	67.8
	Absolute % difference (OECD VS WIOD)	3.0	7.8	-0.3	0.1	-1.1	9.4	-3.1	-6.4	-9.4		-10.5	10.5
World	OECD	26.8	42.2	7.2	1.0	1.7	78.8	8.1	13.1	21.2	100.0	23.8	76.2
	WIOD	25.1	40.7	7.9	1.0	1.8	76.5	8.9	14.6	23.5	100.0	26.3	73.7
	Absolute % difference (OECD VS WIOD)	1.7	1.5	-0.7	0.0	-0.2	2.3	-0.7	-1.5	-2.3		-2.5	2.5

 : absolute differences greater than 3% or less than -3%

4.2.2 Comparison of major value added components in gross exports based on GTAP and WIOD ICIO tables

The results of the comparison of the value added components of gross exports between the GTAP and the WIOD data sets are reported in Tables 9 and 10. These tables are presented the same way as for the OECD-WIOD comparison, for two years, 2004 and 2007. Generally speaking, GTAP-WIOD differences are much more significant than those noted between the OECD and the WIOD data sources.

The main noticeable differences in the results obtained from the two sources pertain to the value added components of exports in both final and intermediate goods and services that absorbed by direct importers. This can be observed identically for the two years under review (see columns 1 and 2 in Tables 9 and 10). While the shares of value added exports of final goods and services in gross exports (see column 1) are much bigger in the GTAP results than in WIOD's, for all countries except Turkey, the opposite trend is observed for intermediates (see column 2).

GTAP 2004 and 2007 estimates of value added exports of final goods and services absorbed by direct importers exceed those based on WIOD data by more than 10% for most countries. The difference with WIOD estimates stand at 11.8% at world level for 2004 and reaches 24.9% for Indonesia and even 34.9% for Russia, the highest differential noticed from the two tables. On the contrary, GTAP estimates of value added in intermediates gross exports absorbed by direct importers are much lower than WIOD's. For few countries, including Australia, Canada and Japan, the level of deviation shown for intermediates is almost the same as for final goods and services. For example, the GTAP-WIOD absolute difference for Canada value added exports absorbed by direct importers in 2007 stands at 16.7 % for final goods and services (see column 1 in table 10) and -16.7% for intermediates (see column 2 in table 10). Such a balanced deviation between the two types of goods suggests that the two sources might use different HS to end use concordance to allocate aggregate bilateral trade flows to intermediate and final goods.

Table 9. Decomposition of gross exports into their value added components, 2004 (% of total gross exports) - Comparison of GTAP and WIOD results

		Domestic VA content of exports						Foreign VA content of exports			Additional indicators		
		Direct VA exports of final Goods and Services (G/S)	Direct VA exports of intermediate G/S	Indirect VA exports of G/S to third countries	Returned domestic VA in final G/S	Returned Domestic VA in intermediate G/S	Total (= 1 to 5)	Foreign VA in final G/S	Foreign VA in intermediate G/S	Total (= 7+8)	Total of all VA components (= 6+9)	Total multiple counting (= 4+5+7+8)	Value added exports (= 1+2+3)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Australia	GTAP	34.6	44.6	10.7	0.2	0.1	90.2	4.1	5.8	9.8	100.0	10.2	89.8
	WIOD	19.6	57.2	9.9	0.2	0.3	87.2	3.1	9.7	12.8	100.0	13.3	86.7
	Absolute % difference (GTAP VS WIOD)	14.9	-12.6	0.8	0.0	-0.1	3.0	1.0	-4.0	-3.0		-3.1	3.1
Brazil	GTAP	47.4	35.6	9.3	0.2	0.0	92.6	3.9	3.5	7.4	100.0	7.7	92.3
	WIOD	27.8	48.5	10.8	0.1	0.2	87.3	4.6	8.1	12.7	100.0	12.9	87.1
	Absolute % difference (GTAP VS WIOD)	19.7	-12.9	-1.5	0.1	-0.1	5.3	-0.7	-4.6	-5.3		-5.3	5.3
Canada	GTAP	41.3	28.0	4.4	0.5	0.4	74.5	17.0	8.5	25.5	100.0	26.3	73.7
	WIOD	24.3	45.7	4.4	0.5	0.6	75.6	11.2	13.2	24.4	100.0	25.6	74.4
	Absolute % difference (GTAP VS WIOD)	17.0	-17.7	0.0	0.0	-0.2	-1.0	5.7	-4.7	1.0		0.8	-0.8
China	GTAP	31.5	30.0	9.1	0.3	1.5	72.4	14.0	13.6	27.6	100.0	29.4	70.6
	WIOD	34.0	31.5	7.5	0.4	1.5	75.0	11.9	13.1	25.0	100.0	26.9	73.1
	Absolute % difference (GTAP VS WIOD)	-2.5	-1.6	1.5	-0.1	0.0	-2.6	2.2	0.5	2.6		2.6	-2.6
India	GTAP	38.3	37.6	9.7	0.2	0.1	85.9	6.7	7.3	14.1	100.0	14.4	85.6
	WIOD	31.6	42.4	8.7	0.1	0.3	83.0	7.7	9.3	17.0	100.0	17.4	82.6
	Absolute % difference (GTAP VS WIOD)	6.8	-4.7	1.0	0.1	-0.2	2.9	-1.0	-1.9	-2.9		-3.0	3.0
Indonesia	GTAP	42.9	33.0	10.2	0.2	0.1	86.4	6.2	7.4	13.6	100.0	13.8	86.2
	WIOD	18.0	52.1	10.4	0.1	0.2	80.8	5.3	13.8	19.2	100.0	19.5	80.5
	Absolute % difference (GTAP VS WIOD)	24.9	-19.1	-0.2	0.1	-0.2	5.6	0.9	-6.5	-5.6		-5.6	5.6
Japan	GTAP	50.5	25.5	11.8	1.1	0.6	89.5	6.0	4.5	10.5	100.0	12.3	87.7
	WIOD	33.2	43.7	10.9	0.9	1.1	89.8	3.7	6.6	10.2	100.0	12.2	87.8
	Absolute % difference (GTAP VS WIOD)	17.3	-18.2	0.8	0.3	-0.5	-0.3	2.3	-2.0	0.3		0.1	-0.1
Korea Rep	GTAP	36.8	22.2	9.1	0.2	0.4	68.7	17.5	13.8	31.3	100.0	31.9	68.1
	WIOD	26.2	32.7	8.9	0.2	0.5	68.5	10.8	20.7	31.5	100.0	32.2	67.8
	Absolute % difference (GTAP VS WIOD)	10.6	-10.5	0.2	0.0	-0.2	0.2	6.7	-6.9	-0.2		-0.3	0.3
Mexico	GTAP	36.9	31.5	6.6	0.2	0.5	75.7	14.3	10.0	24.3	100.0	25.1	74.9
	WIOD	24.5	37.9	5.6	0.2	0.5	68.8	15.1	16.2	31.2	100.0	32.0	68.0
	Absolute % difference (GTAP VS WIOD)	12.4	-6.4	0.9	0.0	0.0	6.9	-0.8	-6.1	-6.9		-6.9	6.9
Russia	GTAP	44.9	32.8	12.4	0.2	0.2	90.5	5.4	4.2	9.5	100.0	9.9	90.1
	WIOD	10.0	66.1	15.5	0.3	0.3	92.1	1.1	6.8	7.9	100.0	8.4	91.6
	Absolute % difference (GTAP VS WIOD)	34.9	-33.2	-3.1	-0.1	-0.1	-1.7	4.3	-2.6	1.7		1.4	-1.4
Taiwan prov.	GTAP	31.7	22.8	8.8	0.1	0.3	63.6	18.4	18.0	36.4	100.0	36.8	63.2
	WIOD	16.2	31.1	10.0	0.2	0.5	57.9	10.8	31.3	42.1	100.0	42.8	57.2
	Absolute % difference (GTAP VS WIOD)	15.5	-8.4	-1.2	-0.1	-0.2	5.7	7.6	-13.3	-5.7		-6.0	6.0
Turkey	GTAP	35.5	36.6	12.1	0.2	0.1	84.5	6.0	9.5	15.5	100.0	15.8	84.2
	WIOD	40.1	25.8	7.9	0.1	0.2	74.1	12.7	13.2	25.9	100.0	26.2	73.8
	Absolute % difference (GTAP VS WIOD)	-4.6	10.8	4.2	0.1	-0.1	10.4	-6.7	-3.7	-10.4		-10.3	10.3
United States	GTAP	46.9	27.2	6.7	5.0	2.8	88.6	6.4	5.0	11.4	100.0	19.3	80.7
	WIOD	26.5	45.1	7.3	4.8	4.6	88.4	4.2	7.4	11.6	100.0	21.0	79.0
	Absolute % difference (GTAP VS WIOD)	20.4	-17.9	-0.7	0.2	-1.8	0.2	2.3	-2.4	-0.2		-1.7	1.7
Western EU	GTAP	38.4	28.4	9.0	0.9	0.7	77.3	11.6	11.1	22.7	100.0	24.2	75.8
	WIOD	29.0	35.0	8.6	0.8	1.0	74.4	10.7	15.0	25.6	100.0	27.4	72.6
	Absolute % difference (GTAP VS WIOD)	9.4	-6.6	0.4	0.1	-0.3	3.0	0.9	-3.9	-3.0		-3.2	3.2
New EU countries	GTAP	33.7	23.7	9.1	0.1	0.2	66.9	17.2	15.9	33.1	100.0	33.4	66.6
	WIOD	23.2	29.2	9.3	0.1	0.2	62.0	14.9	23.1	38.0	100.0	38.4	61.6
	Absolute % difference (GTAP VS WIOD)	10.5	-5.4	-0.1	0.0	-0.1	4.9	2.3	-7.2	-4.9		-5.0	5.0
Rest of the World	GTAP	29.8	40.2	10.2	2.1	2.0	84.2	7.3	8.5	15.8	100.0	19.8	80.2
	WIOD	17.8	43.5	6.5	1.3	3.5	72.6	10.0	17.4	27.4	100.0	32.2	67.8
	Absolute % difference (GTAP VS WIOD)	12.0	-3.3	3.7	0.8	-1.5	11.7	-2.7	-8.9	-11.7		-12.3	12.3
World	GTAP	38.1	30.3	9.1	1.4	1.1	79.9	10.4	9.7	20.1	100.0	22.6	77.4
	WIOD	26.3	39.0	8.2	1.2	1.7	76.3	9.4	14.3	23.7	100.0	26.5	73.5
	Absolute % difference (GTAP VS WIOD)	11.8	-8.7	0.9	0.2	-0.6	3.6	1.1	-4.6	-3.6		-4.0	4.0

 : absolute differences greater than 3% or less than -3%

Table 10. Decomposition of gross exports into their value added components, 2007 (% of total gross exports) - Comparison of GTAP and WIOD results

		Domestic VA content of exports						Foreign VA content of exports			Additional indicators		
		Direct VA exports of final Goods and Services (G/S)	Direct VA exports of intermediate G/S	Indirect VA exports of G/S to third countries	Returned domestic VA in final G/S	Returned Domestic VA in intermediate G/S	Total (= 1 to 5)	Foreign VA in final G/S	Foreign VA in intermediate G/S	Total (= 7+8)	Total of all VA components (= 6+9)	Total multiple counting (= 4+5+7+8)	Value added exports (= 1+2+3)
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Australia	GTAP	26.0	49.6	13.7	0.3	0.2	89.8	3.6	6.5	10.2	100.0	10.6	89.4
	WIOD	14.2	58.9	11.2	0.3	0.4	85.0	2.5	12.5	15.0	100.0	15.6	84.4
	Absolute % difference (GTAP VS WIOD)	11.8	-9.3	2.4	0.0	-0.2	4.8	1.2	-6.0	-4.8		-5.0	5.0
Brazil	GTAP	40.8	40.7	10.8	0.4	0.1	92.7	3.4	3.8	7.3	100.0	7.7	92.3
	WIOD	26.4	49.5	12.0	0.1	0.2	88.3	3.8	7.9	11.7	100.0	12.1	87.9
	Absolute % difference (GTAP VS WIOD)	14.4	-8.8	-1.2	0.2	-0.2	4.5	-0.4	-4.1	-4.5		-4.4	4.4
Canada	GTAP	39.0	30.9	5.4	0.5	0.5	76.3	14.9	8.8	23.7	100.0	24.7	75.3
	WIOD	22.4	47.6	5.7	0.5	0.7	76.9	9.8	13.3	23.1	100.0	24.3	75.7
	Absolute % difference (GTAP VS WIOD)	16.7	-16.7	-0.3	0.0	-0.2	-0.5	5.1	-4.6	0.5		0.3	-0.3
China	GTAP	33.9	30.5	8.3	0.4	1.6	74.7	13.3	12.0	25.3	100.0	27.3	72.7
	WIOD	35.8	30.4	7.4	0.4	1.8	75.7	11.6	12.7	24.3	100.0	26.5	73.5
	Absolute % difference (GTAP VS WIOD)	-1.9	0.1	1.0	0.0	-0.2	-1.0	1.7	-0.7	1.0		0.7	-0.7
India	GTAP	31.8	39.9	9.7	0.3	0.2	81.8	8.2	9.9	18.2	100.0	18.6	81.4
	WIOD	31.9	39.2	8.0	0.1	0.4	79.7	9.9	10.4	20.3	100.0	20.8	79.2
	Absolute % difference (GTAP VS WIOD)	-0.2	0.7	1.6	0.1	-0.2	2.1	-1.7	-0.5	-2.1		-2.2	2.2
Indonesia	GTAP	39.5	37.9	10.3	0.2	0.1	88.0	5.6	6.4	12.0	100.0	12.2	87.8
	WIOD	17.0	55.3	11.3	0.1	0.3	84.0	4.3	11.6	16.0	100.0	16.3	83.7
	Absolute % difference (GTAP VS WIOD)	22.5	-17.4	-1.0	0.1	-0.2	4.0	1.3	-5.2	-4.0		-4.1	4.1
Japan	GTAP	47.7	25.2	10.2	0.7	0.5	84.4	8.6	7.0	15.6	100.0	16.8	83.2
	WIOD	29.6	42.2	11.1	0.6	1.1	84.6	5.0	10.4	15.4	100.0	17.1	82.9
	Absolute % difference (GTAP VS WIOD)	18.1	-16.9	-0.9	0.1	-0.6	-0.2	3.5	-3.4	0.2		-0.3	0.3
Korea Rep	GTAP	35.4	21.5	8.9	0.2	0.4	66.4	18.3	15.3	33.6	100.0	34.2	65.8
	WIOD	21.2	34.2	9.6	0.2	0.6	65.7	9.5	24.7	34.3	100.0	35.1	64.9
	Absolute % difference (GTAP VS WIOD)	14.2	-12.7	-0.7	0.0	-0.2	0.7	8.8	-9.4	-0.7		-0.9	0.9
Mexico	GTAP	35.3	34.1	7.5	0.2	0.5	77.6	12.2	10.1	22.4	100.0	23.1	76.9
	WIOD	22.3	41.0	6.6	0.3	0.6	70.8	13.4	15.8	29.2	100.0	30.1	69.9
	Absolute % difference (GTAP VS WIOD)	13.0	-6.9	0.9	0.0	-0.1	6.9	-1.2	-5.7	-6.9		-7.0	7.0
Russia	GTAP	41.5	36.3	12.7	0.3	0.3	91.2	4.6	4.3	8.8	100.0	9.4	90.6
	WIOD	9.2	65.4	17.7	0.4	0.4	93.1	0.8	6.1	6.9	100.0	7.7	92.3
	Absolute % difference (GTAP VS WIOD)	32.3	-29.0	-5.0	-0.1	-0.2	-2.0	3.8	-1.8	2.0		1.7	-1.7
Taiwan prov.	GTAP	26.8	23.1	9.8	0.1	0.3	60.1	17.8	22.1	39.9	100.0	40.3	59.7
	WIOD	12.4	30.4	11.0	0.1	0.5	54.4	9.3	36.3	45.6	100.0	46.2	53.8
	Absolute % difference (GTAP VS WIOD)	14.5	-7.2	-1.2	0.0	-0.2	5.7	8.5	-14.2	-5.7		-6.0	6.0
Turkey	GTAP	33.0	36.5	11.4	0.2	0.2	81.3	7.1	11.6	18.7	100.0	19.1	80.9
	WIOD	36.1	26.2	8.0	0.1	0.3	70.6	13.3	16.0	29.4	100.0	29.7	70.3
	Absolute % difference (GTAP VS WIOD)	-3.1	10.3	3.4	0.1	-0.1	10.7	-6.2	-4.4	-10.7		-10.6	10.6
United States	GTAP	43.5	29.0	7.1	3.8	2.6	86.0	7.6	6.4	14.0	100.0	20.4	79.6
	WIOD	25.4	45.7	7.8	3.8	4.0	86.8	4.7	8.5	13.2	100.0	21.1	78.9
	Absolute % difference (GTAP VS WIOD)	18.1	-16.7	-0.7	0.0	-1.4	-0.7	2.8	-2.1	0.7		-0.7	0.7
Western EU	GTAP	34.8	29.1	8.9	0.8	0.8	74.4	12.4	13.2	25.6	100.0	27.2	72.8
	WIOD	26.7	34.0	8.7	0.7	1.1	71.2	11.4	17.5	28.8	100.0	30.6	69.4
	Absolute % difference (GTAP VS WIOD)	8.1	-4.9	0.2	0.1	-0.3	3.2	1.0	-4.3	-3.2		-3.5	3.5
New EU countries	GTAP	28.9	25.4	9.5	0.1	0.3	64.3	17.0	18.7	35.7	100.0	36.1	63.9
	WIOD	21.8	28.5	9.2	0.1	0.3	59.9	15.5	24.6	40.1	100.0	40.5	59.5
	Absolute % difference (GTAP VS WIOD)	7.2	-3.1	0.3	0.0	0.0	4.4	1.4	-5.8	-4.4		-4.4	4.4
Rest of the World	GTAP	26.0	43.6	11.1	2.8	2.5	85.9	5.9	8.2	14.1	100.0	19.4	80.6
	WIOD	15.3	43.9	6.7	1.8	4.5	72.2	9.2	18.5	27.8	100.0	34.1	65.9
	Absolute % difference (GTAP VS WIOD)	10.7	-0.3	4.4	1.0	-2.0	13.6	-3.3	-10.3	-13.6		-14.7	14.7
World	GTAP	34.5	32.1	9.3	1.3	1.2	78.5	10.6	11.0	21.5	100.0	24.1	75.9
	WIOD	24.2	38.7	8.5	1.1	1.9	74.4	9.6	16.1	25.6	100.0	28.6	71.4
	Absolute % difference (GTAP VS WIOD)	10.3	-6.5	0.8	0.2	-0.7	4.1	1.0	-5.1	-4.1		-4.6	4.6

 : absolute differences greater than 3% or less than -3%

Turkey presents the highest GTAP-WIOD deviations for the domestic and foreign value added of exports, of about +/- 10% (see columns 6 and 9 in Tables 9 and 10). Surprisingly, this was also the case with the OECD-WIOD comparison where the absolute difference was around +/- 5%. That presupposes a difference in the processing of Turkish data between WIOD and the two other ICIO tables. This discrepancy may also be attributed to the deviations on basic economic variables (see III) observed for Turkey, like the direct value added by sector variable.

Similar to the OECD-WIOD comparison, the differences noticed for the shares of indirect value added exports (see column 3) or those of the domestic value added returned back home (see columns 4 and 5) are generally minor. The major differences for the share of indirect value added exports in gross exports are noticed for Russia and Turkey

V Direction for further improvement

5.1 Fostering a better division of work to improve and develop the statistical sources used for the production of ICIO tables

Due to lack of data availability, reliability or consistency, the construction of ICIO tables is complex and usually requires the application of specific assumptions to reconcile various data from different sources. These data originate from various statistical frameworks and sources, such as national Input-Output tables, Supply-Use tables, national accounts variables (output, value added,...), merchandise trade statistics based on the Broad Economic Categories (BEC) classification or the Harmonized System (HS), trade in services statistics based on the balance of payments, and so on.

In order to improve the reliability of ICIO tables, it is important to address the numerous issues met with international trade statistics, which affect both goods and services data. Some of the problems to be tackled are: coverage issues, the inconsistency of so-called "mirror" statistics, confidentiality issues, without omitting the crucial lack of data in some domains (e.g. services bilateral trade statistics). In addition, specific trade patterns such as intra-firm trade, transit-trade, processing trade or re-exports require the development and use of complementary data sources, without which ICIO tables will not be able to reflect the reality of international production and trade. Further work is also needed to identify data sources for re-exports and estimate the mark-up margins for major re-exporting countries in the world in order to treat them as the re-

exporting country's indirect service exports in future efforts. In addition, to make GDP and final demand decomposition internally consistent, international shipping services should be treated as an additional industry in the ICIO table, not just simply add to direct value-added in the destination country as our comparison excise estimating trade in value-added and decomposing gross exports.

This inevitably calls for more intensified international co-operation among national and international statistical institutions. Moreover, since the effort required is tremendous, the collaboration should concentrate on an optimized division of labor between the various actors involved. To some extent, this would be like an application of the global value chains model to the international statistical community, with each organization being dedicated and specialized in some specific domains or statistical activities.

5.2 Systematic comparison of ICIO tables with standard statistical frameworks

Trade analysts and policy makers are used to scrutinizing official statistics based on standard statistical systems, like the System of National Accounts (SNA), the Balance of Payments (BOP) or customs-based statistics. Whenever economic variables derived from ICIO tables differ significantly from those based on official sources, their relevancy or usefulness will be questioned. The most important role of such comparison exercises is to flag the discrepancies, as it signals where ICIO data, and resulting trade in value added indicators, can be weak and need to be improved. Discussing reasons for these deviations is a challenge since they may originate from various aspects (issues with raw data sources, compilation or reconciliation method, and so on). However, ICIO table and trade in value added estimates users should be provided with quality metadata, describing the biases found (and potential explanations) as well as specific information on disseminated data, so that users may better understand and correctly use ICIO tables and related indicators. This paper is an attempt to initiate this type of process. However, a statistical program could be agreed, defined and setup among ICIO tables' compilers to systematically gather related statistics that would serve this comparison exercise.

5.3 Moving towards a better reconciliation between macro and micro-economic data

As mentioned above, ICIO tables' compilation relies on several statistical frameworks that provide standard macro-economic indicators. Additionally, recent ICIO developments and

the rising interest in the analysis of the impact of global value chains have highlighted the usefulness of firm-level data to enrich ICIO tables. Micro-economic data, such as business statistics or firm level surveys, are indeed complementary to macro-economic ones, and international efforts and initiatives should continue to promote better harmonization and consistency between the two data types.

5.4 Harmonizing ICIO compiling methods and improving estimated data

An important target in the near future is to harmonize the reconciliation methods in the construction of ICIO tables and to define "best practices" that would be agreed at the international level and followed by ICIO tables' producers. Constraint optimization should be adopted as standard reconciliation method to benchmark the ICIO table with official national account statistics.

As already mentioned, building an ICIO table is highly time consuming. Therefore, in order to make full use the initial effort so far, it is necessary that ICIO tables are maintained and refined as updates and more details become available over time; if not, the usefulness and reliability of the tables may be rapidly reduced. Some of the remarks made within the comparison of the trade in value added indicators based on the three ICIO tables (see IV 4.5) go into that direction. Indeed, the longtime intervals between update and lack of automatic revision were suggested to explain for some of the observed differences.

5.5 Extending and improving the dissemination of ICIO tables

An easy access and public dissemination of the ICIO tables is necessary to improve the transparency on such statistical tools. Moreover, this is undeniably a good way of developing their use and receiving feedback from users for continuing improvement.

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Appendix Table A1 Countries included in the harmonized database

WIOD	Description	WIOD	Description
AUS	Australia	ITA	Italy
AUT	Austria	JPN	Japan
BEL	Belgium	KOR	Korea Rep
BGR	Bulgaria	LTU	Lithuania
BRA	Brazil	LUX	Luxembourg
CAN	Canada	LVA	Latvia
CHN	China	MEX	Mexico
CYP	Cyprus	MLT	Malta
CZE	Czech Rep	NLD	Netherlands
DEU	Germany	POL	Poland
DNK	Denmark	PRT	Portugal
ESP	Spain	ROU	Romania
EST	Estonia	RUS	Russia
FIN	Finland	SVK	Slovakia Rep
FRA	France	SVN	Slovenia Rep
GBR	United Kingdom	SWE	Sweden
GRC	Greece	TUR	Turkey
HUN	Hungary	TWN	Taiwan prov.
IDN	Indonesia	USA	United States
IND	India	WLD	World
IRL	Ireland	ZOW	The rest of the World

Appendix Table A2 the concordance between WIOD, GTAP, OECD and ISIC rev.3.1 code

harmonized Sector	ISIC Rev.3.1 code	WIOD sector	OECD sector	GTAP sector
1	01-05	C1	AGR	prd, wht, gro, v_f, osd, c_b, pfb, ocr, prc, ctl, oap, rmk, wol, fsh, frs
2	10-14	C2	MIN	coa, oil, gas, omn
3	15-16	C3	FOD	cmt, omt, mil, sgr, ofd, vol, b_t
4	17-19	C4-C5	TEX	tex, wap, lea
5	20	C6	WOD	lum
6	21-22	C7	PAP	ppp
7	23	C8	PET	p_c
8	24-25	C9-C10	CHM, RBP	crp
9	26	C11	NMM	nmm
10	27-28	C12	MET, FBM	i_s, nfm, fmp
11	29	C13	MEQ	otn
12	30-33	C14	ITQ, ELQ, CMQ, SCQ	ele, ome
13	34-35	C15	MTR, TRQ	mvh
14	36-37	C16	OTM	omf
15	40-41	C17	EGW	ely, gdt, wtr
16	45	C18	CON	cns
17	50-55	C19-C22	WRT, HTR	trd
18	60, 63	C23, C26	TRN	otp
19	61	C24		wtp
20	62	C25		atp
21	64	C27	PTL	cmn
22	65-66	C28	FIN	ofi, isr
23	70-74	C29-C30	REA, RMQ, ITS, RDS, BZS	obs
24	75, 80, 85	C31-C33	GOV, EDU, HTH	osg
25	90-95	C34-C35	OTS, PVH	ros

Note: GTAP Sector 57, “DWE” are not part of ISIC