

Stehrer, Robert; Streicher, Gerhard

Working Paper

Whither Panama? Constructing a Consistent and Balanced World SUT System including International Trade and Transport Margins

wiiw Working Paper, No. 94

Provided in Cooperation with:

The Vienna Institute for International Economic Studies (wiiw) - Wiener Institut für Internationale Wirtschaftsvergleiche (wiiw)

Suggested Citation: Stehrer, Robert; Streicher, Gerhard (2013) : Whither Panama? Constructing a Consistent and Balanced World SUT System including International Trade and Transport Margins, wiiw Working Paper, No. 94, The Vienna Institute for International Economic Studies (wiiw), Vienna

This Version is available at:

<https://hdl.handle.net/10419/203959>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Working Papers | 94 | January 2013

Gerhard Streicher and Robert Stehrer

**Whither Panama? Constructing a Consistent
and Balanced World SUT System including
International Trade and Transport Margins**



wiwi Working Papers published since 2010:

- No. 94 G. Streicher and R. Stehrer: Whither Panama? Constructing a Consistent and Balanced World SUT System including International Trade and Transport Margins. January 2013
- No. 93 M. Holzner: The Determinants of Income Polarization on the Household and Country Level across the EU. September 2012
- No. 92 M. Kelle: Crossing Industry Borders: German Manufacturers as Services Exporters. July 2012
- No. 91 S. M. Leitner, R. Stehrer and B. Dachs: The Gravity of Cross-border R&D Expenditure. July 2012
- No. 90 N. Foster, J. Pöschl and R. Stehrer: Offshoring and the Elasticity of Labour Demand. July 2012
- No. 89 N. Foster, J. Pöschl and R. Stehrer: Manufacturing Productivity: Effects of Service Sector Innovations and Institutions. July 2012
- No. 88 A. Breitwieser and N. Foster: Intellectual Property Rights, Innovation and Technology Transfer: A Survey. June 2012
- No. 87 N. Foster: On the Volume and Variety of Intra-Bloc Trade in an Expanded European Union. June 2012
- No. 86 N. Foster, R. Stehrer and G. de Vries: Offshoring and the Skill Structure of Labour Demand. June 2012
- No. 85 M. Holzner and F. Peci: Measuring the Effects of Trade Liberalization in Kosovo. June 2012
- No. 84 S. M. Leitner and R. Stehrer: Labour Hoarding during the Crisis: Evidence for selected New Member States from the Financial Crisis Survey. June 2012
- No. 83 E. Bekkers and J. Francois: Bilateral Exchange Rates and Jobs. June 2012
- No. 82 E. Bekkers, J. Francois and M. Manchin: Import Prices, Income, and Inequality. June 2012
- No. 81 R. Stehrer: Trade in Value Added and the Value Added in Trade. June 2012
- No. 80 R. Stehrer, N. Foster and G. de Vries: International spillovers in a world of technology clubs. June 2012
- No. 79 R. Stöllinger: International spillovers in a world of technology clubs. May 2012
- No. 78 S. Leitner and R. Stehrer: Access to Finance and Composition of Funding during the Crisis: A firm-level analysis for Latin American countries. February 2012
- No. 77 E. Bekkers and R. Stehrer: Reallocation Gains in a Specific Factors Model with Firm Heterogeneity. December 2011
- No. 76 M. Holzner and F. Peci: The Impact of Customs Procedures on Business Performance: Evidence from Kosovo. August 2011
- No. 75 C. Hornok: Need for Speed: Is Faster Trade in the EU Trade-Creating? April 2011
- No. 74 S. Leitner and R. Stehrer: Subgroup and Shapley Value Decompositions of Multidimensional Inequality – An Application to Southeast European Countries. March 2011
- No. 73 S. M. Leitner and R. Stehrer: Do Exporters Share Part of their Rents with their Employees? Evidence from Austrian Manufacturing Firms. February 2011
- No. 72 S. M. Leitner, J. Pöschl and R. Stehrer: Change begets change: Employment effects of technological and non-technological innovations – A comparison across countries. January 2011
- No. 71 M. Holzner: Inequality, Growth and Public Spending in Central, East and Southeast Europe. October 2010
- No. 70 N. Foster, J. Pöschl and R. Stehrer: The Impact of Preferential Trade Agreements on the Margins of International Trade. September 2010
- No. 69 L. Podkaminer: Discrepancies between Purchasing Power Parities and Exchange Rates under the Law of One Price: A Puzzle (partly) Explained? September 2010
- No. 68 K. Hauzenberger and R. Stehrer: An Empirical Characterization of Redistribution Shocks and Output Dynamics. August 2010
- No. 67 R. Stöllinger, R. Stehrer and J. Pöschl: Austrian Exporters: A Firm-Level Analysis. July 2010
- No. 66 M. Holzner: Tourism and Economic Development: the Beach Disease? June 2010
- No. 65 A. Bhaduri: A Contribution to the Theory of Financial Fragility and Crisis. May 2010
- No. 64 L. Podkaminer: Why Are Goods Cheaper in Rich Countries? Beyond the Balassa-Samuelson Effect. April 2010
- No. 63 K. Laski, J. Osiatynski and J. Zieba: The Government Expenditure Multiplier and its Estimates for Poland in 2006-2009. March 2010
- No. 62 A. Bhaduri: The Implications of Financial Asset and Housing Markets on Profit- and Wage-led Growth: Some Results in Comparative Statics. February 2010

Gerhard Streicher is researcher at the Austrian Institute of Economic Research (WIFO), Vienna. Robert Stehrer is Deputy Director of Research at the Vienna Institute for International Economic Studies (wiiw).

This paper was written within the Seventh EU Framework Programme 'WIOD: World Input-Output Database: Construction and Applications' (www.wiod.org) under Theme 8: Socio-Economic Sciences and Humanities, Grant agreement no. 225 281.

*Gerhard Streicher
and Robert Stehrer*

Whither Panama? Constructing a Consistent and Balanced World SUT System including International Trade and Transport Margins

Contents

<i>Abstract</i>	i
1 Introduction.....	1
2 Outline of strategy and data requirements.....	2
2.1 The Panama assumption revisited.....	2
2.2 Construction strategy.....	3
2.2 Data requirements.....	5
3 Estimation of supply and requirements of TIR services.....	5
4 Construction of a consistent trade matrix.....	8
4.1 Derivation of an initial matrix of cif-fob corrections.....	8
4.2 Trade matrix for goods.....	10
4.3 Trade matrix for other services.....	12
4.4 Trade matrix for TIR services.....	13
4.5 Trade matrix – differentiation by user.....	13
5 Construction of a SUT for RoW.....	14
6 Concluding remarks.....	18
References.....	20

List of Tables and Figures

Table 1	Net exports of the 40 WIOD countries.....	7
Table 2	World-wide net exports (=Xfob-Mcif) of TIR services	8
Table 3	The Rest of the World in numbers.....	16
Table 4	Final demand for Rest of the World after balancing.....	17
Table 5	RoW production, imports and exports by commodity	18
Figure 1	From basic to purchaser prices in global SUTs	4
Figure 2	Trade evaluated in cif and fob terms	10
Figure 3	Disaggregation of TIR flows.....	12

Abstract

This paper aims to complement work done within the WIOD project (the 'World Input Output Database' project financed by the EU's Seventh Framework Programme), which compiled supply and use tables for 40 countries, covering about 85% of the world economy. The paper describes the derivation of international trade and transport margins (TIR services) together with a consistent and balanced system of supply and use tables at the world level. As a by-product, this also yields supply and use tables including valuation matrices for the Rest of the World, the approximately 15% of the world economy not covered by the 40 countries included in the WIOD database. The procedure assures a 'balanced world economy' with respect to trade in all goods and services.

Keywords: *transport margins, supply and use tables, world modelling*

JEL classification: *C67, C82, F15*

Whither Panama? Constructing a consistent and balanced world SUT system including international trade and transport margins

1 Introduction¹

Various attempts have been ongoing recently to construct international input-output tables; examples are the OECD-WTO initiative (OECD-WTO, 2012), EXIOPOL (EXIOPOL, 2011), EORA (Kanemoto et al., 2011; Geschke et al., 2011), and region specific tables such as the Asian IDE-JETRO tables (IDE-JETRO, 2006; Hiratsuka, 2010) and the WIOD project (see Timmer et al., 2012, for an overview).² Amongst them, the WIOD project is the only one where the world input-output tables (WIOTs) are derived from a system of international supply and use tables (SUTs). In the WIOD project SUTs for 40 countries, covering about 85% of world economic output, are collected. These SUTs are first collected at the national level and transformed into an ‘international’ version with the national SUTs connected via trade linkages. Except in the ‘analytical’ version of the WIOD database, however, the ‘Rest of the World’ (RoW) is not explicitly included, i.e., no attempt has been made to construct a SUT for RoW.³ Likewise, although international trade and transport margins are included (constituting the link between exports valued at fob and import valued at cif), these margins are not linked back to the global economy. At a national level, domestic trade and transport margins are however linked back to the economy when transforming tables from use in purchaser prices to use in basic prices by re-distributing trade and transport margins to trade and services sectors.

This paper aims to address these two shortcomings where it should be noted that these two issues are not independent of each other. ‘Linking back’ international trade and transport margins to the relevant sectors of the economy necessitates a SUT for the Rest of the World so that at the world level, the supply and use of all commodities, goods as well as services – including transport services – will be balanced. It will also avoid the need to resort to any kind of ‘Panama assumption’ in modelling the supply of transport services (see below). This then provides a consistent supply and use system for the world which is balanced in terms of all flows. This paper discusses how this can be achieved and points to the severe data constraints faced and the – therefore – partly far-reaching assumptions that have to be made. Thus, the resulting SUT for RoW and the world SUT system can only serve as a first step in this construction process. Further research will then have to be

¹ The authors wish to thank Erwin Kolleritsch from Statistik Austria for his advice and valuable discussions.

² For websites of relevant initiatives and similar data: EXIOPOL (<http://www.feem-project.net/exiopol/>); GTAP (<https://www.gtap.agecon.purdue.edu/>); IDE-JETRO (<http://www.ide.go.jp/English/>); OECD-WTO initiative (www.oecd.org/trade/valueadded); WIOD (<http://www.wiod.org/>); WTO ‘Made in World’ (http://www.wto.org/english/res_e/statis_e/miwi_e/miwi_e.htm)

³ The RoW in the analytical WIOTs has been estimated in the framework of the IO tables rather than the supply and use framework; see Timmer et al. (2012) for a detailed documentation.

focused on how to improve on these assumptions and to eliminate existing data constraints.

Apart from (numerically) balancing world input and output, the derivation of a SUT for RoW has also other aspects to recommend it: as it is, the WIOD project will give world-wide input-output linkages in the form of (quadratic) IO tables only. There are, however, some aspects in favour of using SUTs instead of IOTs: for one, the derivation of IOTs (which are derived from SUTs) requires 'technology assumptions' to be made, which essentially are rules on how to deal with atypical production. Product-by-product tables are, for example, derived under the 'industry technology assumption' implying that atypical products are produced with the same technology as the typical product, whereas under the 'commodity technology assumption', atypical commodities are produced with the technology of the sector of which the commodity is the typical product. In the WIOD project industry-by-industry tables are derived using the 'fixed product sales structure assumption', i.e. model D (see Eurostat, 2008, Chapter 11, for details). The two assumptions have different pros and cons and will yield different IOTs. However, when SUTs are available, IOTs can be constructed at this basis, but not vice versa. The move from SUTs to IOTs, therefore, results in a loss of information. Also, in modelling, SUTs are arguably more versatile: it is quite easy to combine SUTs with econometrically derived equations in so-called 'econometric IO models' (for Austrian examples, see Kratena and Wüger, 2006 and Fritz et al., 2005) whereas IOTs tend to be less flexible in this respect. The derivation of a consistent SUT for RoW will allow constructing such an econometric IO model at the world level.

2 Outline of strategy and data requirements

2.1 The Panama assumption revisited

Although specific information seems hard to come by, other world models (the most prominent of which is certainly GTAP) seem to skip over the issue of international transport costs by making a sort of 'Panama assumption': international transport services are assumed to be provided by the Rest of the World via 'flags of convenience' (the rather common practice among shipping companies to register their vessels in ports with lax regulatory regimes), the archetypical provider of such flags being Panama⁴. However, data from the United Nations' Statistical Division UNSD⁵ do not really bear out this assumption: although relative to total GDP, Panama's transport sector is above average, the sector 'Transport, Storage and Communications' accounts for 16% of Panama's total value added; the (un-weighted) world average is about 9% (the average of the WIOD countries is 8.6%, of the non-WIOD countries it is 9.1%). However, the important business of the Panama Canal

⁴ According to the CIA World Fact Book (<https://www.cia.gov/library/publications/the-world-factbook/geos/pm.html>), Panama's merchant fleet, with 6,379 vessels, is the world's largest. 5,244 of those vessels are foreign owned, almost half of which are Japanese.

⁵ UN Statistics Division: http://unstats.un.org/unsd/economic_main.htm

probably makes up a substantial part of this sector. But even if Panama's entire transport sector were devoted to international transport margins, this would contribute USD 2.5 billion to international trade. Compared to the transport costs estimated at 5-10% of the world trade volume of some USD 12,000 billion in 2011⁶, this would be only like a drop in the ocean. Of course, the Rest of the World is more than Panama; but even the combined 'Transport, Storage and Communication' sectors of all non-WIOD countries seem to be too small: according to the UNSD, combined value added in this sector amounts to about USD 400 billion, which corresponds to an estimated USD 800 billion of output. Assuming that international transport margins are produced in RoW only would imply that something in the range of 50 to 100% of RoW's transport output would have to be devoted to international trade.

Clearly, international transport services have to be provided on a much broader basis. As we will argue, this broader basis are 'normal' (net) exports of trade and transport services as recorded in national SUTs.

2.2 Construction strategy

The strategy of constructing such a consistent and balanced system consists of a number of sequential steps:

Step 1: Estimation of total supply of international trade and transport margins (TIR) services⁷

Step 2: Derivation of an initial matrix of cif-fob corrections

Step 3: Determination of the matrix of cif-fob corrections such that, based on this initial matrix, the sum over all bilateral cif-fob corrections equals the sum of all TIR services supplied, i.e.

$$\sum_{\text{world}}(\text{cif-fob corrections}) = \sum_{\text{world}}(\text{TIR-services}),$$

Step 4: Distribution of total cif-fob margins to the TIR services trade, surface-, sea- and air-transport

Step 5: Derivation of a trade matrix for the TIR services

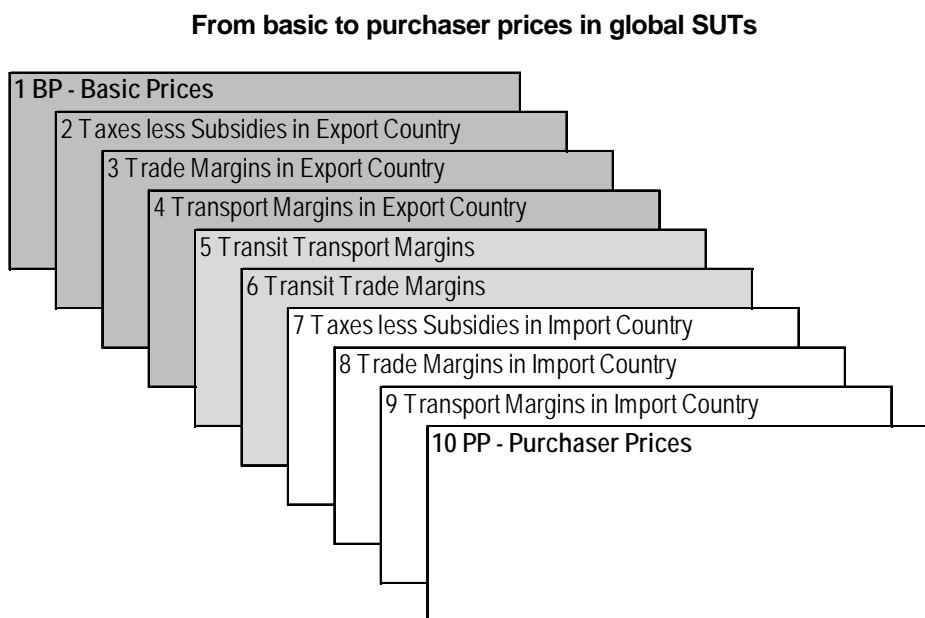
The aim of the exercise is therefore to derive an international margins matrix which – in analogy to the margins matrices of the national SUTs – re-distributes international margins which are imported as part of the cif price to the respective TIR services. In analogy to

⁶ http://www.wto.org/english/news_e/pres11_e/pr628_e.htm

⁷ We propose to call the services which make up international trade and transport margins TIR services (referring to the 'TIR'-signs affixed to lorries employed in international transit). TIR services consist of CPA codes 51 (wholesale trade), 60 (land transport: road, rail, pipeline), 61 (shipping), 62 (air transport), and 63 (auxiliary transport services). The motivation for defining these 5 services as 'TIR services' will be discussed below.

margins matrices in national SUTs, the fob-price of exports would be a ‘basic price’, the cif-price of imports would be a ‘purchaser price’, and the difference cif-fob would be the international trade and transport margins. The total chain from the producer (located in some country) to the consumer (located in some other country) of some good might therefore be described as a series of ten matrices:

Figure 1



Starting from the basic price (BP) at the producer’s door in table 1, we add taxes less subsidies (TIS) and domestic trade and transport margins in the exporter’s country (tables 1-4) to arrive at exports in fob terms, X_{fob} . Further, adding international trade and transport margins (TIR) result in the import price, M_{cif} , at the importer’s border (tables 5 and 6). Tables 7-10 illustrate price transmission within the importing country: TIS (possibly including import duties) as well as (national) trade and transport margins are slapped on the border price, resulting in the purchaser price (PP) finally billed to the consumer (table 10).

In the SUT system, tables 1-4 as well as 7-10 are parts of the national SUTs – of the exporting and importing country, respectively. Tables 5 and 6, however, are not part of any national SUT – in a sense, they are ‘missing’ from our system of national SUTs (except in the case of neighbouring countries, where the absence of transit costs results in X_{fob} prices being equal to the M_{cif} price). This will allow us to determine the ‘world supply’ of TIR services, which, as we will argue, should be the world-wide net export of the respective services.

2.2 Data requirements

Though schematically it seems to be a rather straightforward undertaking, the actual implementation is hampered by a number of hurdles. In this section we therefore report such an empirical exercise which was carried out for the year 2005.

The supply and use tables (in USD) for the 40 WIOD countries are taken from the final version of the WIOD project's database. Information for the 'Rest of the World' (RoW) is taken from the United Nations' Statistical Division UNSD⁸. For a set of 210 countries (which we take to represent 'the whole world') it provides value added data for 7 sectors (plus country totals for private and public consumption, investment, inventories, and imports and exports); for a smaller set of 165 countries, data are available for value added, intermediate consumption and output for 13 sectors (see below on how these data sources are combined).

Information on trade flows of goods (CPA codes 1-37) is taken from the UN COMTRADE database. We collected total imports and exports of all countries and subtracted bilateral flows of WIOD countries. These bilateral data have then been adjusted according to the same procedure as the other WIOD bilateral trade data.⁹ Information on trade in services is taken as well from the WIOD data for trade in services, which include bilateral flows for all countries in the world. These data for trade in services are combined from various sources (Balance of Payment data from IMF, OECD, Eurostat); see Timmer et al. (2012) for details.

Additionally, we use information on trade by mode of transport (air, road, rail, sea, post, unknown) as compiled by Eurostat to gain some idea about the different modes used in the transportation of different goods.

3 Estimation of supply and requirements of TIR Services

As outlined above, the first step is to determine the overall magnitude of the supply of TIR services and to figure out from where these international trade and transport margins (TIR) are delivered. As these services have to be produced somewhere, these are recorded in the tables of domestic supply. Moreover, as these are not consumed in the producing country, they enter (probably after the imposition of domestic TIS) the export vector X_{fob} (fob = free on board; this is the price at the border of the exporting country). These TIR exports are, however, not explicitly imported in any country – instead, they enter the importing country as part of the 'composite good' (= manufactured good plus international trade and transport margins) valued as M_{cif} (cif = cost, insurance, freight) which is the price at the border of the importing country. Therefore, the export surplus at the world level of

⁸ UN Statistics Division: http://unstats.un.org/unsd/economic_main.htm

⁹ We thank Johannes Pöschl (wiiw) for data work.

TIR services should give an indication of the total difference of M_{cif} and X_{fob} – in other words, total TIR costs. A look at the total net exports by goods and services of the 40 WIOD countries confirms these deliberations:

The largest trade deficit of the WIOD countries is for good 11 (crude petroleum). This is no surprise since – with the exception of Russia (and, to a smaller extent, Brazil and Mexico) – the WIOD area does not cover any major oil exporters. The largest trade surplus is for services 51 (wholesale trade), 61 (shipping) and 65 (financial services) – two sectors among which are providers of margins. What is even more striking, as Table 1 shows, is that *all* services which are credited with providing trade and transport margins (50-52, 60-63) in the national SUTs exhibit positive net exports from the WIOD countries. However, in our list of TIR services we included only 51 (wholesale trade) plus the four transport services 60-63. Retail trade services (52) is omitted since – according to the ‘territorial principle’ – retail services should be consumed at the place of production, i.e., at the place of the retailer. CPA 50 is more contentious as it covers trade in vehicles (both wholesale and retail), gas stations, as well as repair of vehicles. Thus, the wholesale part of CPA 50 should be included in our list of TIR services – which, however, is impossible to disentangle from the other components of 50. We chose not to include 50.¹⁰ The resulting value of CPA 51 and 60-63 was taken as the contribution of the WIOD countries regarding total supply of TIR services. In the year under consideration, 2005, this amounts to roughly USD 500 billion.

However, this amount does not include the Rest of the World which still accounts for about 15% of world GDP and might be an important provider of such services. Lacking SUTs for RoW, we start constructing them: on the basis of the UNSD data, we utilize the average commodity structure of the SUTs for the WIOD countries which might come closest to the ‘Rest of the World’ – we chose Brazil (BRA), Indonesia (IDN), and India (IND) – denoted as BII. Applying this commodity structure to total output and intermediate use by the seven sectors as well as the categories of final demand as included in the UNSD database, we derived a ‘proxy’ SUT for the RoW. At this stage the RoW-SUT is only indicative and serves the sole purpose of deriving net exports in TIR services. At a later stage, we will derive a consistent SUT for RoW, where the M_{cif} and X_{fob} vectors are the results of a commodity balancing at the world level. The reason for this sequential approach is that the balancing at the world level does not work for the TIR services: if our above reasoning is correct, the world needs to run a (statistical) surplus in TIR services as these are not properly reported in the national SUTs of either the exporting or the importing countries (see discussion above), with this surplus constituting the cif-fob difference in the trade of manufactured goods.

¹⁰ This aspect is one point of potential refinements requiring more detailed information.

Table 1

Net exports of the 40 WIOD countries

Goods:

CPA	WIOD-Net exports
1 Products of agriculture, hunting and related services	-38,059
2 Products of forestry, logging and related services	-9,852
5 Fish and other fishing products	-14,252
10 Coal and lignite, peat	-12,255
11 Crude petroleum and natural gas, services	-567,275
12 Uranium and thorium ores	53
13 Metal ores	-30,922
14 Other mining and quarrying products	1,941
15 Food products and beverages	-37,100
16 Tobacco products	-6,789
17 Textiles	56,078
18 Wearing apparel, furs	-97,797
19 Leather and leather products	-27,091
20 Wood and products of wood and cork	-10,229
21 Pulp, paper and paper products	1,010
22 Printed matter and recorded media	15,067
23 Coke, refined petroleum products and nuclear fuel	-61,560
24 Chemicals, chemical products and man-made fibres	-93,843
25 Rubber and plastic products	20,510
26 Other non metallic mineral products	-34
27 Basic metals	-51,683
28 Fabricated metal products, except machinery	31,864
29 Machinery and equipment n.e.c.	21,205
30 Office machinery and computers	-56,234
31 Electrical machinery and apparatus n.e.c.	36,370
32 Radio, television and communication equipment	-48,824
33 Medical, precision and optical instruments	-32,822
34 Motor vehicles, trailers and semi-trailers	41,046
35 Other transport equipment	85,678
36 Furniture, other manufactured goods n.e.c.	-85,099
37 Secondary raw materials	6,442

Services:

CPA	WIOD-Net exports
40 Electrical energy, gas, steam and hot water	-2,577
41 Collected and purified water, distribution services of water	443
45 Construction work	-2,171
50 Trade, maintenance and repair services of motor vehicles	4,549
51 Wholesale trade and commission trade services	252,012
52 Retail trade services, repair services	29,656
55 Hotel and restaurant services	-2,810
60 Land transport and transport via pipeline services	67,682
61 Water transport services	145,075
62 Air transport services	15,892
63 Supporting and auxiliary transport services	23,497
64 Post and telecommunication services	441
65 Financial intermediation services, except insurance	122,412
66 Insurance and pension funding services	-27,094
67 Services auxiliary to financial intermediation	7,728
70 Real estate services	-16,900
71 Renting services of machinery and equipment	5,237
72 Computer and related services	55,855
73 Research and development services	768
74 Other business services	-85,170
75 Public administration and defence services	2,108
80 Education services	763
85 Health and social work services	-3,473
90 Sewage and refuse disposal services	-768
91 Membership organization services n.e.c.	-1,871
92 Recreational, cultural and sporting services	-6,535
93 Other services	1,772
95 Services of households as employers of domestic staff	136

Source: WIOD; own calculations.

This ‘proxy’ SUT for RoW, however, shows a surprising result (see table 2): the surplus of net exports in TIR services is almost non-existent – it is estimated at USD 1 billion only (as compared with the USD 500 billion surplus of the WIOD countries). At first sight, this seems puzzling as – after all – the RoW includes Panama and Liberia, two important providers of ‘flags of convenience’. A second look reveals, however, that for example the ten largest shipping lines are all located in WIOD countries; the same is true for the largest ‘general purpose’ logistic enterprises such as FEDEX, DHL and UPS. As for the ‘flags of convenience’, the UNSD database credits neither Panama nor Liberia with an excessively large transport sector (the flag of convenience most probably involves nothing more than the payment of a registration fee). In this light, the result that RoW does not contribute to the world supply of TIR services seems not so far off, probably.

A word of caution has to be raised with respect to this estimated amount of net exports of TIR services from RoW: the number hinges crucially on the structural assumptions; using different assumptions yields appreciably different TIR totals. We think that our result of zero net exports from RoW (being based on the average structure of BRA, IND, IDN) represents the lower bound of the reasonable range; the upper bound would probably correspond to RoW’s share in world value added in transport services, which is 13%, and which might imply that RoW’s share in world TIR exports could amount to some USD 60-80 billion.

Table 2

World-wide net exports ($=X_{fob}-M_{cif}$) of TIR services

	WIOD	RoW	Total
51 - Wholesale trade and commission trade services	252,012	965	252,977
- Land transport and transport via pipeline services	67,682	9,420	77,102
61 - Water transport services	145,075	- 6,338	138,737
62 - Air transport services	15,892	- 7,920	7,972
63 - Supporting and auxiliary transport services	23,497	5,133	28,630
Total	504,158	1,260	505,418

Source: WIOD; UNSD; own calculations.

Summing up, the total world supply of TIR services is estimated at around USD 500 billion with the RoW providing only little of it. As in the case of national trade and transport margins we assume that TIR services are used for transport of agricultural, mining, and manufactured goods only (CPA codes 1-37).

4 Construction of a consistent trade matrix

4.1 Derivation of an initial matrix of cif-fob corrections

Having thus derived the overall supply of TIRs in a first step, the second step is to derive initial estimates for the cif-fob corrections in the bilateral relations. This is based on detailed

COMTRADE data using panel estimation methods and explained in Streicher (2012) in detail. There, cif markups on fob prices are modelled as a function of distance, landlockedness, and whether two trading partners are located on the same continent, plus commodity fixed effects.

This results, first, in a bilateral matrix of cif-fob ratios for each product of CPA codes 1-37. Applying these estimated ratios to the bilateral product-specific import levels results in a matrix of cif-fob corrections in levels. This matrix is then reconciled with the total supply of TIR services as presented in Section 3.1. It should be noted here that these adjustments only affect the level of cif-fob corrections in value terms, but not the relative structures.

Having derived such a matrix of bilateral cif-fob mark-ups, the third step is then the derivation of a consistent trade matrix for all commodities. The construction of such a trade matrix consists of four parts which are discussed in turn.

1. A trade matrix for TIR-carrying commodities 1-37, including cif-fob corrections (Section 4.2)
2. A trade matrix for services other than TIR services which do not involve a cif-fob correction (Section 4.3)
3. A trade matrix for TIR services 51, 60-63. Part of trade in these services is brought about by the cif-fob correction of step 1 (importers of commodities import TIR services as part of the cif price) (Section 4.4).

These steps lead to a trade matrix of dimension importer x exporter x commodity. At this stage, no distinction is made between different trade structures for different *uses* of a commodity. This will constitute a further step:

4. Disaggregation of the trade matrix derived in steps 1-3 to allow for different trade structures by different uses (intermediates, consumption and final demand).

4.2 Trade matrix for goods

For the TIR-carrying commodities, CPA 1-37, the problem to be solved may be illustrated as follows:

Figure 2

Trade evaluated in cif and fob terms

Country		AUS				AUT				...				USA				RoW				TIR	M _{cif}
		1	2	...	37	1	2	...	37	1	2	...	37	1	2	...	37	1	2	...	37		
AUS	1																						
	2																						
	...																						
	37																						
AUT	1																						
	2																						
	...																						
	37																						
...	1																						
	2																						
	...																						
	37																						
USA	1																						
	2																						
	...																						
	37																						
RoW	1																						
	2																						
	...																						
	37																						
X _{fob}																						TIR	

Figure 2 illustrates the trade flows between all countries and commodities 1-37. Due to cif-fob margins this constitutes a very ‘incomplete’ boundary value problem: First, we know the M_{cif} -vector for the WIOD countries from the SUTs made available, but not for RoW; likewise, we know the X_{fob} -vector only for the WIOD countries, but again not for RoW.¹¹ Second, from the TIR vector, which represents the wedge between X_{fob} and M_{cif} , we only know the sum – it was estimated in Step 1 above at about USD 500 billion.

To tackle this incomplete boundary value problem by RAS, we actually disaggregate the above matrix into 3 matrices which have to satisfy that:

¹¹ Even if we had information on the export and import vectors of RoW, a balancing algorithm would still be necessary in all likelihood, to ensure equality of global exports and imports conditional on the TIRs.

$$\text{Trade matrix in fob} + \text{TIR matrix} = \text{Trade matrix in cif}$$

Initial values for the trade matrix in cif are derived from the COMTRADE database; derivation of initial values for the TIR matrix was done in step 2 – they are scaled to total TIR as derived in step 1. The third matrix, the trade matrix in fob prices, is the difference between the fob and the TIR matrices.

Being very incomplete, this boundary value problem cannot be solved in the usual way. Instead, we iterate over the (unknown) boundary values for RoW: iteratively and for each commodity, X_{fob} and M_{cif} of RoW are adapted such that the total X_{fob} and M_{cif} , respectively, of the WIOD group become feasible: in case there are ‘too little’ exports from RoW to satisfy the WIOD area’s import needs, $X_{\text{fob}}(\text{RoW})$ is raised; similarly for $M_{\text{cif}}(\text{RoW})$. The TIR matrix is adapted in each step, keeping total TIR at the predefined level. To prevent this algorithm from settling on the ‘RoW only’ solution (i.e. that *all* exports from the WIOD area go to RoW and that *all* imports into the WIOD area originate in RoW), an additional constraint has to be introduced: the sum of total RoW exports over all commodities 1-37 is set at a fixed share of total world exports. This fixed share is derived from the COMTRADE data base and amounts to 12%. In essence, this implies that *total* exports from RoW are fixed at 12% of total world exports; the commodity structure, however, is determined in the RAS.

This algorithm balances X_{fob} and M_{cif} for commodities 1-37 at the world level, while at the same time yielding TIR flows between countries. However, these are *total* TIR flows, without distinction between the individual TIR services 51, 60-63. For this disaggregation, we use information from the Eurostat data on trade by transport mode, which record extra-EU flows for the member states by HS2 commodities and a number of modes of transport: air, sea, road, rail (plus post and ‘unknown’). Although this database provides a very ‘Eurocentric’ view, it seems to be the only source for this kind of information. For trade between partners sharing a continent (like the continental EU member states), an ad-hoc correction to the transport structure of flows was introduced, by substantially reducing the air and sea shares and raising the land transport share.

For the disaggregation, this provides some information on the mode of transport, i.e. TIR services 60-63. Still missing is the share of wholesale trade, CPA 51, for which we have no information whatsoever. The solution was a pragmatic one: as an initial guess, the wholesale share was assumed to be a uniform 50% for all flows (this is the share of 51 in total TIR). This is certainly pragmatic, but probably not overly so. At least, it seems to involve not much more pragmatism than already used in the derivation of the national SUTs: comparing all WIOD countries, the share of wholesale in trade and transport margins is surprisingly similar for all commodities, at around 45%. Boundary values for this RAS (shaded in gray in Figure 3) are then given by world totals of the TIR services as indicated in Table 2 on the one hand and cif-fob difference for each flow on the other.

Figure 3

Disaggregation of TIR flows

Exporter	Importer	Good	TIR services					Total
			51	60	61	62	63	
AUS	AUT	1						0.09
		2						0.00
		5						0.00
		10						0.00
	
		37						0.15
AUS	BEL	1						0.69
		2						
		5						0.00
		10						51.59
	
		37						0.14
.....	
RoW	USA	1						688.36
		2						37.13
		5						295.25
		10						92.11
	
		37						1.67
Total			252,977	77,102	138,737	7,972	28,630	505,158

4.3 Trade matrix for other services

The trade matrix for services other than TIR services is simpler: as we assume that these do not carry TIR margins, we do not need to introduce a cif-fob correction. Therefore, the net export vector for RoW is known: it is simply the mirror to the net exports from the WIOD area. However, it is only *net* exports which are known – to derive exports and imports separately, we have to follow a similar procedure as in the case of commodities 1-37, namely fixing RoW's share of world exports for services. Like the starting values for the trade matrix, this share should be derived from the Balance of Payments database. However, the RoW share according to the BoP, at around 13%, proved 'too low to balance the world'; we had to use a share of 21% instead.

4.4 Trade matrix for TIR services

The last part concerns the trade submatrix of TIR services: clearly, ‘recorded’ imports and exports of these services cannot balance at the world level, as part of the exports enters importing countries only via cif-fob corrections (i.e. international trade and transport margins). Therefore, one first has to add these corrections to imports of TIR services; i.e.:

for all TIR services 51, 60-63:

$$\begin{aligned} \text{total import of a trade\&transport service (in BP) of Importer} = \\ \text{direct import of T\&T service (in cif) of Importer} \\ + \sum_{(\text{Exporter, Good})} \text{TIR service}(\text{Importer, Exporter, Good}). \end{aligned}$$

After that, the balancing algorithm is the same as in the case of other services. Again, we have to fix an export share for RoW, which in this case is close to the BoP share of 14%.

4.5 Trade matrix – differentiation by user

In the previous three steps we derived a trade matrix of dimension importer x exporter x commodity. However, the WIOD project provides some more detail: in the international SUTs there is a distinction between intermediate consumption, final consumption (by households, by non-profit organisations serving households (NPISH) and government) and investment demand (the basis for the different trade structures are highly disaggregated trade data). Using RAS and taking trade structures by user from the WIOD international SUTs as starting values¹², we adapt them to the boundary values presented by the trade matrix from step 3.

One of two crucial differences between our trade matrix by user and WIOD’s international SUTs is in the treatment of re-exports (i.e., exports of previously imported goods which did not undergo any processing or transformation). Following WIOD, we take re-exports as a ‘residual’, i.e. re-exports occur when imports of a commodity are higher than domestic use¹³. In WIOD, however, re-exports are recorded as a separate *user*; also, re-exports originate from the home country only – they are not explicitly and specifically imported. Following SUTs from European countries (see, e.g., Statistik Austria, 2011), we re-define re-exports as imports of user ‘export’. Assuming the same initial trade structure as for imports of intermediates, re-exports thus are included in the same RAS procedure as are imports by any other user.

¹² For the SUT for RoW – which will be derived in the next chapter – we assume that all users in RoW exhibit identical trade structures.

¹³ This is not accurate, however: for example, in Austria’s official SUT, imports of exports are recorded for a much higher number of commodities than is the case in WIOD’s international SUT (compare Statistik Austria, 2011).

The other difference is that we define an additional user: in our table, TIR is the additional user which uses the international trade and transport margins derived above. Demand of user TIR consists of demand for commodities 51, 60-63 and is satisfied by imports only. By this setup, we ensure that the 'official' M_{cif} numbers for TIR services are satisfied (these are the sum of TIR services imports for all users excluding TIR – remember: we derived world demand for TIR services as the world-wide net exports of TIR services. TIR, therefore, 'eats up' this excess demand for TIR services in a consistent way, without interfering with the rest of the SUTs).

5 Construction of a SUT for RoW

As a result of the derivation of a consistent trade matrix as described above, we also have at our disposal vectors X_{fob} and M_{cif} for the Rest of the World. These we will use to construct a SUT for RoW. As already emphasized in the introduction, some caution is required: the resulting RoW-SUT should not be considered as *the* SUT for RoW, but rather as a SUT which is consistent, in the sense that it will lead to full commodity balance at the world level. Nevertheless, it will be constructed in such a way that much available information on the RoW economy is incorporated.

Information on the RoW is taken from the United Nations' Statistical Division UNSD¹⁴ providing economic indicators for about 210 countries. Besides country totals (such as GDP, imports, exports, etc.), this source also provides some (modest) disaggregation; on the supply side, it includes data on value added for eight sectors:

- Agriculture, hunting, forestry, fishing (ISIC A-B)
- Mining, Manufacturing, Utilities (ISIC C-E)
- Manufacturing (ISIC D)
- Construction (ISIC F)
- Wholesale, retail trade, restaurants and hotels (ISIC G-H)
- Transport, storage and communication (ISIC I)
- Other Activities (ISIC J-P)
- (Imports of goods and services)

For final demand, the following categories are covered (valued at purchaser prices):

- Household consumption expenditure (including Non-profit institutions serving households)
- General government final consumption expenditure
- Gross capital formation

¹⁴ UN Statistics Division: http://unstats.un.org/unsd/economic_main.htm

- Gross fixed capital formation (including Acquisitions less disposals of valuables)
- Changes in inventories
- (Exports of goods and services)

The Rest of the World is derived as the sum over the approximately 170 non-WIOD countries. The sum of exports and imports cannot be used directly, as it also includes inter-RoW trade; however, appropriate vectors X_{fob} and M_{cif} for RoW are already available as a by-product of the derivation of a consistent trade matrix as discussed above.

A different segment of the UNSD database provides more detailed information, albeit for a smaller set of 165 countries (also, it has data in national currency only). In addition to value added, this database provides output and intermediate consumption; moreover, it includes 13 instead of 7 sectors of production. We combine the two data sets by aggregating the 13 sectors of the second data set to the 7 sectors of the first; then, after summing over the non-WIOD countries, we take the VA/Q ratios and apply them to the VA data from the first data set, thereby generating an estimate for the RoW's Q and S. The results are presented in Table 3. Using the numbers on output and intermediate use (in PP) for the seven sectors and the four categories of final demand as included in the UNSD database, an initial guess for the commodity structure of supply and demand by sector and category, respectively, is taken from the WIOD SUTs as the average of the three countries Brazil, Indonesia and India (BII). We also aim at a 'clean' transformation of supply in basic prices to use in purchaser prices; therefore, we also use average TnS (Taxes net of Subsidies on commodities) and TTM-structures (trade and transport margins) again as derived from the three countries mentioned above.

The balance which has to be achieved is given by supply (RoW) = demand (RoW):

$$M_{cif} + \text{domSup}^{BP} = \text{domUse}^{PP} + X_{fob} - \text{TIS}(\text{domUse}^{PP} + X_{fob}) - \text{TTM}(\text{domUse}^{PP} + X_{fob})$$

M_{cif} and X_{fob} are given; starting from BII structures, the other terms are adapted to achieve this identity. This adaptation is not implemented as a full RAS; rather, it is done in a sequential way: the column sums of domestic supply in basic prices (DomSup^{BP}) were held at the levels derived from UNSD, only allowing for a different commodity structure (as the most extreme example, the share of CPA 11, oil and gas, in the output of the *mining* sector had to be substantially increased with respect to BII in order to satisfy world demand for this commodity); to facilitate this we assumed that RoW sectors exhibit primary production only. The balancing was brought about mainly through modifications on the demand side. But even here, the deviation of the column sums from the UNSD totals was moderate, with a range of $\pm 5\%$. The balancing totals for final demand are given in Table 4.

In total, RoW accounts for 11% of world production, 14% of world imports in cif, and 18% of world exports in fob (excluding codes 10-13, oil, coal, and iron ore, where RoW's share in world exports is more than 60%, this share drops to 14%).

Table 3

The Rest of the World in numbers

	VA	[mio US\$] S	Q
Gross Domestic Product (GDP)	5,282,191		
Supply:			
Agriculture, hunting, forestry, fishing (ISICA-B)	411,489	201,935	613,424
Mining, Utilities	941,056	322,293	1,263,348
Manufacturing (ISICD)	780,298	1,675,372	2,455,671
Construction (ISICF)	247,156	335,700	582,856
Wholesale, retail trade, restaurants and hotels (ISICG-H)	692,456	432,624	1,125,080
Transport, storage and communication (ISICI)	403,505	394,057	797,562
Other Activities (ISICJ-P)	1,576,275	759,532	2,335,808
Imports of goods and services	1,752,166		
Taxes less subsidies = GDP - □ (VA)	229,956		
Final Demand:			
Household consumption expenditure (including NPISH)	2,948,535		
General government final consumption expenditure	745,774		
Gross fixed capital formation	1,067,606		
Changes in inventories	71,293		
Exports of goods and services	2,069,772		

Note: Imports and Exports of Goods and Services are results from the trade balancing algorithm.

Source: UNSD; own calculations.

The structure of RoW by commodity is presented in Table 5. Apart from mining products, RoW's competitive edge can be found in agriculture, forestry and fisheries (codes 1-5), textiles and leather (codes 18 and 19) and refined petroleum products (23). Trade in services is more contentious: here, numbers on RoW's share in world totals (which may seem quite high – see e.g. codes 70, 85 and 91) are certainly plagued by rather low trade volumes where, typically, exports make up only a very small share of domestic production. On the other hand, a few of the services with a high RoW share are especially conducive to offshoring (66 – insurance; 74 – business services). Also, reports on booming medical tourism in some RoW countries may justify the high share in world exports of code 85 (medical services).

Table 4

Final demand for Rest of the World after balancing

		Supply	Use in PP	Use of margins	Taxes minus subsidies	Use in BP
A1B	Agriculture, Hunting, Forestry and Fishing	613,424	201,935	24,798	3,881	198,054
C	Mining and Quarrying	859,061	172,828	11,585	3,629	169,199
15t16	Food, Beverages and Tobacco	558,036	403,184	54,836	5,970	397,213
17t18	Textiles and Textile Products	169,741	106,528	13,857	1,953	104,575
19	Leather, Leather and Footwear	40,617	26,062	3,233	613	25,450
20	Wood and Products of Wood and Cork	37,185	19,846	2,430	417	19,429
21t22	Pulp, Paper, Paper, Printing and Publishing	87,358	54,926	5,712	1,692	53,234
23	Coke, Refined Petroleum and Nuclear Fuel	256,218	173,464	9,006	3,867	169,597
24	Chemicals and Chemical Products	343,803	236,426	22,243	5,674	230,752
25	Rubber and Plastics	68,310	47,186	5,494	1,256	45,930
26	Other Non-Metallic Mineral	61,371	35,999	3,524	666	35,333
27t28	Basic Metals and Fabricated Metal	214,890	145,206	12,983	2,681	142,525
29	Machinery, Nec	102,901	71,046	7,992	2,582	68,464
30t33	Electrical and Optical Equipment	221,937	158,736	17,051	4,940	153,797
34t35	Transport Equipment	187,341	130,799	11,682	4,491	126,309
36t37	Manufacturing, Nec; Recycling	105,962	65,964	9,093	1,726	64,238
E	Electricity, Gas and Water Supply	404,287	149,465	8,396	1,987	147,478
F	Construction	582,856	335,700	44,250	9,742	325,958
50	Sale, Maintenance and Repair of Motor Vehicles and Motorcycles; Retail Sale of Fuel	44,037	7,623	330	150	7,472
51	Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	411,192	128,825	5,971	2,402	126,423
52	Retail Trade, Except of Motor Vehicles and Motorcycles; Repair of Household Goods	441,887	146,626	6,771	2,731	143,895
H	Hotels and Restaurants	227,964	149,550	17,402	2,522	147,028
60	Inland Transport	412,662	241,875	18,771	6,518	235,357
61	Water Transport	50,745	17,315	1,191	402	16,914
62	Air Transport	26,003	13,272	872	301	12,971
63	Other Supporting and Auxiliary Transport Activities; Activities of Travel Agencies	70,868	26,712	1,113	499	26,212
64	Post and Telecommunications	237,285	94,883	4,790	2,283	92,601
J	Financial Intermediation	376,556	107,334	2,349	1,801	105,533
70	Real Estate Activities	404,604	81,573	2,110	1,284	80,289
71t74	Renting of M&Eq and Other Business Activities	306,538	128,477	4,396	2,825	125,652
L	Public Admin and Defence; Compulsory Social Security	476,469	141,275	7,483	2,722	138,553
M	Education	249,908	83,522	5,133	1,549	81,973
N	Health and Social Work	172,096	80,943	6,590	1,717	79,226
O	Other Community, Social and Personal Services	330,837	134,642	10,306	3,542	131,100
P	Private Households with Employed Persons	18,798	1,766	169	33	1,732
Imp_cif	Imports (valued at cif)	1,752,166				
Final Demand:						
Cons_h	Household consumption expenditure (including NPISH)		3,065,465	224,275	56,682	3,008,784
Cons_g	General government final consumption expenditure		792,366	1,383	1,863	790,503
GFCF	Gross fixed capital formation		1,035,263	67,334	26,680	1,008,583
Inven	Changes in inventories		71,220	14,097	2,359	68,861
Exports	Exports of goods and services		2,069,870	198,472	51,324	2,018,546
Total	Total	10,925,915	11,155,698	869,472	229,956	10,925,915

Source: Own calculations.

Table 5

RoW production, imports and exports by commodity

CPA	RoW totals [Mio. US\$]			RoW as % of world total			CPA	RoW totals [Mio. US\$]			RoW as % of world total		
	Make	Imports cif	Exports fob	Make	Imports cif	Exports fob		Make	Imports cif	Exports fob	Make	Imports cif	Exports fob
1	527,840	26,439	53,502	24%	13%	28%	40	388,227	3,816	6,199	18%	9%	15%
2	66,835	602	8,102	30%	3%	43%	41	16,060	446	2	7%	75%	0%
5	18,750	96	12,182	15%	0%	43%	45	582,856	1,334	3,421	10%	7%	18%
10	77,151	3,178	9,433	31%	6%	20%	50	44,037	1,562	1	5%	53%	0%
11	637,678	41,558	553,057	44%	5%	66%	51	411,192	22,353	23,318	10%	32%	8%
12	-	57	-	0%	98%	0%	52	441,887	17,948	22	12%	66%	0%
13	88,650	2,819	26,183	38%	3%	31%	55	227,964	10,086	12,795	10%	12%	15%
14	55,583	18,302	9,323	21%	21%	11%	60	412,662	1,788	11,208	19%	3%	8%
15	511,472	62,725	78,241	15%	13%	17%	61	50,745	13,410	7,072	13%	22%	4%
16	46,564	404	5,535	23%	2%	23%	62	26,003	9,771	1,851	6%	8%	1%
17	72,148	79,157	14,146	11%	34%	6%	63	70,868	1,517	6,651	7%	2%	6%
18	97,593	13,030	85,910	21%	5%	35%	64	237,285	6,744	6,137	13%	12%	11%
19	40,617	6,004	25,623	20%	5%	24%	65	326,422	123,392	977	10%	60%	0%
20	37,185	10,201	14,538	8%	10%	16%	66	50,135	5,447	32,468	4%	7%	45%
21	56,678	18,996	12,263	9%	12%	8%	67	-	8,556	829	0%	24%	2%
22	30,680	22,340	2,505	5%	31%	4%	70	404,604	48	16,948	7%	0%	68%
23	256,218	63,371	96,464	14%	16%	26%	71	67,764	7,212	1,920	11%	22%	6%
24	343,803	112,272	167,332	13%	11%	17%	72	35,578	56,933	1,028	3%	48%	1%
25	68,310	44,041	12,498	7%	18%	5%	73	111,319	4,641	3,865	19%	9%	7%
26	61,371	16,053	9,272	7%	14%	9%	74	91,876	40,406	125,339	2%	9%	27%
27	157,045	88,460	115,136	8%	15%	20%	75	476,469	2,245	134	10%	24%	1%
28	57,845	48,837	10,965	4%	19%	4%	80	249,908	2,188	1,424	13%	20%	13%
29	102,901	141,927	58,226	5%	17%	7%	85	172,096	71	3,542	4%	1%	58%
30	43,371	52,281	78,350	10%	12%	20%	90	225,042	202	960	42%	6%	27%
31	72,557	78,542	19,700	8%	21%	6%	91	32,749	307	2,178	8%	8%	53%
32	79,977	164,548	151,477	7%	18%	18%	92	38,242	3,987	10,494	3%	7%	18%
33	26,032	30,948	44,844	5%	11%	16%	93	34,804	2,877	1,102	3%	11%	4%
34	187,152	120,101	19,642	8%	12%	2%	95	18,798	177	41	7%	57%	13%
35	189	106,810	7,934	0%	33%	3%							
36	105,862	21,046	85,542	16%	6%	27%							
37	100	7,560	23	0%	32%	0%							
							Total	9,173,749	1,752,166	2,069,870	11%	15%	18%

Source: Own calculations.

6 Concluding remarks

The paper described a strategy for constructing a trade matrix together with supply and use tables for the Rest of the World resulting in a consistent world SUT system in the sense that at the world level, supply and use of all commodities is balanced. In doing so we (i) show that it is possible to derive consistent trade and transport margins (TIR) to account for the wedge between fob and cif prices; 'consistency' meaning that also for TIR services, equality of demand and supply is provided for at the world level; (ii) reveal the data needs and/or assumptions required to bring this consistency about; and (iii) based on these TIR flows, we show that it is possible to construct a SUT for the Rest of the World which ensures a 'balanced world' with respect to all goods and services. In the construction we fur-

ther rely on and stick to official data on world output and demand (as published by the UN) to quite a large extent (as far as this is possible).

Of course, as this is very much research in progress, a number of open questions and the need for further research and efforts remain. These include (but are not limited to) the following items: (i) The estimation for total TIR margins is split in two: total TIR margins provided by WIOD countries on the one hand and RoW on the other hand. The estimate for the RoW part is quite ad-hoc. Although some ad-hocery in this respect is indispensable (after all, we do not have SUTs for RoW when we start this exercise; rather, a SUT for RoW can only be derived *post festum*), the derivation might be placed on a sounder footing. (ii) Room for improvement is certainly given when distributing TIR margins to the five TIR services; the initial values for the RAS which ensures consistency in this respect are based on Eurostat data and include information on extra-EU trade only, thus introducing a strong Eurocentric bias. (iii) As for the SUT for RoW, this is certainly not *the* SUT, but only a SUT which ensures that the commodity balance at the world level is ensured. However, it is not taken from thin air, but based on boundary values for output and intermediate and final consumption taken from the UNSD data base; to a large degree, these boundary values can be met. Nevertheless, more effort could and should be invested to further improve this congruence, even if improvement can most probably not be achieved via better data, but only 'statistically' via better algorithms. (iv) The exercise presented here was limited to the derivation of a trade matrix and RoW-SUT for 2005; a valid question concerns the feasibility (and sensibility) of applying this procedure to other years as well, thus providing a time series of trade matrices and SUTs for RoW. This is certainly possible; however, the main concern arising here is inter-temporal comparability: by repeating this exercise for, say, 1995-2009, the period for which SUTs for the WIOD countries are available, would we be able to learn something about the time development of TIR margins (and about the development of RoW)? Without having done this exercise (yet), it is hard to tell how 'meaningful' these time series would *look*; however, given the assumptions and 'manual interventions' necessary for the year 2005, it is a fair bet that such a time series would have a serious range of uncertainty. At the very least, the ad-hoc elements used for 2005 (mainly involving the RoW-part of total TIR margins and then the derivation of the RoW-SUT) would have to be much more formalized in order to allow for repeatability (and comparability) over time.

References

- Eurostat (2008), Eurostat Manual of Supply, Use and Input-Output Tables, Luxembourg.
- EXIOPOL (2011), Technical Report: Full EXIOBASE database management system including agreed scripts operational, EXIOPOL project, Deliverable: DIII.4.b-5
- Fritz, O., K. Kratena, G. Streicher and G. Zakarias (2005), MultiREG – A Multiregional Integrated Econometric Input Output Model for Austria, in: OeNB (ed.), Workshops – Proceedings of OeNB Workshops #5, Macroeconomic Models and Forecasts for Austria, Vienna 2005.
- Geschke, A., M. Lenzen, K. Kanemoto and D. Moran (2011), AISHA: A tool to construct a series of contingency tables, Paper presented at the 19th IIOA Conference, Alexandria, US.
- Hiratsuka, D. (2010), Characteristics and determinants of East Asia's trade patterns, in: D. Hiratsuka and Y. Uchida (eds), Input Trade and Production Networks in East Asia, IDE-Jetro.
- IDE-JETRO (2006), How to make the Asian Input-Output Tables, Institute of Developing Economies, March.
- Kanemoto, K, A. Geschke, D. Moran and M. Lenzen (2011), Building Eora: A Global Multi-Region Input Output Model at High Country and Sector Detail, Paper presented at the 19th IIOA Conference, Alexandria, US.
- Kratena, K. and Wüger, M. (2006), PROMETEUS: Ein multisektorales makroökonomisches Modell der österreichischen Wirtschaft, WIFO Monatsbericht 3/2006.
- OECD-WTO (2012), Trade in Value Added: Concepts, Methodologies and Challenges, Joint OECD-WTO Note, Paris-Geneva.
- Streicher, G. (2012), Estimation of Transport Costs for WIOD, Paper prepared for the final report of the WIOD project.
- Statistik Austria (2011), Input-Output-Tabelle 2007.
- Timmer, M., A.A. Erumban, J. Francois, A. Genty, R. Gouma, B. Los, F. Neuwahl, O. Pindyuk, J. Poeschl, J.M. Rueda-Cantucho, R. Stehrer, G. Streicher, U. Temurshoev, A. Villanueva and G.J. de Vries (2012), The World Input-Output Database (WIOD): Contents, sources and methods, WIOD Background document available at www.wiod.org.

Short list of the most recent wiiw publications (as of January 2013)

For current updates and summaries see also
wiiw's website at www.wiiw.ac.at

Whither Panama? Constructing a Consistent and Balanced World SUT System including International Trade and Transport Margins

by **Gerhard Streicher and Robert Stehrer**

wiiw Working Papers, No. 94, January 2013
21 pages including 5 Tables and 3 Figure
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

wiiw Monthly Report 1/13

edited by **Leon Podkaminer**

- The European Commission grossly underestimates the effects of German domestic demand expansion
- The new North-South Divide in Europe – can the European convergence model be resuscitated?
- Changes in the European convergence model
- Statistical Annex: Selected monthly data on the economic situation in Central, East and Southeast Europe

wiiw, January 2013
32 pages including 8 Tables and 11 Figures
(exclusively for subscribers to the wiiw Service Package)

wiiw Monthly Report 12/12

edited by **Leon Podkaminer**

- Draghi's démarche and the nightmare of the Bundesbank
- Trade does not drive global growth
- A note on Kazakhstan's Oil Fund
- Statistical Annex: Selected monthly data on the economic situation in Central, East and Southeast Europe

wiiw, December 2012
28 pages including 13 Tables and 5 Figures
(exclusively for subscribers to the wiiw Service Package)

wiiw Handbook of Statistics 2012: Central, East and Southeast Europe

covers key economic data on Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Ukraine

wiiw, Vienna, November 2012 (ISBN-978-3-85209-030-6)
428 pages including 248 Tables and 117 Figures

Hardcopy, including CD-ROM with PDF: EUR 92.00
(tables cover the period 2000, 2005, 2008-2011, graphs range from 2007 to September 2012)

PDF on CD-ROM: EUR 75.00
PDF download: EUR 70.00

(tables and graphs are identical to those in the hardcopy of the Handbook)

Excel Tables on CD-ROM, including PDF to view graphs and preface, plus hardcopy: EUR 250.00
Excel Tables download, including PDF to view graphs and preface: EUR 245.00

(time series covering the whole period 1990-2011)

The Role of Multinational Companies in International Business Integration

by **Gábor Hunya**

wiiw Research Reports, No. 384, November 2012
43 pages including 8 Tables and 18 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

wiiw Monthly Report 11/12

edited by **Leon Podkaminer**

- Eurozone crisis and fiscal austerity push half of the CESEE region into recession
 - Albania: EU, ho!
 - Bosnia and Herzegovina: change without evolution
 - Croatia: employment victimized by budget consolidation
 - Kazakhstan: slower growth due to lower oil production
 - Macedonia: back to recession
 - Montenegro: new old government
 - Russian Federation: growth flat, politics bad
 - Serbia: new government, old problems
 - Ukraine: incumbent political elite retains its grip
 - Statistical Annex: Selected data on FDI in Central, East and Southeast Europe
wiiw, November 2012
40 pages including 18 Tables
(exclusively for subscribers to the wiiw Service Package)
-

wiiw Monthly Report 10/12

edited by **Leon Podkaminer**

- Bulgaria: economic sluggishness expected to drag on
 - Czech Republic: deepening recession
 - Estonia: domestic demand mitigates slowdown
 - Hungary: waning growth prospects
 - Latvia: growth remains in high gear
 - Lithuania: consumers sustain vivid growth
 - Poland: soft landing materializes
 - Romania: investment-led growth amidst political
 - Slovakia: export-led growth
 - Slovenia: stabilization of the banking sector still ahead
 - Statistical Annex: Selected data on FDI in Central, East and Southeast Europe
wiiw, October 2012
46 pages including 20 Tables
(exclusively for subscribers to the wiiw Service Package)
-

Global Value Chains and the EU Industry

by **Robert Stehrer, Marcin Borowiecki, Bernhard Dachs, Doris Hanzl-Weiss, Steffen Kinkel, Johannes Pöschl, Magdolna Sass, Thomas Christian Schmall and Andrea Szalavetz**

wiiw Research Reports, No. 383, October 2012
152 pages including 42 Tables and 34 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

European Neighbourhood – Challenges and Opportunities for EU Competitiveness

by **Peter Havlik et al.**

wiiw Research Reports, No. 382, September 2012
154 pages including 24 Tables and 61 Figures
hardcopy: EUR 8.00 (PDF: free download from wiiw's website)

Trade Integration in the CIS: Alternate Options, Economic Effects and Policy Implications for Belarus, Kazakhstan, Russia and Ukraine

by **Vasily Astrov, Peter Havlik and Olga Pindyuk**

wiiw Research Reports, No. 381, September 2012
108 pages including 31 Tables and 26 Figures
hardcopy: EUR 24.00 (PDF: EUR 15.00)

Changes in the Structure of Intra-Visegrad Trade after the Visegrad Countries' Accession to the European Union

by **Sándor Richter**

wiiw Statistical Reports, No. 5, September 2012
99 pages including 52 Tables and 81 Figures
hardcopy: EUR 24.00 (PDF: EUR 15.00)

wiiw Monthly Report 8-9/12

edited by **Leon Podkaminer**

- Trade and economic integration in the CIS: an evaluation
 - Volume and variety of intra-bloc trade in an expanded European Union
 - The gravity of cross-border R&D expenditure
 - Statistical Annex: Selected data on FDI in Central, East and Southeast Europe
- wiiw, August-September 2012
34 pages including 14 Tables and 4 Figures
(exclusively for subscribers to the wiiw Service Package)
-

Innovation and Technology Transfer across Countries

by **Neil Foster**

wiiw Research Reports, No. 380, August 2012
117 pages including 20 Tables and 37 Figures
hardcopy: EUR 24.00 (PDF: free download from wiiw's website)

Sectoral Employment Effects of Economic Downturns

by **Robert Stehrer, Terry Ward et al.**

wiiw Research Reports, No. 379, August 2012
246 pages including 64 Tables and 39 Figures
hardcopy: EUR 24.00 (PDF: free download from wiiw's website)

Surveying Romanian Migrants in Italy Before and After the EU Accession: Migration Plans, Labour Market Features and Social Inclusion

by **Isilda Mara**

wiiw Research Reports, No. 378, July 2012
136 pages including 39 Tables and 112 Figures
hardcopy: EUR 24.00 (PDF: free download from wiiw's website)

wiiw Service Package

The Vienna Institute offers to firms and institutions interested in unbiased and up-to-date information on Central, East and Southeast European markets a package of exclusive services and preferential access to its publications and research findings, on the basis of a subscription at an annual fee of EUR 2,000.

This subscription fee entitles to the following package of **Special Services**:

- A free invitation to the Vienna Institute's **Spring Seminar**, a whole-day event at the end of March, devoted to compelling topics in the economic transformation of the Central and East European region (for subscribers to the wiiw Service Package only).
- Copies of, or online access to, **The Vienna Institute Monthly Report**, a periodical consisting of timely articles summarizing and interpreting the latest economic developments in Central and Eastern Europe and the former Soviet Union. The statistical annex to each *Monthly Report* contains, alternately, country-specific tables or graphs with monthly key economic indicators, economic forecasts, the latest data from the wiiw Industrial Database and excerpts from the wiiw FDI Database. This periodical is not for sale, it can only be obtained in the framework of the wiiw Service Package.
- Free copies of the Institute's **Research Reports** (including *Reprints*), **Current Analyses and Forecasts**, **Country Profiles** and **Statistical Reports**.
- A free copy of the **wiiw Handbook of Statistics** (published in October/November each year and containing more than 400 tables and graphs on the economies of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Montenegro, Poland, Romania, Russia, Serbia, the Slovak Republic, Slovenia and Ukraine)
- Free online access to the **wiiw Monthly Database**, containing more than 1200 leading indicators monitoring the latest key economic developments in ten Central and East European countries.
- **Consulting**. The Vienna Institute is pleased to advise subscribers on questions concerning the East European economies or East-West economic relations if the required background research has already been undertaken by the Institute. We regret we have to charge extra for *ad hoc* research.
- Free access to the Institute's specialized economics library and documentation facilities.

Subscribers who wish to purchase wiiw data sets **on CD-ROM** or special publications not included in the wiiw Service Package are granted considerable **price reductions**.

**For detailed information about the wiiw Service Package
please visit wiiw's website at www.wiiw.ac.at**

To
The Vienna Institute
for International Economic Studies
Rahlgasse 3
A-1060 Vienna

- Please forward more detailed information about the Vienna Institute's Service Package
- Please forward a complete list of the Vienna Institute's publications to the following address

Please enter me for

- 1 yearly subscription of *Research Reports* (including *Reprints*) at a price of EUR 120.00 (hardcopy, Austria), EUR 135.00 (hardcopy, Europe), EUR 155.00 (hardcopy, overseas) and EUR 48.00 (PDF download with password) respectively
- 1 yearly subscription of *Current Analyses and Forecasts* a price of EUR 150.00 (hardcopy, Austria), EUR 155.00 (hardcopy, Europe), EUR 170.00 (hardcopy, overseas) and EUR 120.00 (PDF download with password) respectively

Please forward

- the following issue of *Research Reports*
- the following issue of *Current Analyses and Forecasts*
- the following issue of *Working Papers*
- the following issue of *Research Papers in German language*
- the following issue of *wiiw Database on Foreign Direct Investment*
- the following issue of *wiiw Handbook of Statistics*
- (other)

.....
Name

.....
Address

.....
Telephone

Fax

E-mail

.....
Date

.....
Signature

Herausgeber, Verleger, Eigentümer und Hersteller:

Verein „Wiener Institut für Internationale Wirtschaftsvergleiche“ (wiiw),
Wien 6, Rahlgasse 3
ZVR-Zahl: 329995655

Postanschrift: A-1060 Wien, Rahlgasse 3, Tel: [+431] 533 66 10, Telefax: [+431] 533 66 10 50

Internet Homepage: www.wiiw.ac.at

Nachdruck nur auszugsweise und mit genauer Quellenangabe gestattet.

P.b.b. Verlagspostamt 1060 Wien