WORLDNET Revisited – Part 3
Containerisation Rates

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Background

This is the third part of a series of articles looking at EU trade flows with the rest of the world, picking up from the original DG-MOVE study, WORLDNET [1]. The first article in the series covered total trade flows, comparing forecasts published in 2009 with current trade volumes. See [2]. Then this was developed further in the second article to look at ways for measuring containerised trade.

Initially it was hoped that since the Extra-EU trade data records both the transport mode and the container mode, that it would be possible to derive a good measure of containerised trade for at least the Extra-EU trade without having to use any estimation techniques. However this was not the case as it became obvious through comparison with port statistics that trade data underestimates container volumes, and in fact that certain EU reporting countries such as the Netherlands and Ireland do not report any containerised trade, which is a clear sign that this data is not checked for consistency.

The aim of this article is therefore to look for ways of estimating containerised trade volumes by applying containerisation factors to the trade data records. Previously we attempted this by applying a simple set of containerisation factors per NST 3-digit commodity code. Essentially this produces a subset of trade flows consisting of non-bulk cargo, but it does not allow for different rates of containerisation on different routes, or for different trade directions (imports versus exports), and therefore it will tend to average out the flows, meaning that routes with low containerisation factors e.g. EU-Russia are overestimated, while routes with high containerisation factors e.g. EU-East Asia are underestimated.

This can be seen by comparing the data in Table 1 and Table 2. Table 1 (Method 1 - direct measurement) uses the trade data container mode at face value, whereas Table 2 uses a simple set of factor per product category. Method 1 is known to underestimate the total volume, but it does distinguish clearly between highly containerised routes such as Europe-Far East and less containerised routes such as EU-Other Europe. Method 2, on the other hand, increases the number of containerised tonnes to a more plausible level, but it overstates the volumes on shorter routes such as 'Other Europe' and 'Russian Federation', where the flows are likely to be moved by truck rather than via container by sea.

*Table 1: EU Containerised Import Tonnes (000s) – **METHOD 1** – Direct Measurement*

EU Imports	Agric.	Foods	SdFuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
Oth. Europe	420	1,317	1	22	278	1,268	1,862	15	1,312	3,459	9,953
North Africa	966	704	0	107	96	236	258	31	458	833	3,689
Other Africa	1,766	1,962	0	80	233	391	185	5	204	489	5,315
Middle East	268	147	0	116	153	323	192	39	1,546	766	3,550
Central Asia	263	60	0	2	5	50	151	3	98	635	1,268
East Asia	3,813	4,968	120	152	1,265	4,683	5,454	125	9,936	40,323	70,838
Russian Fed	634	133	97	291	340	91	17	78	402	555	2,638
N. America	1,588	2,220	123	143	481	322	630	17	4,058	2,990	12,572
CS America	4,285	3,427	9	14	284	404	249	31	556	1,309	10,568
Oceania	247	516	7	1	187	60	41	1	73	102	1,235
TOTAL	14,250	15,453	356	928	3,322	7,829	9,039	344	18,644	51,462	121,626

*Table 2: EU Containerised Import Tonnes (000s) - **METHOD 2** - Commodity Containerisation Factors*

EU Imports	Agric.	Foods	SdFuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
Oth. Europe	10,586	8,617	1	638	1,632	14,351	25,353	3,599	12,712	21,576	99,064
North Africa	1,903	912	0	352	115	746	1,288	3,040	2,527	4,360	15,243
Other Africa	2,933	3,615	0	42	956	1,158	966	8	1,003	4,102	14,784
Middle East	416	264	0	291	234	513	379	493	5,249	1,696	9,534
Central Asia	363	160	0	38	17	396	238	297	456	927	2,891
East Asia	4,528	10,131	4	601	205	10,540	7,104	222	13,272	52,759	99,367
Russian Fed	7,234	1,824	8	1,269	364	8,791	676	5,252	5,283	4,340	35,042
N. America	2,165	4,964	1	5,954	651	1,056	1,371	1,419	9,010	5,428	32,019
CS America	6,380	7,932	3	551	351	2,621	1,456	494	8,818	2,722	31,327
Oceania	691	1,294	0	2	127	133	147	1	100	131	2,627
TOTAL	37,198	39,714	17	9,738	4,652	40,305	38,976	14,824	58,430	98,041	341,897

A further problem using commodity-related containerisation factors is that it may also underestimate volumes in categories such as solid fuels, which are overwhelmingly bulk categories, but which could in certain circumstances be carried in containers if the consignment sizes are very small. Even when working with three-digit NST codes, the categories are quite broad, so within any commodity definition there may be quite a broad range of consignment types, some of which may occasionally be transported by container.

The fact that small quantities may display a different kind of transport mode choice compared to large quantities is potentially problematic if we wish to apply average containerisation factors. This is also a problem for many forms of mode split modelling incidentally.

Segmented Containerisation Factors

The first solution to be tested is with the use of containerisation factors segmented by:

- NSTR 3-digit product
- World regions
- Trade direction

By using the data where container mode is reliably available it is possible to calculate factors for all these combinations. More than half of the EU Member States do report what appears to be accurate containerised trade tonnes, so this was done by filtering the measured data for this subset.

It is also possible, however, that these countries do still partially under-report, so this needs to be borne in mind.

Ideally, one does not want to replace accurately reported data with estimated data, so rather than using a look-up table for the whole trade dataset, a programmatic method was used to process the data, so that the final tables contain one field showing total trade tonnes, and a new one showing containerised trade tonnes.

Then the program uses the logic that flows reported as containerised probably are containerised, but that there is non-reporting of container mode for certain Member States, and likely to be some partial under-reporting for the rest.

Applying this method (Method 3), we arrive at the following results, which can be compared directly against the previous results (Method 1 – direct measurement, and Method 2 – commodity based containerisation factors). The main difference compared to second method is that estimates of container tonnes are now much lower on shorter distance ODs such as Other Europe and Russia.

*Table 3: EU Containerised Import Tonnes 2019 (000s) - **METHOD 3** – Segmented Containerisation Factors*

EU Imports	Agric.	Foods	Sd Fuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
Oth. Europe	479	1,576	5	82	328	1,762	2,753	31	1,616	4,076	12,709
North Africa	1,250	815	0	177	106	267	374	47	565	1,135	4,736
Other Africa	3,027	3,224	7	88	276	783	861	7	735	4,069	13,077
Middle East	397	287	0	155	167	472	425	504	3,757	1,775	7,939
Central Asia	329	129	0	6	8	123	277	291	207	841	2,212
East Asia	4,846	8,524	124	520	363	6,030	7,233	268	13,702	55,709	97,318
Russian Fed	768	216	179	361	399	143	19	147	441	660	3,333
N. America	2,185	4,648	125	5,293	644	927	1,373	1,415	6,926	4,905	28,441
CS America	6,279	6,796	10	586	312	1,677	1,382	491	4,290	2,190	24,013
Oceania	621	1,092	8	1	489	105	121	1	101	140	2,679
TOTAL	20,181	27,307	459	7,267	3,091	12,290	14,819	3,202	32,340	75,500	196,457

The same approach was then applied to 2019 EU export flows.

*Table 4: EU Containerised Export Tonnes 2019 (000s) - **METHOD 3**- segmented Containerisation Factors*

EU Exports	Agric.	Foods	Sd Fuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
Oth. Europe	542	1,265	85	297	238	913	963	136	5,091	3,083	12,613
North Africa	1,071	2,191	127	170	47	841	1,977	275	2,867	5,040	14,606
Other Africa	1,770	6,276	64	562	19	425	1,704	632	2,270	4,294	18,015
Middle East	3,239	5,753	201	467	102	864	3,957	211	3,381	5,167	23,341
Central Asia	482	266	87	175	1,181	190	168	24	581	856	4,011
East Asia	11,547	13,515	453	782	3,996	3,148	5,470	1,402	24,261	14,213	78,787
Russian Fed	45	495	6	105	6	86	380	17	1,022	914	3,076
N. America	2,939	7,290	122	280	457	3,188	4,005	1,457	6,383	13,629	39,750
CS America	1,273	2,420	140	343	71	730	1,658	2,539	3,325	6,194	18,692
Oceania	924	1,389	54	62	24	259	412	214	627	2,109	6,076
TOTAL	23,832	40,861	1,338	3,243	6,142	10,645	20,693	6,906	49,809	55,498	218,967

These tables indicate around 400 million tonnes of containerised trade between the EU and the rest of the world in 2019, with the largest volumes on the East Asian and North American trade routes, and in the manufactured goods category.

For future analyses, this method of applying detailed containerisation factors appears the most promising so far, so it will be continued in the ongoing work.

References

1. WORLDNET Final Report(D11), 2009, NEA, OSC, IWW, MKMETRIC, TINA Vienna, DEMIS. A study on behalf of the European Commission, DG-TREN, FP6.

2. NTP Research (2020), "WORLDNET Revisited – Part 1", The Hague, Netherlands.

3. NTP Research (2020), "WORLDNET Revisited – Part 2 – European Container Volumes", The Hague, Netherlands.