

WORLDNET Revisited – Part 2

European Container Volumes



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Part 2 - European Container Volumes

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Background

This is the second 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 covered total trade flows, comparing forecasts published in 2009 with current trade volumes. See [2].

In the first article, it was shown that EU trade with the rest of the world grew more slowly up to 2019 than had been expected, but that this was mainly due to relatively slow growth of intra-EU trade (which is significantly the largest component of European trade) combined with either slow growth or negative growth in bulk cargo. However, trade in non-bulk cargo, especially with East Asia continued to grow according to the long-term trend, and in line with predictions in the 2009 study. Much of this trade sector involves containerised cargo, so this needs to be examined in more detail.

Containerised cargo statistics can be analysed using two main categories of sources:

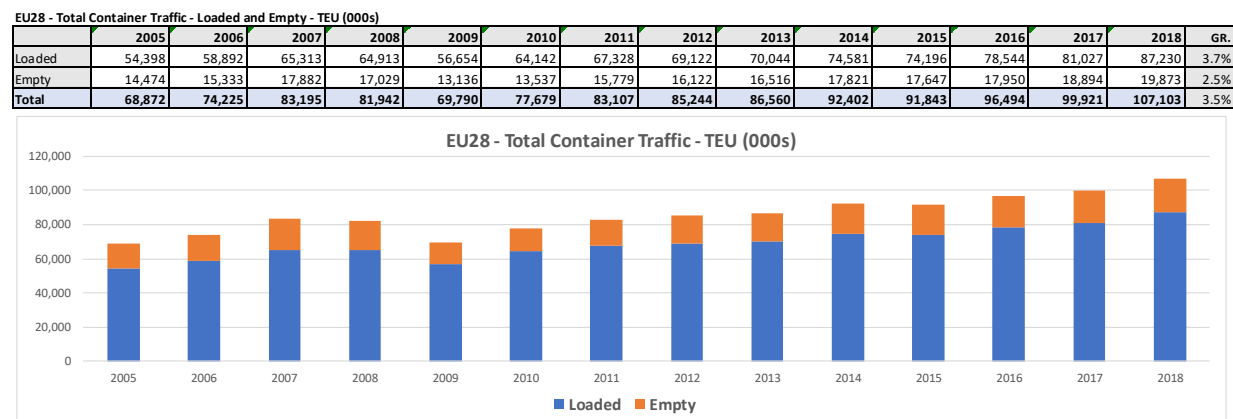
- Using transport data, showing containers handled in EU seaports, or
- From trade data, which also shows the origins and destinations of the cargo, as well as the types of products being traded.

Container Flows - Transport Data

An overview of container traffic from Eurostat transport data is shown below in Figure 1. This shows that between 2005 and 2018 the total number of TEUs handled rose by an average rate of 3.5% per annum, going from 68.9 million TEU in 2005 to 107.1 million TEU in 2018. Of the 107 million TEU handled in 2018, 87.2 million TEU (81%) were loaded and 19.9 million TEU (19%) were empty.

The series shows the impact of the worldwide economic recession in 2008 triggered by the US banking collapse, followed by a period of stability and then growth from 2014 until 2019.

Figure 1: Total TEU (000s) handled in EU28 ports, 2005-2018



Source: Eurostat, [mar_mg_am_coh]

The figures are broken down by maritime country in Table 1 below. ‘Change:05-18’ is the absolute increase in TEU’s handled between 2005 and 2018. ‘AGR:05-18’ is the average year on year growth rate between 2005 and 2018. ‘GR:05-18’ is the total growth from 2005 to 2018. The countries listed are the port locations where the container loading or unloading took place, and not necessarily the importing or exporting countries.

Table 1: Containers handled per maritime country, 2005-2018, TEU (000s)

	2005	2010	2015	2018	Change:05-18	AGR:05-18	GR:05-18
Belgium	6,911	9,601	9,776	11,219	4,308	3.8%	62.3%
Bulgaria	109	142	201	242	133	6.3%	122.0%
Denmark	614	734	757	834	220	2.4%	35.8%
Germany	12,097	13,092	15,193	15,133	3,036	1.7%	25.1%
Estonia	127	152	209	240	113	5.0%	89.0%
Ireland	994	773	874	1,001	7	0.1%	0.7%
Greece	1,798	1,184	4,008	5,633	3,835	9.2%	213.3%
Spain	11,386	12,424	14,285	17,199	5,813	3.2%	51.1%
France	3,855	4,247	4,801	5,764	1,909	3.1%	49.5%
Croatia	94	145	182	264	170	8.3%	180.9%
Italy	7,784	8,466	10,276	13,080	5,296	4.1%	68.0%
Cyprus	326	333	309	417	91	1.9%	27.9%
Latvia	162	256	359	479	317	8.7%	195.7%
Lithuania	214	295	350	749	535	10.1%	250.0%
Malta	87	107	96	134	47	3.4%	54.0%
Netherlands	9,343	11,202	11,719	13,888	4,545	3.1%	48.6%
Poland	492	1,042	1,793	2,650	2,158	13.8%	438.6%
Portugal	1,104	1,633	2,695	3,195	2,091	8.5%	189.4%
Romania	867	546	689	668	-199	-2.0%	-23.0%
Slovenia	210	481	803	980	770	12.6%	366.7%

	2005	2010	2015	2018	Change:05-18	AGR:05-18	GR:05-18
Finland	1,302	1,243	1,230	1,416	114	0.6%	8.8%
Sweden	1,117	1,358	1,451	1,603	486	2.8%	43.5%
UK	7,879	8,224	9,787	10,316	2,437	2.1%	30.9%
EU28	68,872	77,680	91,843	107,104	38,232	3.5%	55.5%

Source: Eurostat, [mar_mg_am_coh]

Thus, the total EU28 market grew by over 38 million TEU in the thirteen year period, implying an average growth rate of 3.5% per annum.

Apart from the high levels of growth, both in relative and absolute terms, the market displays some important characteristics:

- Container handling is heavily concentrated in the “big six” countries: Belgium(10.5% share), Germany (14.1% share), Spain (16.1% share), Italy (12.2% share), Netherlands (13.0% share), and UK (9.6% share). Collectively they account for 75.5% of total TEUs handled.
- The big six have been growing at between 1.7% and 4.1% per year since 2005.
- Significantly higher growth rates can be found in the middle tier of countries including Greece (+9.2% pa), Poland (+13.8% pa), Portugal (+8.5% pa). These three now account for 11% of the European market, compared to 5% in 2005.
- There is a further group of six smaller countries, Bulgaria, Estonia, Croatia, Latvia, Lithuania and Slovenia, accounting for 3% of the European market, but experiencing high rates of growth, with volumes more than doubling between 2005 and 2018.
- The remaining traffic is accounted for by Denmark, Ireland, France, Cyprus, Malta, Romania, Finland, and Sweden, making up 11% of the market, but experiencing low to average growth rates.

For container traffics it can therefore be seen that the majority of traffics have been concentrated in the western half of Europe, but this is starting to change with Greece and Poland both growing significantly in both relative and absolute terms.

From Eurostat container data it is also possible to analyse the container flows in terms of their origin or destination from the perspective of the ports reporting the flows:

Table 2: Container flows by partner region, TEU (000s)

	Total TEU	Share
Deep Sea	51,106	47.7%
Near Sea	15,456	14.4%
Short Sea	40,507	37.8%
Total	107,069	100.0%

Source: Eurostat

Thus, the short sea flows are the ones where both port of origin and port of destination are in the EU28 (or countries within the EU28's coastal range e.g. Albania). Near Sea includes other Mediterranean countries, Russia, the Black Sea, the Gulf etc. Deep Sea includes the more distant maritime regions.

Short sea flows will normally be counted by Eurostat in both the country of origin and country of destination, whereas the others (Near Sea and Deep Sea) are only counted when they enter or leave the EU.

Container Flows – Trade Data

While transport data provides information about the number of containers handled in EU ports, it does not give any insight into the underlying trade flows, i.e. the types of goods which are being transported or the importing and exporting countries. This is where trade data can be used.

At face value EU trade data reports containerised flows for extra-EU trade, so it ought to be possible to derive accurate statistics at least for EU container trade with third countries. However, this does not appear to be the case in practice. A few Member States appear not to report whether extra-EU flows are containerised, leading to underestimates in the total. This data can be used in some circumstances, as many countries do report containerised trade with apparent accuracy, but for a global analysis of total containerised flows it is not advisable to use the raw data.

Instead, we have attempted to circumvent the problem by calculating containerisation factors per product, based on the reporting countries which do report this, and then applying the factors to the full trade dataset. For the time being we have calculated a single set of containerisation factors to be applied to all extra-EU flows, which is not the optimal approach as different overseas destinations have different rates of containerisation, but this will be addressed in a later article. For the moment we are mainly interested in whether it is possible to derive plausible estimates of containerised trade from the trade data.

Table 3 therefore shows estimated containerised tonnes for EU28 exports to the rest of the world by world area and by NST commodity. Table 4 shows the equivalent results for EU28 imports. They both cover 2018, in order to be comparable with the transport data (TEUs handled) shown above.

Together these flows sum to 311 million tonnes of containerised exports and 342 million tonnes of containerised imports.

Table 3: EU28 Containerised Exports, by world region and commodity, 2018, TEU, (000s)

EU Exports	Agric.	Foods	Sd Fuel	Pet Prd	Ores	Metals	Minerals	Fert.	Chemicals	Manuf.	TOTAL
Oth. Europe	4,944	8,792	13	1,782	7,941	7,010	10,474	2,136	16,303	20,916	80,312
North Africa	4,715	2,845	6	2,070	1,220	2,241	3,024	509	3,139	5,610	25,378
Other Africa	1,696	5,915	4	1,825	38	571	2,005	655	2,145	4,322	19,176
Middle East	3,046	5,147	0	1,129	294	1,238	3,712	209	3,284	5,207	23,266
Central Asia	557	410	0	73	1,034	259	222	30	733	1,378	4,700
East Asia	10,623	12,288	15	976	3,450	3,067	5,274	1,378	24,313	14,672	76,057
Russian Fed.	482	1,912	1	214	12	513	1,380	40	3,355	4,524	12,435
N. America	2,859	6,990	1	2,469	720	5,875	4,060	1,445	6,763	14,344	45,525
CS America	1,204	2,296	1	687	74	931	1,582	2,553	3,540	5,782	18,650
Oceania	866	1,291	0	105	7	250	369	214	595	2,148	5,844
TOTAL	30,993	47,886	41	11,330	14,791	21,954	32,103	9,171	64,171	78,903	311,343

Table 4: EU28 Containerised Imports, by world region and commodity, 2018, TEU, (000s)

EU Exports	Agric.	Foods	Sd Fuel	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

Comparison – Trade and Transport Data

To make a comparison with the transport data, it is necessary to find the subsets of information which correspond. For example, the transport data tables include all short sea flows, including intra-EU trade, transshipment between EU ports, and transport of empty containers.

For the transport data:

- There were 107 million TEU handled in EU ports in 2018.
- Of these 66.562 million were to or from locations outside Europe (near-sea and deep-sea locations).
- Of those, 81% are estimated to be loaded (the rest – 19% - were empty)
- Thus there were 53.915 million loaded TEU between the EU and the rest of the world.

For the trade data, regarding EU exports:

- There were a total of 311 million containerised tonnes exported to non-EU countries.
- Of these there were 231 million tonnes exported to near-sea or deep-sea locations (leaving aside the flows to non-EU Europe).

Regarding EU imports:

- There were 341 million containerised tonnes imported from non-EU countries.
- Of these there were 242 million tonnes imported from non-EU countries.

Taken together, we therefore estimate a total of 473 million tonnes of containerised cargo traded between the EU and either near-sea or (mainly) deep-sea locations.

Comparing this figure (473 million tonnes) to the number of loaded TEU on the same routes (53.9 million TEU), implies a loading rate of 8.8 cargo tonnes per TEU, which is a plausible figure.

While it is difficult to compare the two kinds of statistics directly, they do appear to support each other. To test this further we need to look at trade volumes for different time periods, as it is important to know whether there is close correlation between growth in containerised trade and growth in loaded TEU handled.

Containerised Trade Evolution, 2005-2018

To recap from *Figure 1: Total TEU (000s) handled in EU28 ports, 2005-2018*, the total TEU volumes measured in ports was 107.1 million:

Table 5: EU28 - Total Container Traffic - Loaded and Empty - TEU (000s)

	2005	2010	2015	2018	AGR:05-18
Loaded	54,398	64,142	74,196	87,230	3.7%
Empty	14,474	13,537	17,647	19,873	2.5%
Total	68,872	77,679	91,843	107,103	3.5%

The growth rates in containerised trade are shown below in Table 6,

Table 7 and Table 8. As mentioned, this is not a perfect comparison, because the geographical scope of the two sets of figures cannot be aligned exactly, but it is at least indicative.

Table 6: Containerised trade, EU exports by world area, 2005-2018

EU Exports	2005	2010	2015	2018	AGR:05-18
North Africa	15,150	22,867	27,710	25,378	4.0%
Other Africa	13,793	16,413	18,908	19,176	2.6%
Middle East	18,190	20,073	25,443	23,266	1.9%
Central Asia	3,859	4,742	3,813	4,700	1.5%
East Asia	48,128	60,705	68,940	76,057	3.6%
Russian Fed.	13,674	17,066	11,763	12,435	-0.7%
N. America	39,883	29,372	38,576	45,525	1.0%
CS America	13,368	15,881	17,263	18,650	2.6%
Oceania	3,744	3,675	4,424	5,844	3.5%
TOTAL	169,790	190,795	216,840	231,031	2.4%

Table 7: Containerised trade, EU imports by world area, 2005-2018

EU Imports	2005	2010	2015	2018	AGR:05-18
North Africa	8,427	10,760	12,550	15,243	4.7%
Other Africa	12,904	11,265	12,096	14,784	1.1%
Middle East	7,313	7,552	8,386	9,534	2.1%
Central Asia	2,199	2,972	2,522	2,891	2.1%
East Asia	75,452	75,099	83,762	99,367	2.1%
Russian Fed.	17,176	25,086	31,837	35,042	5.6%
N. America	26,795	29,527	27,691	32,019	1.4%
CS America	28,724	30,259	29,366	31,327	0.7%
Oceania	2,468	2,470	2,552	2,627	0.5%
TOTAL	181,459	194,991	210,761	242,833	2.3%

Table 8: Containerised trade, total (imports and exports) by world area, 2005-2018

Total Imp + Exp	2005	2010	2015	2018	AGR:05-18
Exports	169,790	190,795	216,840	231,031	2.4%
Imports	181,459	194,991	210,761	242,833	2.3%
Total	351,249	385,785	427,600	473,863	2.3%

It shows that growth in TEUs handled has been growing around 1.2% point¹ per year faster than containerised trade tonnes. This is a familiar result, and there are several possible explanations such as:

- Higher rates of containerisation over time, or equivalently, greater proportions of trade with countries which have high rates of containerisation e.g. Far East.
- Greater numbers of empty containers due to trade imbalances (this does not appear to have happened in the period 2005-2018 because the proportion of empty containers is growing more slowly than the number of loaded containers).
- Lower average number of trade tonnes per TEU e.g. due to the product mix, and higher proportion of less dense cargo e.g. packaged consumer goods.
- Multiplier effect caused by transshipment in European hubs, i.e. for each TEU imported, transshipment at a hub port will result in three “moves” rather than just one at the final port of arrival.

With hindsight therefore it would have been possible to predict the total number of TEU handled with the simple formula:

$$TEU_{2018} = (TRADE_{2005} / TONPERTEU) * ((1 + TRD_GR + TEU_GR)^{NPER})$$

Where:

- TEU₂₀₁₈ – is the total number of TEU handled in 2018 (loaded plus empty)
- TRADE₂₀₀₅ – is the amount of containerised trade tonnes in 2005
- TONPERTEU – is the base year tonnes per TEU (covering loaded and empty) = 5.1 Tonnes/TEU
- TRD_GR – is the observed annual growth rate for trade = 2.3% per annum
- TEU_GR – is the additional growth rate for the TEU series = 1.13%
- NPER – is the number of compounding periods.

So, while this is encouraging since it, in effect, allows us to make a link between economic growth and TEU volumes, and thus between port traffic and hinterland activity, we first need to improve the estimation of containerised trade using different factors per world region.

¹ Actually 1.13%

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.