Early estimates of maritime traffic using innovative data sources

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Early estimates of maritime traffic

<u>Objective:</u> Use Eurostat quarterly statistics and EMSA data for improving timeliness of maritime statistics – publish port calls few weeks after a reference quarter instead of a year later

➢ Eurostat-EMSA cooperation started in February 2023, with a formal agreement (MoU) to provide AIS and other administrative data to Eurostat for 'Early estimates of maritime traffic'

➢ National experiences (IRL, DK, GR, NL) were the starting point for developing a way to assess comparability of the two data sources and estimate port calls at EU level

Project results: EMSA data

EMSA provided anonymised microdata from 3 sources:

- SafeSeaNet port calls – vessel traffic monitoring system linking maritime authorities across Europe

arrival_year		arrival_month		portofcall		
2018	12	GRPIR	12	SSN A36A2PR A36 GR		
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- MARINFO vessel information data –commercial AIS data

arrival_year		arrival_month		portofcall	ship
2017	5	GRPIR	1871	MARINFO A36A2PR A36	
2017	5	GRPIR	1871	MARINFO A36A2PR A36	
2017	5	GRPIR	1871	MARINFO A36A2PR A36	
2017	5	GRPIR	1871	MARINFO A36A2PR A36	
2017	5	GRPIR	1871	MARINFO A36A2PR A36	
2017	5	GRPIR	1871	MARINFO A36A2PR A36	
2017	5	GRPIR	1871	MARINFO A36A2PR A36	

- EMSA detected port call data – AIS signals

arrival_year		arrival_month		portofcall	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	
2022	7	NOLAN	4	DPC A36A2PR A36 NO	

Project results: Eurostat data

Directive 2009/42/EC of the European Parliament and of the Council of 6 May 2009 on statistical returns in respect of carriage of goods and passengers by sea (recast):

- Quarterly European port vessel traffic in main European ports, by port, type and size of vessels loading or unloading cargo, embarking or disembarking passengers (including cruise passengers on cruise passenger excursion)

- Comparison for the years 2015-2019

Data set F2:		European port vessel traffic in the main European ports, by port, type and size of vessels loading or unloading cargo, embarking or disembarking passengers (including cruise passengers on cruise passenger excursion)	
Periodicity:		quarterly	
	Variables	Coding detail	Nomenclature
Dimensions	Data set	Two-character alphanumeric	F2
	Reference year	Four-character alphanumeric	(e.g. 1997)
	Reference quarter	One-character alphanumeric	(1, 2, 3, 4)
	Reporting port	Five-character alphanumeric	Selected EEA ports in the port list
	Direction	One-character alphanumeric	Inwards, outwards (1, 2)
	Type of vessel	Two-character alphanumeric	Type of ship, Annex VI
	Size of vessel GT	Two-character alphanumeric	Gross tonnage size classes, Annex VII
Data: Number of vessels; Gross tonnage of vessels.			

Project results: Comparison

Comparison at EU level:

Strong similarity of trends between the EMSA-SSN and EMSA-MARINFO and Eurostat dataset - allows proceeding with their use for estimations of Eurostat F2 data at EU level.

% Variation of port calls over time
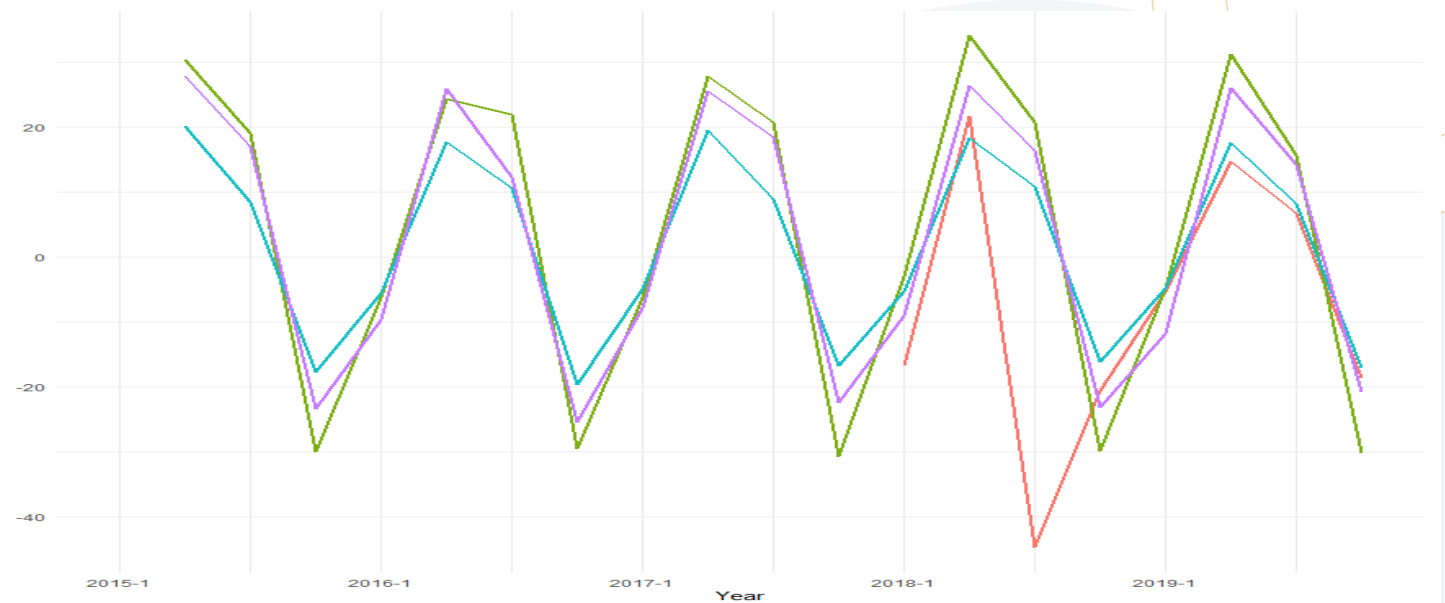
Data source:
- Eurostat statistics
- EMSA MARINFO - AIS
- EMSA AIS detected port calls
- EMSA SafeSeaNet - AIS

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Project results: Comparison

Comparison of the number of vessel's calls by type of vessel at port and country level showed differences for specific years and vessel types

Potential reasons for differences:

- Classification by type of vessel

- Definition of statistical ports

- Scheduled traffic between two ports

- Activity of the vessel

- Exemption in reporting to EMSA

EMSA datasets SafeSeaNet (SSN) port calls and MARINFO datasets most useful - detected AIS port calls dataset is of limited use for the time being

Project results: Modelling

Comparison of two estimation methods in order to select the most reliable one

1)   Multiple Linear Regression

2)   Auto-Regressive Integrated Moving Average with Exogenous variables (ARIMAX)

First method yielded differences in annual totals ranging from-7,4% to 0,5% for EU level 2015-2019 and much larger differences at disaggregated level by type of vessel.

Further limitations include: the model assumes linearity and may not capture all interactions between predictors.

Project results: Modelling

Comparison at EU level for:

Auto-Regressive Integrated Moving Average with Exogenous variables (ARIMAX)

Uses Eurostat data for previous quarters and data from both SSN and MARINFO for the quarter to be estimated (exogenous variables)

Annual deviation per type of vessel - ARIMAX					
	2015	2016	2017	2018	2019
total	5.3%	0.5%	-1.3%	-1.8%	0.5%
10	5.8%	-3.3%	0.2%	-1.2%	-2.3%
20	0.2%	1.7%	-4.2%	-3.2%	3.0%
31	-4.2%	-1.3%	-3.6%	1.1%	-0.8%
32	-2.8%	-0.9%	-5.4%	-0.9%	0.0%
33	6.9%	1.2%	-2.2%	-3.2%	0.4%
35	1.3%	-0.2%	2.6%	3.5%	1.1%
36	-7.9%	-16.9%	14.2%	-0.8%	5.4%

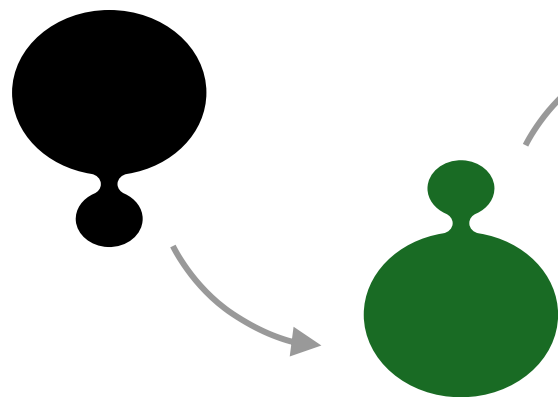| Type of vessels |
|---|
| 10 Liquid bulk |
| 20 Dry bulk |
| 31 Container |
| 32 Specialised |
| 33 General cargo, non-specialised |
| 35 Passenger |
| 36 Cruise Passenger |

Next steps

Publication of the 2015-2019 results as experimental statistics: EU estimates by vessel type

Automation of the EMSA data aggregation process

Possible further work: Improve the classification of vessels by vessel type to produce more reliable data at country level

Drafting an agreement with EMSA on the regular provision of the data needed to produce the estimates

Publication of the estimates on regular basis in Eurobase

Thank you!

Further information:

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