

Monitoring global trade by products using Big Data

Graham Pilgrim, Yann Dorville and Annabelle Mourougane

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Outline



Motivation



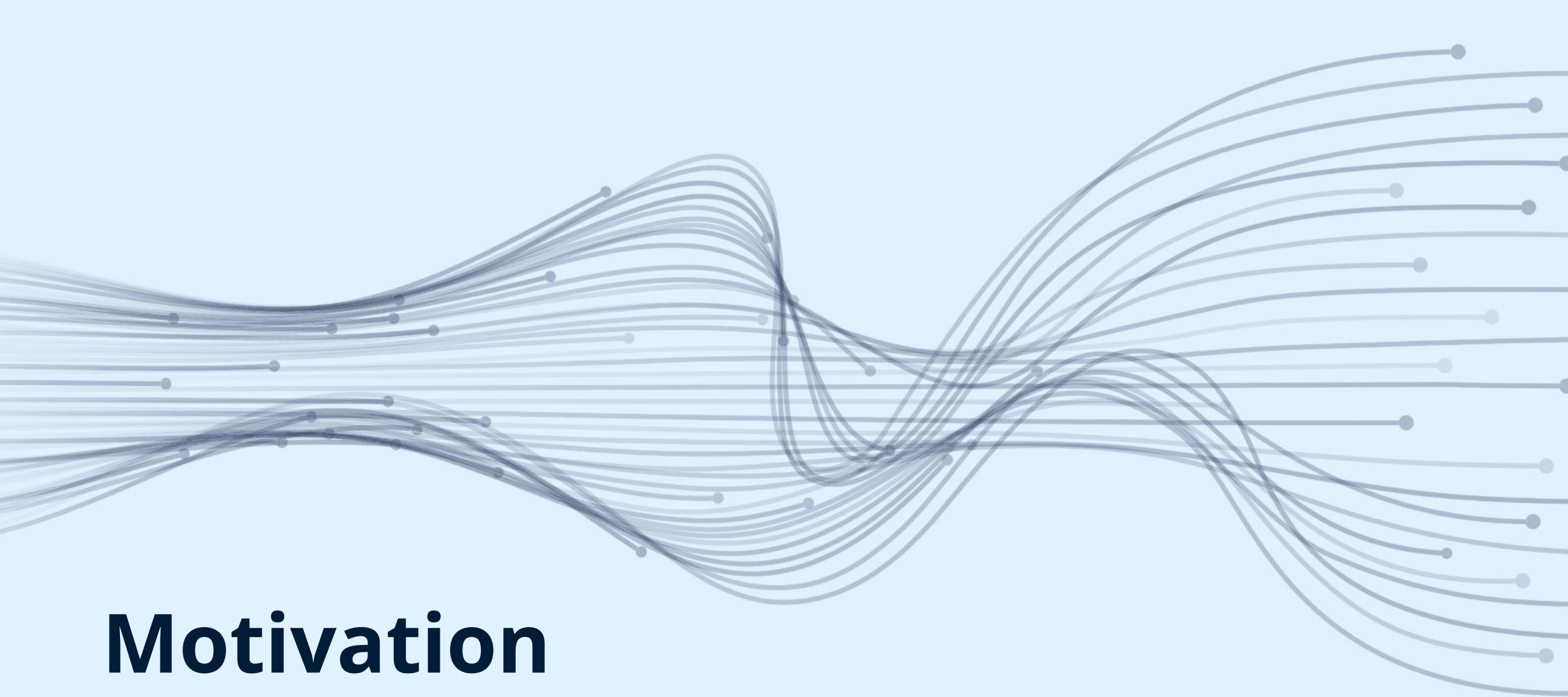
Approach



Applications



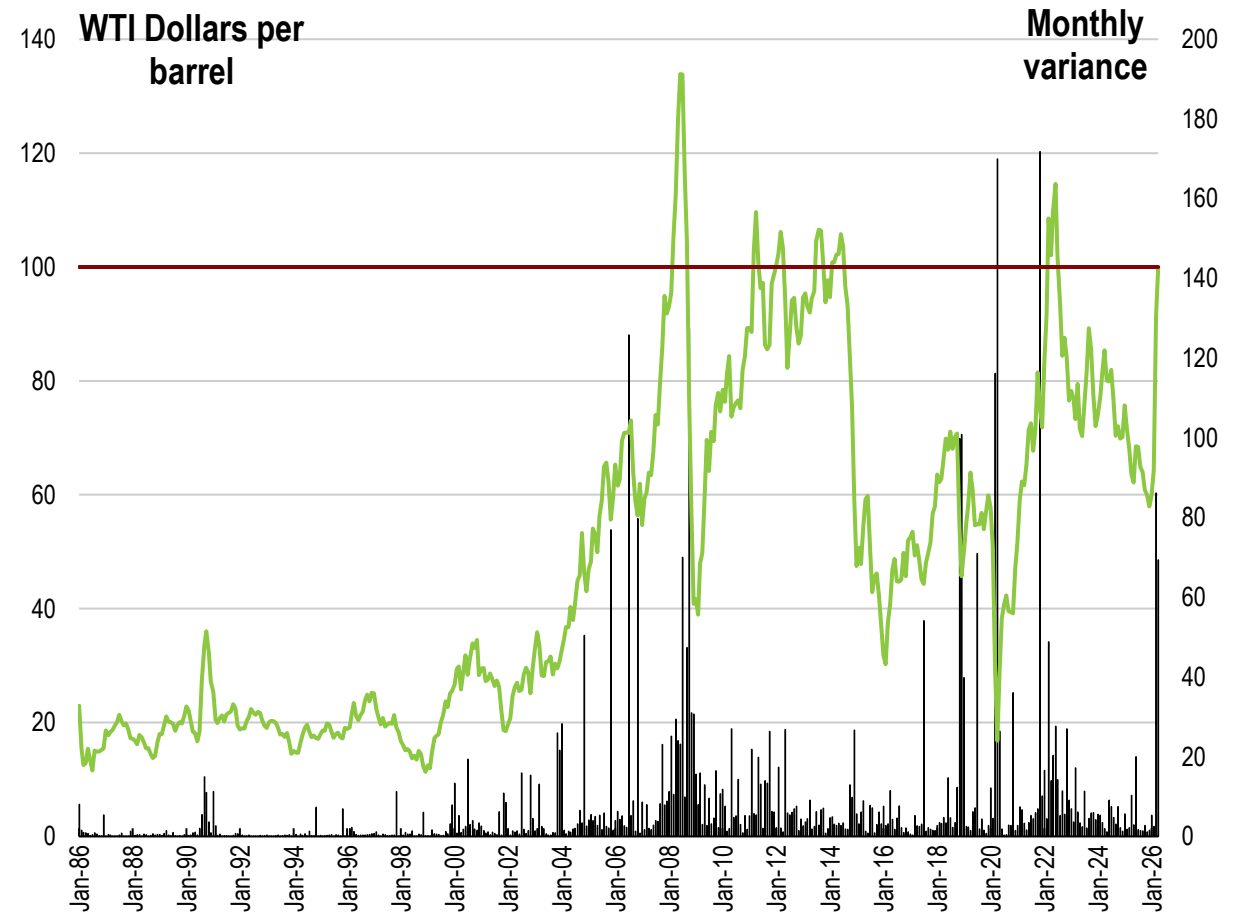
Concluding remarks



Motivation

» Monitoring trade in a volatile environment

- Environment of **high uncertainty**, with occasional spikes in **volatility**
- **Publication lags of trade statistics** are typically four to six weeks, depending on the data source.

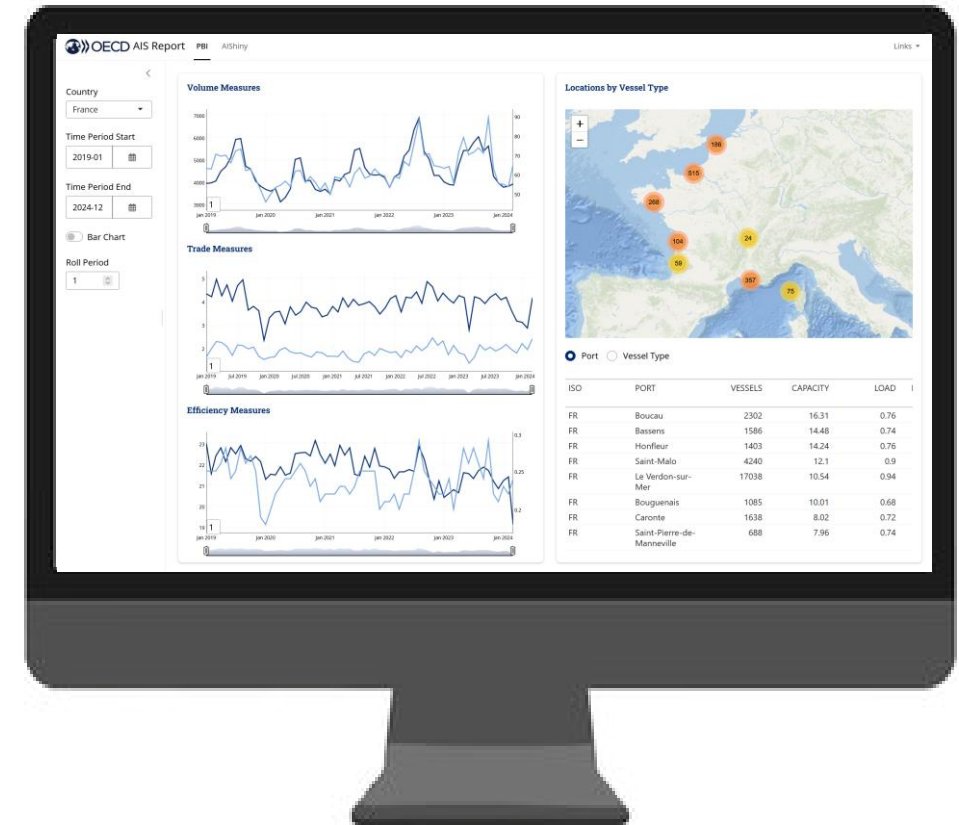


» Literature review

- Standards nowcasting methods using **DFM or machine-learning models** have been developed to monitor trade, usually at the aggregate level (or for goods or services)
- **Increasing use of big data**, which are usually more timely and often have a good country coverage.
- **AIS** has been used to identify port locations (CSO Ireland, 2022), monitor trade in specific commodities (QuantCube Technology, 2022) or to analyse ports and shipping operations in a specific country (Tsalamanis et al., 2018; ONS, 2025).
- Pilgrim et al. (2024) focused on the **delineation of ports and derived proxies of maritime trade**.

Objective and scope

- **Objective** : Monitor trade by commodity across the globe in quasi real time
- **Period**: 2019- April 2026
- Covering **23 commodity groups** and **29 664 berths** across **4 106 ports**.
- Paper and Dashboard

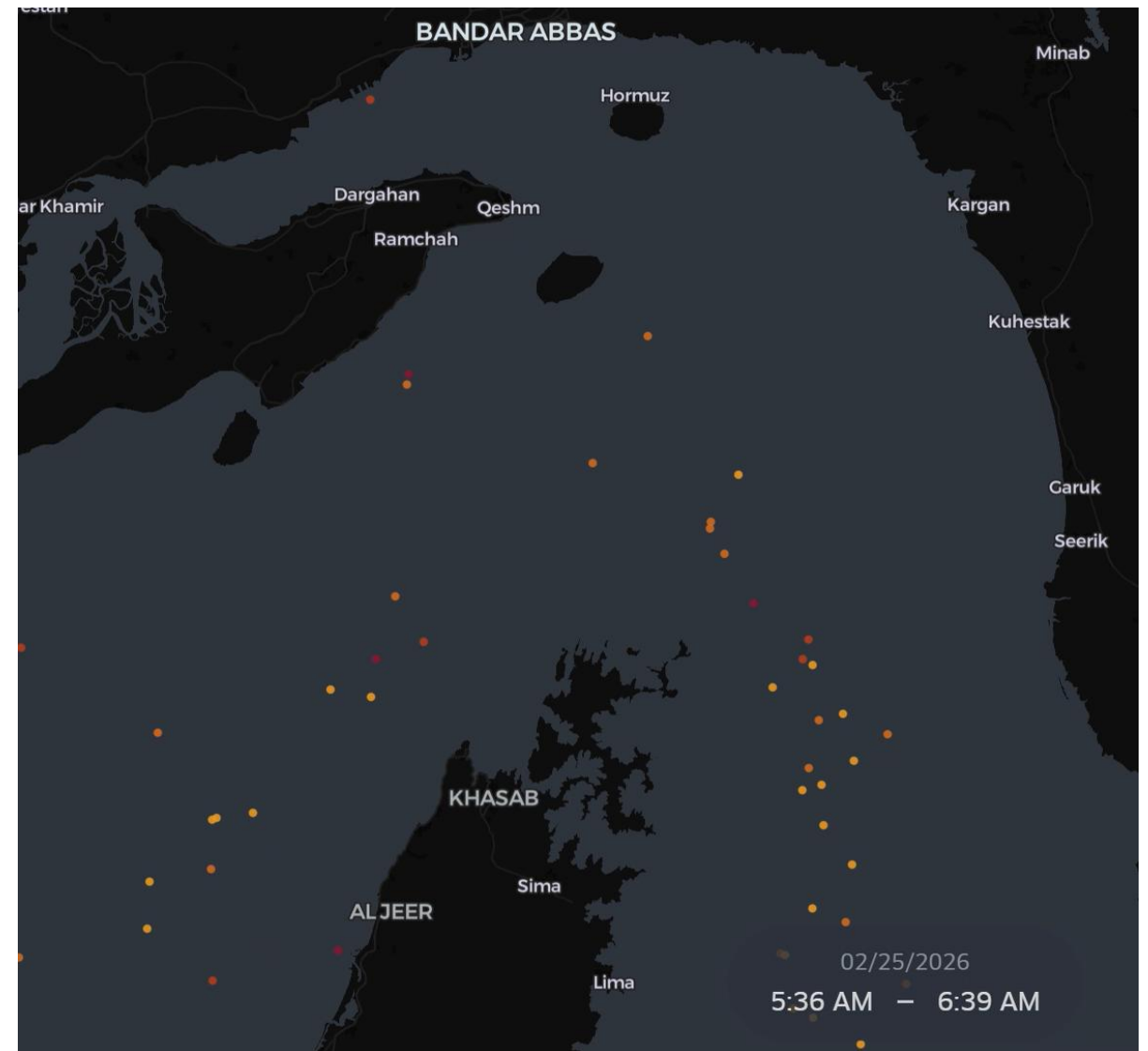




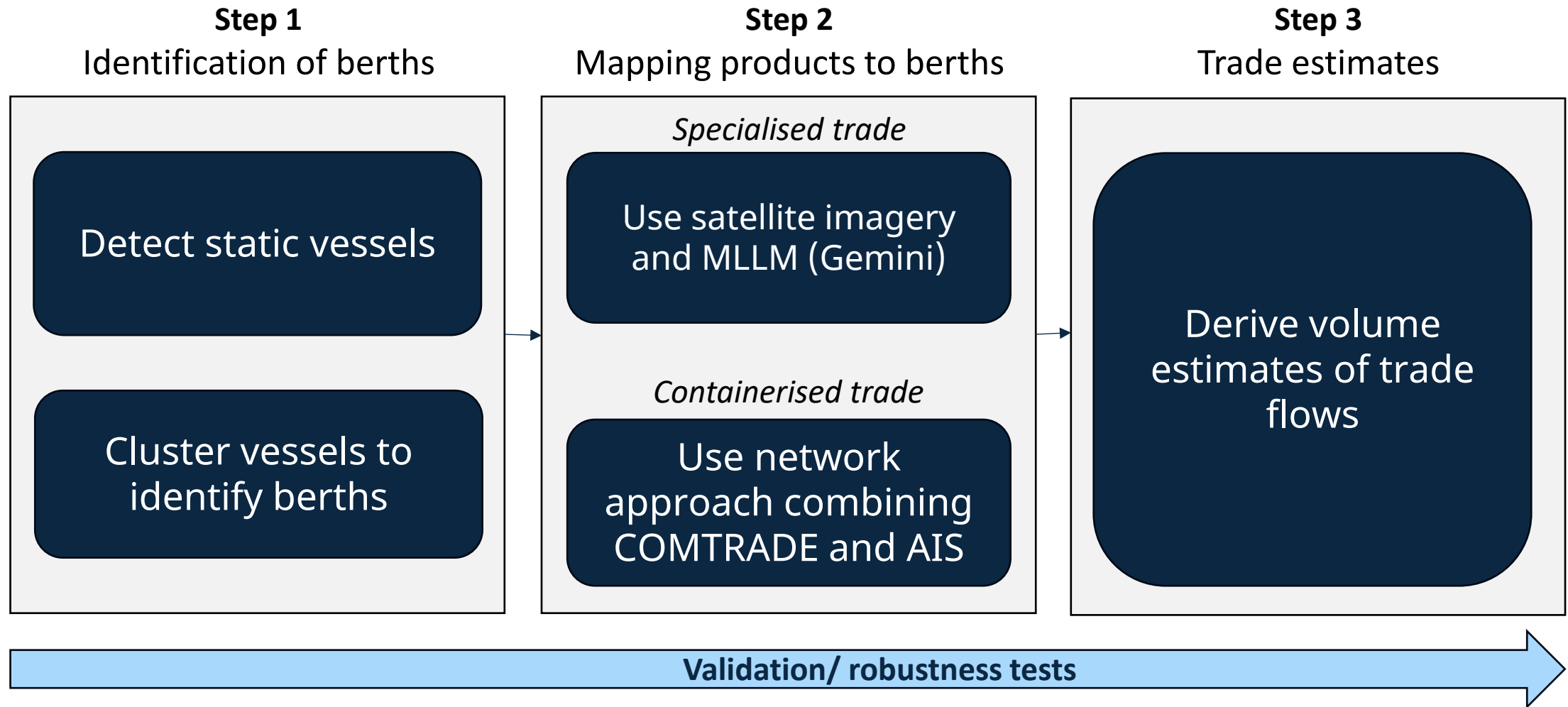
Approach

» What is the AIS?

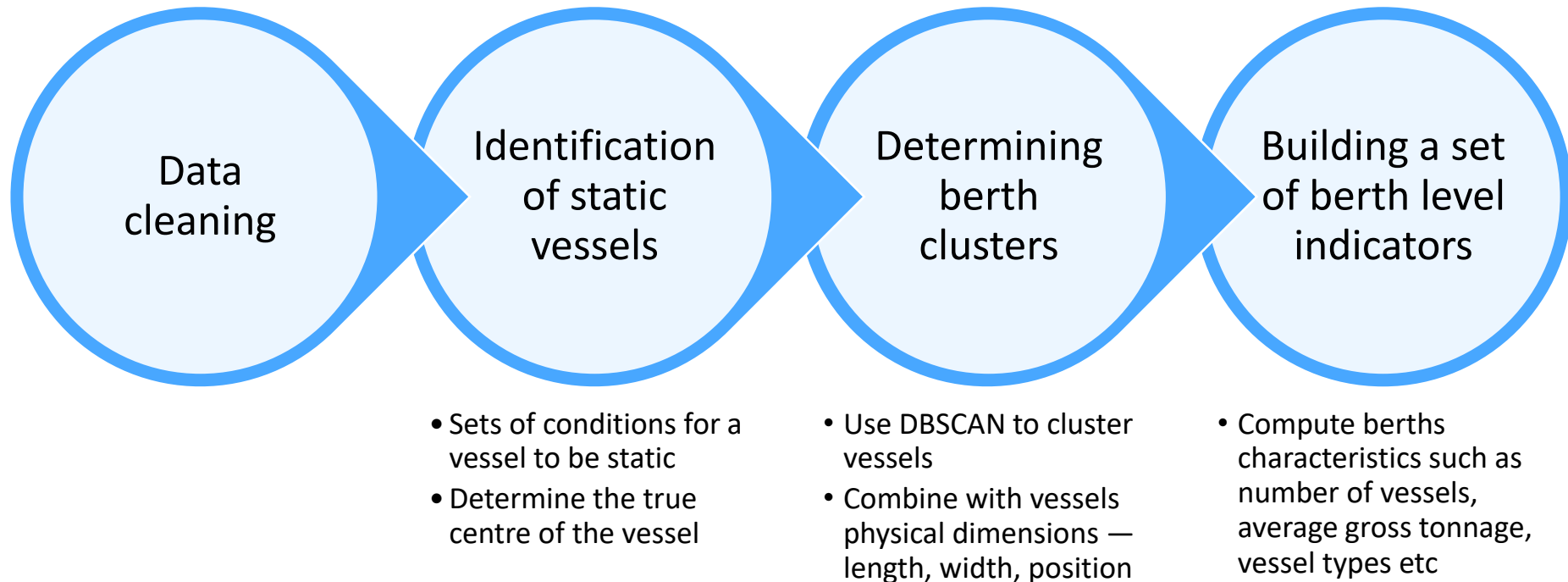
- The **Automatic Identification System (AIS)** was developed by the International Maritime Organisation to track vessels and is primarily used for safety. The dataset is hosted on the **UN Global Platform**.
- It is a database of billions of data points that includes **messages transmitted by ships to land or satellite receivers**, available in **quasi real time**.



» Overview of the approach



» Step 1: Identification of berths

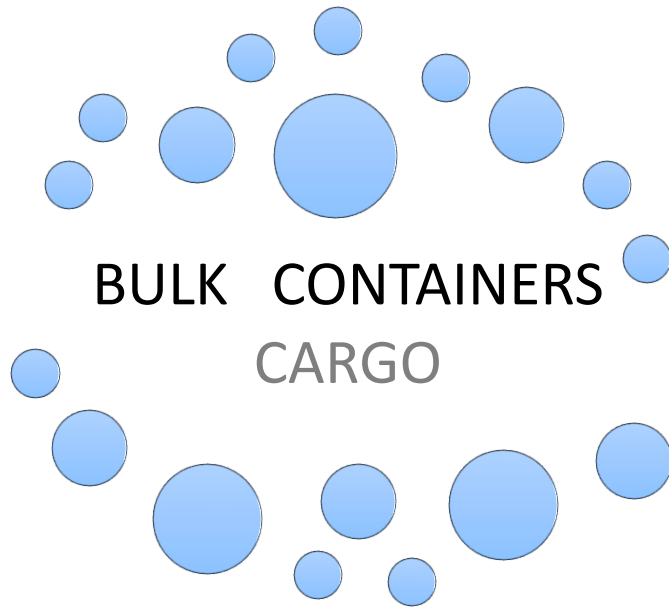


» Step 2: Mapping commodities to berths

Focus on key vessel types

Mapping commodities by vessel types

Obtain the share of commodities that are handled in each berth

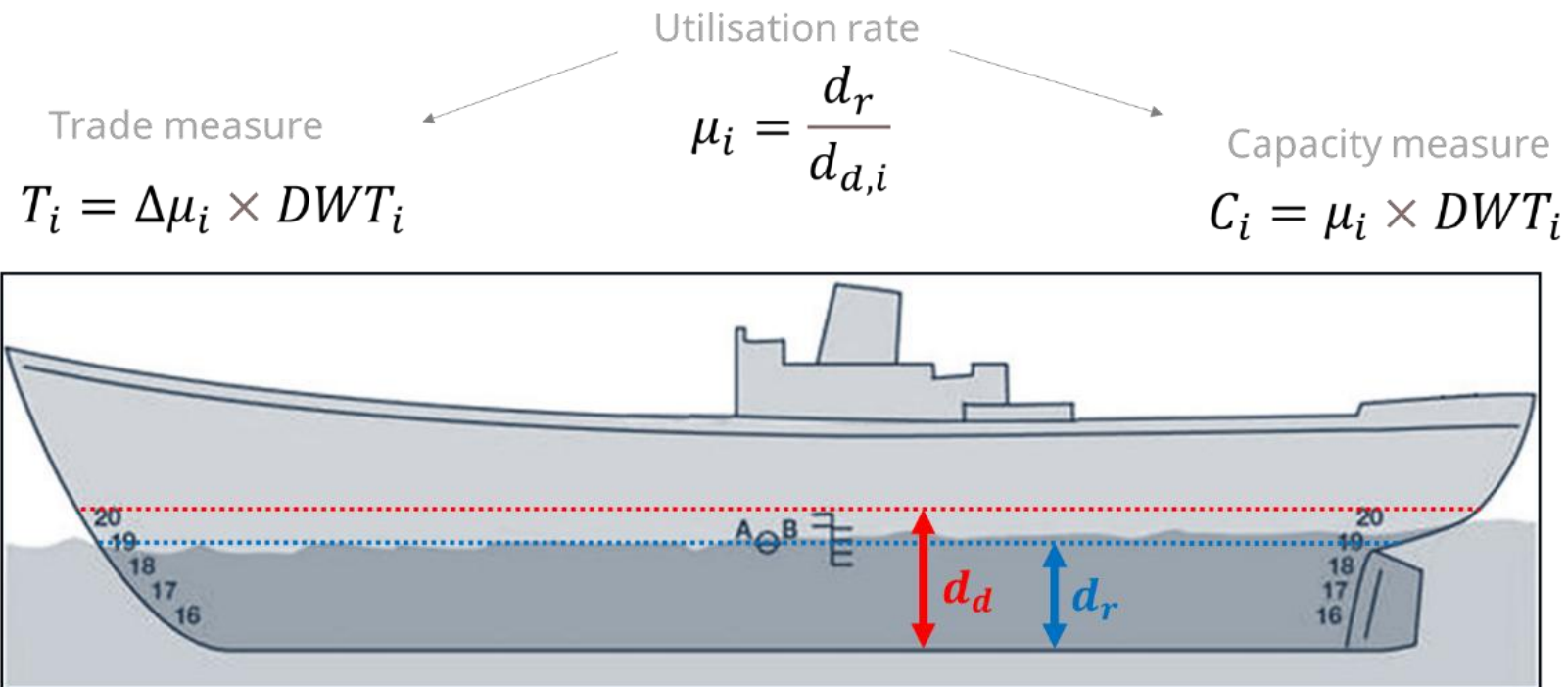


BULK: Use satellite imagery and Gemini

CONTAINERS: Use network approach combining COMTRADE and AIS

Combine bulk and containerised flows

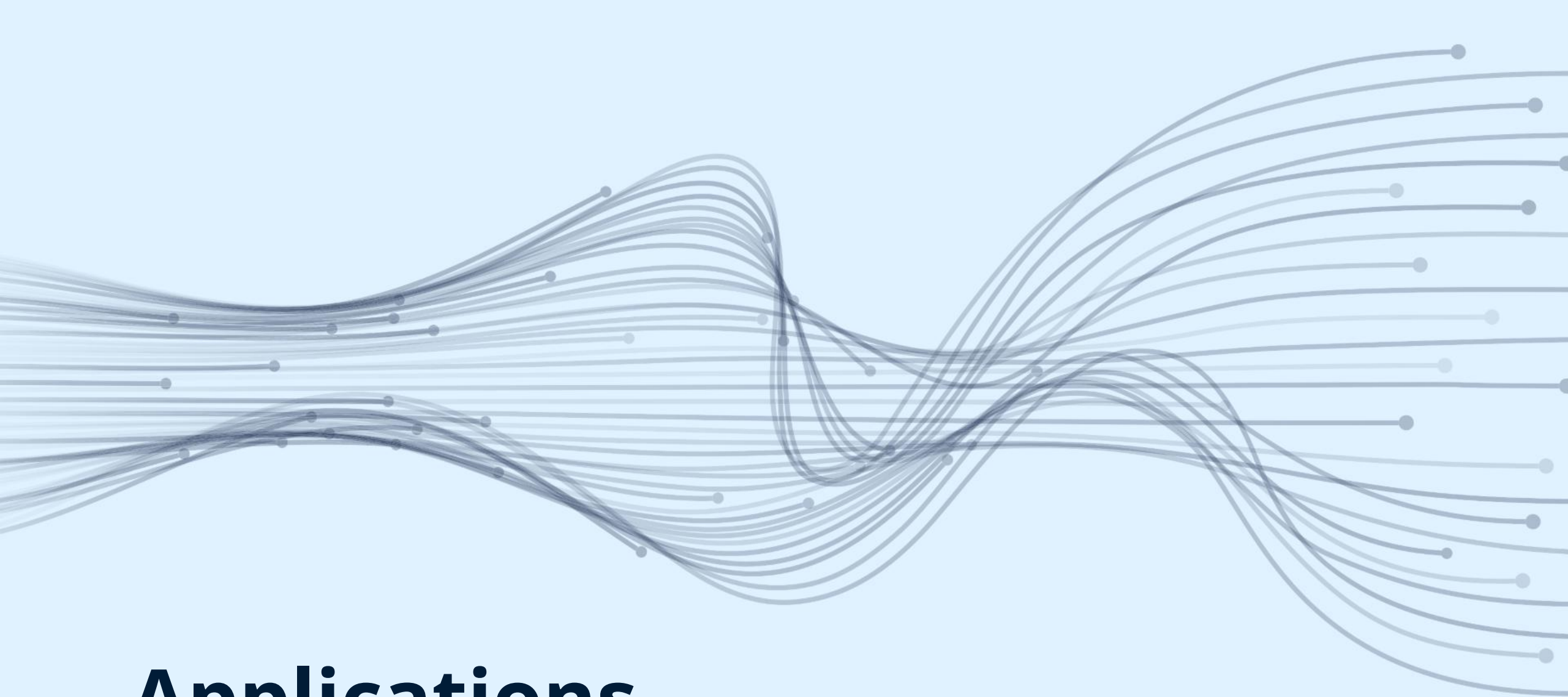
Step 3: Deriving trade proxies



Source: Wang, Liu and Wang (2021).

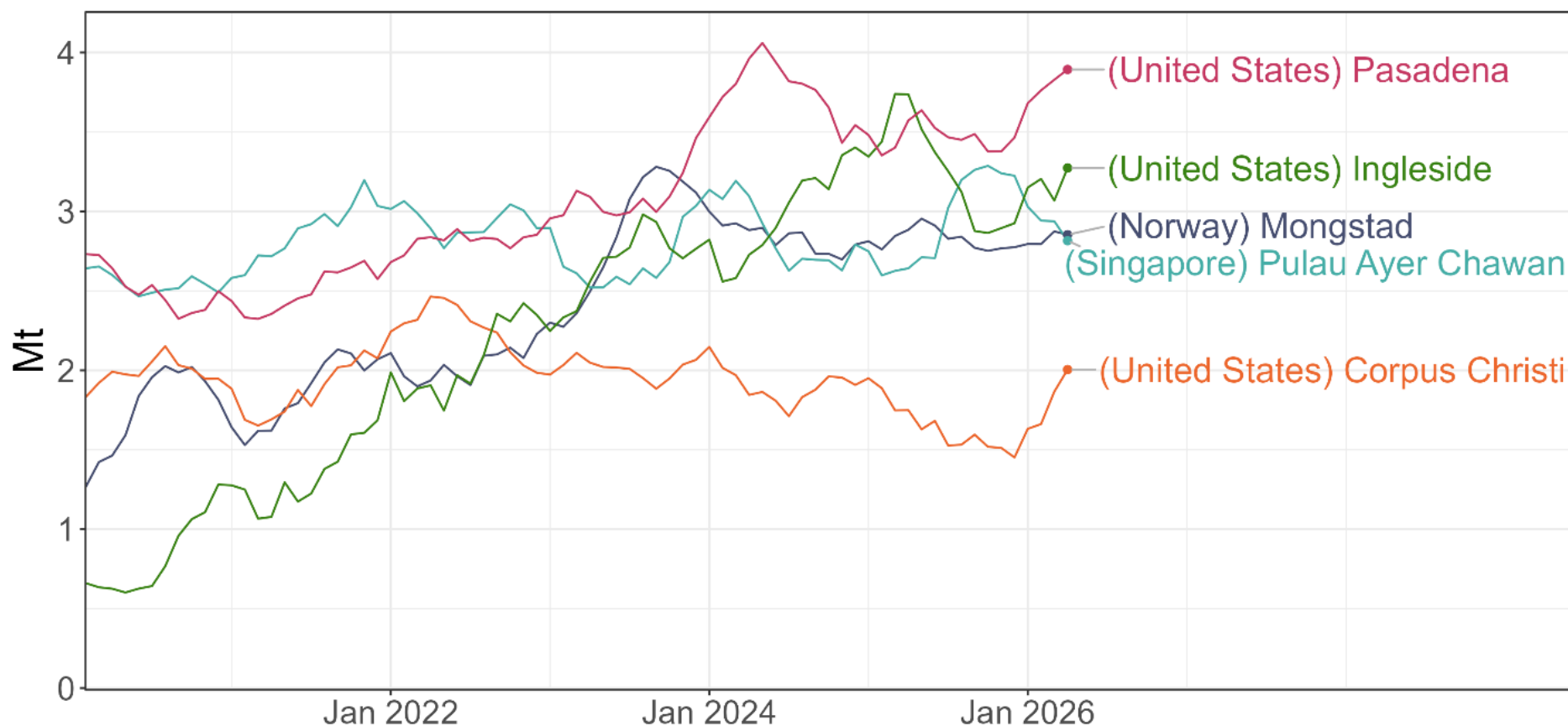
» Caveats

- AIS data are subject to a range of **measurement errors**
- We only capture **maritime trade**, which is large but miss other forms of trade, whose size varies depending on the commodities or regions.
- Estimates relies on **many assumptions** and are particularly **fragile for containerised trade**.
- Due to the "netting effect", **estimates are good in providing the direction of changes**, but not always in terms of estimating trade levels.



Applications

Oil exports from the top 5 oil ports

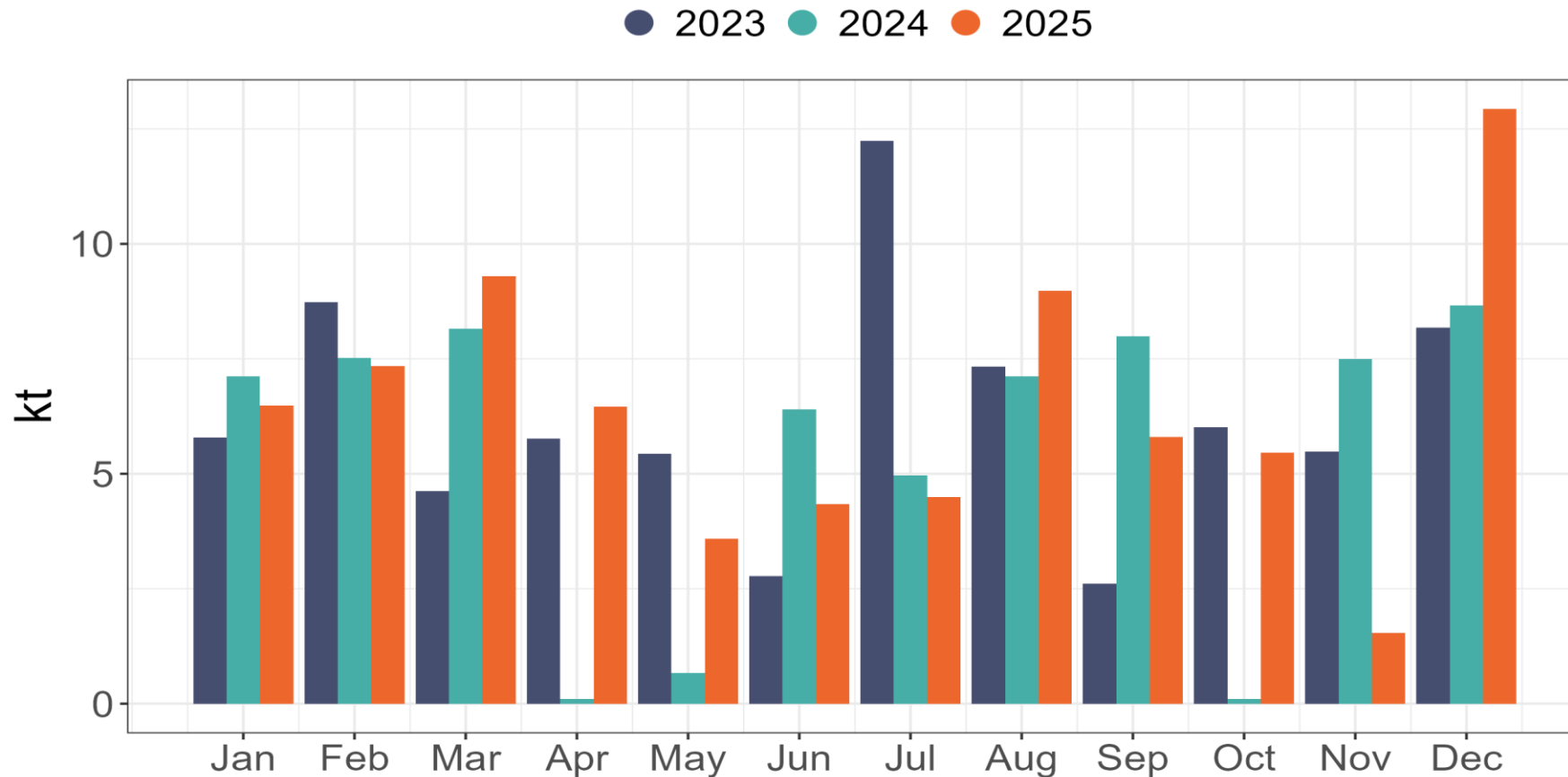


Note: Data have been smoothed using a 3-month moving average

Source: Author calculation using AIS data.

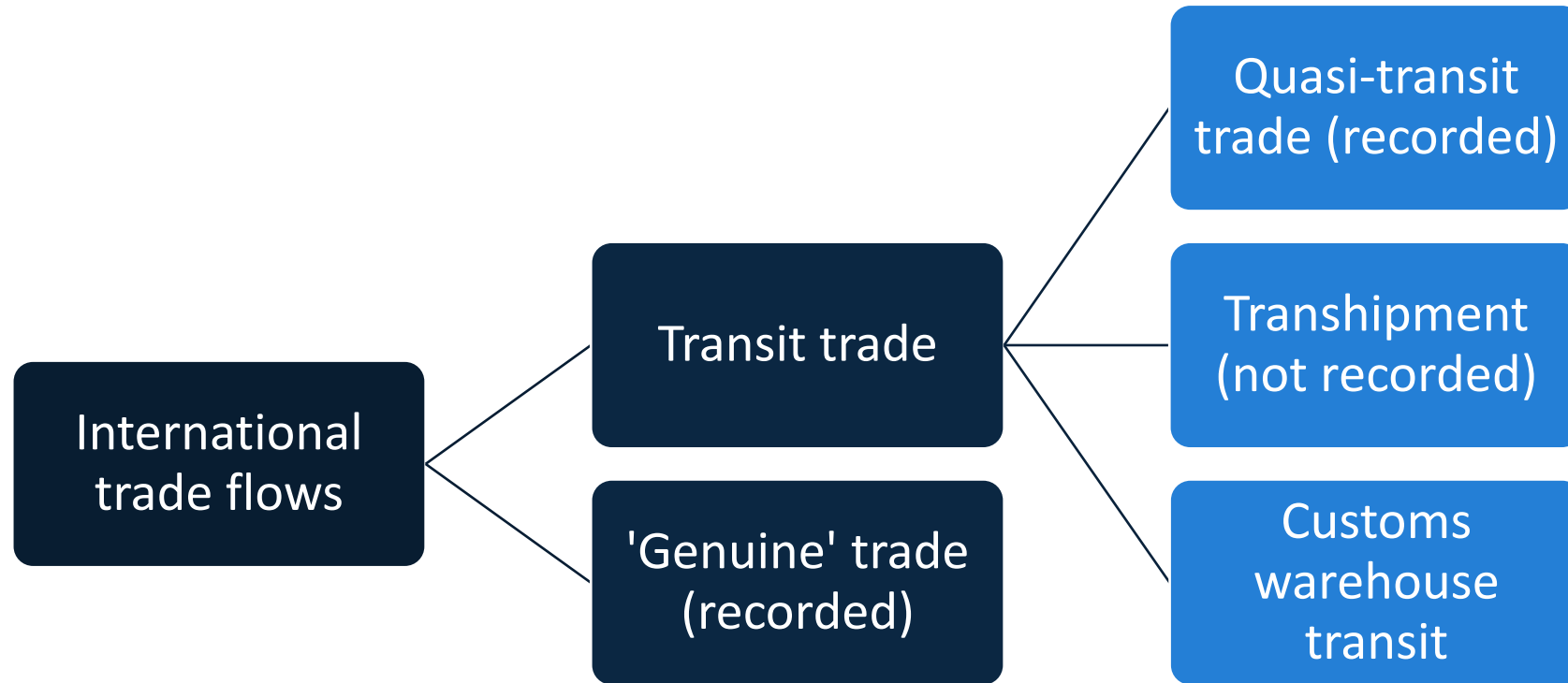
Following the impact of policy shocks or specific events

UK imports that enter through the port of Baltimore



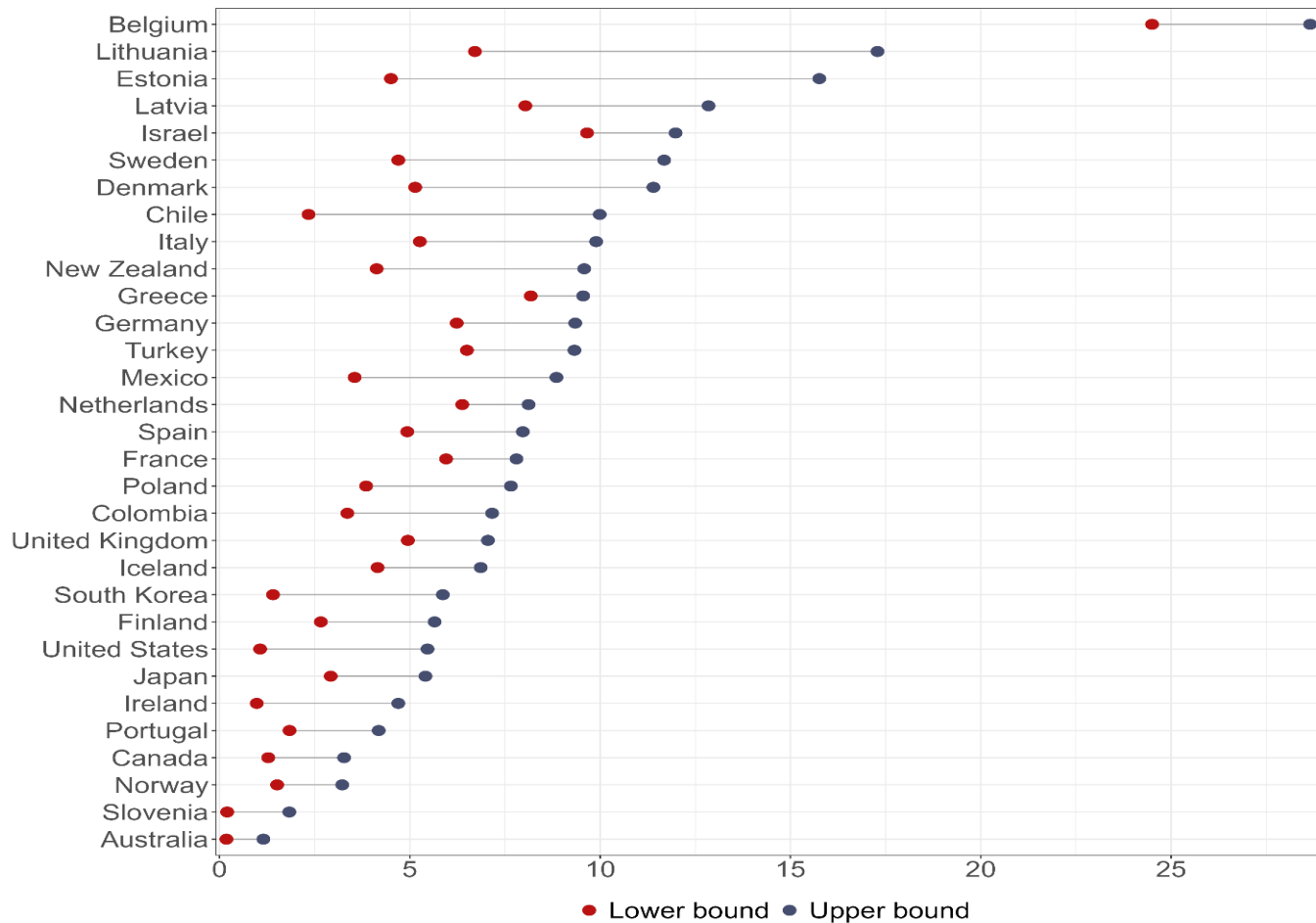
Source: Author calculation using AIS data.

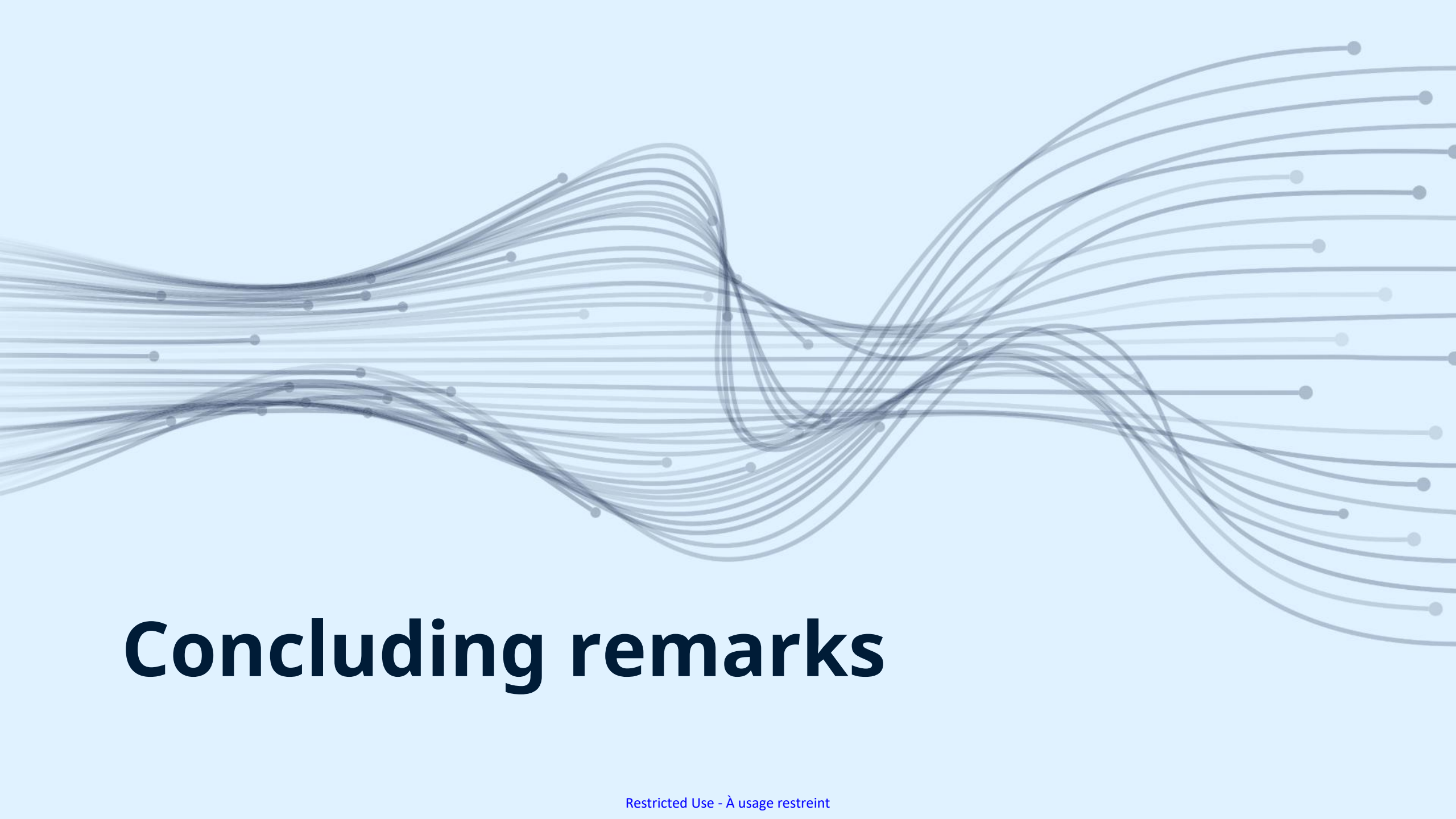
» Deriving estimates of transit trade



>> In 2025, the share of maritime transit trade varies widely across countries

Percentage of maritime trade



The background of the slide features a series of thin, light blue lines that flow and curve across the frame. These lines are punctuated by small, semi-transparent blue dots, creating a sense of movement and data flow. The overall aesthetic is clean and modern, typical of a professional presentation.

Concluding remarks

» Conclusions and next steps

- A new way to **monitor global trade in near real-time, at the commodity level, and across a wide range of countries**, well ahead of official data releases and provides a consistent global estimate of transit trade across countries.
- A few **limitations**
 - we only capture maritime trade, which is large but not the whole picture.
 - our estimates of containerised trade are more fragile than those of specialised trade.
- Key **improvements** would include more frequent updates to port imagery, better handling of containerised trade, and broader validation against customs data.

Thank you

