Which products are traded in your supply chain and how do they score on risk indicators?

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Outline presentation

- Why do we study products in supply chains?
- More detail is necessary – how did we obtain it
- Indicators associated with risks in the literature
- Examples of products from countries, products and countries that score on those indicators
- Conclusion

Why are products in your supply chain relevant?

- Countries are dependant on each other, for food, energy, materials for the green transition and other essential products
- This became even clearer in the beginning of the pandemic, when several medical supplies were not traded and shortages occurred
- And also when Russia cut the gas supply to EU countries
- Recently, problems with goods transported via the Red Sea

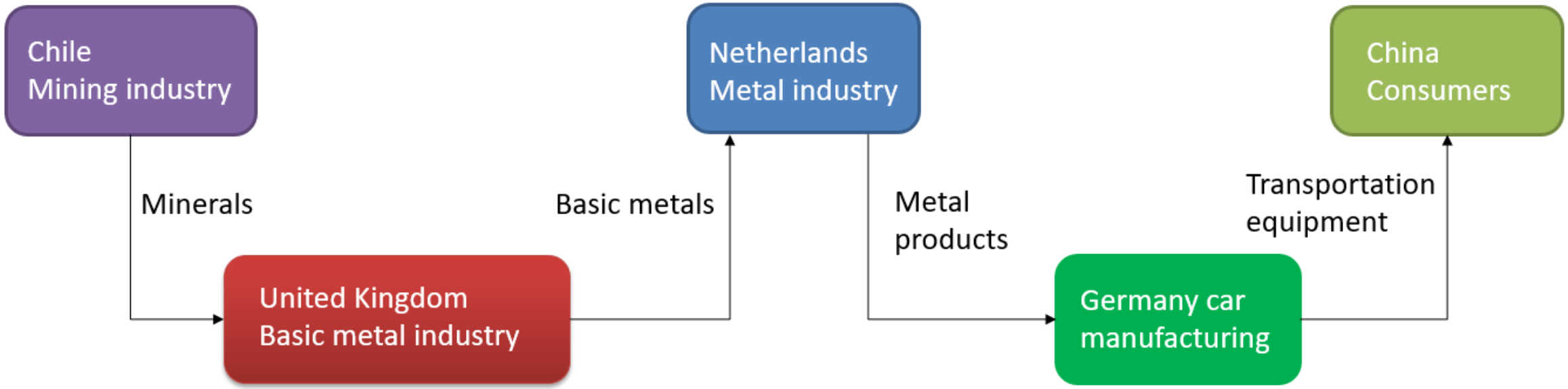
Questions, questions, questions…

Q1: Where are possible risks? If there is a natural disaster, local strikes, geopolitical tensions in a country etc. How might your domestic industries be affected?

Q2: What products does that country produce in your supply chains for which domestic industries?

Q3: Can you get the goods elsewhere? Concentrated world market or not? Are there alternative suppliers in the EU?

Before our project: no detailed information



See, e.g., Kuzmenko & Čechura (2023) how to derive the countries in the supply chain where production for you is located and in what industries.

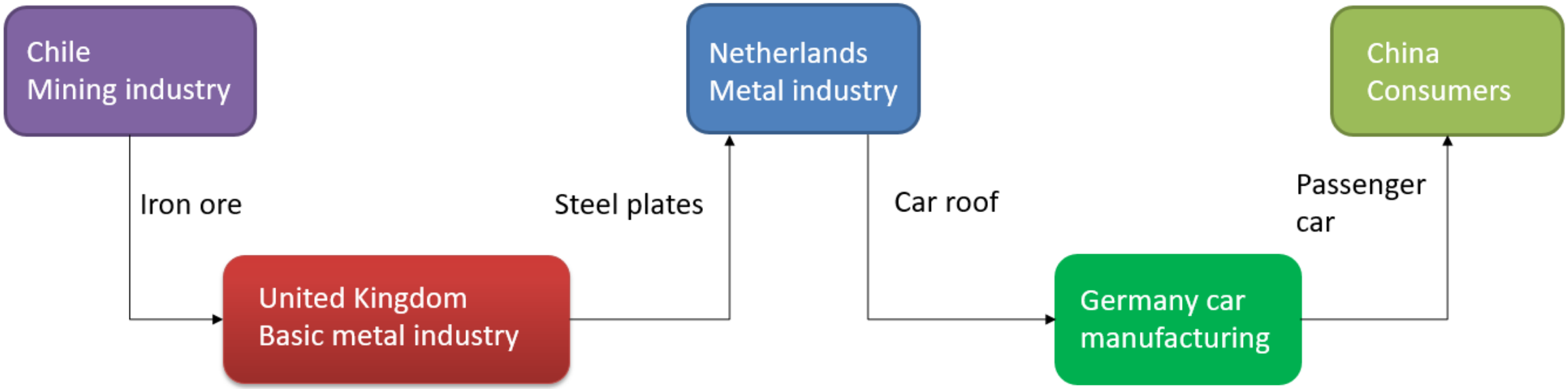
But policymakers need more!

- Questions at **detailed product** by country level
- As **timely** as possible, not of a few years ago
- Possibly a **detailed specific national industry of interest**
- **Quality**, ensure tracking of real dependencies, no “ghosts”

Not: Netherlands uses a lot from Russian mining industry

But: Netherlands imports x of natural gas, y of crude oil, z of coal from Russia, a% is re-exported, b% is used by these industries, these are their customers at home and abroad

After our project: detailed product information



Detailed product information: which product is traded where?

Also possible: more detailed industry information

How did we obtain more detail & accuracy?

- **Capitalise on existing public data** by OECD, Eurostat/JRC, CEPII, such as AMNE, TiVA, FIGARO, BACI
- **Capitalise on non-public data at Statistics Netherlands,** e.g. a firm trades which product with which country, is it used for production or re-exports
- **Devise new methodology**

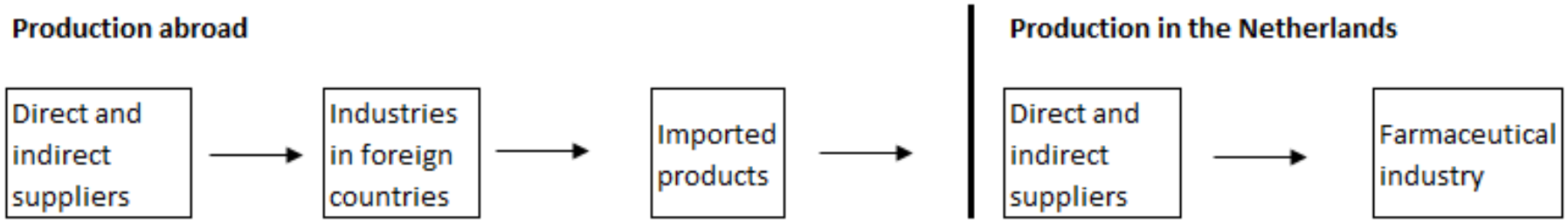
Use Dutch non-public information (NPI)

- Policy makers point out the critical industries; we assigned the right firms to the industries. **(NPI)**
- Map Dutch part of supply chain of those industries. **(NPI)**
- Estimate how much imports of which products the Dutch supply chain needs.
- Correct for imports from a country that are not used for Dutch production but for transit trade **(NPI)**.
- Heterogeneity: industry A and industry B might import the same product, but from different countries **(NPI)**.

The foreign part of the supply chain

- Link imports to exporting industries in countries; use input-output analysis to derive the foreign part of the supply chain.
- International data (FIGARO) provides rough product detail, e.g., metal products for shipyards and furniture industry
- Trade data shows traded products, e.g., screws and steel plates
- Use detailed Dutch information to link screws to furniture industry and steel plates to shipyards
- Result: product A from country B used by domestic industry C.
- Compile related indicators the literature associates with risk.
- This shows possible bottlenecks/chokepoints/vulnerabilities.

Data and methods for deriving the supply chain



Data used to derive the link	ADB MRIO	FIGARO supply table	Dutch input-output table, trade data	Dutch input-output table
Methodology used to derive the link	Input-output analysis	Link products & industries	Lemmers & Wong, Aerts et al.	Hypothetical extraction method

Results from a study that considered supply chains of five Dutch industries: pharmaceutics, energy, semi-conductor, defence, telecommunications

Indicators associated with risks in literature

Request of the ministry, following EC-study Arjona et al., 2023:

1. **Import value** by country of import. Threshold value: 10.000 euros
2. **World market concentration**. Herfindahl-Hirschman index (HHI).
3. **Import diversification of the Netherlands**. HHI.
4. **Non-EU share in EU-imports**. $\frac{extra\ EU\ import\ value}{total\ EU\ import\ value}$. Threshold: 50%
5. **Substitution ratio EU**. $\frac{extra\ EU\ import\ value^{EU}}{total\ EU\ export\ value^{EU}}$. Threshold: 100%
6. **Centrality**. Weighted out-degree centrality.

A **product by country combination** somewhere in the supply chain is **flagged** if all their 6 corresponding indicators surpass the thresholds.

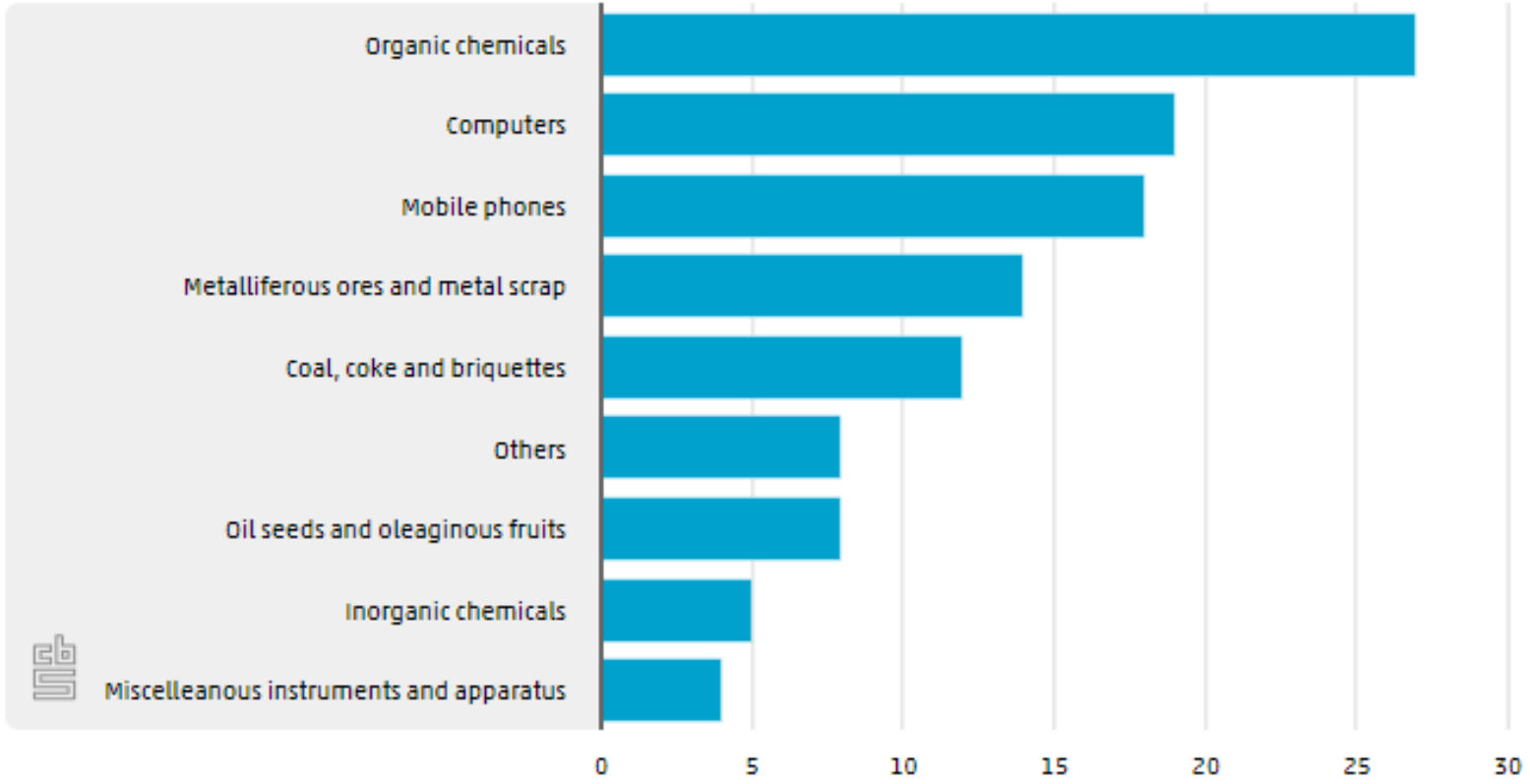
Very detailed information

- Insulin and its salts from the USA (pharmaceutics)
- Iron ore from Brazil and Australia (all 5 industries)
- Coal from Colombia (energy sector)
- Semi-conductor industry, defence, energy sector, telecommunication, each related to at least one of the goods manganese, magnets, magnesium from China

Product by country combination *somewhere* in supply chain

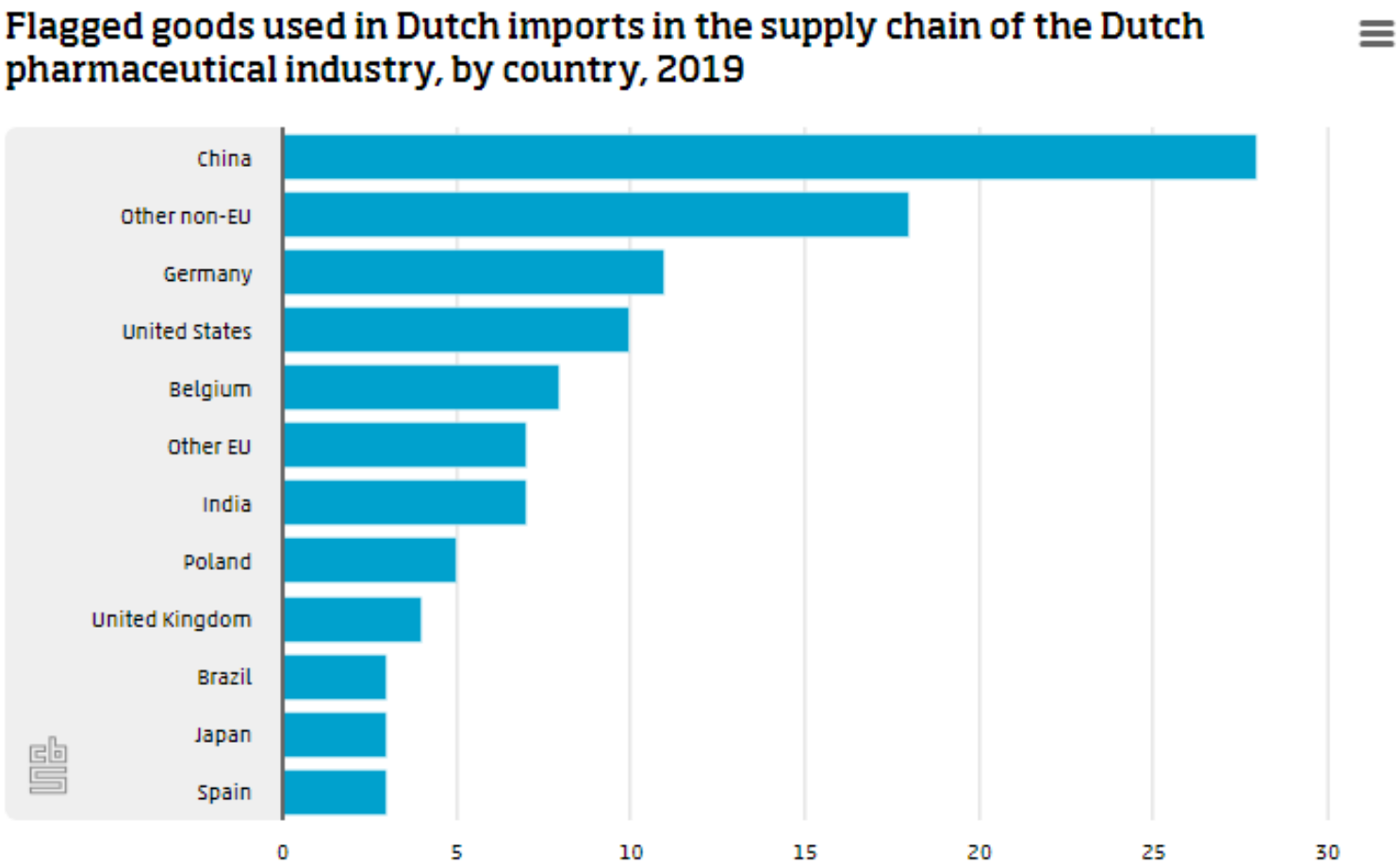
What type of goods are the flagged products?

Flagged goods in the supply chain of the Dutch pharmaceutical industry, upstream trade, by country, 2019



Source: Statistics Netherlands calculations based on Asian Development Bank, Eurostat/JRC, BACI

Where are those flagged goods coming from?



China, Germany and the United States dominate. Not surprising; these countries are among the most important import partners

Conclusion

- We estimated imports, direct and via the supply chain, of 5 Dutch industries, by country by product.
- This can be connected to indicators that the literature associates with risks.
- Example: chloramphenicol (antibiotic)

What is a problematic risk? Policy makers have to decide.

What happens if… That is for other institutions (e.g., CPB, TNO, OECD) to derive; they can use our methods and data.

Questions, remarks, comments?

Share them for the Q&A later on! Alternatively,

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In Dutch:

Report, methodological details and detailed tables here

(**Draft in English available** on request)

Related report on critical materials in Dutch supply chains