



Resilience, Globalization and Productivity

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**Based on Jaravel and Méjean (2021)
Which Strategy for Resilience in a Globalized World?**

A resilience strategy must be structured around a diagnosis of the vulnerabilities

- Supply vulnerabilities may affect competitiveness and productivity but resilience strategies have also a cost
- Core message: to be effective, the resilience strategy must be organized around very specific inputs; fine-tuning of vulnerabilities is possible through the analysis of Customs data and “stress test” methods
- Different axes depending on the vulnerability type:
 - Supply diversification
 - Storage
 - Support to innovation

Identifying vulnerability to external shocks (1/2)

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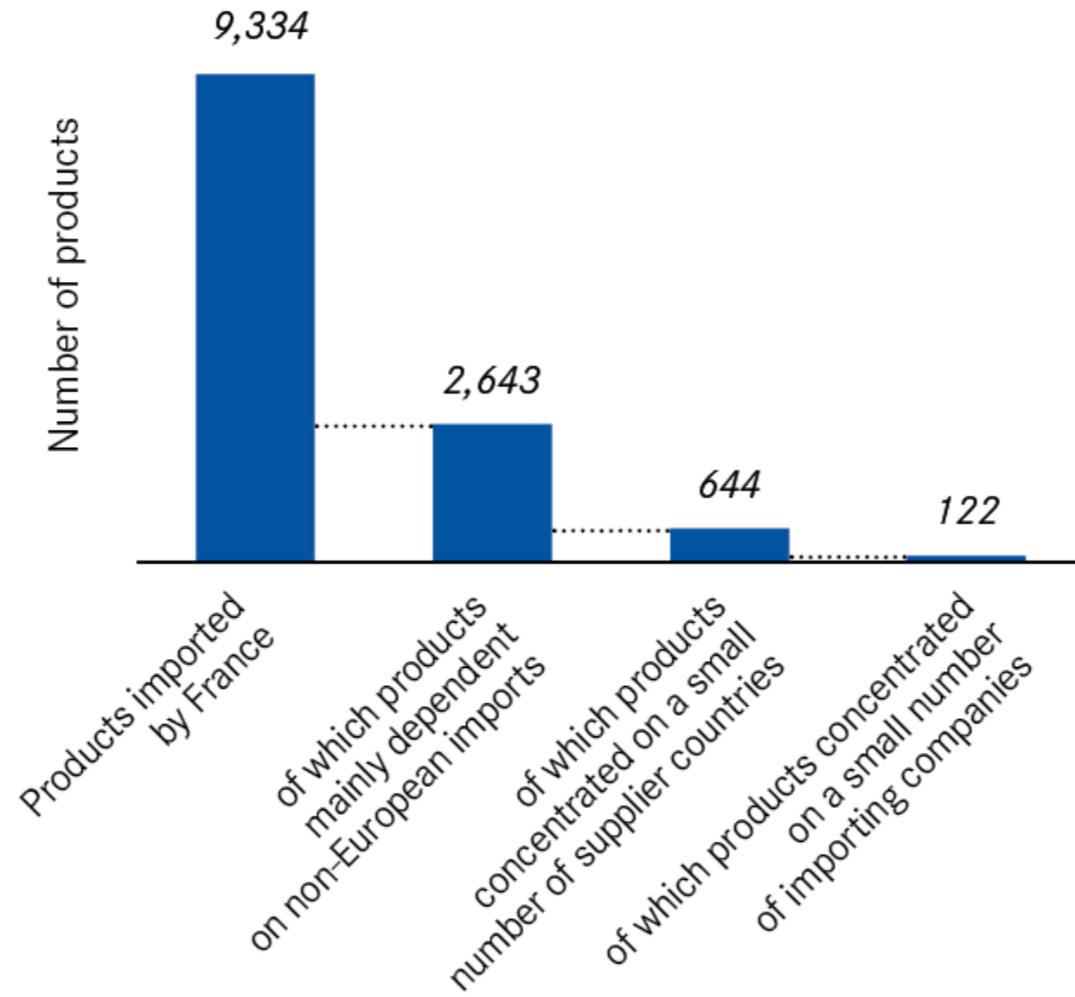
Globalized production processes: productivity gains but exposure to supply risks

- The Covid-19 crisis has highlighted supply vulnerabilities for some products
- On average, trade openness does not imply more volatility in GDP, as several opposing factors are at play
 - Access to international markets is a tool for diversifying demand risks, which reduces volatility
 - Globalized trade induces sectoral specialization, which increases volatility
- Role of globalized value chains:
 - Specialization gains increase productivity
 - But increased exposure to external shocks, and higher “granularity”, which increases supply vulnerabilities

Identifying vulnerability to external shocks (2/2)

- Example of a definition of a vulnerable input according to three criteria:
 - Originates mostly from suppliers outside the European Union
 - Concentrated in a small number of supplier countries (Herfindahl index > 0.50)
 - A single French company represents 90% of imports (“highly vulnerable”)
- Using these criteria, identify 644 inputs that are vulnerable to external shocks, 122 of which are highly vulnerable

Classifying products according to their supply vulnerability

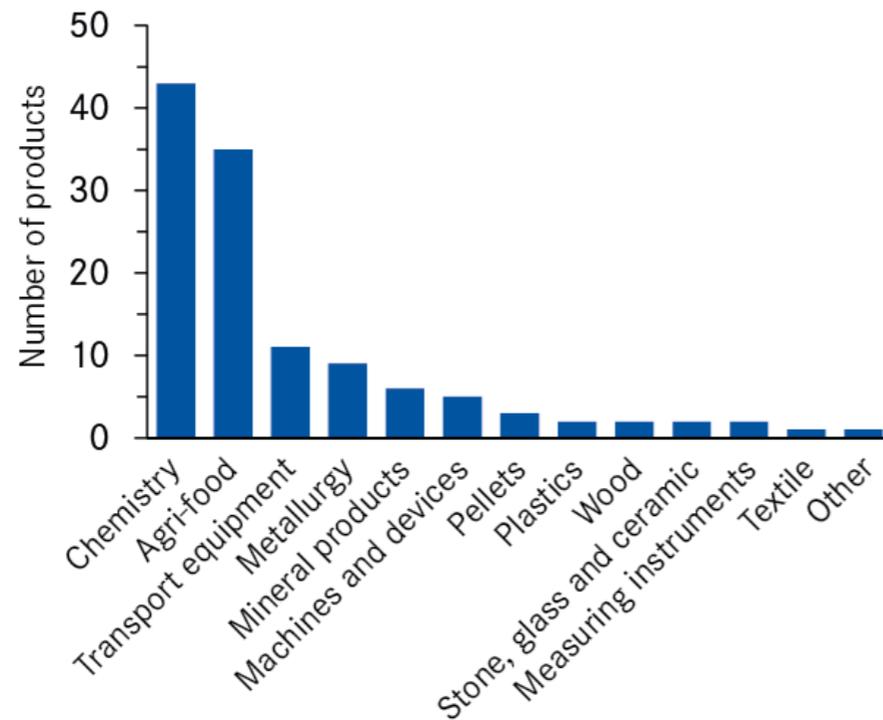


Source: DGDDI, Data from DAU-DEB for 2017.

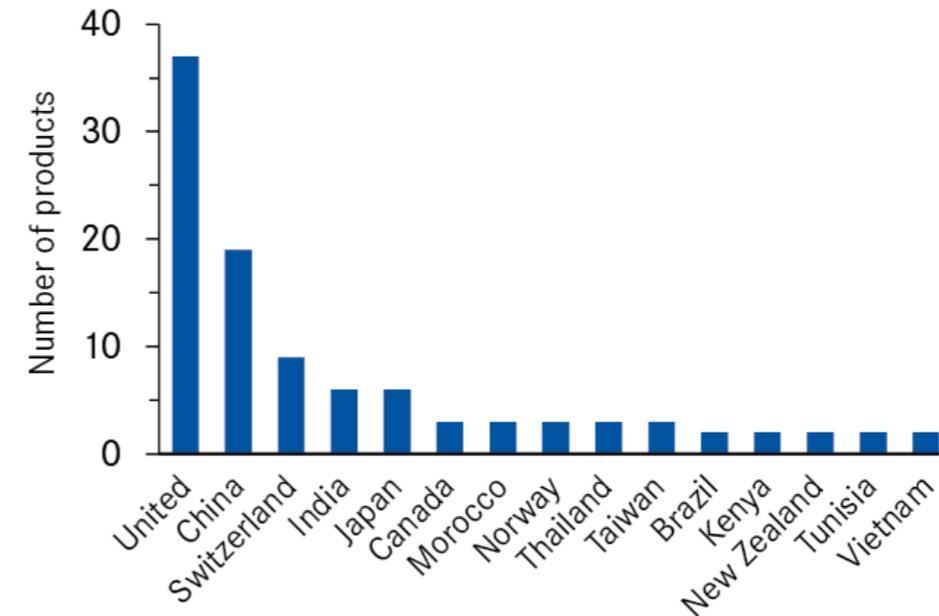
Distribution of supply vulnerabilities

(122 highly vulnerable products)

a. Sectoral distribution



b. Geographical distribution



Note: 43 products are identified as highly vulnerable in the chemical sector. Among the highly vulnerable products, 37 are from the United States.

Source: DGDDI, Data from DAU-DEB for 2017.

Vulnerable inputs of the “Chemicals and Pharmaceuticals”

| | Number of importing companies | Share of largest importing company in total imports (%) | Total value of imports (in thousands of euros) | China's share of total imports (%) |
|---|-------------------------------|---|--|------------------------------------|
| D- or DL-pantothenic acid (vitamin B3 or vitamin B5) and its derivatives | 104 | 42 | 27,527.8 | 73.9 |
| Carbonate; ammonium carbonates | 86 | 55 | 15,393.9 | 72.7 |
| Vitamin B1 and its derivatives | 80 | 31 | 14,612.7 | 69.2 |
| Vitamin B6 and its derivatives used mainly as vitamins | 75 | 38 | 7,424.7 | 68.2 |
| Calcium | 42 | 74 | 6,588.5 | 78.4 |
| Vitamin B12 and its derivatives used mainly as vitamins | 48 | 40 | 5,263.7 | 75.6 |
| o-Phenylenediamine, m-phenylenediamine, p-phenylenediamine, diaminotoluenes and their derivatives | 27 | 72 | 3,316.2 | 88.5 |
| Dihydrostreptomycin, its salts, esters and hydrates | 12 | 37 | 2,856.8 | 99.2 |
| Inositols | 38 | 56 | 1,774.6 | 76.7 |
| Phenylbutazone (INN) | 7 | 71 | 235.0 | 84.7 |
| Malonylurea (barbituric acid) and its salts | 15 | 33 | 105.8 | 91.9 |

Note: Carbonate imports from China from the largest French importer represent 55% of total imports.

Sources: Authors' calculations based on foreign trade statistics from the Inputs not subject to statistical confidentiality. *Direction générale des Douanes et Droits indirects.*

A multi-pronged strategy

Combining diversification of supply sources, storage and competitiveness through innovation depending on the technological level of vulnerable inputs

Three axes:

- **Promoting diversification** of supply sources and strategic alliances when other commercial partners can be mobilized, particularly at the European level
- Should the diversification not be possible, **facilitate or subsidize storage**, particularly for low value-added products
- **For vulnerable inputs at the technological frontier, fostering innovation to produce competitively on the national territory and in Europe**

Measuring “indirect” vulnerabilities at European level

- The European statistical system should be mobilized for a better understanding of indirect vulnerabilities (suppliers of suppliers)
- The European level is the most relevant for defining a resilience policy
- Strategic challenge for the European Union: map the vulnerabilities of European production chains

Recommendation . Expand the access to European trade statistics in order to map vulnerabilities of the European production chains based on the new European statistics on trade in goods and services.

Using the “stress tests” methodology

- “stress tests” methodology: theoretical modelling of the transmission of shocks in international production networks, calibration using data on these networks and “shock” scenarios (whether economic, environmental, geopolitical..)
- Such simulations make it possible to quantify the potential impact of these shocks but also to identify the areas of vulnerability that lead to an amplification of the aggregate effects

Recommendation . Conduct “stress tests” of the production network at national and European levels to identify supply vulnerabilities, according to the risk factors identified by a multidisciplinary committee.

A resilience through competitiveness and innovation at the technological frontier

- Innovation in strategic sectors increases resilience because it entails a capacity to adapt to external shocks
- Due to returns to scale, globalization offers opportunities to increase productivity and innovation at firm, sector and country levels
- Positioning on high-end products with a high technological content allows companies to differentiate themselves from competition from emerging countries and to develop their export market share

A better targeted and better evaluated industrial policy

- Relocalisation requires precise targeting to identify sectors with vulnerabilities and for which France can acquire technological leadership

Ex: nuclear and aeronautical technologies, France's presence in other technological segments could be consolidated, including autonomous vehicles (navigation, obstacle recognition...), computer-aided design software, as well as data transmission

- Need of a better *ex ante* targeting and better *ex post* evaluation

Recommendation . Target innovation aid schemes on vulnerable inputs with high technological content for which France can acquire world leadership and subject them to ex post quantitative evaluations.