The role of the EU in global value chains

Research project "Assessment of EU internal market integration"
Motivation of the project

- Recent trends: income embodied in intra-EU trade growing less than in extra-EU
- Institutional dimension: single market not yet completed
- Ongoing debate on risk sharing: less or more symmetric business cycles?
- New analytical tools: WIOD 2016 release
Key research questions to be answered throughout the project

- *How did the nature of value chains, in which EU members participate, evolve since 2000?*

- *Did specialization patterns changed significantly within the EU, both on a spatial and industrial basis?*

- *What is the impact of existing barriers for further integration, particularly regulation in the service sector?*

- *Did productivity increase through further specialization? In which industries? Which countries benefited more, which less?*
Presentation contents

VALUE ADDED GENERATION THROUGH PRODUCTION CHAINS
Definition, industry coverage, methodology

EMPIRICAL APPLICATIONS
Reading the declining share of the EU economy through value chains
An insight into 'C21 – Pharma' value chain
VALUE ADDED GENERATION THROUGH PRODUCTION CHAINS

DEFINITION
## Definition of a value chain

<table>
<thead>
<tr>
<th>Stage of value chain</th>
<th>Country</th>
<th>Industry</th>
<th>Value added concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream input</td>
<td>'i'</td>
<td>'s'</td>
<td>IND2</td>
</tr>
<tr>
<td>Downstream input</td>
<td>'j'</td>
<td>'t'</td>
<td>IND1</td>
</tr>
<tr>
<td>Final production</td>
<td>'k'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final demand</td>
<td>'l'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**IC** represents input coefficients, **Y** represents the output vector, and **FD** represents the final demand vector.
Indirect value added in the EU as upstream input supplier

<table>
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<tbody>
<tr>
<td>Upstream input</td>
<td>Y</td>
<td>'k'</td>
<td>'u' IND2</td>
</tr>
<tr>
<td>Downstream input</td>
<td>IC\textsubscript{up}</td>
<td>'j'</td>
<td>'t' IND1</td>
</tr>
<tr>
<td>Final production</td>
<td>IC\textsubscript{dw}</td>
<td>EU</td>
<td>'s'</td>
</tr>
<tr>
<td>Final demand</td>
<td>FD</td>
<td>'l'</td>
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</table>
## Indirect value added in the EU as downstream input supplier

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<td>'s'</td>
<td>IND2</td>
</tr>
<tr>
<td>Downstream input</td>
<td>EU</td>
<td>'t'</td>
<td>IND1</td>
</tr>
<tr>
<td>Final production</td>
<td>'k'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final demand</td>
<td>'l'</td>
<td>'u'</td>
<td>DIR</td>
</tr>
</tbody>
</table>
Direct value added in the EU as final producer

<table>
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<tr>
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<th>Country</th>
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<th>Value added concept</th>
</tr>
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<tr>
<td>Upstream input</td>
<td>'i'</td>
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<td>IND2</td>
</tr>
<tr>
<td>Downstream input</td>
<td>'j'</td>
<td>'t'</td>
<td>IND1</td>
</tr>
<tr>
<td>Final production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final demand</td>
<td>'l'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
VALUE ADDED GENERATION THROUGH PRODUCTION CHAINS

INDUSTRY COVERAGE
Industry coverage

Value adding industries

's', 't', 'u'

Sub-sectors

Low tech
Low-medium tech
Medium-high tech
High tech

Trade, transp., accommod.
Business services
Financial services
Construction, real estate
Public adm., others

Final demand industries

'u'

Sectors

Primary (inc. mining) (P)
Manufacturing (M)
 Tradable services (S-T)
Non-tradable services (S-NT)

Own industry ('u')

Other ('s', 't')

All industries
# Industry classification: manufacturing according to technology intensity

<table>
<thead>
<tr>
<th>Manufacturing (M)</th>
<th>Industry classification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low tech (M-L)</strong></td>
<td>C10-C12 Manufacture of food products, beverages and tobacco products</td>
</tr>
<tr>
<td></td>
<td>C13-C15 Manufacture of textiles, wearing apparel and leather products</td>
</tr>
<tr>
<td></td>
<td>C16 Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials</td>
</tr>
<tr>
<td></td>
<td>C17 Manufacture of paper and paper products</td>
</tr>
<tr>
<td></td>
<td>C18 Printing and reproduction of recorded media</td>
</tr>
<tr>
<td></td>
<td>C31_C32 Manufacture of furniture; other manufacturing</td>
</tr>
<tr>
<td></td>
<td>D35 Electricity, gas, steam and air conditioning supply</td>
</tr>
<tr>
<td></td>
<td>E36 Water collection, treatment and supply</td>
</tr>
<tr>
<td></td>
<td>E37-E39 Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services</td>
</tr>
<tr>
<td><strong>Low-medium tech (M-LM)</strong></td>
<td>C19 Manufacture of coke and refined petroleum products</td>
</tr>
<tr>
<td></td>
<td>C22 Manufacture of rubber and plastic products</td>
</tr>
<tr>
<td></td>
<td>C23 Manufacture of other non-metallic mineral products</td>
</tr>
<tr>
<td></td>
<td>C24 Manufacture of basic metals</td>
</tr>
<tr>
<td></td>
<td>C25 Manufacture of fabricated metal products, except machinery and equipment</td>
</tr>
<tr>
<td></td>
<td>C33 Repair and installation of machinery and equipment</td>
</tr>
<tr>
<td><strong>Medium-high tech (M-MH)</strong></td>
<td>C20 Manufacture of chemicals and chemical products</td>
</tr>
<tr>
<td></td>
<td>C27 Manufacture of electrical equipment</td>
</tr>
<tr>
<td></td>
<td>C28 Manufacture of machinery and equipment n.e.c.</td>
</tr>
<tr>
<td></td>
<td>C29 Manufacture of motor vehicles, trailers and semi-trailers</td>
</tr>
<tr>
<td><strong>High tech (M-H)</strong></td>
<td>C21 Manufacture of basic pharmaceutical products and pharmaceutical preparations</td>
</tr>
<tr>
<td></td>
<td>C26 Manufacture of computer, electronic and optical products</td>
</tr>
<tr>
<td></td>
<td>C30 Manufacture of other transport equipment</td>
</tr>
</tbody>
</table>
Industry classification: services according to their tradability and type of activities (1/2)

** Tradable services (S-T) **
- G45 Wholesale and retail trade and repair of motor vehicles and motorcycles
- G46 Wholesale trade, except of motor vehicles and motorcycles
- G47 Retail trade, except of motor vehicles and motorcycles
- H49 Land transport and transport via pipelines
- H50 Water transport
- H51 Air transport
- H52 Warehousing and support activities for transportation
- H53 Postal and courier activities
- I Accommodation and food service activities

**Trade, transp., accommod. (G&H&I) **
- J58 Publishing activities
- J59 J60 Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities
- J61 Telecommunications
- J62 J63 Computer programming, consultancy and related activities; information service activities
- M69 M70 Legal and accounting activities; activities of head offices; management consultancy activities
- M71 Architectural and engineering activities; technical testing and analysis
- M72 Scientific research and development
- M73 Advertising and market research
- M74 M75 Other professional, scientific and technical activities; veterinary activities
- N Administrative and support service activities

**Business services (J&M&N) **
- K64 Financial service activities, except insurance and pension funding
- K65 Insurance, reinsurance and pension funding, except compulsory social security
- K66 Activities auxiliary to financial services and insurance activities
### Industry classification: services according to their tradability and type of activities (1/2)

<table>
<thead>
<tr>
<th>Non-tradable services (S-NT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction, real estate (F&amp;L)</td>
</tr>
<tr>
<td>F Construction</td>
</tr>
<tr>
<td>L68 Real estate activities</td>
</tr>
<tr>
<td>O84 Public administration and defence; compulsory social security</td>
</tr>
<tr>
<td>P85 Education</td>
</tr>
<tr>
<td>Q Human health and social work activities</td>
</tr>
<tr>
<td>R_S Other service activities</td>
</tr>
<tr>
<td>T Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use</td>
</tr>
<tr>
<td>U Activities of extraterritorial organizations and bodies</td>
</tr>
<tr>
<td>Public adm., others (O_U)</td>
</tr>
</tbody>
</table>


Empirical application: example

Value added throughout the value chain of pharma industry

Value adding sectors / sub-sectors

- P
- M
- M-L
- M-LM
- M-MH
- M-H
- S-T
- S-NT

Value added concept

- DIR
- IND1
- IND2

Year

- 2000
- 2001
- 2013
- 2014

Value added in low-tech manufactures of country 'j' in 2013 as downstream suppliers of inputs to the production of pharma products in country 'k' for final demand of country 'l', proportional to the participation of country 'i' in upstream stages of the value chain

Countries

<table>
<thead>
<tr>
<th>i</th>
<th>j\k</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<td>152447.4</td>
<td>0.040099</td>
<td>0.085108</td>
<td>0.000326</td>
<td>0.037542</td>
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<td>0.011273</td>
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<td>0.00715</td>
<td>0.044658</td>
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<td>1.73E-05</td>
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<td>0.000254</td>
<td>1.63E-06</td>
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<td>0.000532</td>
<td>0.000442</td>
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<td>0.241105</td>
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<td>0.000368</td>
<td>0.0003</td>
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<td>3.22E-05</td>
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<td>0.000154</td>
<td>0.241105</td>
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<tr>
<td>1</td>
<td>9</td>
<td>0.00325</td>
<td>7.91E-06</td>
<td>3.44E-05</td>
<td>9.99E-05</td>
<td>0.000154</td>
<td>0.241105</td>
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<td>0.000141</td>
<td>0.0000424</td>
<td>0.000154</td>
<td>0.241105</td>
</tr>
<tr>
<td>1</td>
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<td>0.241105</td>
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<td>7.95E-07</td>
<td>9.75E-07</td>
<td>2E-09</td>
<td>1.67E-07</td>
<td>4.61E-07</td>
</tr>
</tbody>
</table>

C21 Pharmaceuticals and pharmaceutical products

Final demand industry
VALUE ADDED GENERATION THROUGH PRODUCTION CHAINS

METHODOLOGY
Multi-regional input output framework

Intermediate consumption

Production

Value added

\[ Z_{(1,1),(1,1)} \]
\[ Z_{(h,r),(1,1)} \]
\[ Z_{(i,s),(1,1)} \]
\[ Z_{(j,t),(1,1)} \]
\[ Z_{(k,u),(1,1)} \]
\[ Z_{(C,I),(1,1)} \]

Final demand

Output

\[ f_{(1,1),1} \]
\[ f_{(h,r),1} \]
\[ f_{(i,s),1} \]
\[ f_{(j,t),1} \]
\[ f_{(k,u),1} \]
\[ f_{(C,I),1} \]

\[ x_{1,1} \]
\[ x_{h,r} \]
\[ x_{i,s} \]
\[ x_{j,t} \]
\[ x_{k,u} \]
\[ x_{C,I} \]

\( C = \text{number of countries} \)
\( I = \text{number of industries} \)
Technological coefficients

Output
\[ x = Z + f \]

Intermediate consumption
\[ Z = [A] \times x \]

Intermediate products from industry 's' of country 'i' used by industry 't' of country 'j' as a share of total output of industry 't' of country 'j'

A demand matrix: $A = \begin{pmatrix} 
A_{(1,1),(1,1)} & \cdots & A_{(1,1),(j,t)} & \cdots & A_{(1,1),(C,I)} \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
A_{(i,s),(1,1)} & \cdots & A_{(i,s),(j,t)} & \cdots & A_{(i,s),(C,I)} \\
\vdots & \ddots & \vdots & \ddots & \vdots \\
A_{(C,I),(1,1)} & \cdots & A_{(C,I),(j,t)} & \cdots & A_{(C,I),(C,I)} 
\end{pmatrix}$

Demand of intermediate products from industry 's' of country 'i'

Demand of intermediate products by industry 't' of country 'j'
Industrial inter-linkages

Production embodied in final demand (*Leontief inverse*)

\[ x = A \times x + f \quad \Rightarrow \quad x = (I - A)^{-1} \times f = B \times f \]

- **Output of industry 's' of country 'i' embodied in one unit of final demand**

\[
B = \begin{pmatrix}
  b_{(i,s),(1,1)} & \cdots & b_{(1,1),(l,u)} & \cdots & b_{(1,1),(C,I)} \\
  \vdots & \ddots & \vdots & \ddots & \vdots \\
  b_{(i,s),(1,1)} & \cdots & b_{(i,s),(l,u)} & \cdots & b_{(i,s),(C,I)} \\
  \vdots & \ddots & \vdots & \ddots & \vdots \\
  b_{(C,I),(1,1)} & \cdots & b_{(C,I),(l,u)} & \cdots & b_{(C,I),(C,I)}
\end{pmatrix}
\]

- **Output supported by one unit of final demand of products from industry 'u' by country 'l'**
Value added generation

Value added embodied in final demand

\[ w = \mathbf{v} \times B \times \mathbf{f} \]

\[ v_{i,s} = \frac{w_{i,s}}{x_{i,s}} \]

\[ f_{(k,u)} = \sum_{l=1}^{C} f_{(k,u),l} \]

\[
\mathbf{v} = \begin{pmatrix}
    v_{1,1} & \cdots & 0 & \cdots & 0 \\
    \vdots & \ddots & \vdots & \ddots & \vdots \\
    0 & \cdots & v_{i,s} & \cdots & 0 \\
    \vdots & \ddots & \vdots & \ddots & \vdots \\
    0 & \cdots & 0 & \cdots & v_{C,I}
\end{pmatrix}
\]

\[
\mathbf{f} = \begin{pmatrix}
    f_{(1,1)} & \cdots & 0 & \cdots & 0 \\
    \vdots & \ddots & \vdots & \ddots & \vdots \\
    0 & \cdots & f_{(k,u)} & \cdots & 0 \\
    \vdots & \ddots & \vdots & \ddots & \vdots \\
    0 & \cdots & 0 & \cdots & f_{(C,I)}
\end{pmatrix}
\]
Value added decomposition

Indirect 2 (upstream input supply)

\[ VAIND_{i,s}^{(i,s)\prec(j,t)\prec(k,u)\prec(l)} = \sum_{g} \sum_{q} \sum_{h} \sum_{r} w_{i,s} \times b_{(i,s),(g,q)} \times A_{(h,r),(j,t)} \times A_{(j,t),(k,u)} \times f_{(k,u),l} \]

Indirect 1 (downstream input supply)

\[ VAIND_{j,t}^{(i,s)\prec(j,t)\prec(k,u)\prec(l)} = w_{j,t} \times A_{(j,t),(k,u)} \times f_{(k,u),l} \times \frac{VAIND_{i,s}^{(i,s)\prec(j,t)\prec(k,u)\prec(l)}}{\sum_{h} \sum_{r} VAIND_{h,r}^{(h,r)\prec(j,t)\prec(k,u)\prec(l)}} \]

Direct (producer)

\[ VADIR_{k,u}^{(i,s)\prec(j,t)\prec(k,u)\prec(l)} = w_{k,u} \times f_{(k,u),l} \times \frac{VAIND_{j,t}^{(j,t)\prec(k,u)\prec(l)}}{\sum_{h} \sum_{r} VAIND_{h,r}^{(h,r)\prec(k,u)\prec(l)}} \times \frac{VAIND_{i,s}^{(i,s)\prec(j,t)\prec(k,u)\prec(l)}}{\sum_{h} \sum_{r} VAIND_{h,r}^{(h,r)\prec(j,t)\prec(k,u)\prec(l)}} \]
EMPIRICAL APPLICATIONS

READING THE DECLINING SHARE OF THE EU ECONOMY THROUGH VALUE CHAINS
EU losing share in world's economy

Global share of total value added in the EU
A few research questions (1/2)

• How did the participation of the EU in value chains evolve during the last 15 years?

• Was that an homogenous process across periods and value chains?

• How did the composition of EU value added changed accordingly?
Using broad-defined value chains: definition

<table>
<thead>
<tr>
<th>Stage of value chain</th>
<th>Region</th>
<th>Industry</th>
<th>Value added concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input supplier</td>
<td>IC</td>
<td>EU / RoW</td>
<td>All</td>
</tr>
<tr>
<td>Final production</td>
<td>Y</td>
<td>EU / RoW</td>
<td><code>u</code></td>
</tr>
<tr>
<td>Final demand</td>
<td>FD</td>
<td>EU / RoW</td>
<td><code>u</code> sub-sectors &amp; sectors</td>
</tr>
</tbody>
</table>

Definition of value chains:
- **Input supplier**: Upstream
- **Final production**: Downstream
- **Final demand**: Downstream

Value added concept:
- **IND**: All
- **DIR**: `u` sub-sectors & sectors
Value added in the EU through value chains

Stage of value chain

- Input supplier (Upstream)
- Final production (Downstream)
- Final demand (Downstream)

Value added concept

- DIR&IND
- DIR&IND
- IND
- IND

Intra-EU final demand
- EU Input supplier
- EU Final production
- EU Final demand

Extra-EU final exports
- EU Input supplier
- EU Final production
- EU Final demand

Intra-RoW final demand
- EU Input supplier
- EU Final production
- EU Final demand

Extra-EU final imports
- EU Input supplier
- EU Final production
- EU Final demand
EU losing share in world's economy: particularly when final producer in VCs

Global share of total value added in the EU, by value chain

**Final production in EU**
- Intra-EU final demand
  - 2000-2014: -1.3pp
- Extra-EU final exports
  - 2000-2014: -3.5pp
- Value added in EU
  - 2000-2014: -1.3pp

**Final production in RoW**
- Extra-EU final imports
  - 2000-2007: +1.0pp
  - 2007-2014: -1.2pp
- Intra-Row final demand
  - 2000-2007: +0.8pp
  - 2007-2014: -0.3pp

Value added in EU: $14tn
Extra-EU final exports: $1.2tn
Extra-EU final imports: $46bn
Intra-Row final demand: $1.4tn
Changing composition of EU value added

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct: Intra-EU final demand</th>
<th>Indirect: Intra-EU final demand</th>
<th>Direct: Extra-EU final exports</th>
<th>Indirect: Extra-EU final exports</th>
<th>Indirect: Intra-RoW final demand</th>
<th>Indirect: Extra-EU final imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>35.9%</td>
<td>2.4%</td>
<td>2.9%</td>
<td>5.9%</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>35.6%</td>
<td>2.6%</td>
<td>3.2%</td>
<td>6.7%</td>
<td>0.3%</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>32.5%</td>
<td>3.8%</td>
<td>8.4%</td>
<td>0.3%</td>
<td>51.8%</td>
<td></td>
</tr>
</tbody>
</table>

2000-2007:
-1.1pp
-0.3pp
+0.2pp
+0.3pp
+0.8pp

+0.3pp (-0.8pp)
-3.1pp (-3.4pp)
+0.6pp (+0.8pp)
+0.6pp (+0.9pp)
+1.7pp (+2.5pp)
= (=)
A few research questions (2/2)

• Which are the factors behind the loss of global economic relevance of the EU (demand, market share, fragmentation?)

• Which industries are contributing to a larger extent to this phenomenon?

• Are factors common across industries?
# Dimensions of shift-share analysis

<table>
<thead>
<tr>
<th>Dimensions of shift-share analysis</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Industry coverage</strong></td>
<td>Industries / sub-sectors and sectors of <strong>final demand</strong></td>
</tr>
</tbody>
</table>
| **Factors** | **Industry composition of global final demand**  
  Construction increased its global share in final demand to 13% in 2014 from 11% in 2000  
**Geographical composition of final demand** by industry  
  The share of EU in global final demand of motor vehicles decreased to 18% in 2014 from 27% in 2000  
**Geographical composition of final production** by origin of final demand  
  The share of EU in final supply of air transport services in Rest-of-World decreased from 5.6% in 2000 to 4.1% in 2014  
**Degree of production fragmentation** by industry  
  Indirect value added embodied in extra-EU final exports of basic metals increased by 7pp between 2000 and 2014 up to 74%  
**Geographical composition of indirect value added** by industry  
  The participation of the EU in indirect value added embodied in intra-EU final demand of health services declined to 80% in 2014 from 87% in 2000 |
Contribution to change in global share of total value added in the EU (by factor)
Contribution to change in global share of total value added in the EU (by sector of final demand)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL</td>
<td>-2.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRIMARY</td>
<td>-0.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANUFACTURING</td>
<td>-1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRADABLE SERVICES</td>
<td>-0.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NON-TRADABLE SERVICES</td>
<td>-0.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Contribution to change in global share of total value added in the EU (by sector of final demand and factor)
Contribution to change in global share of total value added in the EU (by sub-sector of final demand)
Contribution to change in global share of total value added in the EU (by sub-sector of final demand and factor)
Contribution to change in global share of total value added in the EU (by industry of final demand, selected 30 industries)
Contribution to change in global share of industrial value added in the EU (by industry of final demand, selected 30 industries)
Contribution to change in global share of industrial value added in the EU (by industry of final demand, selected 30 industries)
Contribution to change in global share of industrial value added in the EU (by industry of final demand, selected 30 industries)
EMPIRICAL APPLICATIONS

AN INSIGHT INTO 'C21 – PHARMA' VALUE CHAIN
Definition of the C21 value chain

Stage of value chain | Region | Industry | Value added concept
--- | --- | --- | ---
Upstream input | EU / RoW | 'S' sub-sectors & sectors | IND2
Downstream input | EU / RoW | 't' sub-sectors & sectors | IND1
Final production | EU / RoW | | DIR
Final demand | EU / RoW | | |
EU losing global share in value added embodied in final demand of C21 products

- 2000-2007: +5.6pp
- 2007-2014: -10.5pp
- 2000-2014: -4.8pp
A few research questions (1/3)

- How did global final demand of C21 products evolve during the last 15 years?

- Did the EU win or lose global market share in C21 production? Was the process homogeneous across value chains?

- How did fragmentation of C21 value chain change? Did the EU increase its participation as input supplier?
Global share of *final demand* in the EU of C21 products
Global share of *final production* in the EU of C21 products (by origin of final demand)

**Final demand in EU**
- 2000-2014: -13.6pp
- 2000-2007: +13.2pp
- 2007-2014: -7.8pp

**Final demand in RoW**
- 2000-2007: +6.1pp
- 2007-2014: -10.3pp

**TOTAL**
- 2000-2014: -4.2pp
- 2000-2007: +6.1pp
- 2007-2014: -10.3pp

Global share of final demand in the EU
Global share of \textit{indirect value added in the world} embodied in final demand of C21 products

Value added in \textit{upstream input suppliers} (VAIND2)
\textbf{2000-2014: +4.2pp}

Value added in \textit{downstream input suppliers} (VAIND1)
\textbf{2000-2014: =}

Percentage (%)
Global share of indirect value added embodied in final demand of C21 products (by region of final production)

**Final production in EU**
- Value added in upstream input suppliers (VAIN2)
  - 2000-2014: +2.8pp
- Value added in downstream input suppliers (VAIN1)
  - 2000-2014: -0.9pp

**Final production in RoW**
- Value added in upstream input suppliers (VAIN2)
  - 2000-2014: +4.5pp
- Value added in downstream input suppliers (VAIN1)
  - 2000-2014: +0.4pp
A few research questions (2/3)

• How did changes in demand and production related to C21 value chain impact value generation in EU?

• Which industries (sub-sectors and sectors) supplying inputs for final production of C21 were the main contributors?

• Were factors common across industries, type of value chain and periods?
## Dimensions of shift-share analysis

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry coverage</td>
<td>Industries / sub-sectors and sectors of value added</td>
</tr>
<tr>
<td>Type of (broad-based) value chains</td>
<td>Intra-EU final demand, extra-EU final exports, intra-RoW final demand, extra-EU final imports</td>
</tr>
<tr>
<td>Factors (specific of the value chain supplying final C21 products)</td>
<td>Geographical composition of final demand of C21 products, by origin of final demand&lt;br&gt;Geographical composition of final production of C21 products, by origin of final demand&lt;br&gt;Degree of production fragmentation of the value chain supplying final C21 products&lt;br&gt;Industrial composition of indirect value added embodied in final demand of C21 products&lt;br&gt;Geographical composition of indirect value added embodied in final demand of C21 products, by industry</td>
</tr>
</tbody>
</table>
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by factor)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sector of value generation, including own industry)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sub-sector of value generation, excluding own industry)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sector of value generation and factor)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sub-sector of value generation and factor)

- **2000-2007**
- **2007-2014**

**LOW**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**L-MED**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**M-HIGH**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**HIGH**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**G&H&I**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**K**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**J&M&N**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**C&L**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**Q**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**MANUFACTURES**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**TRAD. SERV.**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL

**NON-T. SERV.**
- Geographical composition of final demand
- Geographical composition of final production by origin of final demand
- Degree of production fragmentation
- Industrial composition of indirect value added
- Geographical composition of indirect value added by industry
- TOTAL
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sector of value generation, broad value chain and factor)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sector of value generation, broad value chain and factor)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sub-sector of value generation, broad value chain and factor)
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by sub-sector of value generation, broad value chain and factor)

2007-2014
Contribution to change in global share of total value added in the EU embodied in final demand of C21 products (by industry of value generation, 30 selected industries bar own industry)
Contribution of M72 to change in global share of total value added in the EU embodied in final demand of C21 products (by value chain and factor)
Indirect value added generated in $M72$ embodied in final demand of $C21$ products produced in the EU (by upstreamness of input supply)

**Share in total value added**

- Value added in downstream input suppliers ($VARIANT1$)
- Value added in upstream input suppliers ($VARIANT2$)

**EU global share**

- Value added in downstream input suppliers ($VARIANT1$)
- Value added in upstream input suppliers ($VARIANT2$)
A few research questions (3/3)

• How did the distribution of value added embodied in final demand of C21 products evolve during the last 15 years?

• Was this process homogenous across stages of value generation?

• Did the role of new accession countries (EU-13) increase or decrease throughout this period? In which industries (sub-sectors and sectors) were the main changes recorded?
Distribution of value added in the EU embodied in global final demand of C21 products
Change in share of value added in the EU embodied in global final demand of C21 products, by stage of value chain and country

**DIRECT**

**INDIRECT (downstream)**

**INDIRECT (upstream)**

- EU15 countries
- EU13 countries

<table>
<thead>
<tr>
<th>Country</th>
<th>EU15 Countries</th>
<th>EU13 Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEL</td>
<td></td>
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<tr>
<td>DEU</td>
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<td>FRA</td>
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-6 -5 -4 -3 -2 -1 0 1 2 3 4 5

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6
EU-13 share of value added in EU embodied in final demand of C21 products, by stage of value chain
EU-13 share of value added in EU embodied in final demand of C21 products, by type of value chain

- Domestic final demand
- Intra-EU final exports
- Extra-EU final exports

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic final demand %</th>
<th>Intra-EU final exports</th>
<th>Extra-EU final exports</th>
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<td>2003</td>
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<tr>
<td>2004</td>
<td>9.2</td>
<td>10.6</td>
<td>0.0</td>
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<tr>
<td>2005</td>
<td>10.6</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>2006</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>2007</td>
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<td>2011</td>
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<td>2014</td>
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</tbody>
</table>
Contribution to change in EU-13 share of value added in EU embodied in final demand of C21 products, by sector/sub-sector and stage of value chain

**By sector**

- Indirect (upstream)
- Indirect (downstream)
- Direct
- TOTAL

**By sub-sector**

- LOW
- L-MED
- M-HIGH
- HIGH
- G&H&I
- K
- J&M&N
- C&L
- NON-T. SERV.
Change in EU-13 share of value added in EU embodied in final demand of C21 products, by sector and sub-sector

By sector

By sub-sector
Contribution to change in EU-13 share of value added in EU embodied in final demand of C21 products, by industry, 30 selected industries bar own industry.)
EU-13 share of *indirect* value added in EU embodied in final demand of C21 products, by *stage of input supply in selected industries*
THANK YOU!
ANNEX: WIOD 2016
RELEASE
World Input-Output Database

**Release 2013**

World Input-Output Tables and underlying data, covering 40 countries, and a model for the rest of the world for the period 1995-2011. Data for 35 sectors are classified according to the International Standard Industrial Classification revision 3 (ISIC Rev. 3). The tables adhere to the 1993 version of the SNA.

**Release 2016**

World Input-Output Tables and underlying data, covering 43 countries, and a model for the rest of the world for the period 2000-2014. Data for 56 sectors are classified according to the International Standard Industrial Classification revision 4 (ISIC Rev. 4). The tables adhere to the 2008 version of the SNA.
THE EU IN GLOBAL VALUE CHAINS

WIOD: country coverage

<table>
<thead>
<tr>
<th>European Union 28</th>
<th>EU15</th>
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<tr>
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<table>
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<tr>
<th>Rest of the World</th>
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<tbody>
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</table>
## WIOD: sector coverage

### 2013 release

<table>
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<th>Sector</th>
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<tbody>
<tr>
<td>Primary</td>
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<tr>
<td>Manufacturing</td>
<td>15</td>
</tr>
<tr>
<td>Tradable services</td>
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</tr>
<tr>
<td>Non-tradable services</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>35</strong></td>
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</table>

### 2016 release

<table>
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<th>Count</th>
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<tbody>
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<td>4</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>20</td>
</tr>
<tr>
<td>Tradable services</td>
<td>21</td>
</tr>
<tr>
<td>Non-tradable services</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>56</strong></td>
</tr>
</tbody>
</table>

### Differences between 2013 and 2016 releases

- **Primary** sector: 2 to 4
- **Manufacturing** sector: 15 to 20
- ** Tradable services** sector: 10 to 21
- ** Non-tradable services** sector: 8 to 9

### New sectors in 2016 release

- **C20** Manufacture of chemicals and chemical products
- **C21** Manufacture of basic pharmaceutical products and pharmaceutical preparations
- **C26** Manufacture of computer, electronic and optical products
- **C27** Manufacture of electrical equipment
- **C29** Manufacture of motor vehicles, trailers and semi-trailers
- **C30** Manufacture of other transport equipment
- **J62_J63** Computer programming, consultancy and related activities; information service activities
- **K64** Financial service activities, except insurance and pension funding
- **K65** Insurance, reinsurance and pension funding, except compulsory social security
- **K66** Activities auxiliary to financial services and insurance activities
- **M69_M70** Legal and accounting activities; activities of head offices; management consultancy activities
- **M71** Architectural and engineering activities; technical testing and analysis
- **M72** Scientific research and development
- **M73** Advertising and market research
- **M74_M75** Other professional, scientific and technical activities; veterinary activities
THANK YOU!