EURO AREA DEPENDENCE ON INTERNATIONAL SUPPLY CHAINS

The supply shocks caused by the earthquake in Japan had serious effects on global supply chains and on those countries whose production strongly depends on Japanese inputs. The car industry was the most affected, as more than half of Japanese global car production occurs outside Japan. For instance, in the United States the implied drop in motor vehicle output in the second quarter of 2011 relative to the first quarter ($5.5 billion) represented an estimated negative contribution to GDP growth of at least 0.15 percentage point (on a quarter-on-quarter annualised basis). Although this episode had a more limited effect on euro area production, it raised general concerns about the risks of the international transmission of supply shocks via trade linkages.[1]

Global supply chains are a significant feature of today's global economy, and trade in intermediate inputs now accounts for more than half of the goods imported by OECD economies and around three-quarters of the imports of large developing economies.[2] Vertical specialisation and intra-industry trade have led to an increasing interconnectedness among economies and put emphasis on the importance of value chains as drivers of supply shocks. Against this background, this box describes the potential risks for the euro area stemming from disruptions in the global supply chain originating from its major trading partners. In this context, the degree of riskiness depends both on the current dependence on import suppliers and on the degree of substitutability via alternative suppliers.

General import patterns in the euro area

The euro area obtains 60% of its total extra-euro area imports of goods from ten major trading partners. In 2010 the most important euro area suppliers were China (13.5%),

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1 Looking at the car industry, in 2009 the share of Japanese vehicle brands in total domestic production was 50% in the United Kingdom, 35% in the United States and only 3% in the euro area. The share of imported Japanese vehicles in total sales in 2010 was 13% in the United States, 5% in the United Kingdom and 4% in the euro area. The source of these data is the Reserve Bank of Australia, *Statement on Monetary Policy*, August 2011.

2 See Miroudot, S., Lanz, R. and Ragoussis, A., "Trade in Intermediate Goods and Services", *OECD Trade Policy Working Paper Series*, No 93, 2009.

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the United Kingdom (9.6%), the United States (8.3%) and the Russian Federation (7.2%).[3] The share of intermediate goods in total extra-euro area imports increased sharply between 1999 and 2001, and between 2004 and 2008, when it reached the pre-crisis peak of 65% (see chart). At an aggregate sectoral level, mineral fuels, oils and energy-related products (20%), followed by machinery and computers (12%) and electrical machinery (11%), are the products with the highest import shares (see Table A). According to the Balassa index, the euro area tends to import more than the world average of mineral fuels, oils and energy-related products, pharmaceutical products, organic chemicals, clothing, aircraft, spacecraft and furniture.[4]

Share of intermediate goods in total extra-euro area imports

(percentage points)

Sources: Eurostat and ECB calculations.
Notes: Intermediate goods are defined according to the Broad Economic Categories classification of the United Nations. The last observation refers to May 2011.

Overall import dependence of the euro area

The overall import dependence of the euro area via global supply chains can be assessed in terms of the current dependence on its suppliers and the degree of substitutability of these suppliers with alternative sources. The analysis relies on a set of indicators computed from euro area

3   The others were Switzerland, the Czech Republic, Poland, Japan, Sweden and Norway.

4   The Balassa index is computed as $\dfrac{M_{i,EA}/M_{EA}}{M_i/M}$, where $M_{i,EA}$ is euro area imports of sector i, M_{EA} is total euro area imports, M_i is total world imports of sector i and M is total world imports. A value of the index greater than one means that in that sector the euro area imports relatively more than the aggregate world average import share, suggesting that, for the supply of goods belonging to that industry, the euro area is more dependent on imports than the world average.

Table A Euro area import shares by industry and Balassa index

(import shares in percentage points)

Industry	Import share	Balassa index
Mineral fuels, oils, waxes	19.89	1.16
Nuclear reactors, boilers, machinery and computers	11.63	0.91
Electrical machinery and equipment and parts	11.07	0.81
Vehicles other than railway or tramway	6.02	0.97
Pharmaceutical products, excluding drugs	4.27	1.48
Optical, photographic precision instruments and accessories	3.43	1.05
Organic chemicals	3.04	1.17
Articles of apparel and clothing – not knitted	2.31	1.73
Plastics and articles thereof	2.15	0.74
Articles of apparel and clothing – knitted	2.11	1.67
Pearls, stones, precious metals	1.93	0.64
Aircraft, spacecraft and parts thereof	1.77	1.28
Iron and steel	1.56	0.74
Furniture	1.48	1.27

Sources: Baci database and CEPII.
Note: The industries reported in this table are classified according to a two-digit level of aggregation.

Table B Euro area imports with high current dependence and low substitutability: selected sectors by trading partner			
Trading partner	Number of sectors[1]	Number of intermediate sectors	Share of total bilateral imports[2] (percentages)
China	94	65	1.20
United States	44	31	7.80
United Kingdom	14	10	1.10
Japan	13	8	0.70
Switzerland	9	8	0.40
Russian Federation	6	6	3.20
Czech Republic	5	4	0.30
Sweden	4	4	1.60
Norway	3	1	2.20
Poland	2	1	0.80

Sources: CEPII and ECB calculations.
1) Sectors are selected applying the following criteria: main import partner's share above 30%; euro area import share above 20%; Balassa index above 1; and ubiquity share below 30%.
2) For each of the trading partners, the data give the value of the imports of the selected sectors as a share of the total bilateral imports of the euro area.

bilateral trade flow data for more than 5,000 sectors.[5] On the basis of these indicators, import flows characterised by high current dependence and low substitutability are identified as the vulnerable links in the euro area global supply chain.[6] In particular, the interruption of import flows for intermediate goods would represent a threat for euro area producers and a channel of international propagation of supply shocks.

The overall import dependence of the euro area varies considerably across trading partners (see Table B). When counting the sectors for which the euro area exhibits high current dependence and low substitutability from other suppliers, China leads (94 sectors, of which 65 intermediate goods), followed by the United States (44 sectors, of which 31 intermediate goods), the United Kingdom (14 sectors, of which 10 intermediate goods) and Japan (13 sectors, of which 8 intermediate goods). While only for the United States do these sectors represent a substantial share (7.8%) of the total bilateral trade with the euro area,[7] the goods imported from the other countries might still be relevant, as their absence could hinder the production of many final goods and harm specific euro area industries or firms.

To understand which industries are indeed more exposed, it is important also to take into account the sectoral dimension of the analysis.[8] This shows that the euro area exhibits high overall import dependence on most of its trading partners for organic chemicals used as inputs in the pharmaceutical, cosmetic and other downstream chemical sectors (plastic, rubber, paints, etc.). In addition, the import dependence is high for certain inorganic chemicals and textile intermediate products imported from China, for inorganic chemicals and pulp and paper-related products imported from the United States, and for synthetic textile products and small engines imported

5   The indicators used to capture high current dependence are: the share of each partner in the total extra-euro area imports for each sector (focusing on those sectors where the euro area import shares are above 20%) and the euro area Balassa index for imports (looking at sectors where this is greater than one). To assess the degree of substitutability, the following are computed: the world market share of each partner in each sector (considering only those sectors with a market share above 30%) and the total number of extra-euro area countries that export in each sector as a share of the 234 countries in the dataset (this index is called "ubiquity" and focuses on values smaller than 30%). Finally, intra-euro area import shares are calculated for each sector. If the intra-euro area import share is high, this is considered as evidence that domestic production could substitute for the lack of foreign suppliers.
6   The data used in the analysis, although very disaggregated, do not fully capture quality differences among varieties belonging to the same product category, and this probably implies an over-assessment of the degree of substitutability.
7   Another exception is Russia, with a share of 3.2%. This value is mainly driven by the imports of energy-related products.
8   Given the high number of very detailed sectors, what follows is only a synthetic overview of the results.

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from Japan. As for the intermediate goods imported from the United Kingdom and Switzerland, they are usually characterised by quite a high degree of substitutability from domestic producers, also when the degree of substitutability from other foreign suppliers is low. This could be explained by the more similar trade specialisation between these countries and the countries of the euro area.

The results mainly suggest that the effects of a supply shock originating in one of the euro area's main trading partners would probably be limited to some specific domestic industries, in particular textiles and chemicals. For instance, the overall effects of the Japanese earthquake on euro area production turned out to be smaller than expected. Imports from Japan represent a relatively small share of total euro area imports (3%), and import dependence on Japan does not appear to be concentrated in those sectors where production was most affected by the earthquake (cars, motor vehicle parts and computer accessories). Nevertheless, as some anecdotal evidence has suggested, when substitutability is very low (e.g. owing to parent-affiliate linkages), a shock to the supply of crucial inputs can have a serious impact, even if only on a few individual firms.