International integration of production: factor trade and employment effects
(The Vienna Institute for International Economic Studies - WIIW)

Production is becoming more and more globalised
The internationalisation of production has been one of the key driving forces of EU integration. This ongoing process has been the underway since the 1990s when Eastern European countries rapidly integrated into the European economy, a process which resulted in the enlargement of the EU in 2004 and 2007. This process has taken place at a time when overall international economic integration has gained momentum within other regions (with the signing of the NAFTA agreement and the emergence of Asian production networks) as well as between regions (which is seen most clearly with the emergence of China). These developments have led to increasing interlinkages across economies and particularly in a few key sectors such as electronics and the transport equipment industry.

World input-output table covers all inter-regional direct and indirect flows
The strength of these interlinkages is measured using indicators of vertical specialisation. Such indicators are based on input-output tables which also provide information on the imports of intermediates by industry. The WIOD database also splits up these imports by source countries thus allowing one to properly account for inter-country and inter-industry flows of goods for the 41 countries (including rest of the world) and 35 industries covered. Taking account of these inter-regional trade flows generalises the most widely used indicator of vertical specialisation in the literature introduced by Hummels et al. (2001).

Import content of exports is increasing significantly, but falling over the crisis
Based on such an indicator, which gives information on the “direct and indirect import content of exports” as a proportion of the total output needed to produce these exports, the rising importance of international production is clearly observable.

Figure 1 demonstrates the strong increase in this indicator over the period 1995-2007 for the major advanced economies (i.e. the EU, the USA and Japan). For EU-extra trade the foreign content increased from 8% in 1995 to 13% in 2007. Even stronger increases are seen for Japan (from 6.5% to 13%). Interestingly, the share is still relatively low for the EU when compared with the other two countries. A second striking finding is that this share decreased over the crisis period (2007-2009) in all countries by 1-2 percentage points. For the EU member states these shares range from 20% in Great Britain to more than 40% in Hungary and Luxembourg with the simple average across EU member states being about 30% indicating the rising importance of production integration.
Geographic sourcing structure of import content of exports shifted to emerging markets

These foreign components of a country’s exports are sourced from various suppliers. Since 1995 the geographic sourcing structure has changed significantly for EU members due to the European integration process and the increasing importance of emerging economies, most notably China. Figure 3 provides information on the foreign component of exports by region comparing the EU-15 and EU-12 to the USA and Japan. Differentiating intra-EU sourcing between the EU-15 and the EU-12 indicates a strong within-EU integration process of the latter group which increased from 4.5% in 1995 to almost 10% in 2009. With respect to extra-EU sourcing the emergence of China is clearly visible. The share of China increased from 5.7% to almost 25% mostly at the expense of Japan (12.5% to 5.7%) and the USA (24% to 15%). During the crisis (2007-2009) the shares of all source countries of the EU, with the exception of China, declined or remained constant; with respect to intra-EU sourcing it turns out that intra-EU15 sourcing slightly declined as well, while the share of EU12 countries increased.

Vertical specialisation is closely linked to inter-country value added flows

The concept of vertical specialisation is closely linked to calculations of the value added content of trade (i.e. domestic value added embodied in a country’s exports and foreign value added embodied in a country’s imports) and trade in value added (i.e. a country’s value added embodied in other countries consumption) as outlined in Stehrer (2012). The foreign value added content of the EU’s exports is increasing in line with the increasing vertical specialisation (for details see Foster-Stehrer-deVries, 2012).

Macroeconomic imbalances remain but differ by factor of production

In a mirror perspective, countries are also themselves part of other countries supply chains, i.e. other countries’ source for intermediates. Though a country’s overall trade balance does not change, the WIOD dataset allows for the calculation of trade imbalances by factor of production. Results reveal that the advanced economies tend to be net importers of capital in value terms and net exporters of high-educated labour. This result is triggered by the
relatively high capital intensity of assembly production in the emerging economies combined with low wages in these countries, while advanced economies tend to export high-tech goods which are skill-intensive. In physical terms, the advanced economies are net importers of low-skilled labour in particular, which is due to low labour productivity in the emerging and developing economies (for details see Foster-Stehrer-deVries., 2012, and Stehrer, 2012).

**Bilateral net trade in value added differs from trade balance in gross terms**

In a bilateral context the trade balances when measured in value added terms might differ from trade balances when measured in gross terms. Whereas the EU-27 trade balance with the US in value terms was slightly larger than in gross terms the deficit with China was significantly lower. Differences for other countries are less strong (see Figure 2).

**Figure 2 – Bilateral trade balances, 2008**

![Figure 2](image)

*Source: WIOD database*

**Scale effect of offshoring offsets productivity effect**

The increasing internationalisation of production triggers fears of potential employment losses in advanced economies. Econometric analysis allows for the splitting of the effects of increased production sharing into a productivity and a scale effect; the former due to the fact that less domestic labour is needed to produce a particular level of output and the latter due to firms becoming more competitive due to offshoring activities. Results when considering total employment tend to suggest that while there has been a negative technology effect of both narrow (i.e. relocation of a sectors’ activities into the same sector of another country) and broad offshoring (i.e. offshoring of activities to other countries in any sector) the overall effect of offshoring has been neutral. The negative technology effects tend to be more prevalent in manufacturing industries than in services industries. This implies that the positive scale effect of offshoring offsets the negative effect technology effects. Results for the different employment types (low-, medium- and high-skilled) are largely similar to those for total employment with a negative technology effect usually offset by a positive scale effect, resulting in an overall neutral impact of offshoring (see Foster-Pöschl-Stehrer, 2012, for details).
**Offshoring triggers changes in the wage structures by squeezing medium-skilled labour**

A further concern is that although offshoring does not impact strongly on the levels of employment in general it might trigger changes in the relative wages of labour by skill types. Examining the effects of offshoring on the wage bill shares by education (see Foster-Stehrer-Timmer-deVries, 2012) suggests that both narrow and broad offshoring have tended to reduce the cost shares of all types of employment in total variable costs, and that they have tended to impact on medium-skilled workers to a greater extent than low- and high-skilled workers. Results on the elasticities of the cost shares with respect to offshoring are found to be somewhat more mixed – reflecting the fact that medium-skilled workers tend to make up the largest shares in total variable costs – but in the majority of cases the elasticities are found to be largest in the case of medium-skilled labour. Results for manufacturing offshoring also tend to suggest that offshoring has impacted upon medium-skilled labour to a greater extent than the other types of labour in the majority of cases. Overall, the results would seem to suggest that in the recent years, offshoring has impacted upon all types of labour, with medium-skilled labour being squeezed to a greater extent by foreign offshoring (see also Stehrer-Stöllinger, 2012, for a discussion on offshoring effects by occupational categories).

**References:**


