



# Office Memorandum

To: Members of the Executive Board

July 23, 2013

From: The Secretary

Subject: **German-Central European Supply Chain—Cluster Report—First Background Note—Trade Linkages**

The attached corrections to FO/DIS/13/100, Sup. 1 (7/3/13) have been provided by the staff:

## **Evident Ambiguity**

**Page 6, Figure 2:** for "Selected Periphery" read "Selected European Countries"

**Page 8, Figure 4:** for "Selected Periphery" read "Selected European Countries"

Questions may be referred to Mr. Lall (ext. 36113), Mr. Aiyar (ext. 35973), and Mr. Elekdag (ext. 34835) in EUR.

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Supplement 1  
Correction 2



growth, it could in principle pose some challenges going forward. Higher concentration of trade could also imply that the CE4's dependency on the German economy has increased with ramifications for business cycle co-movement and vulnerabilities to shocks. Moreover, sustaining a country's role in the supply chain and continuing to derive the associated benefits could involve policy effort. Policies taken by the CE4 members should ultimately aim to safeguard the benefits of the GCESC while mitigating any risks related to greater exposure to the German economy.

**7. This chapter is structured as follows:** The next section provides some stylized facts on recent trends in Germany's bilateral trade links with the CE4, and, in light of challenges related to the interpretation of trade statistics in the context of supply chains, it looks at a decomposition of exports into domestic and foreign value added (VA) and assesses how they have changed over time. This section also evaluates Germany's and the CE4's exposure to other countries based on their final consumption and compares it to the exposure under the commonly used gross bilateral trade statistics published in the IMF Direction of Trade Statistics (DOTS). The following section examines the effects of the GCESC on the CE4 countries, with a particular focus on technology transfer, business cycles synchronization, and income convergence. The final section provides concluding remarks.

## THE GERMAN-CENTRAL EUROPEAN SUPPLY CHAIN

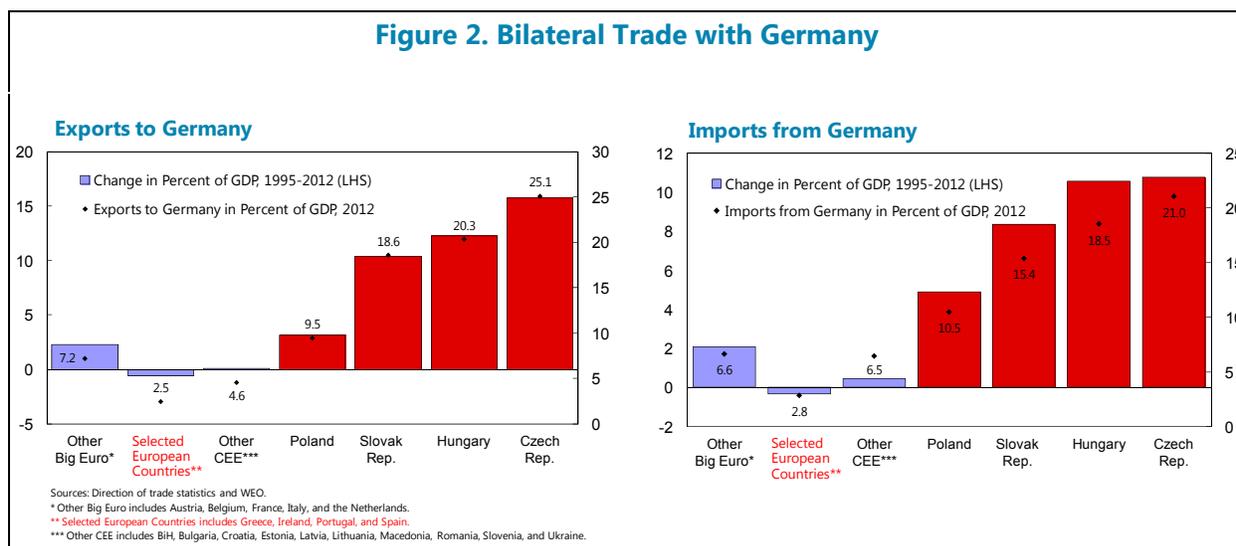
### A. Trends in CE4 Trade Linkages with Germany

**8. The CE4's trade links with Germany have strengthened considerably since the mid-1990s, largely reflecting their increased integration into the GCESC (Figure 2).** Between 1995 and 2011, the CE4's imports from Germany grew by 8½ percent of GDP on average (cumulative basis), with Czech Republic leading the way (10½ percent of GDP), while exports to Germany increased sharply by nearly 10 percent of GDP on average. Consequently, Germany has become the main trading partner (with the largest export and imports as a share of GDP) of all the CE4 countries.

**9. Compared with other countries, including CEE economies, the CE4 exhibits the strongest trade linkages with Germany.** The CE4's average imports from Germany stood in 2012 at 16 percent of GDP, which, apart from Austria—which traditionally has a high German import content—is well above other European countries. Similarly, the average of the CE4's exports to Germany in 2012 stood at 18 percent of GDP, behind only the Netherlands (22 percent of GDP). A closer look at the sectoral level suggests that knowledge-intensive sectors, particularly transport and electrical equipment, account for the CE4's largest bilateral trade with Germany. As documented in the next section, the increased links in these sectors have led to the transfer of technology, which in turn has translated to sizeable gains in terms of comparative advantage.

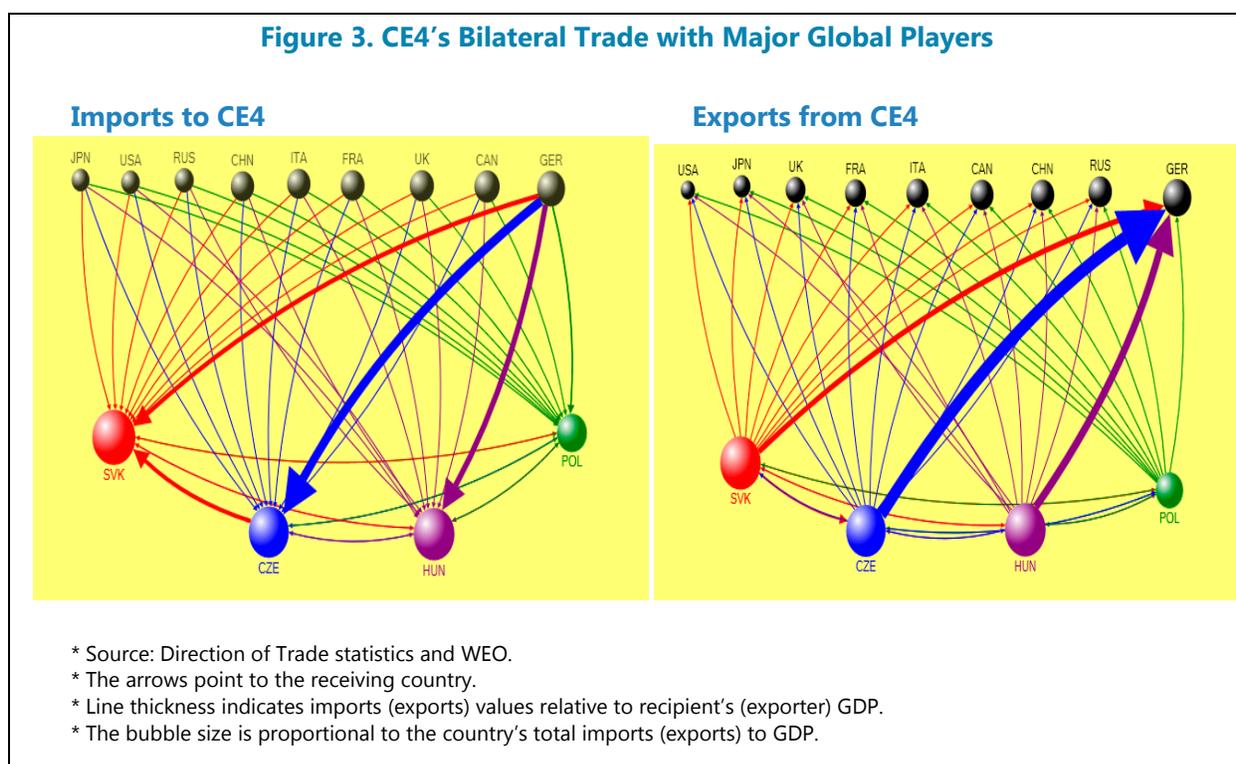
**10. While trends are similar, the CE4 is not a homogenous group (Figure 2).** Poland's trade linkages with Germany (as a share of GDP) are significantly less than those in other CE4 countries, largely due to Poland's large GDP (Poland's GDP is about 54 percent of the CE4's GDP) and higher

share of domestic demand, which mechanically dampens the magnitude of the trade intensity with Germany as compared to other CE4 economies. In this regard, although Poland’s openness has increased in recent years, it remains a relatively closed economy with the sum of overall imports and exports at 74 percent of GDP (compared to an average of 157 percent of GDP in rest of the CE4 countries).



**11. The importance of Germany as a major trading hub for the CE4 is illustrated in Figure 3.** The thickness of the arrows represents the share of imports (exports) relative to recipient (exporter) GDP and the bubble size indicates the country’s total imports (exports) to GDP. The charts clearly show that, among the major global players, Germany is the largest trading partner for the CE4. For Czech Rep, Hungary, and Slovakia, imports from Germany are between 15 to 21 percent of the countries’ GDP while exports to Germany amount to 16 to 24 percent of GDP. For Poland, Germany’s exports and imports shares are somewhat lower, due to Poland’s higher GDP level and less dependence on external trade, yet with exports and imports at 10-11 percent of GDP, Germany remains Poland’s major trading partner.

Figure 3. CE4's Bilateral Trade with Major Global Players



## 12. The CE4's high degree of integration into the supply chain reflects a host of factors.

Beyond the geographic proximity to Germany, cultural similarities, and high unit labor cost differentials,<sup>9</sup> the countries share a similar sectoral structure, which suggests that they have adequate labor skills to support the GCESC.<sup>10</sup> In this context, Rahman and Zhao (2013) computed the industrial similarity index relative to Germany. They showed that the CE4 countries had strong similarities with Germany even before they integrated into the supply chain.

## B. Shortcomings of Traditional Trade Statistics

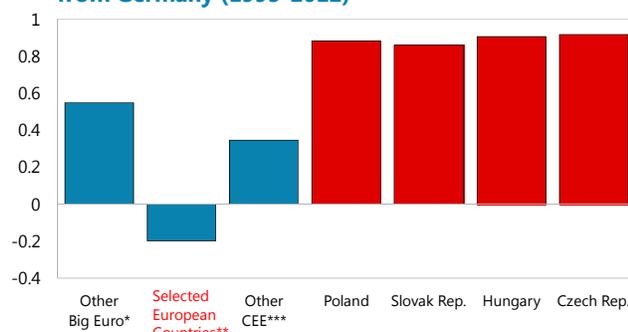
**13. Vertical specialization networks have created challenges for interpreting official trade statistics.** Trade statistics are usually measured in gross terms, which include both intermediate and final goods. In supply chain-related activities, particularly when imported intermediates are re-exported after some processing, export figures tend to be inflated and do not adequately reflect the countries' domestic VA, which matters most for domestic employment and economic growth.

<sup>9</sup> The average exchange rate-adjusted unit labor cost differential between the German manufacturing sector and that in the CE4 during 1995-2009 ranged between 35 percent (Poland) and 58 percent (Hungary).

<sup>10</sup> Among others, these variables were found to have a significant contribution to the share foreign VA in countries' exports. See Rahman and Zhao (2013).

**14. The shortcomings of trade statistics in supply chain-integrated countries are illustrated in the high and positive correlation of the CE4 countries' import from and exports to Germany (Figure 4).** This is in contrast to much lower correlations for other countries vis-à-vis Germany. This may owe partly to high business cycles synchronization, but also suggests that a large part of the CE4's exports to Germany contains German intermediates, which were imported and then processed in the CE4 as part of the fragmented production process. The high correlation may also suggest that the share of the CE4's foreign VA in these products is relatively high.

**Figure 4. Correlation between Exports and Imports from Germany (1995-2012)**



Sources: Direction of trade statistics and WEO.

\* Other Big Euro includes Austria, Belgium, France, Italy, and the Netherlands.

\*\* Selected European Countries includes Greece, Ireland, Portugal, and Spain.

\*\*\* Other CEE includes BiH, Bulgaria, Croatia, Estonia, Latvia, Lithuania, Macedonia, Romania, Slovenia, and Ukraine.

### C. Decomposition of Gross Exports into Domestic and Foreign Value Added

**15. To evaluate the CE4's role in the GCESC, we decompose gross exports into VA exports using the newly released World Input-Output Table (WIOT).** We follow the Hummels et al. (2001) measure of vertical specialization by looking at the import content of production for exports. This measure was used in several studies, including Chen et al (2005), Johnson and Noguera (2012), Koopman et al. (2011), and more recently, in Rahman and Zhao (2013), and is different from the definition used in earlier studies such as Feenstra and Hanson (1996), which mainly focused on documenting trends in outsourcing, usually defined as the imported input shares of gross output or of material inputs.<sup>11</sup>

**16. The analysis builds on the conceptual framework developed by Koopman et al. (2011).** It decomposes gross exports into five main categories depending on the location of VA and stage of production (Figure 5). These include: (1) domestic VA (DVA) in final goods, (2) DVA in intermediate goods not processed for further exports, (3) DVA in intermediate goods processed for exports to third countries, (4) DVA exported to another country but returns back to the original country for exports to a third country, and (5) foreign VA (FVA) used as input into exports.

<sup>11</sup> The WIOT provides an annual time series for 1995-2009 for 35 sectors and covers forty countries, including all EU 27 countries and 13 other major advanced and emerging economies (see details in Annex 1).