

Articles

1 The impact of global value chain participation on current account balances – a global perspective

Participating in global value chains may improve an economy's competitiveness and thereby raise its current account balance. Specifically, an economy's competitiveness may increase as a result of substituting imported for domestically produced intermediate goods. The increase in competitiveness boosts the economy's exports and raises its income. If it is expected that other economies will eventually catch up in terms of competitiveness by also participating in global value chains, the economy's competitive edge – and thus the rise in income – is only temporary. As a consequence, part of the income gain will be saved, raising the economy's current account balance. This article provides empirical evidence suggesting that a rise in global value chain participation relative to the rest of the world has a positive impact on an economy's current account balance. Results from widely used reduced-form current account regression models suggest that economies that participate more in global value chains than their trading partners also display larger current account surpluses or smaller current account deficits. Differences in the extent to which countries participated in global value chains appear to explain a substantial fraction of the current account surpluses that were observed in the run-up to the global financial crisis.

1 Introduction

A salient feature of the global economy over the last few decades has been the existence of large and persistent global imbalances. For example, the years prior to the global financial crisis were marked by some emerging market economies, commodity exporters and some advanced economies running large current account surpluses, matched by deficits in particular in the United States. Several studies have shown that part of these global imbalances can be explained by differences in financial market development across economies, in particular by the lack of financial development in emerging market surplus economies.⁴⁷ At the same time, the debate about the driving forces underlying large and persistent current account surpluses in several advanced economies is still ongoing. Understanding the determinants of external imbalances is critical for academics and policymakers, because such determinants play an important role in the transmission of domestic shocks and policies across borders in an increasingly integrated world.

⁴⁷ See, for example, Bernanke, B.S., *The global saving glut and the U.S. current account deficit*, speech at the Sandridge Lecture, Virginia Association of Economists, Board of Governors of the Federal Reserve System, 2005; Caballero, R., Farhi, E. and Gourinchas, P.-O., "An Equilibrium Model of Global Imbalances and Low Interest Rates", *American Economic Review*, Vol. 98, Issue 1, 2008, pp. 358-393; or Mendoza, E.G., Quadrini, V. and Ríos-Rull, J.-V., "Financial Integration, Financial Development, and Global Imbalances", *Journal of Political Economy*, Vol. 117, No 3, 2009, pp. 371-416.

Another striking feature of the global economy during the last few decades has been the rise of global value chains.

The increasing dispersion of stages of production across countries was spurred by a number of factors. The decline in transportation costs amid large wage differences between advanced and emerging market economies made the internationalisation of supply chains profitable. Moreover, advances in information and communication technologies made the complex coordination of production processes at distance possible.⁴⁸ A further factor was the adoption of trade-liberalising policies over the past few decades.

The fragmentation of production chains across countries led to a steady increase in the share of trade accounted for by intermediate goods.

This development continued at least until the start of the global financial crisis. Trade in intermediate goods and services now accounts for a very large share of overall trade flows in goods and services.⁴⁹ The regional dispersion of the research and development underlying the iPod, the manufacturing and assembly of its components as well as its sale and distribution in local markets is a well-known example of global value chain fragmentation.⁵⁰

Global value chains may have effects on a wide range of economic outcomes.

Several studies have shed light on the effects of global value chains by documenting the increased fragmentation of production across borders. Drawing on newly developed input-output tables, these studies have developed frameworks to measure trade in valued added and economies' and individual sectors' integration in global value chains.⁵¹ Building on these insights, other studies have been concerned with the economic implications of global value chains. For example, participation in global value chains appears to boost growth⁵², amplify cross-country monetary policy spillovers⁵³ and render an economy's income distribution more uneven.

This article examines the role of global value chains in current account balances from a global perspective.⁵⁴ It presents empirical evidence suggesting

⁴⁸ See, for example, Elms, D. and Low, P. (eds.), *Global value chains in a changing world*, WTO Secretariat, 2013; Baldwin, R., "Global supply chains: why they emerged, why they matter, and where they are going", in Elms, D. and Low, P. (eds.), *Global value chains in a changing world*, WTO Secretariat, 2013, pp. 13-59; and United Nations Conference on Trade and Development (UNCTAD), *World Investment Report 2013 – Global Value Chains: Investment and Trade for Development*, 2013.

⁴⁹ One estimate is that, respectively, 56% and 73% of overall trade flows in goods and services are accounted for by intermediates; see Miroudot, S., Lanz, R. and Ragoussis, A., "Trade in Intermediate Goods and Services", *OECD Trade Policy Papers* 93, OECD Publishing, 2009.

⁵⁰ See Dedrick, J., Kraemer, K. and Linden, G., "Who Profits from Innovation in Global Value Chains? A Study of the iPod and Notebook PCs", *Industrial and Corporate Change*, Vol. 19, Issue 1, 2010, pp. 81-116.

⁵¹ See, for example, Hummels, D., Ishii, J. and Yi, K.-M., "The nature and growth of vertical specialization in world trade", *Journal of International Economics*, Vol. 54, Issue 1, 2001, pp. 75-96; Trefler, D. and Zhu, S.C., "The structure of factor content predictions", *Journal of International Economics*, Vol. 82, Issue 2, November 2010, pp. 195-207; Johnson, R.C. and Noguera, G., "Accounting for Intermediates: Production Sharing and Trade in Value Added", *Journal of International Economics*, Vol. 86, Issue 2, 2012, pp. 224-236; or Koopman, R., Wang, Z. and Wei, S.-J., "Tracing Value-Added and Double Counting in Gross Exports", *American Economic Review*, Vol. 104, No 2, 2014, pp. 459-494.

⁵² See Saito, M., Ruta, M. and Turunen, J., "Trade Interconnectedness: The World with Global Value Chains", *IMF Policy Paper*, August 2013.

⁵³ See Georgiadis, G., "Determinants of global spillovers from US monetary policy", *Journal of International Money and Finance*, Vol. 67, 2016, pp. 41-61.

⁵⁴ The article does not investigate the impact of global value chain participation on current account balances in the euro area.

that economies which participate more in global value chains than other economies exhibit larger current account surpluses or smaller current account deficits. The evidence also suggests that the impact of global value chain participation on current account balances is economically significant. For example, about a quarter of the large US current account deficit during the run-up to the global financial crisis that cannot be explained by other fundamentals can be explained by its limited relative participation in global value chains.

The finding that global value chain participation improves an economy's current account balance has important policy implications. In particular, it implies that persistent deviations from a balanced current account do not, as is often argued, reflect domestic distortions, but are in fact welfare-maximising outcomes against the background of differences in economies' competitiveness. As a consequence, policies aimed at narrowing global imbalances should focus on measures that facilitate participation in global value chains. For example, adopting policies that facilitate innovation and reduce protectionist barriers may help to improve an economy's competitiveness by fostering its global value chain participation; similarly, multilateral initiatives aimed at trade and financial liberalisation may also reduce an economy's external imbalances by fostering participation in global value chains.

The article is structured as follows: Section 2 reviews the evolution of global imbalances and global value chain participation over the last few decades; Section 3 discusses the mechanism through which global value chain participation may affect an economy's current account balance; Section 4 reports results from an analysis of cross-country data that sheds light on the empirical relevance of participation in global value chains for current account balances; and Section 5 concludes.

2 The evolution of global imbalances and participation in global value chains

2.1 Global current account imbalances

The period before the global financial crisis was characterised by a build-up of large external imbalances (see Chart 1). While the United States accumulated large current account deficits, China, Japan and oil-exporting economies recorded large surpluses. At the time, the consensus view was that an eventual – possibly rapid – unwinding of these imbalances could trigger a crisis.⁵⁵ The International Monetary Fund (IMF) repeatedly advocated policy measures that would facilitate a smooth unwinding in the context of a multilateral consultation process.⁵⁶

⁵⁵ See Catão, L.A. and Milesi-Ferretti, G.M., "External Liabilities and Crises", *IMF Working Paper* WP/13/113, May 2013.

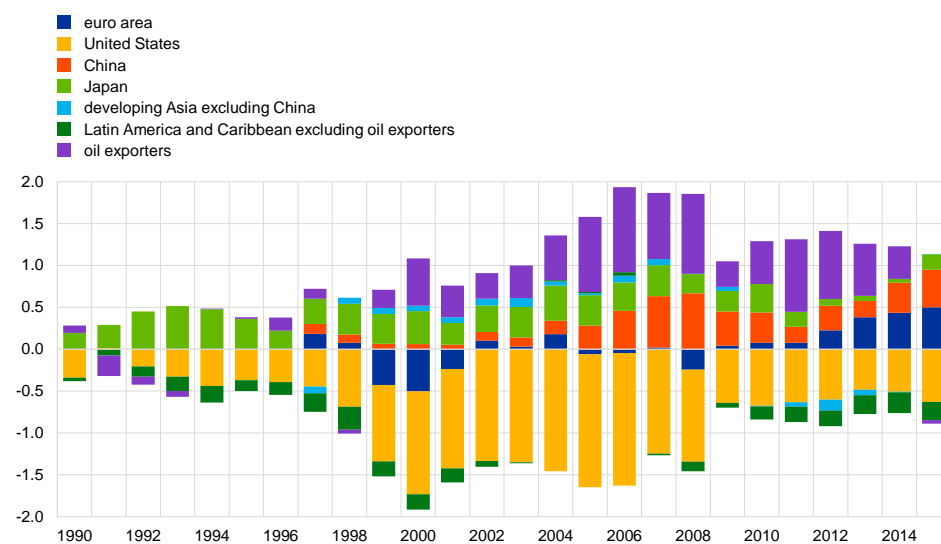
⁵⁶ IMF, *Imbalances and Growth: Update of Staff Sustainability Assessments for G-20 Mutual Assessment Process*, September 2013.

The global financial crisis was followed by a rebalancing process. Between 2007 and 2015 surpluses and deficits declined markedly. For G20 economies, the average absolute current account balance relative to GDP fell from 4.7% in 2007 to 3.9% in 2015; in GDP-weighted terms, it fell from 3.6% to 2.6%, as larger economies underwent a stronger rebalancing. The global financial crisis that was triggered by other factors thus preceded the unwinding of global imbalances. While it is difficult to decompose current account balances into structural and cyclical components, the evidence suggests both contributed to the rebalancing after the global financial crisis.⁵⁷

Chart 1

Evolution of global current account balances

(percentages of world GDP)



Source: IMF World Economic Outlook.

Adjustments in major surplus and deficit economies contributed markedly to the reduction in global imbalances. For example, the US current account deficit fell from 1.6% of world GDP in 2006 to 0.6% in 2015. In China, the current account surplus dropped from 0.6% of world GDP in 2007 to an average of about 0.3% between 2009 and 2015. In Japan, the persistent current account surplus of around 0.3% of world GDP between 2005 and 2010 subsequently almost disappeared, partly on account of a changed economic policy environment with the temporary halt in nuclear energy production and the effects of the “Abenomics” policies introduced in 2012.

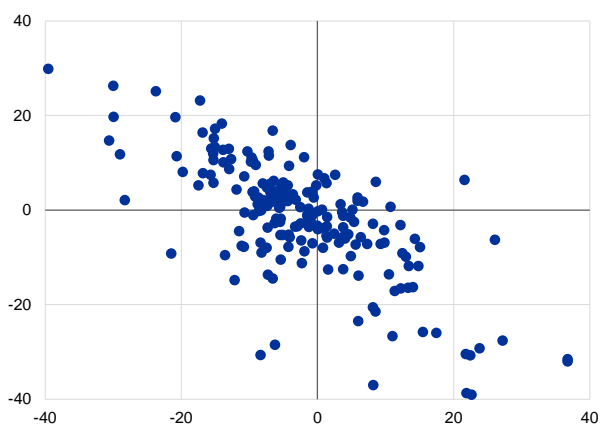
Rebalancing was a global phenomenon across advanced and emerging market economies. This can be seen by the relationship between the current account positions of the countries monitored in the IMF World Economic Outlook in 2007 and the changes in their current account balances between 2007 and 2015 (see Chart 2). Economies with a positive current account balance at the onset of the global

⁵⁷ IMF, “2013 Pilot External Sector Report”, *IMF Policy Paper*, August 2013.

financial crisis tended to experience a reduction between 2007 and 2015, whereas those with a negative position tended to see an improvement.

Chart 2
Current account balances in 2007 and changes between 2007 and 2015

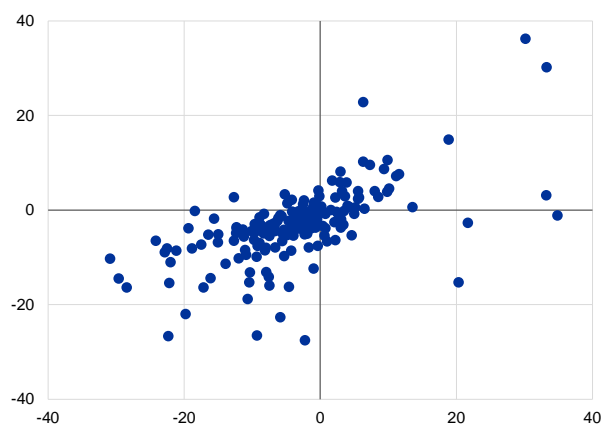
(percentages of GDP; x-axis: current account balance 2007; y-axis: change in current account balance, 2007-15)



Source: IMF World Economic Outlook.

Chart 3
Current account balances over the periods 1990-2005 and 2008-15

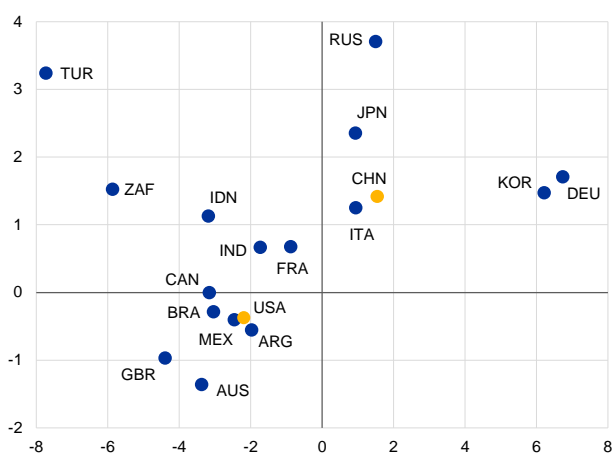
(percentages of GDP; x-axis: current account balance 1990-2005; y-axis: current account balance 2008-15)



Source: IMF World Economic Outlook.

Chart 4
Current account balances in 2013 and changes between 2013 and 2015 for G20 economies

(percentages of GDP; x-axis: current account balance 2013; y-axis: change in current account balance, 2013-15)



Source: IMF World Economic Outlook.

Despite the contraction in global imbalances across economies, the constellation of current account surpluses and deficits remained broadly unchanged. Chart 3 shows that the bulk of economies with current account surpluses (deficits) in the period 1990-2005 remained in surplus (deficit) in the period after 2008.

More recently, current account imbalances of several economies have widened again, in particular in some systemically important economies. After 2013 the US current account deficit widened to 2.6% of GDP, the surplus of China to 3% and that of Japan to 3.3%. The rebalancing process seems to have come to a halt across G20 economies in general, as there is a positive correlation between current account balances in 2013 and the change in current account balances between 2013 and 2015 (see Chart 4). Despite the recent rise in these economies'

current account surpluses and deficits, global imbalances have remained broadly stable owing to the drop in oil prices and the associated fall in the current account surpluses of oil-exporting economies (see Chart 1).

2.2 Global value chain participation

Measuring global value chain participation is challenging. One measure of “downstream participation”, i.e. how much a country is using imports in its production of exports, is the ratio of domestic value added in an economy’s gross exports, or “VAX” ratio.⁵⁸ Low values of the VAX ratio indicate that a large share of an economy’s gross exports reflect the value added of foreign inputs. The production of the iPod may again serve as an illustrative example of downstream participation: while the iPod is exported from China, the actual value added in China is very limited, consisting mainly of low-skilled assembly services. The major part of the value is produced by firms in the United States, Japan, South Korea and Taiwan through delivery of sophisticated intermediate inputs.⁵⁹ China therefore has a low VAX ratio in terms of the iPod, and is, according to this downstream metric, participating strongly in the global value chain of the iPod. Another measure of downstream participation, the “backward participation” measure, can be constructed as the ratio of an economy’s gross intermediate inputs to total gross output on the basis of data from the World Input-Output Database (WIOD).⁶⁰ Box 1 presents a discussion of the WIOD and the backward participation measure.

Global value chain participation has risen significantly since the 1970s.

Historical data show that there has been a secular decline in the VAX ratio (see Chart 5). An increasingly large share of an economy’s gross exports thus represents imported value added, i.e. imported intermediates that are used in the production of exports. Global value chain participation has also risen when measured by backward participation (see Chart 6).

The rise in global value chain participation has been a global phenomenon.

The cross-country mean of backward participation has increased in tandem with its dispersion, measured by the standard deviation (see Table 1). This suggests that the rise in backward participation over this period has been spread relatively evenly across economies and in line with the limited increase in the range between the minimum and maximum values of backward participation.

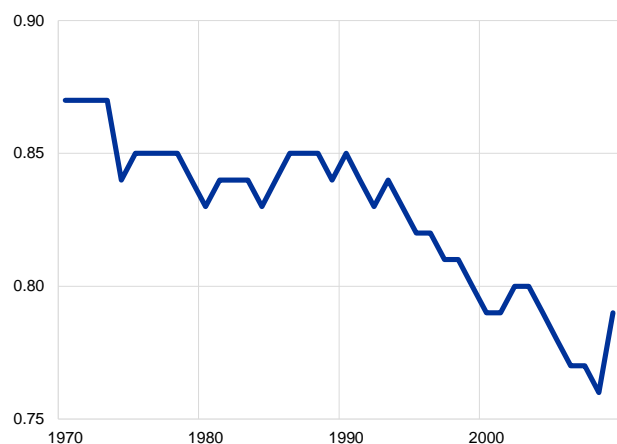
⁵⁸ See Johnson, R.C. and Noguera, G., “A Portrait of Trade in Value Added over Four Decades”, *Review of Economics and Statistics*, 2016.

⁵⁹ See Dedrick et al., op. cit.

⁶⁰ See Timmer, M.P., Dietzenbacher, E., Los, B., Stehrer, R. and de Vries, G., “An Illustrated User Guide to the World Input-Output Database: the Case of Global Automotive Production”, *Review of International Economics*, Vol. 23, Issue 3, 2015, pp. 575-605; and Timmer, M.P., Los, B., Stehrer, R. and de Vries, G.J., “An Anatomy of the Global Trade Slowdown based on the WIOD 2016 Release”, *Groningen Growth and Development Centre research memorandum 162*, 2016.

Chart 5**Evolution of the global VAX ratio**

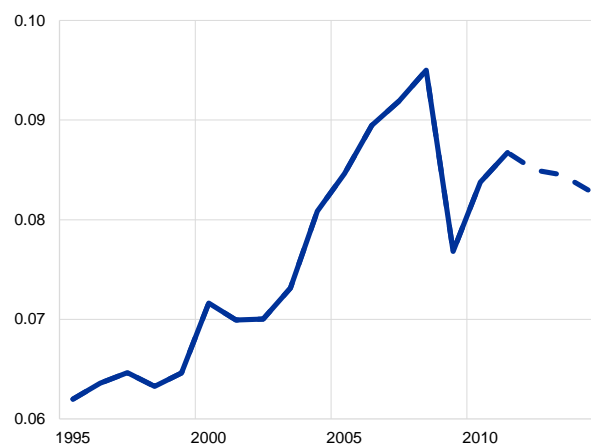
(ratio of domestic value added to gross exports)



Source: Johnson, R.C. and Noguera, G. (see footnote 12).

Chart 6**Evolution of global backward participation**

(ratio of gross imported intermediate inputs to total gross output)

Sources: WIOD and ECB calculations.
Note: The solid line represents data from the 2013 WIOD release and the dashed line data from the 2016 release.

Very recently, in the aftermath of the global financial crisis, measures of downstream participation have pointed to a slowdown in the rise of global value chains.⁶¹ As the levelling-off in the expansion of global value chains has been geographically widespread, the causes of the slowdown are unlikely to be country or region-specific. Possible explanations that have been put forward include reductions in the length of firms' supply chains aimed at improving risk management (for example, in response to the 2011 earthquake in Japan), the adoption of local content requirements and other regulatory measures, and changes in the composition of demand.⁶²

Table 1**Descriptive statistics for backward participation in 2000 and 2014**

(ratio of gross imported intermediate inputs to total gross output)

	Observations	Mean	Standard deviation	Minimum	Maximum
2000	44	0.12	0.06	0.03	0.35
2014	44	0.15	0.08	0.04	0.42

Sources: WIOD and ECB calculations.

⁶¹ See also ECB, "Understanding the weakness in global trade – What is the new normal?", *Occasional Paper Series*, No 178, 2016; Timmer, M., Los, B., de Vries, G. and Stehrer, R., "Peak trade? An anatomy of the recent global trade slowdown", Groningen Growth and Development Centre, 2016.

⁶² See also IMF, *World Economic Outlook*, October 2016.

Box 1

Measuring global value chain participation on the basis of international input-output tables

This article uses the WIOD to construct measures of economies' global value chain participation. In two editions, the WIOD provides global input-output tables at annual frequency for a large number of countries and sectors. The 2013 edition covers the period 1995-2011 and the 2016 edition the period 2000-14. Unfortunately, the two editions of the WIOD are not consistent in terms of country and sector coverage. For example, while the 2013 edition covers 35 sectors in 40 countries, the 2016 edition covers 56 sectors in 43 countries. Both editions also cover a block of countries constructed as the "rest of the world". For many purposes, therefore, the data from the two WIOD editions cannot be combined in order to construct continuous measures of global value chain participation for the entire period 1995-2014. This article uses changes in the backward global value chain participation measure for 2011 to 2014 from the 2016 vintage in order to extrapolate the values of the measures constructed using the 2013 vintage beyond 2011.

Various concepts and metrics have been proposed to measure trade in value added and global value chain participation on the basis of global input-output tables.⁶³ In this article, a simple measure of global value chain participation is constructed on the basis of the WIOD data: the "backward participation" measure reflects a country's downstream participation, and is defined as the ratio of an economy's gross intermediate imports relative to its total gross output.

Another framework for the measurement of trade in value added has been developed and established by the Organisation for Economic Co-operation and Development (OECD).⁶⁴ In this framework, the OECD has defined backward participation as "foreign value added".⁶⁵ This indicator is constructed on the basis of the OECD-World Trade Organization (WTO) Trade in Value Added database, which covers 61 countries and 34 sectors for 1995, 2000, 2005, 2008 and 2011. The correlation between the backward participation measure used in this article and the measure of foreign value added based on the OECD definition is 0.94. The correlation between the VAX ratio and the backward participation measure used in this article is 0.97.

3 The impact of participation in global value chains on the current account

Participating in global value chains may give an economy a temporary competitive edge that results – in order to smooth consumption over time – in a rise in its current account balance. This could occur in a situation where domestic and imported intermediate goods are substitutes in production and the economy experiences a shock that reduces the cost of imported intermediate goods relative to those produced domestically; such a shock could reflect the adoption of trade and capital flow liberalising policies or advances in information and communication technologies, which have been identified in the literature as the

⁶³ See, for example, Hummels et al., *op. cit.*; Johnson, R.C. and Noguera, G., *op. cit.*; Koopman et al, *op. cit.*; or OECD, *TIVA 2015 indicators – definitions*, 2015.

⁶⁴ See OECD-WTO, *Trade in Value-Added: Concepts, Methodologies and Challenges*, 2012.

⁶⁵ OECD 2015, *op. cit.*

driving forces behind the rise in global value chain participation. By substituting less expensive imported intermediate goods for those produced domestically, domestic firms participate in global value chains and, at the same time, achieve a gain in competitiveness relative to exporters in the rest of the world. As a result, the economy's trade balance improves, driven by a rise in its exports.⁶⁶ As it is expected that foreign economies will – possibly with a delay – also adopt trade and capital flow liberalising policies and exploit advances in information and communication technologies, the gain in competitiveness for domestic exporters is perceived to be only temporary. As a consequence, in order to smooth consumption over time, part of the income gain in the domestic economy will be saved, which improves the current account balance.⁶⁷ A key element in this hypothesised mechanism is that participating in global value chains (by substituting imported for domestically produced intermediate goods) raises the efficiency of production in the domestic economy. Box 2 discusses the empirical evidence on the effect of global value chain participation on productivity. Moreover, it is crucial that the gain in competitiveness achieved through the substitution of imported intermediate goods for domestic goods is only temporary. If the competitive edge is permanent, or perceived to be so, the current account balance is likely to deteriorate as consumption, and thus imports, rise commensurately to permanent income.

Box 2

Empirical evidence on the effect of participation in global value chains on productivity

Participation in global value chains affects firm-level productivity, mainly by allowing firms to benefit from specialisation gains.⁶⁸ Studies that explore this link using industry-level data tend to conclude that off-shoring affects productivity positively. For example, Amiti and Wei⁶⁹ estimate the effects of off-shoring on productivity in US manufacturing industries, concluding that services off-shoring has a positive effect on productivity; off-shoring of material inputs also has a positive effect on productivity, but the magnitude is smaller. Winkler⁷⁰ obtains similar results for Germany using input-output data for 1995-2006. Crinò⁷¹ uses comparable data for nine European countries and finds that services off-shoring exerts a positive and economically large effect on domestic productivity. Egger and Egger⁷² analyse how off-shoring affects the productivity of low-skilled workers employed in the EU manufacturing sector. They find a negative effect on productivity in the

⁶⁶ In principle the rise in imports of intermediates could also lead to a deterioration of the economy's trade balance. However, in a standard structural open economy model in general equilibrium the rise in exports dominates the rise in imported intermediates: see Brumm, J., Georgiadis, G., Gräß, J. and Trottner, F., [Global value chain participation and current account imbalances](#), 2015.

⁶⁷ For an analysis of this mechanism in a structural general equilibrium model, see Brumm et al., op. cit.

⁶⁸ For a survey, see Amador, J. and Cabral, S., "Global Value Chains: Surveying Drivers, Measures and Impacts", *Banco de Portugal Working Paper*, No 3/2014, 2014.

⁶⁹ See Amiti, M. and Wei, S.-J., "Service Offshoring and Productivity: Evidence from the US", *The World Economy*, Vol. 32, Issue 2, 2009, pp. 203-220.

⁷⁰ See Winkler, D., "Services Offshoring and its Impact on Productivity and Employment: Evidence from Germany, 1995-2006", *The World Economy*, Vol. 33, Issue 12, 2010, pp. 1672-1701.

⁷¹ See Crinò, R., "Service Offshoring and Productivity in Western Europe", *Economics Bulletin*, Vol. 6, No 35, 2008, pp. 1-8.

⁷² See Egger, H. and Egger, P., "International Outsourcing and the Productivity of Low-Skilled Labor in the EU", *Economic Inquiry*, Vol. 44, Issue 1, 2006, pp. 98-108.

short run, but that the impact becomes positive in the long run. Schwörer⁷³ combines industry-level data on off-shoring from the WIOD with firm-level data for nine European countries between 1995 and 2008. The study finds that off-shoring of services and of non-core manufacturing activities contributed to an increase in productivity; however, no significant effect is found for off-shoring of core manufacturing activities. Schwörer also finds evidence for additional productivity gains for multinational firms.

Other studies have used firm-level data. Görg and Hanley⁷⁴ examine the effect of international outsourcing on productivity at the plant level in the electronics industry in Ireland. They find that total international outsourcing increases plant-level productivity, but that this effect only holds for plants with low export intensities. When distinguishing between off-shoring of services and materials, their study finds that the positive impact on productivity is limited to materials outsourcing. Görg et al.⁷⁵ investigate the impact of international outsourcing on productivity with plant-level data for Irish manufacturing, finding that being more embedded in international markets leads to larger productivity gains from outsourcing. McCann⁷⁶ also finds that an increase in outsourcing intensity leads to productivity gains for foreign-owned firms and for indigenous exporters in Ireland. In contrast, being an outsourcer matters strongly for Irish firms that are not exporting, while for exporters and foreign affiliates productivity increases are much lower. Using a dataset of Japanese firms, Ito et al.⁷⁷ find productivity gains for firms that outsource both manufacturing and services tasks, but not for firms that outsource only one or the other. Hijzen et al.⁷⁸ also use firm-level data for the Japanese manufacturing industries, and find that intra-firm off-shoring has generally a positive effect on productivity of the off-shoring firm, while arm's length off-shoring does not. Kasahara and Rodrigue⁷⁹ find evidence of a positive impact of imported intermediates on productivity in Chilean manufacturing plants. Morrison Paul and Yasar⁸⁰ find that higher shares of imported materials and subcontracted inputs are associated with higher productivity for Turkish textile and apparel manufacturing plants. The results of Fariñas and Martín-Marcos⁸¹ suggest that foreign outsourcing has a positive impact on total factor productivity growth at the firm level in a sample of Spanish manufacturing firms. Jabbour⁸² finds positive effects of off-shoring on productivity and profitability for French manufacturing firms, but only in the case of

⁷³ See Schwörer, T., "Offshoring, domestic outsourcing and productivity: Evidence for a number of European Countries", *Review of World Economics* (Weltwirtschaftliches Archiv), Vol. 149, Issue 1, 2013, pp. 131-149.

⁷⁴ See Görg, H. and Hanley, A., "International Outsourcing and Productivity: Evidence from the Irish Electronics Industry", *The North American Journal of Economics and Finance*, Vol. 16, Issue 2, 2005, pp. 255-269.

⁷⁵ See Görg, H., Hanley, A. and Strobl, E., "Productivity Effects of International Outsourcing: Evidence from Plant-level Data", *Canadian Journal of Economics*, Vol. 41, Issue 2, 2008, pp. 670-688.

⁷⁶ See McCann, F., "The heterogeneous effect of international outsourcing on firm productivity", *Working Papers* 2010-06, CEPII Research Center, 2010.

⁷⁷ See Ito, B., Tomiura, E. and Wakasugi, R., "Offshore Outsourcing and Productivity: Evidence from Japanese Firm-level Data Disaggregated by Tasks", *Review of International Economics*, Vol. 19, Issue 3, 2011, pp. 555-567.

⁷⁸ See Hijzen, A., Inui, T. and Todo, Y., "Does Offshoring Pay? Firm-Level Evidence From Japan", *Economic Inquiry*, Vol. 48, Issue 4, 2010, pp. 880-895.

⁷⁹ See Kasahara, H. and Rodrigue, J., "Does the use of imported intermediates increase productivity? Plant-level evidence", *Journal of Development Economics*, Vol. 87, Issue 1, 2008, pp. 106-118.

⁸⁰ See Morrison Paul, C. and Yasar, M., "Outsourcing, Productivity, and Input Composition at the Plant Level", *Canadian Journal of Economics*, Vol. 42, Issue 2, 2009, pp. 422-439.

⁸¹ See Fariñas, J.C. and Martín-Marcos, A., "Foreign Sourcing and Productivity: Evidence at the Firm Level", *World Economy*, Vol. 33, Issue 3, 2010, pp. 482-506.

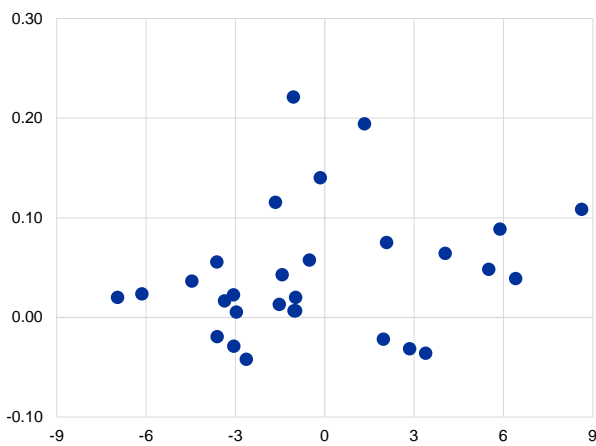
⁸² See Jabbour, L., "Offshoring and Firm Performance: Evidence from French Manufacturing Industry", *World Economy*, Vol. 33, Issue 3, 2010, pp. 507-524.

international outsourcing to developing countries. Finally, for Germany Wagner⁸³ finds some evidence of a positive causal effect of off-shoring on firm-level productivity, although this effect is small.

4 Empirical evidence on the effect of global value chain participation on current account balances

Chart 7
Economies' current account balances and backward participation relative to the rest of the world

(x-axis: current account balance as a percentage of GDP; y-axis: backward participation)



Source: WIOD and ECB calculations.
Note: Each dot corresponds to a country's sample mean backward participation and its current account balance relative to the rest of the world.

Global value chain participation and current account balances are positively correlated.

Consistent with the mechanism discussed in the previous section, the unconditional cross-country correlation between current account balances and economies' backward participation relative to the rest of the world is positive, albeit not statistically significantly different from zero (see Chart 7). Moreover, for selected economies with large and persistent current account imbalances, there is a noticeable co-movement between backward participation relative to the rest of the world and the current account balance over time (see Chart 8).⁸⁴ For example, for the United States, the rise and fall in the current account deficit over the past two decades has been accompanied by a similar decline and subsequent increase in the country's backward participation relative to the rest of the world. Likewise, for Germany and China there is a markedly positive correlation between their backward participation relative to the rest of the world and their current account balances.

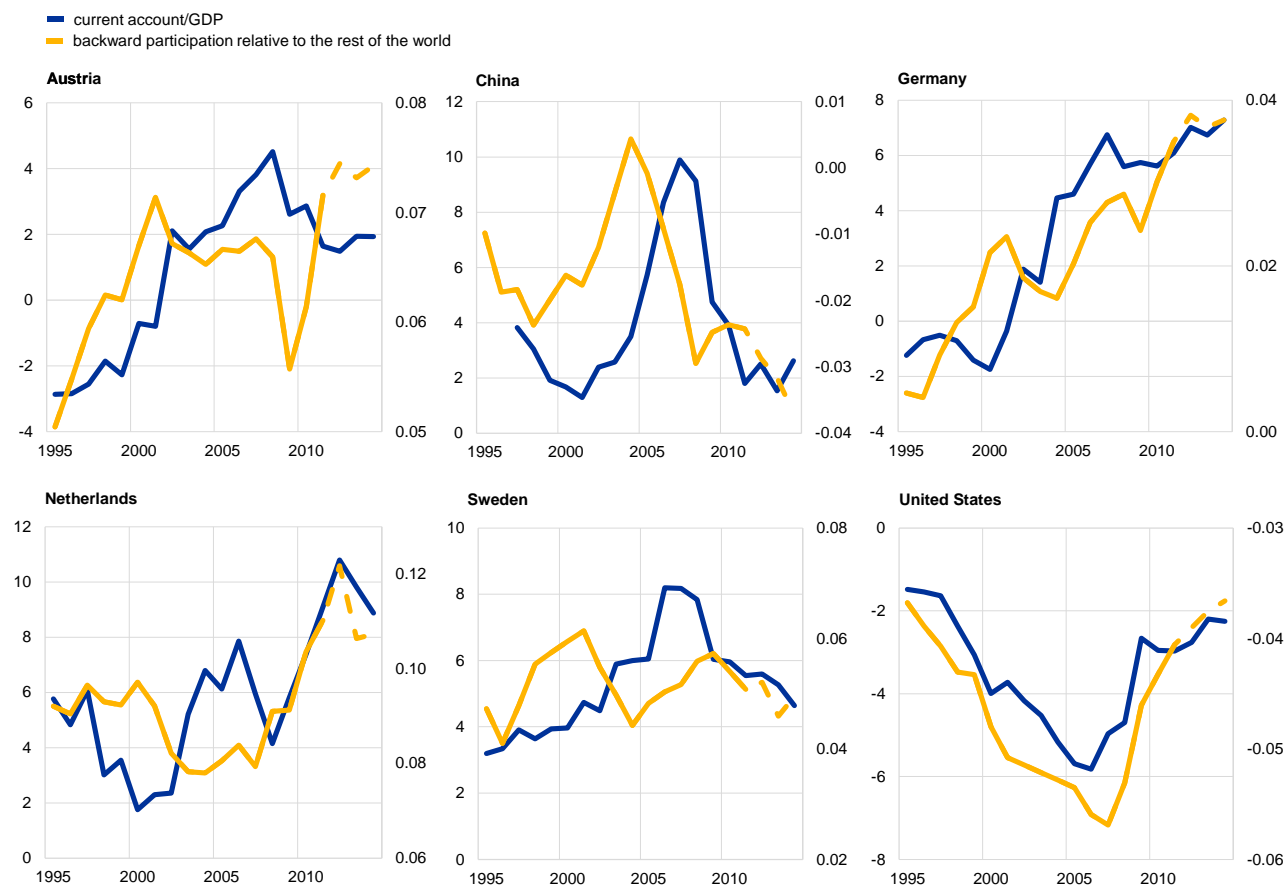
⁸³ See Wagner, J., "Offshoring and Firm Performance: Self-selection, Effects on Performance, or Both?", *Review of World Economics* (Weltwirtschaftliches Archiv), Vol. 147, Issue 2, June 2011, pp. 217-247.

⁸⁴ The backward measure used in Chart 8 refers to the value of an economy's backward participation relative to the rest of the world. A change in global value chain participation in a given country can affect its current account balance only to the extent that other countries' global value chain participation does not change to the same degree.

Chart 8

Co-movement between selected economies' global value chain participation relative to the rest of the world and current account balances

(current account as a percentage of GDP)



Sources: IMF World Economic Outlook and WIOD.

Note: For the global value chain participation data, the solid line represents data from the 2013 WIOD release and the dashed line data from the 2016 release. The data from the 2016 release have been used to extrapolate the data from the 2013 release.

In order to identify the effect of global value chain participation on current account balances, other possible determinants of the current account must be controlled for. To do so, current account balances are typically regressed on a large number of potential determinants in cross-country panel datasets. Such an approach has also been adopted by the IMF in its multilateral surveillance, namely the Consultative Group on Exchange Rate Issues (CGER) methodology and its successor, the External Balance Assessment (EBA). While it is widely recognised that the EBA model does have its weaknesses,⁸⁵ it is a useful empirical framework, not least because it has become the main reference for the assessment of current account imbalances in the IMF's Article IV consultations and External Sector Reports. Box 3 provides a more detailed description of the IMF's EBA model.

⁸⁵ For a discussion, see Phillips, S., Catão, L., Ricci, L., Bems, R., Das, M., Di Giovanni, J., Unsal, D.F., Castillo, M., Lee, J., Rodriguez, J. and Vargas, M., "The External Balance Assessment (EBA) Methodology", *IMF Working Paper*, Issue 13, 2013.

Box 3

The External Balance Assessment model

In order to identify the determinants of current account balances, one strand of the literature has used structural models inspired by the new open economy macroeconomics paradigm.⁸⁶ Under this inter-temporal approach, current account imbalances are the outcome of decisions taken by forward-looking agents who maximise utility given expectations of future productivity, fiscal policy and financial market conditions. While these models allow a structural analysis of current account dynamics, their empirical fit tends to be relatively poor. Another strand of the literature has examined the determinants of the current account in empirical frameworks that are not tied to a particular structural model.⁸⁷ In this spirit, reduced-form panel regressions for the determination of the current account have been explored. The IMF's External Balance Assessment (EBA) model is a version of such a reduced-form panel regression model.⁸⁸

The backbone of the EBA consists of the panel data regression

$$ca_{it} = \alpha + x_{it} * \beta + u_{it},$$

where ca denotes the current account balance relative to GDP for country i in period t , and x is a set of economic fundamentals that are believed to determine the current account. Importantly, most of the explanatory variables in x are measured relative to rest-of-the-world averages; this is done because a change in, for example, the fiscal balance in country i can affect its current account balance only to the extent that other countries' fiscal balances do not change commensurately. The explanatory variables in the EBA include the net foreign asset position, the oil balance, output per worker, population growth, the old-age dependency ratio, capital account openness, expected output growth, the terms of trade, the output gap and the fiscal balance. The residuals from the EBA regression are commonly interpreted as those parts of the observed current account balances that cannot be explained by economic fundamentals.

The results from EBA regression models suggest that higher global value chain participation relative to the rest of the world improves economies' current account balances, even after controlling for other economic fundamentals. The first column of Table 2 reports the estimation results for the effect of economies' backward participation relative to the rest of the world on the

⁸⁶ See, for example, Sachs, J., "The Current Account and Macroeconomic Adjustment in the 1970s", *Brookings Papers on Economic Activity*, Vol. 12, Issue 1, 1981, pp. 201-282; Glick, R. and Rogoff, K., "Global versus country-specific productivity shocks and the current account", *Journal of Monetary Economics*, Vol. 35, Issue 1, 1995, pp. 159-192; or Obstfeld, M. and Rogoff, K., "The Intertemporal Approach to the Current Account", in Grossman, G. and Rogoff, K. (eds.), *Handbook of International Economics*, Vol. 3, Elsevier, 1995, Ch. 34, pp. 1731-1799.

⁸⁷ See, for example, Calderon, C., Chong, A. and Loayza, N., "Determinants of Current Account Deficits in Developing Countries", *The B.E. Journal of Macroeconomics*, Vol. 2, Issue 1, 2002, pp. 1-33; Chinn, M. and Prasad, E., "Medium-Term Determinants of Current Accounts in Industrial and Developing Countries: An Empirical Exploration", *Journal of International Economics*, Vol. 59, Issue 1, 2003, pp. 47-76; Gruber, J., Kamin, S., "Explaining the Global Pattern of Current Account Imbalances", *International Finance Discussion Papers*, Issue 846, Board of Governors of the Federal Reserve System, 2005; or Ca'Zorzi, M., Chudik, A. and Dieppe, A., "Thousands of Models, One Story: Current Account Imbalances in the Global Economy", *Journal of International Money and Finance*, Vol. 31, Issue 6, 2012, pp. 1319-1338.

⁸⁸ IMF 2013, op. cit.; and Phillips et al., op. cit.

current account balance obtained from the EBA regression model.⁸⁹ The coefficient estimate is positive and statistically significant, and consistent with the mechanism discussed in Section 3: countries that participate more in global value chains display larger current account surpluses or smaller deficits.^{90, 91}

Table 2
EBA regression results

	current account (1)	trade balance (2)
backward participation	0.13***	0.50***

Source: ECB calculations.
Note: *** indicates statistical significance at the 1% level.

The evidence suggests that the effect of global value chain participation on the current account operates through the trade balance. The mechanism laid out in Section 3 suggests that participation in global value chains affects an economy's current account balance by boosting its exports and thereby its trade balance. The empirical evidence reported in the second column of Table 2 provides support to this hypothesis, suggesting that participation in global value chains indeed improves economies' trade balances.

Cross-country differences in global value chain participation account for a significant fraction of the unexplained component of observed current account balances. Despite some success in terms of empirical fit, a general finding in the literature on reduced-form empirical models is that the unexplained part of the observed current account balances remains large. Chart 9 plots absolute current account balances as a percentage of GDP for the year 2009 for non-EU countries for which this exceeded 2.5% before the recent contraction of global imbalances. The absolute residuals of the EBA model that do and do not account for economies' participation in global value chains are plotted as additional bars. Chart 9 suggests that there are large unexplained current account balances for surplus and deficit economies in the standard EBA model without global value chain participation measures. The unexplained current account balances are considerably smaller when economies' participation in global value chains is accounted for. For example, for the United States about half of the unexplained part of the observed current account deficit of 2.6% of GDP in 2009 can be accounted for by the country's limited participation in global value chains relative to the rest of the world.

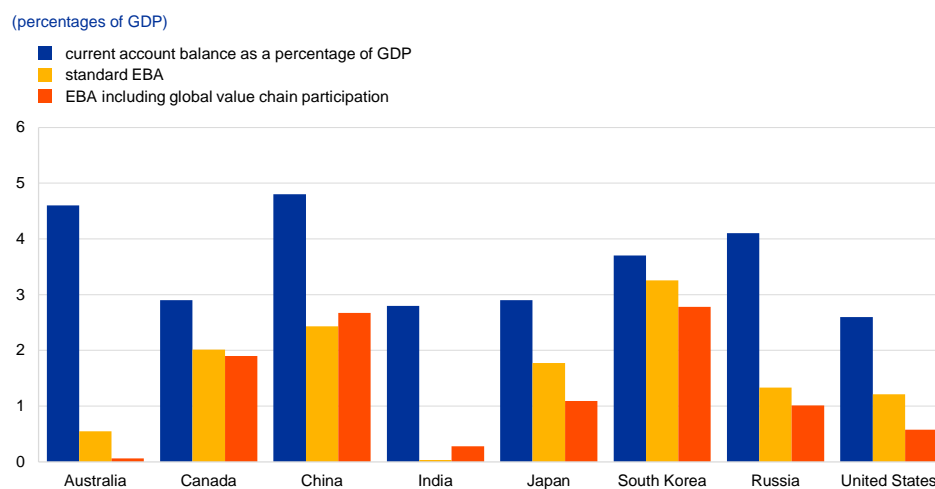
⁸⁹ Analogously to the IMF's original EBA model, the results are obtained from generalised least squares estimation using data for 29 economies over the period 1995-2011. The regression results reported are robust to heteroscedasticity and autocorrelation in the error term.

⁹⁰ The results also imply that an economy's current account balance improves if its global value chain participation falls by less than that of the rest of the world.

⁹¹ There is also some evidence that, in addition to backward participation, increased forward participation can improve the current account balances of economies, even though the effects are quantitatively weaker and operate through other mechanisms (see Brumm et al., op. cit.).

Chart 9

Observed and unexplained current account balances



Sources: IMF World Economic Outlook and ECB calculations.

5 Conclusion

The empirical evidence suggests that apart from fostering growth, magnifying cross-country spillovers and changing an economy's income distribution, global value chain participation improves current account balances.

Against the background of the recent stalling in the rise in global value chain participation, it is natural to ask whether this will have implications for global current account balances. However, it must be borne in mind that an economy's global value chain participation only affects its current account balance if the former changes relative to that in the rest of the world. As highlighted in the recent literature, the observed slowdown in the fragmentation of production across borders has been a global phenomenon and is unlikely to impact global current account configurations.