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Reaping the benefits
of global value chains
in Turkey

**Volker Ziemann,
Béatrice Guérard**

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REAPING THE BENEFITS OF GLOBAL VALUE CHAINS IN TURKEY

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By Volker Ziemann and Béatrice Guérard

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ABSTRACT/RÉSUMÉ

Reaping the benefits of global value chains in Turkey

Despite major progress, Turkey still lags behind most comparable countries in terms of exported value added per capita. Its remarkable economic performance over the past 15 years has not been sufficiently backed by gains in export market shares, in particular when measured in value added terms. While Turkey incorporates an increasing share of foreign value added in its own exports, its capacity to provide intermediate inputs to other countries' exports is still limited. This paper argues that Turkey's participation in global value chains remains below potential owing to institutional features that hamper efficient allocation of capital and labour, obstacles inherent in bilateral trade agreements and entry regulations, underdeveloped human capital and insufficient investment in innovation, R&D and knowledge-based capital. Progress along these dimensions would strengthen Turkey's backward and forward trade linkages and contribute to rebalancing its growth model. The adjustment process towards a more export-oriented economy operating on a level playing field needs to be flanked by dedicated industrial, social and environmental policies to alleviate adverse consequences on displaced firms and workers and the ecosystem.

This working paper relates to the *2016 OECD Economic Survey of Turkey* (www.oecd.org/economy/surveys/economic-survey-turkey.htm)

JEL Classification: C33; F02; F14; O30.

Keywords: global value chains, export performance, trade and investment policies

Tirer les avantages des chaînes de valeur mondiales en Turquie

Malgré des progrès, la Turquie accuse toujours un retard par rapport à la plupart des pays comparables en termes de valeur ajoutée exportée par habitant. Sa performance économique remarquable au cours des 15 dernières années n'a pas été suffisamment soutenue par des gains de parts de marché à l'exportation, en particulier lorsque ceux-ci sont mesurés en valeur ajoutée. Alors que la Turquie intègre une part croissante de valeur ajoutée étrangère dans ses propres exportations, sa capacité à fournir des intrants intermédiaires pour les exportations d'autres pays est encore limitée. Ce papier fait valoir que la participation de la Turquie dans les chaînes de valeur mondiales reste inférieure à son potentiel en raison de caractéristiques institutionnelles qui entravent l'allocation efficace du capital et du travail, des obstacles inhérents aux accords commerciaux bilatéraux et des règlements d'entrée de professions, du capital humain sous-développé et de l'insuffisance des investissements dans l'innovation, la R & D et le capital de connaissances. Progresser dans ces dimensions permettrait de renforcer les liens commerciaux en amont et en aval de la Turquie et de contribuer à rééquilibrer son modèle de croissance. Le processus d'ajustement vers une économie plus orientée vers l'exportation opérant avec des règles du jeu équitables doit être encadré par des politiques industrielles, sociales et environnementales dédiées à atténuer les conséquences néfastes sur les entreprises et les travailleurs déplacés et l'écosystème.

Ce Document de travail se rapporte à l'*Étude économique de l'OCDE de la Turquie 2016* (www.oecd.org/fr/economy/etudes/etude-economique-turquie.htm)

JEL Classification: C33 ; F02 ; F14 ; O30.

Mots clefs : chaînes de valeur mondiales, performance à l'exportation, politiques de commerce et d'investissement

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REAPING THE BENEFITS OF GLOBAL VALUE CHAINS IN TURKEY

Volker Ziemann and Béatrice Guérard¹

Turkey's participation in GVCs

The growing role of global value chains (GVCs) in international production processes is of critical importance for Turkey's development. Participation in GVCs is one of the key drivers of successful productivity diffusion in a globalised world (OECD, 2015a). Greater trade openness enhances exposure to international competition and forces domestic firms, frontier as well as non-frontier ones, to comply with best practices of global frontier firms and raise productivity levels accordingly. Backward integration, that is the use of foreign inputs to produce final and intermediate goods exported by Turkish firms, often entails import competition, in particular in manufacturing and services, and accelerates the reallocation of domestic resources towards the most competitive firms. Backward integration also facilitates the diffusion of knowledge either indirectly through learning from suppliers or directly via knowledge spillovers from foreign direct investment (FDI). Forward integration, that is the production of intermediate inputs used in other countries' exports, increases the potential market, leverages the use of Turkey's human, capital and natural resources, and, as a result, contributes to rebalancing the Turkish economy. Increased production for foreign markets requires convergence of product standards toward international best practices and triggers virtuous feedback loops between productivity, innovation, human capital endowment and living standards.

However, cross-border fragmentation of manufacturing supply chains also generates externalities some of which deserve policy attention. For instance, countries with less stringent environmental regulations may absorb more polluting production processes than on a level playing field, with adverse consequences for the environment and well-being. Transition countries may also face an increase in inequality during early stages of GVC integration, as only the best firms are able to compete with international best practice. Deepening integration in GVCs exposes countries to a greater number of shocks although a better regional and product-range diversification can offset the adverse effects on stability. Against this backdrop, policy needs to take into account the trade-offs between enhanced growth prospects and potential negative spillovers on other relevant policy dimensions arising from GVC integration. Metrics such as the OECD's Better Life index or the United Nations' Sustainable Development Goals can help to identify and quantify the effects of these trade-offs and calibrate policy accordingly.

While the concept of GVCs is not new, their quantitative assessment became possible only recently owing to the development of inter-country input-output tables pioneered, among others, by the OECD. A major spinoff of these tables is the joint OECD-WTO Trade in Value-Added (TiVA) database that allows value-added flows to be distinguished from gross export flows. Two dimensions are worth mentioning in the GVC context. First, the TiVA data allows analysts to determine the source of value added embodied in gross exports. Among other things, the focus on the origin of value added emphasises the importance of

1. The authors are members of the OECD Economics Department. They would like to thank Economics Department colleagues Robert Ford, Koray Kalafatçılar, Vincent Koen, Alvaro Pereira and Julien Reynaud, and OECD colleagues Bert Brys (Centre for Tax Policy), Dorothee Flaig and Julien Gourdon (Trade and Agriculture Directorate), Dirk Pilat and Mariagrazia Squicciarini (Science, Technology and Industry Directorate), Angelica Salvi del Pero (Education, Labour and Social Affairs Directorate), William Thorn (Education Directorate) as well as Gary Gereffi (Duke University) for valuable comments, suggestions and data provision. Special thanks are due to Rauf Gönenç (Economics Department) for his guidance and inspiration, as well as to Sisse Nielsen and Mercedes Burgos (both Economics Department) for excellent editorial assistance.

services as inputs to gross exports and sheds light on the sectoral heterogeneity with respect to foreign and domestic origin of value added (Figure 1, Panel A).

Figure 1. Value-added origin of exports and its destination

Note: OECD peers are the 10 countries, other than Turkey, with the lowest per capita GDP in the OECD: Czech Republic, Slovenia, Portugal, Slovak Republic, Estonia, Greece, Hungary, Poland, Chile and Mexico. Non-OECD peers include Argentina, Bulgaria, Brazil, China, Croatia, India, Malaysia, Romania, Russia, Thailand and Vietnam.

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Second, the TiVA data sheds light on the downstream path of exported goods and services by distinguishing the share of exported value-added that is directly absorbed by partners' domestic demand and the share that is further exported to third countries. The latter serves as a measure of successful integration in global supply chains, which has become a major driver of export performance. Although Turkey has a medium ranking in terms of the level of exports in value added, Turkey still lags behind most peer countries in terms of per capita exports of domestically produced value added (Figure 1, Panel B) and the gap that is much larger than the gap in per capita GDP. In particular the share of exports that serve as inputs to partners' exports is substantially lower than in other countries. While more than 30% of the exported domestic value added of OECD peers is further exported to third countries, this share is only about 20% in Turkey which suggests that Turkish firms are either less well integrated into global supply chains or they occupy predominantly downstream parts in them.

World export market shares confirm that Turkey's export business is concentrated on final rather than intermediate goods (Figure 2, Panel A). Turkey's strong export performance since 2000 is predominantly backed by manufacturing exports while exports of services and primary products exhibit declining world market shares both in terms of gross exports and domestic value added embodied in service exports (Figure 2, Panel B and C). However, when considering the source of value added in world exports, Turkey achieved sustained gains in market shares in both manufacturing and services (Figure 2, Panel D). This suggests a relatively high service content in Turkish manufacturing exports. Indeed, more than 35% of value added exported as manufacturing products originates from domestic services while this share is below 30% for OECD countries on average and only 25% for non-OECD peer countries.

Figure 2. Turkey's export market shares

In percentage points of world exports

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Progress in export performance since 2000 is slightly less pronounced when measured in value added (Figure 2, Panel C) rather than gross terms (Panel B). Indeed, Turkey's backward participation index, which measures the share of foreign value-added contained in Turkey's gross exports, nearly doubled between 2000 and 2011, the largest increase alongside India (Figure 3). In contrast, Turkey's forward participation index, defined as Turkish value added embodied in partner countries' exports as a share of Turkey's gross exports, remained broadly stable between 2000 and 2011. In other words, the capacity of the Turkish firms to play a role in upstream parts of value chains has remained very limited compared to other countries. Forward participation is low in manufacturing in particular, where it decreased more than in any other peer country between 2000 and 2011.

Figure 3. Participation in global value chains

Note: The backward participation index is defined as the share of foreign value added in a country's gross exports. Forward participation is defined as the ratio of domestic value added embodied in foreign countries' exports over gross exports.

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

One major caveat associated with GVC participation indicators is that they solely focus on global supply chains that include at least two border-crossing events (the import of the intermediate input and the export of the assembled product). In fact, backward participation indices do not capture the extent to which foreign intermediates enter supply chains for products eventually absorbed by own domestic demand. Similarly, forward participation does not capture the extent to which an economy is able to export intermediates that are further processed in the partner country and then absorbed by the same partner's domestic demand rather than exported further. GVC indicators thus fail to capture some downstream and upstream parts of global supply chains.

The TiVA data are subject to several other caveats. They implicitly assume that all firms operating in the same industry use the same technology and inputs. They also assume that the import content of exported goods in a given industry is the same as the import content of total demand in that industry. Finally, Turkey-specific issues arise stemming from the use of outdated input-output tables and very aggregate national accounts tables. Against this background, Turkey should continue to improve the statistical infrastructure and the integration into global databases designed for cross-country measurement of GVC integration.

GVC participation by sector

A sector's backward intensity index measures the share of foreign value added in the sector's gross exports. A sector's forward intensity index is the share of the sector's value added in exports that is subsequently embodied in foreign countries' exports (Figure 4, Panel A). Exports of services, agricultural and mining products typically contain less foreign value added than manufactured products. Mining and metal products, because they are generally intermediate rather than final goods, enter foreign exports more than textile, food and agricultural products. Compared to OECD averages, backward intensity is generally stronger in manufacturing and weaker in services. As for forward participation, nearly all sectors are less forward intense in Turkey: only textile, automotive and machinery reach levels in line with OECD averages. This hints at generalised rather than sector-specific impediments to forward integration for Turkish firms.

Figure 4. Revealed comparative advantages

2011

1. Turkey's sector intensity indices are displayed.

2. Each sector's revealed comparative advantage is defined as the sector's relative contribution to Turkey's gross exports (value added in exports) divided by the sector's share in world gross exports (value added in exports).

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Cross-country differences in export industry composition suggest that differences in GVC participation are to a great extent reflected in the industry composition of exports (Figure 4, Panel B). For instance, Turkey's weakness in forward linkages correlates with the predominance of textiles (manufacturing) and hotels and restaurants (services) sectors with rather low forward intensity. Similarly, some manufactured products with typically very strong backward linkages, such as chemicals or electrical products, are relatively underrepresented in the basket of Turkey's gross exports. Among the sectors with a comparative advantage, only metal products display high backward intensity.

Sectoral contributions to GVC participation (Figure 5) shows that the metal sector exports a much higher share of total foreign value added than in other countries owing to a high sector-specific backward participation index (Figure 4, Panel A) in combination with a higher share in gross exports (Figure 4, Panel B). Similarly, the automotive sector accounts for a disproportionately high share of backward participation in Turkey, but also, and even more so, in OECD peer countries. The textile sector also contributes more than in other countries but the sector's GVC-intensity is generally low. Conversely, chemical and electrical products account for less of backward integration when compared to other countries mainly due to their low shares in Turkey's gross exports (Figure 4, Panel B).

Forward participation is concentrated in the services sector that typically explains more than half of domestic value added contained in foreign countries' exports (55% in the case of Turkey). The relatively low level of Turkey's forward participation largely reflects the low contribution of mining and business activities (real estate, renting, consulting, etc.) (Figure 5, Panel B). Mining contributes less due to low exports in this sector (Figure 4, Panel B) while business activities suffer from low forward intensity in Turkey compared to other countries. Over time, as a result of higher export growth and faster increases in backward intensity in manufacturing, backward participation has become more concentrated in manufacturing exports (87% of exported foreign value in 2011 against 66% in 2000, see Appendix 1). The

division of value added contained in other countries' exports between services and manufacturing has remained broadly stable (see Appendix 2).

Figure 5. Sectoral contributions to GVC participation indices

Note: OECD peers are the 10 countries, other than Turkey, with the lowest per capita GDP in the OECD: Czech Republic, Slovenia, Portugal, Slovak Republic, Estonia, Greece, Hungary, Poland, Chile and Mexico.

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Beyond the sectoral composition of exports, the price of products within each sector can also explain external imbalances. Recent evidence from CEPII's trade unit values database suggests that for each manufacturing sector, the share of high-value products in the sector's exports is consistently lower in Turkey than in other country groupings except for primary, food and textile good exports where the share of high-price-range products slightly exceeds the one observed on average in non-OECD peer countries (Figure 6). Over time, the share of high-value products mostly stagnated in Turkey, with the notable exception of the textile sector where the share of high-value products doubled between 2000 and 2005 but stagnated thereafter. In sharp contrast, OECD peer countries have managed to increase the share of high-value exports in most sectors over time. This weighs on Turkey's forward participation while it potentially increases foreign value added in Turkish exports.

Figure 6 Share of high-value exports by sector

Note: A high-value product's unit value exceeds the world reference by at least 15%. The world reference is the world median of all unit values weighted by the value of their trade flow for a given year. OECD peers are the 10 countries, other than Turkey, with the lowest per capita GDP in the OECD: Czech Republic, Slovenia, Portugal, Slovak Republic, Estonia, Greece, Hungary, Poland, Chile and Mexico. Non-OECD peers include Argentina, Bulgaria, Brazil, China, Croatia, India, Malaysia, Romania, Russia, Thailand and Vietnam.

Source: CEPII Trade Unit Value database, see Emlinger and Piton (2014), "World trade flows characterization: Unit values, trade types and price ranges", CEPII Working Papers, No 2014-26.

As a complementary analysis to forward (downstream) and backward (upstream) integration indices, network metrics have been computed based on bilateral value added trade flows in the OECD TiVA database for the total manufacturing sector as well as for the textile and the automotive sector. The resulting heat maps (Appendix 3) illustrate the ongoing deepening of Turkey's integration in international trade. Progress since 2000 is most significant in the textile and the automotive sector while Turkey remains at the periphery of the European manufacturing hub when overall manufacturing trade flows are considered. Turkey's position in the automotive value added trade network highlights its pivotal location between the three major automotive hubs (Europe, North America, East Asia) and underscores the global reach of Turkish car component manufactures.

GVC participation by partner country

In absolute terms, encompassing both forward and backward linkages, Germany is Turkey's main GVC trading partner (Figure 7). USD 3 billion of Turkish value added is exported further by Germany and close to USD 4 billion of German value added is contained in Turkish exports. This corresponds roughly to one tenth of Turkey's backward and forward linkages. The only country, from which Turkey was sourcing even more value added for its exports in 2011, merely consisting of primary products, was Russia. Italy and China were respectively the second and third most important countries in terms of forward linkages.

Participation indices can also be defined for each trading partner. Forward participation with respect to a partner country indicates the share of domestic value added contained in the bilateral exports that is later embodied in the partner's exports to third countries. Backward participation with respect to a country is defined as the share of foreign value added embodied in exports to this country. Turkish trade with Korea and China is the most GVC-intense as bilateral forward and backward participation indices by far exceed the indices observed for other countries and the economy as the whole (Figure 8, Panel A). Indeed,

gross exports to China contain 40% of Turkish value added that is re-exported by China and 51% of foreign value added. In comparison, exports to Germany only contain 15% of Turkish value added that is re-exported by Germany and only 19% of foreign value added. The twofold increase in backward participation between 2000 and 2011 (Figure 3, Panel A) was mainly driven by trade with China, Brazil and India on the back of more dynamic and more foreign-value intense trade (Figure 8, panel B). The increase in forward participation mainly came from trade with Poland but was offset by less forward-intense trade with other countries like the Czech Republic or Korea.

Figure 7. Turkey's main GVC partner countries

Note: Turkish value added embodied in foreign country's exports (forward participation) and foreign country's value added contained in Turkey's exports (backward participation) are shown for Turkey's main GVC partner countries.

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Figure 8. GVC participation by export destination

Note: Bubble size reflects partner shares in gross exports (Panel A) or growth in bilateral trade between 2000 and 2011 (Panel B).

Source: OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Bilateral value added trade balances can differ substantially from gross trade balances. A classic example is the assembly of the iPhone in China (Gereffi, 2014). Several parts of the iPhone are imported by China, notably from Korea. Indeed, China's value added embodied in the iPhone is very small compared to the total value of the iPhone that is exported. As a result, if a country imports iPhones from China, the deterioration in the bilateral gross trade balance exceeds by far the deterioration in the value-added trade balance. Conversely, bilateral gross trade balances with China can underestimate the actual balance of value added contained in the countries' final demand as exported and imported value added of third countries are ignored. For trade between China and Turkey, the former prevails as the bilateral gross trade balance is considerably more negative than the value added trade balance. The aggregate effect is offset by trade with the rest of the world, which suggests that Turkey may play role akin to China's in the middle East (Iran, Iraq and Syria are important export markets for Turkey but not covered in the OECD TiVA database).

Drivers of participation in global value chains

Integration in GVCs may take place via arm's-length trade or through FDI by multinational enterprises (MNEs). Arm's-length relationships within international production chains typically occur for standard products with low coordination, codification and transaction costs. More customised products entail more complex transactions, codifications and supplier capability requirements. This increases costs for the lead firm due to necessary transfers of ownership to suppliers, which favours the integrated firm approach in organising the international production process. Beyond these two extreme cases, three intermediate governance types of GVCs can be defined according to the complexity of transactions, the ability to codify transactions and the capabilities of the supplier base (see Figure 9).

Figure 9. Governance types of global value chains

Source: Gereffi et al. (2005), « The governance of global value chains », *Review of International Political Economy*, Vol 12, No. 1, p. 89.

The prevalence and distribution of these types of governance structures within a given country depend inter alia on the type of GVCs in which the country is integrated. Low-technology product chains are more likely to be organised by arm's-length relationships while more high-technology products may favour MNEs and FDI. As different governance types call for different policies, the understanding of a country's comparative advantages and the assessment of its factor endowments is key in defining the appropriate policy mix. Two comments are in order. First, the industry structure of an economy is endogenous to the

policy framework put in place. Second, the type of governance chosen can itself be an endogenous response to the policy framework.

Non-policy drivers

Like trade openness, GVC participation partly depends on factors that are not directly related to economic policies such as the size of the country or remoteness. Indeed, the larger the domestic market, the higher the chance that exporting firms can source intermediate inputs from home rather than seeking them from abroad. Similarly, the distance to global economic activity, measured as average geographical distance weighted by GDP, is expected to increase trade costs and reduce the likelihood of trade linkages. However, distance may affect both the numerator and denominator of backward and forward participation indices, and its impact is thus less certain. Legal origins or common language indicators are also often found to be significant in explaining bilateral trade linkages in gravity-type models (Kowalski et al., 2015a).

Natural capital endowments also play a central role in backward and forward linkages. Absence of raw material and other primary products increases backward linkages while their abundance increases forward linkages. The state of development determines an economy's capacity to produce valuable intermediates to be used by both domestic and foreign countries' exporters. As such, the relative quality of productive and human capital is expected to be negatively (positively) correlated with backward (forward) participation. Alternatively, GDP per capita can be used as a proxy for the state of development. Finally, industry composition also affects GVC participation. For instance, services exports typically contain less foreign value added than manufacturing industries (Figure 4, Panel A). Table 1 illustrates the cross-country regression results that tend to confirm the aforementioned correlations.

Table 1. Non-policy drivers of GVC participation

	Backward participation index	Forward participation index
log distance to activity	-0.363**	-0.070
log population (in millions)	-0.456***	0.229
log real GDP per capita	-0.470**	1.037***
Share of manufacturing in value added	0.534***	-0.146
Share of natural capital	-0.257	0.803***
Adj. R-Square	0.62	0.53
Observations	40	40

Note: * significant at 5%, ** significant at 1%, *** significant at 1%. Standardised coefficients are shown. GVC participation indices refer to 2011, independent variables to 2010.

Source: OECD TiVA 2015 database, CEPII, Penn World Tables, External Wealth of Nations database. OECD calculations.

Some of the weakness in forward participation is explained by Turkey's weak natural capital endowment and its level of GDP per capita (see Table 1). Progress with the latter is expected to come with an increase in forward participation. Regarding backward participation, Turkey's characteristics would suggest a high potential owing to its favourable geographical situation and its dependence on foreign primary inputs. Figure 10 illustrates the deviations of GVC participation indices from their expected value resulting from the set of non-policy drivers (Table 1). The results suggest that both backward and forward linkages are below their expected values in Turkey. Insofar as the five variables in Table 1 fully capture non-policy drivers, the residuals shown in Figure 10 reflect country-specific differences in policy settings. The quantitative assessment of policy drivers for GVC participation is described in Appendix 4.

Figure 10. Deviation from expected GVC participation index

Note: Residuals obtained from regressions in Table 1 are shown.

Source: OECD calculations based on OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Quality of institutions, infrastructure and business environment

The quality of basic institutions is found to be a key driver of participation in GVCs, particularly in developing countries (Kowalski et al., 2015). Poor governance, political instability and corruption are major obstacles for attracting MNE investment. Additional costs related to restrictions of foreign entry further affect foreign investor decisions and distort prices in favour of production for domestic markets. Contract enforcement is a key channel through which the quality of institutions affects a country's attractiveness for potential business partners abroad, in particular with regard to inward FDI. In particular young firms mention corruption, political instability and informality as their main obstacles to investment (Atabek et al., 2016). Against this backdrop, improvement of Turkey's performance in world governance indicators is likely to benefit GVC integration (Figure 11, Panel A). Participation in GVCs also heavily relies on efficient network infrastructure and other logistics-related services. While Turkey benefits from a rather well-developed transport infrastructure, ICT infrastructure is still underdeveloped compared to many peer countries (Figure 11, Panel B).

Regulatory burdens, in particular those impeding firm growth above certain employee thresholds (OECD, 2014a), make it harder for firms to reach the necessary scale to become competitive exporters. In addition, Turkey has the highest minimum-to-median wage ratio in the OECD, further exacerbated by the recent increase in the minimum wage. This damages international competitiveness, especially in labour-intensive sectors where Turkey has comparative advantages. The new hike in minimum wages at the beginning of 2016, although partly subsidised by reduced employer social security contributions for 2016, hurts exporters more than firms that produce for domestic markets as the latter can adjust prices unless import competition prevents them from doing so. The distortive impact of the high minimum-to-median wage ratio is magnified by large productivity heterogeneity among SMEs in Turkey (see Atabek et al., 2016). The squeezed margins drive exporting firms out of the market or reduce their investment capacity and competitiveness. Worse, the minimum wage increase is likely to drive firms back into the grey economy or make it harder for firms to escape from it. Informal firms are significantly less likely to integrate into GVCs or to become exporters.

Figure 11. Network readiness indicators

Source: World Bank (2015), World Governance indicators; World Economic Forum (2015), Network Readiness Index.

Shortcomings in institutions can increase financial vulnerabilities and volatility. Notwithstanding recent progress on the back of macro-prudential measures and declining current account deficits, effective exchange rate volatility has started to increase again since 2013, from an already elevated level when compared to other countries (Figure 12). Excessive exchange rate volatility affects the predictability of cash flows related to trade activities and deteriorates confidence. Besides curbing inflation, limiting the volatility of capital flows and exchange rates is the major challenge for Turkey's monetary policy.

Figure 12. Financial volatilities and exchange rate evaluation

1. Time-varying volatilities obtained from GARCH(1,1) models of monthly changes in nominal and real effective exchange rates (through to Feb. 2016) as well as year-on-year growth of quarterly consumer price indices (through to 2015Q4).
2. Methodology of the Peterson Institute for International Economics (<http://www.piie.com>).

Source: OECD Economic Outlook database; Biannual reports of the Peterson Institute for International Economics (<http://www.piie.com>).

Trade and investment policies

In the early 1980s, Turkey embarked on the transition from an import-substituting to an export-oriented industrialisation strategy. Turkey first replaced non-tariff barriers such as import lists or quotas by tariff barriers, and then engaged in a process of cutting tariffs. However, since 2005, tariffs on primary products started to rise again, albeit from low levels (Figure 13, Panel A). A key aspect of Turkey's trade liberalisation is the customs union with the EU, which came into force at the end of 1995 and eliminated all duties, quantitative restrictions and charges having an equivalent effect on bilateral trade of industrial and processed agricultural goods. The agreement further stipulated the adoption of the EU's common external tariff for most industrial products and a convergence of industry standards.

Subsequently, Turkey has concluded several further bilateral preferential trade agreements. As a result, the gap between the most-favoured-nation (MFN) tariff and the effectively applied tariffs (AHS) has widened for manufactured products (Figure 13, Panel B) but less so for primary products (Figure 13, Panel C). Empirical results suggest that the decline in tariffs applied on manufactured products has significantly contributed to the increase in forward linkages (Appendix 4). Against this backdrop, recent developments reflected by increasing tariffs on primary products and emissions of trade-defensive measure (see below) signal a halt in trade liberalisation. The renewed dialogue with the European Union with the aim to resume the convergence process should be flanked by a renewed commitment towards trade liberalisation.

Figure 13. Tariffs applied on primary and manufactured products

Source: World Bank, World Integrated Trade Solution (WITS).

Besides lowering or abolishing tariffs, preferential trade agreements (PTAs) typically include other dimensions of trade-related policies. However, none of Turkey's PTAs includes more than three out of the seven possible dimensions codified by the Design of Trade Agreements (DESTA) database (Box 1). As accession negotiations with the EU resume, there is room for progress along the remaining PTA dimensions. Compliance with EU standards and convergence towards the EU policy framework would not only benefit trade with the EU but also enhance Turkey's attractiveness in the eyes of investors worldwide.

Box 1. Depth of Turkey's preferential trade agreements

The depth index of preferential trade agreements (PTAs) is based on the Design of Trade Agreements (DESTA) database and combines seven dimensions potentially included in PTAs to liberalise trade between the parties (Dür et al., 2014). The first sub-index focuses on tariffs and is equal to 1 if all tariffs (with limited exceptions) are to be reduced to zero. The remaining six sub-indices capture areas other than tariffs that contribute to trade liberalisation between the parties: service trade, investment, standards, intellectual property rights, public procurement and competition. The respective sub-indices take the value of 1 if a substantive provision for the respective dimension is contained in the agreement and 0 otherwise. These dimensions underline the importance of PTAs that goes well beyond the simple reduction of tariffs, in particular for emerging countries such as Turkey. The customs union with the EU, for instance, has forced Turkey to accelerate the alignment process with the EU's acquis and the reform process with benefits for FDI, exporting enterprises' productivity and Turkish consumers (World Bank, 2014).

The depth-index of PTAs is obtained as the sum over these seven dimensions and ranges accordingly from 0 to 7 for each country pair. According to the DESTA database, Turkey has negotiated 24 PTAs in addition to the customs union with the EU. However, none of the agreements includes more than three dimensions according to DESTA definitions. Most protocols include provisions for a free trade zone and for product standards. As a result, the trade-weighted average depth of PTAs is considerably lower for Turkey than for most other developing countries (Figure 14). The recently concluded preferential trade agreement with the Republic of Korea, which is not part of the DESTA database and entered into force in 2013, is an encouraging step towards deeper commitments and may path the way towards more comprehensive PTAs in the future. It already includes provisions for intellectual property and competition and agreements on investment and trade in services are under ratification as of December 2015 (WTO, 2016). Other recently concluded PTAs include Malaysia (2015) and Singapore (2015). These two agreements include broader provisions similar to the one with Korea. In addition, the Turkey-Singapore agreement includes a chapter on public procurement. Going forward, Turkey seeks to include services and investment in current FTA negotiations with Ukraine, Peru, Japan, Mexico and other countries.

Figure 14. Trade-weighted depth of preferential trade agreements

Note: Average depth of free-trade agreements weighted by bilateral trade flows is shown. Depth of an agreement ranges from 0 to 7 and is defined by the number of dimensions covered: zero tariffs, services trade, investments, standards, public procurement, competition and intellectual property rights.

Source: Design of Trade Agreements (DESTA); OECD calculations.

A major problem arising from the customs union with the EU relates to the asymmetry it implies for trade with third countries. Turkey's negotiations of free trade agreements with third countries are undermined by attempts at trade deflection as these countries ship their exports to Turkey through Europe. Trade deflection has been identified particularly in the imports of Mexican cars coming to Turkey through Europe and forced Turkey to introduce measure at the importation stage in the form of additional financial obligation of 10%, which is the rate of EU's Common External Tariff in cars. The estimated effects of finalising the ratification process or commencing the negotiations on free trade agreements with third countries such as Mexico, South Africa and Columbia are sizable (World Bank, 2014).

International trade in goods is further affected by non-tariff-measures (NTMs) such as sanitary and phytosanitary measures (SPS), technical barriers to trade (TBT) or pre-shipment inspection and other custom formalities (PSI) that hinder or limit trade of certain goods. Further NTMs include contingent trade-defensive measures (TDM) such as anti-dumping, countervailing and safeguard measures, as well as other NTMs such as non-automatic licensing, quotas and prohibitions and quantity controls other than those related to SPS and TBT. 2014 data from CEPII's NTM-map suggests that Turkey has implemented more import restrictions in the area of customs formalities than its peers (Figure 15). According to the WTO (2016), Turkey has been the third biggest user of safeguard measures since the WTO's inception, initiating 21 safeguard investigations over the period 1 January 1995 to 30 April 2015 and taking 14 safeguard actions over the same period. Trade-defensive and safeguard measures are on the rise in Turkey, against the background of the risk of a renewed cycle of protectionism.

Figure 15. Non-tariff-measures by type

Note: Frequency refers to the share of imported products affected by the respective type of NTM. Coverage denotes the share of imported value affected by NTMs. OECD peers are the 10 countries, other than Turkey, with the lowest per capita GDP: Czech Republic, Slovenia, Portugal, Slovak Republic, Estonia, Greece, Hungary, Poland, Chile and Mexico.

Source: Gourdon (2014), "CEPII NTM-MAP: A tool for assessing the economic impact of non-tariff measures", CEPII Working Papers, No.2014-24.

Evidence from the Global Trade Alert project confirms this trend. The number of NTMs that potentially harm foreign trade has increased worldwide over recent years (Evenett and Fritz, 2015). Turkey is most affected by measures implemented by India and Russia, Turkey's main supplier of imports in 2014. Escalating geopolitical tensions have further exacerbated the adverse impacts on trade between Russia and Turkey towards the end of 2015. The country most harmed by Turkey's measures is China followed by the United States and India.

Barriers to trade facilitation are found to reduce significantly the volume of GVC trade flows (Appendix 4). This calls for progress along several trade facilitation dimensions where Turkey performs poorly compared to OECD best practices and peer countries, in particular in terms of external border agency cooperation, the simplification of documents and making trade-relevant information available to the trade community (Figure 16). Recent initiatives to reduce customs processing delays such as the one-stop-shops at the Bulgarian and Georgian border are promising. They should be evaluated and, if judged successful, extended to other borders in due time. In addition, Turkey has launched the Authorised Economic Operators certificate that permits firms which fulfil the Authorised Economic Operator requirements regarding documentation, financial solvency and safety to clear goods locally and facilitates the shipping of goods through a reduction of documentation.

Figure 16. OECD trade facilitation indicators

Source: OECD (2015), Trade facilitation indicators www.oecd.org/trade/facilitation/indicators.htm.

Visa restrictions are frequently highlighted by Turkish entrepreneurs as a major impediment to doing business across borders, in particular with Europe. In addition, visa restrictions hinder cross-country mobility of scientists, and hence, the diffusion and appropriation of technologies and innovation (Appelt et al., 2015). In conjunction with the insufficient depth of trade agreements, especially with the EU, visa restrictions put Turkey at a disadvantage compared to other emerging countries, in particular in Eastern Europe (Figure 17).

Figure 17. Visa restriction index

Source: Henley & Partners (2015), Visa Restrictions Index.

To the extent that foreign-owned firms are better integrated in GVCs, in particular as the import content of their exports is higher, attracting FDI raises backward integration in GVCs. In addition, MNEs export more than domestic firms and they also invest more in research and development (R&D), which extends the scope for upstream value added production of intermediates used in third countries' exports, hence, raises forward participation. At the same time, foreign affiliates of MNEs are also found to integrate less domestic intermediates in their exports, which reduces the spillover of such firms on the domestic economy and forward participation. In fine, the aggregate impact on forward participation depends on the balance between the extensive marginal effect (more exports of intermediates) and the intensive marginal effect (lower domestic value added embodied per export unit). Empirical evidence at least suggests that differential treatment of foreign suppliers reduces the scope of GVC linkages, in particular forward participation (Appendix 4).

FDI can also benefit the domestic economy indirectly through transfer and diffusion of new technologies. Many factors affect the attractiveness of an economy for foreign investors. The quality and quantity of natural, human and productive capital certainly plays a major role, as does the quality of institutions. But there are also direct barriers for FDI. The OECD FDI regulatory restrictiveness index measures four dimensions of restrictions: i) foreign equity, ii) screening and approval, iii) key foreign personnel and iv) other restrictions. The sectoral breakdown (Figure 18, Panel A) shows that, in addition to media, Turkey is most FDI-restrictive in transport, real estate and business services, notably accounting and audit, all of which are arguably key service providing sectors for export-oriented foreign firms. Restrictions almost entirely stem from foreign equity restrictions in Turkey. FDI inward stocks are significantly lower in Turkey than in other countries (Figure 18, Panel B). Empirical evidence suggests that facilitating FDI inflows has the potential to boost Turkey's integration in GVCs (Appendix 4).

Figure 18. Foreign direct investment

Source: OECD FDI Regulatory Restrictiveness Index (FDI Index); UNCTAD.

Barriers to competition, insufficient regulatory transparency and restrictions to the movement of people hinder foreign entry and hamper cross-border trade. The OECD service trade restrictiveness index shows that the most restricted business services in Turkey are accounting and legal services. Removing overly stringent regulations in these areas would improve resource allocation, productivity and competitiveness, not only in the services sector but also in downstream industries that use these services as inputs. Providing cost-efficient services not only helps improve the competitiveness of Turkish exporters, it also raises the attractiveness of the Turkish economy for foreign investors.

Innovation, R&D and knowledge-based capital

Further integration into GVCs crucially depends on Turkey's ability to improve forward linkages. The production of competitive intermediate products requires constant upgrading to keep up with international best practices. Upgrading can occur along various dimensions that can be classified into intensive and extensive upgrading. The former comprises process upgrading, product upgrading and functional upgrading. The latter refers to integrating or originating new production chains (OECD, 2013a).

Process upgrading increases the efficiency of existing production by reducing defect rates and increasing worker productivity. It can involve a novel production process, investments in new technologies or innovation in management and organisational practices. One example is the monitoring of daily production results by displaying key numbers inside production plants to increase motivation and competition between shifts and identify inefficiencies. Other examples include the use of ICT tools in enterprise resource planning or the use of E-sales and E-purchases solutions. On average, Turkey performs poorly along a number of such efficiency-enhancing dimensions (Figure 19), although substantial disparities exist across firms (see Atabek et al., 2016).

Figure 19. Diffusion of selected ICT tools and activities in enterprises, 2014

Note: Enterprise resource planning (ERP) systems are software-based tools that can integrate the management of internal and external information flows. Supply chain management refers to the use of automated data exchange (ADE) applications. Radio Frequency Identification (RFID) is a technology that enables contactless transmission of information via radio waves. Reported as a percentage of enterprises with ten or more persons employed.

Source: OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/sti_scoreboard-2015-en.

Process upgrading designates the processing of an increasing number of tasks or parts of the product chain, in particular incorporating higher value added slices. In addition, the increase in productivity lifts the firm's non-price competitiveness and its likelihood of becoming an exporter. The rise of GVCs has increased the interconnectedness of countries and the number of potential competitors. To keep up with international best practice, continuous process upgrading is key and a prerequisite for product upgrading.

Product upgrading encompasses the design and creation of new products but also enhancing the company's ability to improve existing products. Doing this faster than rivals is key in the competition for participation in GVCs. The intensity of innovation and R&D activities is a good indicator for a country's product design and product improvement ability. Spending on R&D and the number of R&D personnel is found to significantly increase per capita exports of domestically produced value added (Appendix 4).

Despite significant progress in recent years, the share of R&D expenditures in GDP is still low in Turkey (Figure 20, Panel A). Overall, expenditures on R&D reached 1% of GDP in 2014, still well below the target of 1.8% set out in the 10th Development Plan for 2018. The share of business enterprise expenditures on R&D in the country's gross domestic expenditures on R&D has risen from 24% in 2003 to 49.8% in 2014 but remains below the 10th Development Plan's target of 60% in 2018. The plan further sets out the target of 176 000 researchers in 2018 which would roughly require a doubling from the 89 657 researchers in 2014. With currently 3.1 researchers per 1 000 persons in the labour force Turkey has one of the lowest concentrations of researchers in the OECD.

Figure 20. R&D expenditures

As percentage of GDP, 2014 or latest available

Source: OECD (2016), "Main Science and Technology Indicators", OECD Science, Technology and R&D Statistics (database). DOI: <http://dx.doi.org/10.1787/data-00182-en>.

The Scientific and Technological Research Council of Turkey (TÜBİTAK) has launched the Support Programme for Research, Technological Development and Innovation Projects in Priority Areas (TÜBİTAK-1003) which seeks to stimulate target-oriented, concrete R&D projects of academics and research centres that can be easily monitored and are conducted in specific areas with strong R&D capacity, namely health, energy, automotive, machine-manufacturing, ICT, food, water, defence and aerospace. Publicising regular impact assessments and monitoring of allocated expenses and projects

would help ensure that the programme does not crowd out private investments and that it leads to the expected outputs.

Like in other countries, government support for business R&D has increasingly relied on tax incentives rather than direct support. Turkey grants three types of R&D tax incentives: i) immediate expensing of eligible R&D expenditure and additional tax allowances for qualifying R&D expenditure in the corporate income tax, ii) reductions in employer social security contributions and iii) partial personal income tax exemption for R&D staff up to certain limits. Tax incentive support has risen on average by close to 25% per year between 2006 and 2013, one of the fastest rates in the OECD, and the share of tax incentives in overall government support for business R&D reached 47.4% in 2013, close to the OECD average of around 50% (Figure 21). The design of Turkey's R&D tax incentive system would benefit from an impact assessment of existing provisions. This could also help to determine the optimal mix between direct and tax support with the aim of reducing deadweight losses and ensuring that incentives do not unduly favour large firms and incumbents.

Figure 21. Government support for business R&D

Source: OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/sti_scoreboard-2015-en.

As part of the previous government's 2016 Economic Reform Agenda, an innovation and R&D reform package aimed at boosting R&D, especially in small firms, by softening the eligibility criteria for R&D support. The package also included additional reductions of personal income tax rates for PhD or Masters students. The government was to further grant up to TRY 100 000 (around USD 34 000) to young graduates in order to help kick-start their businesses, with the possibility of extending the funding to TRY 500 000 depending on the quality and progress of the project. Finally, the scope of the Technology Development Zones (Box 1) was to be broadened with the creation of design centres in thematic zones specialised in strategic sectors such as IT, health, biotechnology, nanotechnology, defence, aerospace and aviation.

Functional upgrading involves producing higher valued added parts of value added chains. One success story is the Turkish car manufacturing industry that rather than merely assembling cars increasingly produces car components which are exported to the entire world. This is a prime example of deepening GVC integration over time. First, foreign direct investors (e.g. international car brands) engage

in a vertical production process by mainly exploiting lower labour costs and delegating labour-intensive, low value added parts of the production chain to the host country (assembly of the car). These activities increase the exports of the host country but reduce the share of domestic value added as the import content is typically very high. In this early stage of integrating into GVCs, backward participation increases while forward participation either stagnates or even declines as was the case in Turkey until 2011. In the second stage, technological spillovers enable domestic companies to replicate parts of the production process (e.g. car components) and lead to international vertical production linkages at arm's length. In this stage, forward linkages are strengthened. The above aggregate and sectoral evidence suggests that Turkey went through the first stage between 2000 and 2011 (Figure 3, Appendices 1 and 2). Recent success stories in the car component and shipbuilding sectors illustrate progress in the second phase.

Box 2. Special investment zones in Turkey

There are three types of special investment zones in Turkey: i) technology development zones (TDZs) or techno-parks, ii) organised industrial zones (OIZs) and iii) free-trade zones (FTZs).

TDZs are designed to attract investments in technology sectors and support R&D activities. The aim of such zones is to accompany firms in developing technologies and software, to help converting innovations into a commercial product, to attract FDI and to bring together academics and professionals in the area. To this end, a number of tax exemptions have been legislated for the first five years of operational activity (which may be extended to 10 years for some activities) and up to end-2023: a) revenues resulting from R&D activities are exempt from personal and corporate income taxes, b) sales directly related to derived products are exempt from VAT, and c) R&D and support personnel do not pay income taxes. In addition, 50% of employer social security contributions are paid by the government during the first five years of activity, up to end-2024. There are currently 59 TDZs of which 44 are operational.

OIZs provide infrastructure and services to allow companies to produce in an investor- and employee-friendly environment. Firms inside such zones benefit from lower water, gas and telecommunication costs and are exempt from a number of municipal taxes. Provided services range from integrated bank branches to shopping centers, security, cleaning, permit and licensing services, catering services and schools. The geographical concentration of firms facilitates knowledge transfers, creates economies of scale and limits adverse externalities on the environment. There are currently 290 OIZs of which 211 are operational.

FTZs are tax free zones mainly located near major Turkish ports. They are designed to facilitate export activities through minimizing transport costs, reducing legal and administrative burdens, subsidising land and providing a number of tax incentives: a) production inside the FTZ is exempted from personal and corporate income tax, b) imported goods are exempt from customs duty, c) all goods purchased by companies operating in an FTZ are exempt from VAT, d) energy, water and telecommunication services are exempt from consumption taxes (special consumption taxes and VAT), and e) employees working for a company that operates in an FTZ and exports at least 85% of the FOB value of goods produced inside the FTZ are exempt from personal income tax.

A key driver for the development and diffusion of productivity-enhancing new technologies and innovations is experimentation by firms (OECD, 2015a). An enabling policy environment allows successful firms to thrive and reduces the costs for those who fail. In particular, an efficient patent system can help firms protect their innovation and leverage the benefits through rapid scaling-up. In its 2016 Economic Reform Agenda, the government has announced a new patent law, which stipulates that the costs for SMEs related to patenting and the compliance with the requirements of the Turkish Standards Institute will be covered by the government. Indeed, while Turkey has made considerable progress in terms of patent applications filed under the Patent Cooperation Treaty (PCT) over the past decade (9.5 patents filed per million population in 2013 against 3.5 in 2005), it still lags significantly behind its best-performing peers (Figure 22).

Figure 22. Patent applications

Source: OECD Patent Statistics database.

Effective intellectual property protection needs to be coupled with the power to sanction and remedy behaviour and mergers that restrict and distort competition in order to limit rent seeking (OECD, 2013c). Another key driver for the growth of innovative firms are labour and product market regulations. Stringent regulations impede the efficient allocation of capital and labour and thereby reduce the return to innovation. This is even more relevant for firm entry and, more generally, young firms that typically are more innovative (OECD, 2015a). The second leg of an experimentation-enabling policy framework concerns the costs associated with innovation failure. Turkey performs poorly with respect to some policies that determine the cost of failure for firms, with very strong employment protection, stringent regulation of flexible work agency assignments which is often circumvented by informal or semi-formal subcontracting, and costly and lengthy insolvency resolution procedures (Figure 23).

Figure 23. Experimentation-enabling policy gaps

Note: Distance to top three performers is shown in units of standard deviation.

Source: OECD Indicators of Employment Protection; World Bank, Doing Business 2016; Alemani, E. et al. (2013), "New indicators of competition law and policy in 2013 for OECD and non-OECD countries", OECD Economics Department Working Papers, No. 1104, OECD Publishing.

To the extent that returns to innovation and the cost of failure determine the net present value of a potential innovation, the mentioned policies also affect access to finance for innovative firms and the depth of risk capital markets. Global private equity penetration is underdeveloped in Turkey. In 2014, private equity investment as a share of GDP fell to 0.02% (from 0.05% in 2013) against 0.20% in India, 0.15% in China or 0.12% in Brazil and 1.64% in Israel (EMPEA, 2015). Even in absolute terms, private equity investments fell to a five-year low in 2014. Recent initiatives to kick-start venture capital and business angel activities are welcome but the major impediment to the development of private equity and venture capital markets remains the poor business environment and notably the costly exits in case of failure.

Education and skills

Participating in international production chains also means competing with other countries' human capital. In Turkey, a very low share of adults has attained at least upper secondary education, notwithstanding progress for younger cohorts (Figure 24). As of 2014, around two thirds of the working age population had not reached the upper secondary level of education, against an OECD average of 24%. Even among the 25-34 year-olds, this share stands at 50% against 17% on average in the OECD. Based on current patterns, 64% (47%) of today's youth are estimated to complete upper secondary education (tertiary education) in the course of their lives (OECD, 2015b). While the expected tertiary graduation rates are close to the 50% OECD average, there is still room for improvement for expected graduation rates in upper secondary education, for which the OECD average stands at 85%.

A growing body of the literature recognises the benefits of early childhood education and care for cognitive and non-cognitive skills of children as well as for educational outcomes (OECD, 2011 and OECD, 2015c). As of 2013, only 7% of the three-year-olds attended pre-school institutions against 74% on average across the OECD. Increasing enrolment rates in early childhood education would not only benefit the young but also help increase labour participation, in particular of young mothers and the elderly who often take care of their grand-children.

Figure 24. Percentage of adults who have attained at least upper secondary education

Note: For Brazil, Chile, France, the Russian Federation and Saudi Arabia, the year of reference is 2013, for China, 2010, for Indonesia, 2011 and for South Africa, 2012.

Source: OECD (2015), Education at a Glance 2015: OECD Indicators, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/eag-2015-en>.

Spending on education is comparatively low in Turkey. Measured in US dollars at purchasing parity, total expenditures per student in 2012 was less than a third of the OECD average in primary and secondary education and roughly half of the OECD average in tertiary education. As a percentage of GDP, total public education expenditures are 3.8% against 4.7% on average in the OECD. While this is up substantially from 2.9% of GDP in 2008, it is still one of the lowest in the OECD. One of the related outcomes is that class sizes are much larger in Turkey than in the OECD on average, both in primary and secondary education, which tends to undermine the quality of the received education.

Beyond school, vocational education and training (VET) plays a big role in matching qualifications with labour market needs, in particular for the manufacturing sector that requires very specific skills. VET programmes are still underdeveloped in Turkey. Only 9% of the current working age population state an upper secondary or post-secondary non-tertiary vocational education as their highest educational degree compared with 26% on average in the OECD. The increasing demand for highly skilled technicians and professionals, in particular in the highly fragmented international productions chains, is a key policy challenge for Turkey.

The weak role of VET in Turkey reflects a more general disconnect between secondary and tertiary curricula and the actual needs of the labour market. More than half of the managers in Turkey report having difficulties to fill job openings (OECD, 2016a). Qualification and skill mismatches in the labour market have become a major concern for policymakers around the world. Unlike most other OECD countries, Turkey reports a higher incidence of under-qualification than over-qualification (OECD, 2016b). Job mismatches are more related to mismatched fields of study than to mismatched skills. Compared to other OECD countries, Turkish employees make significantly less use of skills at work, be it problem-solving, ICT skills, reading, writing or numeracy, even after adjusting for the low level of proficiency. The average use of reading skills at work is found to be correlated with average productivity (OECD, 2016b).

Efforts to bridge this gap include the integration in organised industrial zones (see Box 2) of schools and training premises. For instance, the Gebze Organised Industrial Zone (GOSB) close to Istanbul hosts a vocational high school that provides classrooms, workshops and a gym for around 720 students. To support upskilling and on-site vocational training for unemployed the National Employment Agency (ISKUR) covers training programme expenses provided that a certain number of the trainees are employed by the company after the programme. In addition, the Government Action Plan 2016 stipulates that, during the first year of employment, ISKUR pays TRY 50 per day and covers the related employers' social security contributions of first-time employed on condition that their recruitment includes on-the-job training. The authorities expect 250 000 young people to benefit from these subsidies in 2016 which would correspond to annual fiscal costs of around TRY 4 billion (0.3% of GDP) if used at full scale over an entire year.

In addition to low average productivity reflected by or rooted in low average use of skills, micro-evidence from suggests that labour allocation is weak in some parts of the economy, in particular in the labour-intensive sector (Atabek et al., 2016). On the one hand, this reflects poor labour allocation within some industries, such as textiles, due to overly stringent labour regulations and excessive labour costs amplified by marked size thresholds that have been documented in the 2014 *OECD Economic Survey of Turkey* (OECD, 2014a). On the other hand, it may suggest that more productive firms are held back from growing further by skill shortages. As these firms are more likely to export, the sectoral distribution of skill shortages could shed light on impediments to further progress in participating in GVCs.

Besides basic, academic, technical and generic skills, soft skills play an increasingly important role in explaining the performance of enterprises, in particular in the context of international competition. Multicultural openness and leadership are key ingredients for the success of export-oriented firms. The extent to which firms rely on professional managers rather than relatives or friends of firm owners increases management's ability to adopt international best practice. While Turkey has made progress with

respect to many peer countries, it still ranges relatively low in terms of reliance on professional management (Figure 27, and a more detailed discussion in Atabek et al., 2016). A related indicator shows that management's accountability to investors and boards is limited in Turkey, despite progress over the past decade. The willingness to delegate authority is also relatively underdeveloped.

Figure 25. Reliance on professional management

Note: Survey average to the question: "In your country, who holds senior management positions?" [1 = usually relatives or friends without regard to merit; 7 = mostly professional managers chosen for merit and qualifications].

Source: World Economic Forum (2015), Executive Opinion Survey.

Implications of participation in GVCs

Growth and external imbalances

GVC participation boosts trade openness, which is consistently found to have a significant positive impact on real income growth (Barro, 2015). GVC participation extends and diversifies the potential export market, fosters investment and entails technological, skill and managerial spillovers. Backward linkages also increase competitive pressures and reduce the costs for intermediates input (OECD, 2015b). International competition is also likely to support the efficient reallocation of resources toward more productive firms.

But, more intense and more globalised trade linkages expose economies to a greater number of shocks and reinforce the propagation mechanisms of these shocks within and across regions. Consequently, domestic output depends increasingly on business cycles in other countries which may increase volatility and vulnerabilities. Synchronisation is further reinforced by the increasing extent of service inputs in tradable goods and growing international substitution of non-tradable goods and services through offshoring. Against this background, progress towards a more diversified integration into GVCs, both regional and product-wise, would contribute to reduce potential vulnerabilities.

Backward participation, at least for its direct impact, is neutral for the value added trade balance as the foreign value added enters both imports and exports and therefore cancels out. In contrast, forward participation, that is, domestic value added contained in foreign countries' exports improves the trade balance. The indirect effects of backward linkages are less clear. On the one hand, foreign inputs can crowd out domestic intermediates of already existing exported goods which deteriorates the trade balance. On the other hand, foreign inputs can crowd in further domestic inputs, notably services. In addition,

technological and knowledge transfers boost the development of domestic value added production with the view of substituting or complementing imported goods and services.

Turkey's poor trade balance is reflected in high import content of domestic demand (Figure 26). Indeed, only 29% of imported intermediates are re-exported by Turkey, much less than in most other countries (54% on average in OECD peers, 43% on average across all countries). Consistent with the described bottlenecks in human capital and framework policies, the increase in backward linkages has not yet produced the expected beneficial effects on exports. Turkey's exported domestic value added, both for final demand and further exports to third countries, as a share of total value added, has broadly remained stable over time.

Figure 26. Turkey's trade balance

Note: Value added trade balance is the difference between domestic value added in foreign final demand and foreign value added in domestic final demand. Numbers are expressed in percentage points of value added production.

Employment and social inclusion

The emergence of GVCs is both a major opportunity and a challenge for social upgrading. Deeper integration into GVCs is likely to increase inequality at first as it reduces the distance between the national frontier and the global frontier more than it does affect the position of national laggards. Firms and workers less well equipped for international competition risk a tough transition period. An adequate social safety net and specific active labour market policies can contribute to offsetting adverse effects and make GVC integration benefits more inclusive. To the extent that deeper integration in GVCs is spurred by an uptick in innovativeness, it is also likely to contribute to upward social mobility (Aghion et al., 2015). The authors find that, on the back of creative destruction mechanisms, higher innovation intensity increases the probability for a child to reach a higher quintile of the national income distribution than their parents.

Turkey exhibits one of the lowest shares of jobs that are sustained by foreign final demand (Figure 27). While the impulses for more successful GVC integration are expected from better skilled areas of the labour force, increasing GVC participation, in particular forward, would help absorb a big share of currently unemployed workers, including those with low skills, provided that the regulatory framework allows these firms to compete on a level-playing field. More than half of Turkish firms declare facing competition with unregistered firms, the highest ratio in the OECD after Mexico and Chile. The recent

30% hike in the minimum wage puts an additional burden on low-productive and labour-intensive firms and may further entrench the problem of informality, thwarting greater participation in GVCs.

Figure 27. Jobs sustained by foreign final demand

Source: OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/sti_scoreboard-2015-en.

A breakdown by capital and skill intensity of GVC-related production suggests that Turkey's inputs in manufacturing value chains are increasingly labour intensive, contrasting with most other OECD and BRIIC countries whose participation has become more capital intensive (Figure 28). This may partly reflect country-specific developments with respect to formality and semi-formality (e.g. under-reporting of wages). Indeed, for countries like Turkey and Mexico, Timmer et al. (2014) obtain surprisingly high capital shares, defined as the difference of value added and labour compensation, which may indicate wage measurement biases.

Figure 28. Low- and medium-skilled labour share in manufacturing GVCs

Note: Manufacturing GVCs are defined by the value added of all activities that contribute to the production of a manufactured final good. Low-skilled labour refers to ISCED levels 0, 1 and 2, medium-skilled labour to levels 3 and 4, and high-skilled labour to levels 5 and 6.

Source: Timmer et al. (2014), "Slicing up global value chains", Journal of Economic Perspectives, Vol. 28, No. 2, pp. 99-118.

The environment

Greater trade intensity increases CO₂-emissions due to transport and higher industrial output. At the same time, GVC integration comes in most cases with an alignment of environmental standards to international best practices. Compliance with product standards and codifications is likely to attenuate the detrimental effects of production, in particular in countries such as Turkey where such standards are typically underdeveloped.

The emergence of GVCs is also likely to have affected cross-country comparative advantage in line with the pollution heaven hypothesis. Kozluk and Timiliotis (2016) find evidence that more stringent environmental policies raise the relative costs of producing energy-intense or polluting products rather than importing it from countries with less stringent environmental policies. Against this backdrop, lax environmental policies in Turkey, the least stringent across the OECD (Botta and Kozluk, 2014), may have contributed to the comparative advantage of the metal sector in Turkey which then would have amplified adverse effects of increased trade linkages due to the emergence of GVCs.

Recommendations to reap greater benefits from global value chains

Key recommendations

- Strengthen the rule of law, judiciary independence and the fight against corruption.
- Reduce barriers to foreign direct investment.
- Align the Customs Union agreement with the EU with the most open and all-encompassing international trade agreements, and develop similar agreements with other countries.
- Invest more in vocational training and research-and-development.
- Improve the monitoring of polluting activities and enforcement of environmental regulations and use economic instruments such as pollution taxes, carbon taxes and emission permits.

Other recommendations

- Improve the ICT infrastructure.
- Reduce impediments to cost-efficient trade notably by improving cross-border cooperation, simplifying documents and making trade-relevant information available.
- Reduce the cost of failure by alleviating time and costs of resolving insolvencies and by easing employment protection.
- Raise awareness of poor managerial practices. Support reliance on professional management and multicultural openness. Use public campaigns to disseminate international best management practice.
- Continue to improve the statistical infrastructure to better measure Turkey's participation in GVCs.

REFERENCES

- Aghion, P. et al. (2015), "Innovation and top income inequality", *National Bureau of Economic Research*, NBER Working Paper No. 21247.
- Aleman, E. et al. (2013), "New indicators of competition law and policy in 2013 for OECD and non-OECD countries", *OECD Economics Department Working Papers*, No. 1104, OECD Publishing.
- Appelt, S. et al. (2015), "Which factors influence the international mobility of research scientists? ", *OECD Science, Technology and Industry Working Papers*, 2015/02, OECD Publishing.
- Atabek et al., (2016), "Rebalancing Turkey's growth by improving resource allocation and productivity in manufacturing", *OECD Economics Department Working Papers*, No. XXXX, OECD Publishing.
- Barro, R. (2015), "Convergence and modernisation", *Economic Journal*, Vol. 125, No. 585, pp. 911-942.
- Botta, E. and T. Koźluk (2014), "Measuring environmental policy stringency in OECD countries: A composite index approach", *OECD Economics Department Working Papers*, No. 1177, OECD Publishing.
- Dür, A., Baccini, L. and M. Elsig (2014), "The design of international trade agreements: Introducing a new dataset", *The Review of International Organizations*, Vol. 9, No. 3, pp. 353-375.
- Emlinger, C. and S. Piton (2014), "World trade flows characterization: Unit values, trade types and price ranges", *CEPII Working Papers*, No. 2014-26.
- EMPEA (2015), *2014 Annual Fundraising and Investment Review*, Emerging Markets Private Equity Association.
- EBRD (2015), *Transition Report 2015-16*, European Bank for Restructuring and Development.
- Evenett, S. and J. Fritz (2015), "The tide turns? Trade, protectionism, and slowing global growth", 18th Global Trade Alert Report, Centre for Economic Policy Research.
- Gereffi, G. (2014), "Global value chains in a Post-Washington Consensus world", *Review of International Political Economy*, Vol. 21, No. 1, pp. 9-37.
- Gereffi, G., J. Humphrey and T. Sturgeon (2005), "The governance of global value chains", *Review of International Political Economy*, Vol. 12, No. 1, pp. 78-104.
- Gourdon, J. (2014) "CEPII NTM-MAP: A tool for assessing the economic impact of non-tariff measures", *CEPII Working Papers*, No. 2014-24.
- Kowalski, P. et al. (2015), "Participation of developing countries in global value chains: Implications for trade and trade-related policies", *OECD Trade Policy Papers*, No. 179, OECD Publishing.
- Kozluk, T. and C. Timiliotis (2016), "Do environmental policies affect global value chains? A new perspective on the pollution haven hypothesis", *OECD Economics Department Working Papers*, No. 1282.

- Marcolin, L., S. Miroudot and M. Squicciarini (2016), “Routine jobs, employment and technological innovation in global value chains”, *OECD Science, Technology and Industry Working Papers*, No. 2016/01, OECD Publishing.
- OECD (2011), *Starting Strong III: A Quality Toolbox for Early Childhood Education and Care*, OECD Publishing, Paris.
- OECD (2013a), *Supporting Investment in Knowledge Capital, Growth and Innovation*, OECD Publishing, Paris.
- OECD (2013b), *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, Paris.
- OECD (2013c), “Raising the returns to innovation: Structural policies for a knowledge-based economy”, *OECD Economics Department Policy Notes*, No. 17.
- OECD (2014a), *OECD Economic Surveys; Turkey 2014*, OECD Publishing, Paris.
www.oecd.org/eco/surveys/economic-survey-turkey.htm
- OCDE (2014b), “Tax incentives for R&D and innovation”, in OECD, *OECD Science, Technology and Industry Outlook 2014*, OECD Publishing, Paris.
- OECD (2015a), *The Future of Productivity*, OECD Publishing, Paris.
- OECD (2015b), *Education at a Glance 2015*, OECD Publishing, Paris.
- OECD (2015c), *Starting Strong IV: Monitoring Quality in Early Childhood Education and Care*, OECD Publishing, Paris.
- OECD (2016a), *Getting Skills Right: Assessing and Anticipating Changing Skill Needs*, OECD Publishing, Paris.
- OECD (2016b), *The Survey of Adult Skills (PIAAC), Second International Report*, forthcoming.
- Saia, A., D. Andrews and S. Albrizio (2015), “Productivity spillovers from the global frontier and public policy: Industry-level evidence”, *OECD Economics Department Working Papers*, No. 1238, OECD Publishing.
- Timmer, M., A. Erumban, B. Los, R. Stehrer and G. de Vries (2014), “Slicing up global value chains”, *Journal of Economic Perspectives*, Vol. 28, No. 2, pp. 99-118.
- Waltman, L., N. van Eck and E. Noyons (2010), “A unified approach to mapping and clustering of bibliometric networks”, *Journal of Informetrics*, Vol. 4, No. 4, pp. 629-635.
- World Bank (2014), *Evaluation of the EU-Turkey Customs Union*, World Bank Report No. 85830-TR.
- WTO (2016), *Trade Policy Review of Turkey*, World Trade Organisation, Geneva.

ANNEX 1: BACKWARD PARTICIPATION BY SOURCE AND EXPORTING SECTOR

	Agriculture	Mining	Food	Textile	Wood	Chemicals	Metals	Machinery	Electrical	Automotive	Other manufacturing	Electricity, gas and water	Construction	Wholesale and retail	Hotels and restaurants	Transport and telecom	Financial intermediation	Business activities	Social and personal services	TOTAL
Year: 2000																				
Agriculture	0.1	0.0	0.4	0.4	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.5	0.1	0.0	0.0	0.0	2
Mining	0.2	0.2	0.3	1.8	0.1	3.3	2.9	0.6	0.5	0.8	0.4	0.2	0.8	1.1	0.9	2.6	0.2	0.1	0.2	17
Food	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1
Textile	0.0	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	2
Wood	0.0	0.0	0.1	0.4	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.0	0.1	0.3	0.2	0.3	0.1	0.0	0.1	3
Chemicals	0.2	0.1	0.4	2.6	0.1	2.0	0.8	0.4	0.7	0.9	0.3	0.0	0.4	0.6	0.7	1.4	0.1	0.1	0.2	12
Metals	0.0	0.0	0.1	0.3	0.0	0.3	2.5	0.8	0.6	1.1	0.5	0.0	0.5	0.3	0.2	0.4	0.0	0.0	0.1	8
Machinery	0.0	0.0	0.0	0.2	0.0	0.1	0.2	0.4	0.1	0.2	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	2
Electrical	0.0	0.0	0.0	0.2	0.0	0.1	0.2	0.2	2.0	0.3	0.0	0.0	0.1	0.3	0.1	0.4	0.0	0.0	0.1	4
Automotive	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.1	0.1	1.2	0.0	0.0	0.0	0.3	0.1	0.6	0.0	0.0	0.0	3
Other manufacturing	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Electricity, gas and water	0.0	0.0	0.0	0.3	0.0	0.2	0.4	0.1	0.2	0.2	0.1	0.0	0.1	0.1	0.1	0.2	0.0	0.0	0.0	2
Construction	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1
Wholesale and retail	0.2	0.1	0.4	3.0	0.1	1.7	1.7	0.7	1.5	1.4	0.4	0.0	0.5	0.8	0.8	1.6	0.1	0.1	0.2	15
Hotels and restaurants	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1
Transport and telecom	0.1	0.0	0.3	1.5	0.1	0.7	1.0	0.4	0.6	0.7	0.3	0.0	0.3	0.9	0.6	2.2	0.1	0.1	0.2	10
Financial intermediation	0.1	0.0	0.1	0.8	0.0	0.4	0.5	0.2	0.4	0.4	0.1	0.0	0.2	0.4	0.4	0.8	0.2	0.1	0.1	5
Business activities	0.1	0.1	0.3	1.8	0.1	1.0	0.9	0.5	1.1	1.0	0.3	0.0	0.3	0.7	0.6	1.1	0.1	0.1	0.2	10
Social and personal services	0.0	0.0	0.1	0.3	0.0	0.2	0.2	0.1	0.2	0.2	0.1	0.0	0.1	0.2	0.1	0.2	0.1	0.0	0.1	2
	1	1	3	16	1	11	12	5	8	9	3	0	3	6	5	13	1	1	2	100
Year: 2011																				
Agriculture	0.1	0.0	0.5	0.3	0.0	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	2
Mining	0.2	0.1	0.4	1.2	0.1	3.7	5.4	1.4	0.9	2.2	0.6	0.0	0.2	0.4	0.3	0.9	0.0	0.1	0.1	18
Food	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1
Textile	0.0	0.0	0.0	0.9	0.0	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Wood	0.0	0.0	0.1	0.2	0.1	0.3	0.3	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	2
Chemicals	0.1	0.1	0.4	1.3	0.2	2.9	1.5	0.6	0.7	1.5	0.3	0.0	0.1	0.3	0.3	0.6	0.0	0.1	0.1	11
Metals	0.0	0.1	0.1	0.3	0.0	0.6	5.1	1.4	0.8	2.3	0.5	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.0	12
Machinery	0.0	0.0	0.1	0.1	0.0	0.3	0.5	0.6	0.2	0.5	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	3
Electrical	0.0	0.0	0.0	0.1	0.0	0.2	0.3	0.3	0.8	0.4	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	2
Automotive	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.1	2.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	3
Other manufacturing	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Electricity, gas and water	0.0	0.0	0.1	0.2	0.0	0.3	0.7	0.2	0.2	0.4	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	3
Construction	0.0	0.0	0.0	0.1	0.0	0.1	0.2	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Wholesale and retail	0.1	0.1	0.5	1.9	0.2	2.4	3.4	1.2	1.1	2.7	0.5	0.0	0.1	0.3	0.4	0.7	0.0	0.1	0.1	16
Hotels and restaurants	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Transport and telecom	0.1	0.1	0.3	0.8	0.1	1.0	1.6	0.5	0.5	1.1	0.2	0.0	0.1	0.3	0.2	0.7	0.0	0.1	0.1	8
Financial intermediation	0.1	0.0	0.2	0.5	0.0	0.7	0.9	0.3	0.3	0.7	0.1	0.0	0.0	0.1	0.1	0.3	0.0	0.1	0.0	5
Business activities	0.1	0.1	0.3	0.9	0.1	1.5	1.8	0.8	0.7	1.9	0.3	0.0	0.1	0.3	0.2	0.4	0.0	0.1	0.1	10
Social and personal services	0.0	0.0	0.1	0.2	0.0	0.3	0.7	0.2	0.2	0.5	0.1	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	3
TOTAL	1	1	3	9	1	15	23	8	7	17	3	0	1	2	2	5	0	1	1	100

Source: Input-Output table of foreign value added embodied in Turkey's exports (shares in %). Rows show foreign source sector, columns show Turkish exporting sector.

ANNEX 2: FORWARD PARTICIPATION BY SOURCE AND EXPORTING SECTOR

	Agriculture	Mining	Food	Textile	Wood	Chemicals	Metals	Machinery	Electrical	Automotive	Other manufacturing	Electricity, gas and water	Construction	Wholesale and retail	Hotels and restaurants	Transport and telecom	Financial intermediation	Business activities	Social and personal services	TOTAL
Year: 2000																				
Agriculture	0.2	0.0	0.9	0.4	0.2	0.3	0.1	0.1	0.2	0.2	0.1	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	3
Mining	0.0	0.2	0.1	0.1	0.1	0.7	0.5	0.2	0.2	0.2	0.1	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	3
Food	0.1	0.0	0.3	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	1
Textile	0.0	0.0	0.1	3.2	0.1	0.4	0.1	0.2	0.3	0.6	0.3	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.0	6
Wood	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1
Chemicals	0.2	0.3	0.4	1.0	0.2	2.2	1.1	0.7	1.4	1.4	0.4	0.0	0.2	0.6	0.1	0.8	0.1	0.2	0.1	11
Metals	0.0	0.1	0.1	0.1	0.1	0.4	2.7	1.1	1.3	1.5	0.4	0.0	0.2	0.2	0.0	0.2	0.0	0.1	0.0	9
Machinery	0.0	0.1	0.0	0.1	0.0	0.2	0.2	0.5	0.2	0.3	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	2
Electrical	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.3	1.4	0.4	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.1	0.0	3
Automotive	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.2	1.9	0.0	0.0	0.0	0.3	0.0	0.4	0.0	0.0	0.0	4
Other manufacturing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Electricity, gas and water	0.0	0.1	0.0	0.1	0.0	0.2	0.4	0.2	0.3	0.3	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	2
Construction	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Wholesale and retail	0.2	0.6	0.8	3.0	0.4	1.9	1.4	1.0	2.1	1.7	0.6	0.0	0.1	0.9	0.3	0.9	0.1	0.2	0.1	16
Hotels and restaurants	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1
Transport and telecom	0.2	0.9	0.8	2.0	0.5	2.5	1.9	1.0	3.1	1.7	0.7	0.1	0.2	2.0	0.3	5.1	0.2	0.5	0.1	24
Financial intermediation	0.1	0.3	0.3	0.9	0.2	0.9	0.7	0.5	1.6	0.8	0.3	0.0	0.1	0.5	0.1	0.7	0.2	0.2	0.1	9
Business activities	0.0	0.1	0.2	0.5	0.1	0.5	0.4	0.3	0.6	0.5	0.1	0.0	0.0	0.3	0.1	0.4	0.1	0.1	0.0	4
Social and personal services	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1
TOTAL	1	3	4	12	2	11	10	6	14	12	3	0	1	6	2	10	1	2	1	100
Year: 2011																				
Agriculture	0.2	0.1	0.8	0.3	0.1	0.4	0.2	0.1	0.2	0.3	0.1	0.0	0.0	0.2	0.2	0.1	0.0	0.1	0.0	3
Mining	0.1	0.3	0.1	0.2	0.1	1.5	0.9	0.4	0.5	0.5	0.1	0.0	0.1	0.2	0.0	0.5	0.0	0.1	0.0	6
Food	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1
Textile	0.0	0.0	0.1	1.7	0.1	0.4	0.2	0.2	0.2	0.5	0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.1	0.0	4
Wood	0.0	0.0	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	1
Chemicals	0.2	0.3	0.3	0.5	0.2	2.2	1.0	0.8	1.2	1.6	0.3	0.0	0.1	0.5	0.1	0.7	0.1	0.2	0.1	10
Metals	0.1	0.2	0.1	0.1	0.1	0.6	2.4	1.2	1.0	1.7	0.2	0.0	0.1	0.2	0.0	0.3	0.0	0.1	0.0	9
Machinery	0.0	0.2	0.1	0.1	0.0	0.3	0.3	0.9	0.3	0.6	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	3
Electrical	0.0	0.1	0.0	0.1	0.0	0.2	0.2	0.3	1.0	0.5	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	3
Automotive	0.0	0.1	0.1	0.1	0.0	0.2	0.2	0.3	0.2	2.4	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.1	0.0	4
Other manufacturing	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
Electricity, gas and water	0.0	0.1	0.1	0.1	0.0	0.3	0.7	0.4	0.4	0.6	0.1	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	3
Construction	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0
Wholesale and retail	0.2	0.5	0.7	2.2	0.3	2.3	1.9	1.5	1.8	2.6	0.5	0.1	0.1	0.8	0.2	0.9	0.1	0.3	0.1	17
Hotels and restaurants	0.0	0.0	0.0	0.1	0.0	0.2	0.2	0.1	0.2	0.2	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0	1
Transport and telecom	0.2	0.5	0.6	1.9	0.3	2.5	2.2	1.6	2.5	2.5	0.6	0.1	0.2	1.0	0.2	1.5	0.1	0.4	0.1	19
Financial intermediation	0.1	0.1	0.1	0.3	0.1	0.5	0.5	0.4	0.8	0.6	0.1	0.0	0.0	0.2	0.0	0.2	0.1	0.1	0.0	4
Business activities	0.1	0.3	0.3	0.7	0.2	1.2	1.0	0.9	1.0	1.3	0.2	0.0	0.1	0.5	0.1	0.6	0.1	0.3	0.1	9
Social and personal services	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	1
TOTAL	1	3	4	9	2	13	12	9	12	16	3	0	1	5	1	6	1	2	1	100

Source: Input-Output table of Turkish value added embodied in foreign countries' exports (shares in %). Rows show Turkish source sector, columns show foreign exporting sector.

ANNEX 3: NETWORK VISUALISATION MAPS

The following network maps are based on bilateral trade in value-added flows. The visualisation of similarities technique (VOS, see Waltman et al., 2010) locates countries in such a way that the distance between any two countries reflects their relative trade-connectedness. The underlying mapping approach boils down to minimising the sum of squared distances weighted by relative bilateral trade flows subject to a given average distance between countries. The size of circles is proportional to the countries' trade volume. Colours indicate clusters.

Figure A.1. Manufacturing

Note: The size of circles is proportional to the countries' trade volume. The colours indicate clusters.

Source: Calculations based on OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Figure A.2. Textile

Note: The size of circles is proportional to the countries' trade volume. The colours indicate clusters.

Source: Calculations based on OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

Figure A.3. Automotive sector

Note: The size of circles is proportional to the countries' trade volume. The colours indicate clusters.

Source: Calculations based on OECD/WTO (2016), "Trade in value added", OECD-WTO: Statistics on Trade in Value Added (database). DOI: <http://dx.doi.org/10.1787/data-00648-en>.

APPENDIX 4: DRIVERS OF GVC PARTICIPATION – AN ECONOMETRIC ASSESSMENT

Backward and forward participation indices suffer from an identification problem since potential drivers for GVC integration affect both the numerator and the denominator. Against this background, the subsequent analysis builds on per capita domestic value added, forwarded value added (that is the domestic value added that ultimately serves as input to foreign countries' exports) and backward-sourced value added (that is foreign value added contained in domestic gross exports), as dependent variables. In accordance with available data points annualised growth rates of the dependent variable are calculated over a total of 4 windows (1995-00, 2000-05, 2005-08, 2008-11):

$$g_{it} = \frac{1}{n} \log \left(\frac{Y_{it}}{Y_{it-n}} \right) \quad \begin{cases} n = 5 \text{ if } t = 2000, 2005 \\ n = 3 \text{ if } t = 2008, 2011 \end{cases}$$

Explanatory variables are either expressed in annualised contemporaneous log-growth terms (defined similar to g and denoted x) or are lagged 5- or 3-year averages of policy variables P :

$$Z_{it} = \frac{1}{n} \sum_{s=t-n-1}^{t-1} P_s \quad \begin{cases} n = 5 \text{ if } t = 2000, 2005 \\ n = 3 \text{ if } t = 2008, 2011 \end{cases}$$

In line with the vast literature on real per capita GDP convergence (Barro, 2015), lagged dependent variables are introduced in the regression to account for convergence of per capita exports. The estimated specification is:

$$g_{it} = \alpha \log Y_{it-1} + \beta x_{it} + \gamma Z_{it} + d_i + d_t + \varepsilon_{it} \quad (1)$$

where d_i denote country-dummies and d_t time-dummies to account for country- and time-fixed effects. Standardised coefficients are reported. For instance, a one-standard deviation increase in FDI inflows is, *ceteris paribus*, associated with roughly a 0.3 standard deviation increase in real per capita export growth rates.

Table A.1. Drivers of GVC participation

	Domestic value added content		Foreign value added content		Domestic value added content in foreign countries' exports	
	nominal	real	nominal	real	nominal	real
Lagged log-level of dependent variable	-2.177***	-2.915***	-1.719***	-1.913***	-1.884***	-2.415***
Tariffs (manufactured products)	-0.106	-0.161	0.012	-0.004	-0.203*	-0.281**
EPL - Severance pay	-0.132	-0.085	-0.104	-0.042	-0.110	-0.045
EPL - Temporary contracts	-0.046	-0.020	-0.285*	-0.284	-0.160	-0.152
PMR - Barriers to trade facilitation	-0.145	-0.348***	-0.122	-0.235*	-0.103	-0.264**
PMR - Treatment of foreigner suppliers	-0.352**	-0.223	-0.173	-0.034	-0.378***	-0.265
Annual growth rate of terms of trade	0.177*	-0.014	0.020	-0.161*	0.190***	-0.005
Percent of GERD financed abroad	0.397*	0.561**	0.224	0.262	0.166	0.228
FDI inflows	0.286**	0.200	0.335**	0.244*	0.343***	0.256**
R&D personnel per 1 000 employees	0.383*	0.687**	0.069	0.192	0.268	0.498*
Country- and time-fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-Square	0.419	0.245	0.374	0.231	0.482	0.320
Countries	35	35	35	35	35	35
Observations	111	111	111	111	111	111

Note: * significant at 5%, ** significant at 1%, *** significant at 1%. The panel is constructed over 5- or 3-year windows with the last year being 2000, 2005, 2008 and 2011. The dependent variable is the annualised gross rate of per capita exports. The export deflator is taken from the Penn World Tables. Independent variables are averages over lagged 5- or 3-year windows except for annual growth of terms of trade which is contemporaneous and calculated like the dependent variable. Standardised coefficients are reported.