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Assessing participation of CAREC countries in Global and Regional Value Chains

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Disclaimer

Under the CAREC Think Tanks Network (CTTN), the CAREC Institute has launched the Research Grants Program in May 2019 to support scholars and researchers from members of the CTTN to produce targeted knowledge products which would add to the body of knowledge on regional cooperation in CAREC.

Scholars from member think tanks were encouraged to research CAREC integration topics and undertake comparative analysis between (sub) regions to draw lessons for promoting and deepening regional integration among CAREC member countries particularly as anticipated in the CAREC 2030 strategy and stated operational priorities.

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Abstract

In a world of offshoring, outsourcing and vertical specialization, production of a single good may involve inputs from and manufacturing in many different countries around the world. The participation of developing countries in Global and Regional Value Chains (GVCs and RVCs) creates new opportunities for firms (and even countries) to specialize in tasks and business functions rather than specific products, fully employ their production potential and become a part of the international production networks. The exercise of mapping GVC and RVC participation of particular countries and/or country groups is therefore an essential tool for understanding the structure and the driving forces behind global and regional trade for particular countries, as well potential areas for policy interventions. While many studies measure the GVC and RVC participation indices for OECD and some non-OECD countries, the CAREC (Central Asia Regional Economic Cooperation Program) countries were until now never studied as a separate group. Nevertheless, the global growth slowdown forced many developing economies and emerging markets to look for growth opportunities beyond the traditional links with large developed countries' markets and seek out growth opportunities in regional production and trade collaboration. This policy paper is the first one to create a comprehensive mapping of the GVCs and RVCs for CAREC region by using the inter-country input-output matrices. It contributes to the empirical literature on RVC by assessing the trade linkages between countries in this group and further defines the methodology to compare RVC and GVC participation on the industry level to identify the areas for potential policy intervention to strengthen the value-chain contribution of any given country. In addition, this paper presents case studies of particular industries in order to explain and supplement the empirical findings. The findings of the paper will be particularly useful for evidence-based trade policy of the CAREC countries.

Introduction

The advent of globalization in recent decades has had a profound impact on the development path of countries around the globe. Rapid development of ICT technologies coupled with global tendencies to reduce tariff and non-tariff barriers since WWII made possible economic integration between countries on the scale never imagined before. Integration of production processes gave rise to the concepts of offshoring, outsourcing, vertical specialization and brought a new set of opportunities for developing economies. The participation of developing countries in Global and Regional Value Chains (GVCs and RVCs) created new opportunities for firms (and entire countries) to specialize in tasks and business functions rather than specific products, fully employ their production potential and become a part of the international production networks.

At the same time, participation in such value chains comes with own sets of challenges. Modern VCs tend to be quite competitive and versatile; hence, developing countries often face challenges of fulfilling pre-conditions for integration into Global and Regional Value Chains. In recent years economic growth around the world has been slowing down, and leading emerging markets (China, Latin America, South-East Asia) along with European countries, were the first to feel its effects. Developing economies around the world, which historically rely on trade with larger, more mature market, started to look for growth opportunities outside their orbit, and the question of creating and integrating not only into global, but also into regional value chains became important for economic resilience and stability.

Moreover, participation in RVC can also be seen as the first step towards greater participation in GVC (Slany, 2017) for developing countries that have difficulties integrating into GVC due to less advanced technologies, production processes and skills sets. Whereas economic literature shows that participation in GVC in particular (both buying and selling activities) benefit developing economies (Kowalski, P. *et al.* (2015)) in terms of productivity, sophistication, diversification of exports.

Yet, before policy makers can embark on designing and implementing economic policies which promote RVC and GVC participation, it is important to take stock of just how integrated their country in the regional and respectively global production and trade, and through the exercise of mapping RVC and GVC connections to understand where the opportunities for further integration lie. This paper is the first one to create a comprehensive mapping of the GVCs and RVCs for CAREC region countries by using the inter-country input-output matrices. It contributes to the empirical literature on RVC by assessing the trade linkages between countries in this group and further defines the methodology to compare RVC and GVC participation on the industry level to identify the areas for potential policy intervention to strengthen the value-chain contribution of any given country. In addition, this paper presents case studies of particular industries in order to explain and supplement the empirical findings.

Literature

The emergence of GVC, global value chains, around more than two decades ago transformed the way economists think about countries' comparative advantage and specialization in production. It has also transformed the understanding of what it takes for a country to be successfully integrated into world trade networks and derive maximum benefit from global trade. In the past, a country's comparative advantage was understood in terms of specific products (e.g. wine vs. cloth in the classical example of Ricardo). The "wine-for-cloth" approach led many policy-makers astray by shifting their focus towards import substitution and infant-industry protectionism, in hopes that their country would one day develop capacity for producing and exporting certain high value-added goods (e.g. the case of Brazil's failed attempt at protecting their nascent computer industry). The emergence of GVC and fragmentation of production meant that the share of manufactures intermediate goods imports in the total world imports was more than 50%, while 70% of services imports were intermediate services (De Backer, Miroudot, 2013). Participation in GVC became of crucial importance not only for larger emerging markets but also for smaller developing economies. For example, Kowalski, P. et al., 2015 find that higher GVC participation (measured as growing forward[2] and backward participation measures, imports of more sophisticated non-primary intermediate goods, etc.) benefits countries across all income groups along several dimensions: a) by increasing domestic per capita value-added embodied in exports, which means more gains from trade accruing to domestic capital and labor. b) by increasing sophistication of exports, the so-called 'product upgrading' and c) by increasing diversification of exports. Although the authors stress that there is no "one-size-fits-all" recipe for securing benefits from GVC participation, it is clear from the research that Global Value Chains are instrumental for development.

[2] Increased "forward" participation refers to the increased use of country's domestic value added in foreign exports. Increased "backward" participation refers to the increased use of foreign value added in the country's exports.

Other studies (Slany, 2017) emphasize that participation in GVC can be a stepping stone for developing countries towards higher trade integration with the rest of the world through access to markets, knowledge spillovers and technology transfers. The OECD 2013 synthesis report (OECD, 2013) additionally highlights the opportunities which GVC participation brings to small and medium firms (SMEs) as they can exploit their speed and flexibility to carve a niche in the in the global market as a supplier of services or product components. Of course, as the report emphasizes, participation in GVC varies by industry as well as by country. Just as countries do not participate equally in international trade, not all countries are integrated into global production process. Size and openness of the economy may determine the degree of participation (with small open economies, e.g. Luxemburg, Belgium, Slovakia importing and exporting more in the VC than large economies like United States, Turkey, Canada). For developing countries, the impediments to GVC participation are often linked to institutional factors: contract enforceability, strength of business environment, degree of property rights protection. These factors along with quality of the labor force, lack of infrastructure, determine the degree to which a developing country can participate and benefit from GVC. (OECD, 2013).

Some studies (Slany, 2017) argue that, given the demanding and competitive nature of GVC, it may be more practical for developing countries to first build the trade linkages regionally, integrating into regional value chains (RVC), and use them as a sort of stepping stone towards integration into GVC (emerging European countries are often taken as an example, as they are currently more integrated into the intra-European value chain than in the global VC). This argument, seems quite logical and attractive in its simplicity, and this may account for the fact that policy practitioners are often puzzled why clusters of neighboring developing country groups (e.g. African countries, the countries of the South Caucasus, etc.) do not seem to trade enough with each other and are not more regionally integrated. An example of African countries given by Slany states that intra-African value-added trade is as low as 9%, while in Asia and Latin America it is 45% and 18% respectively. The problem with this argument is that it fails to account for the basic trade gravity model results, which predicts that countries will trade more with larger economies, even if these economies are further away. Moreover, as the study itself points out, the factors that are detrimental to establishing RVC as essentially the same factors that prevent the country from effectively integrating into GVC, namely the transaction costs and trade costs, lack of appropriate infrastructure, deficiencies in trade policies and institutional frameworks that facilitate the ease of crossing national borders. Thus, for any group of neighboring developing economies establishing functional RVC may be actually a more challenging task than plugging oneself into the existing GVC. The latter may be often more attractive in terms of market size, access and technology transfer, and would require less political effort to make necessary modifications in legislation. While the former may be plagued by lack of coordination, national rivalry and competition considerations. Interestingly, the study on Trade Facilitation in the South Caucasus (SDC, ISET, UNDP 2019) found that the integration of the three South Caucasus countries (Azerbaijan, Georgia, Armenia) into the world economy is often hampered by high costs of moving goods across borders of the respective countries, poorly developed transport infrastructure and. This tendency towards low regional VC participation may, unfortunately, hurt developing countries, especially as they miss valuable opportunities to benefit from proximity, access and natural resource endowments of each other. In the case of CAREC countries we have the anecdotal evidence of a similar pattern of low regional VC participation, which needs to be further studied and explained. Yet, before one can draw any conclusions about the opportunities for VC integration among the CAREC economies, the

first step is to develop a comprehensive mapping of intra-region value chain participation based on the existing methodologies.

Methodology[3]

The indicators on global value chains presented in the paper are calculated with the simplified version of the Eora multi-regional input-output (MRIO) model[4]. The model consists of a balanced global MRIO table linking 4,914 industries across 189 countries[5] (included all of the CAREC countries[6]) estimated for 1990-2018 (results from 2016-2018 are nowcasted based on IMF World Economic Outlook).

Simplified version of the Eora MRIO (called Eora26) includes 26 sectors[7] aggregated and harmonized across countries (this classification is consistent across all countries covered). Eora also provides detailed input-output tables including different number of sectors for countries based on the availability of data. Moreover, Eora provides the data using different prices – basic (market) prices and purchaser's prices. For the purposes of this research, the basic prices have been used.

To illustrate the intuition behind using IO tables for calculating value chain participation index, a simple example of an Input Output table is presented in Figure 1 below. The example assumes that a world is made up of only two countries, each with 2 sectors. The input-output table contains three main components:

1. Intermediate goods demand (the T matrix in Eora and yellow cells in the Figure 1)
2. Final demand[8] (the FD matrix in Eora and green cells in the Figure 1), and
3. Value added or primary inputs[9] (the VA matrix in Eora and blue cells in the Figure 1).

The industry (e.g. industry A1) in a country A produces a good, which can be used as an intermediate input in the production of another good in the same country (e.g. good produced in the industry A1 or A2) or in the country B (e.g. exported and used to produce good in the

[3] Methodology is mainly bult based on the UNCTAD (2013), Koopman et al. (2011) and Aslam et al. (2017).
[4] Data source: https://worldmrio.com/
[5] Due to data errors, the following countries have been excluded from GVC analysis: Belarus, Benin, Burkina Faso, Congo, Eritrea, Ethiopia, Guinea, Guyana, Libya, Moldova, Serbia, Sudan, Yemen, Zimbabwe, Former USSR.
[6] CAREC region includes the following 11 countries: Afghanistan, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, China, Tajikistan, Turkmenistan, and Uzbekistan
[7] The sectors in EORA26 are listed as follows: 1. Agriculture; 2. Fishing 3. Mining and Quarrying 4. Food and Beverages 5. Textile and Wearing Apparel 6. Wood and Paper 7. Petroleum, Chemical, and Non-Metallic Mineral Products 8. Metal Products 9. Electric and Machinery 10. Transport Equipment 11. Other Manufacturing 12. Recycling 13. Electricity, Gas, and Water 14. Construction 15. Maintenance and Repair 16. Wholesale Trade 17. Retail Trade 18. Hotels and Restaurants 19. Transport 20. Post and Telecommunications 21. Financial Intermediation and Business Activities 22. Public Administration 23. Education, Health, and Other Services 24. Private Households 25. Others 6. Re-export & Re-import. Source: Eora MRIO Database (https://worldmrio.com/eora26/)
[8] Final demand includes household final consumption, non-profit institutions serving households, government final consumption, gross fixed capital formation, changes in inventories and acquisitions less disposals of valuables. Source: http://unstats.un.org/unsd/nationalaccount/sna1993.asp
[9] Value added inputs include compensation of employees, taxes on production, subsidies on production, net operating surplus, net mixed income and consumption of fixed capital. Source: http://unstats.un.org/unsd/nationalaccount/sna1993.asp

industry B1 or B2) or serve as a final demand again in the same country or abroad (e.g. consumed by household). Thus, the output can be used domestically by country A or exported to another country B, where it can be used as an intermediate input or a final demand. Analogously, the good can be imported from country B, and used in A for production or as a final demand. Input-output analysis assumes that inputs used in a production process are related to the industry outputs by the linear and fixed coefficients of production.

The rows in a MRIO table show the use of gross output from a particular industry in a particular country. The gross output produced in an industry A1 of country A (first row of the Figure 1) can be used by country A itself (in the own industry A1 or another industry A2), or by the other country B, again as an intermediate input or a final demand. Thus, the measure of gross output ($X_i, where\ i = A1, A2, B1, B2$) can be retrieved by summing the intermediate and final outputs (e.g. summing yellow and green blocks in the first row to get X_{A1}).

Figure 1. Example of a MRIO table with 2 countries and 2 goods[10]

		Intermediate use				Final demand		Gross output
		Country A		Country B		Country A	Country B	
		Industry A1	Industry A2	Industry B1	Industry B2	Final Demand	Final Demand	
Country A	Industry A1	Intermediate use of domestic output	+ Intermediate use by A2 of domestic output from A1	+ Intermediate use by B1 of exports from A1	+ Intermediate use by B2 of exports from A1	+ Final use of domestic output from A1	+ Final use by B of exports from A1	= X_{A1}
	Industry A2	+ Intermediate use by A1 of domestic output from A2	+ Intermediate use of domestic output	+ Intermediate use by B1 of exports from A2	+ Intermediate use by B2 of exports from A2	+ Final use of domestic output from A2	+ Final use by B of exports from A2	= X_{A2}
Country B	Industry B1	+ Intermediate use by A1 of exports from B1	+ Intermediate use by A2 of exports from B1	+ Intermediate use of domestic output	+ Intermediate use by B2 of domestic output from B1	+ Final use by A of exports from B1	+ Final use of domestic output from B1	= X_{B1}
	Industry B2	+ Intermediate use by A1 of exports from B2	+ Intermediate use by A2 of exports from B2	+ Intermediate use by B1 of domestic output from B2	+ Intermediate use of domestic output	+ Final use by A of exports from B2	+ Final use of domestic output from B2	= X_{B2}
Value added		+ V_{A1}	+ V_{A2}	+ V_{B1}	+ V_{B2}			
Gross input		= X_{A1}	= X_{A2}	= X_{B1}	= X_{B2}			

Source: UNCTAD (2013), Yedan (2019)

The columns of a MRIO table provide information about production technology, as they indicated the amount of intermediate need of inputs for production of gross output. The production of the gross output of the industry A1 in country A uses domestic intermediate outputs from industry A1 and industry A2, and imported foreign intermediate outputs from industry B1 and industry B2 of country B. The difference between the gross output in each country and the sum of inputs (domestic and foreign) used in production process is the value added (primary input, V).

The simplified example of input-output analysis based on two countries and two sectors can be generalized to the multiple countries and industries:

$$X = T + Y \Leftrightarrow X = AX + Y \Leftrightarrow (I - A)X = Y \Leftrightarrow X = (I - A)^{-1}Y \Leftrightarrow X = LY \quad (1)$$

[10] Yedan, A. Measuring value chains – Use of input-output tables, 2019, Presentation Slides: https://unctad.org/meetings/en/Presentation/aldc2019_ethiopia_servicestrade_yedan_UNECA_en.pdf

Where X is a matrix of gross output (horizontal sum of rows presenting domestic and foreign intermediate inputs and final demand), T is a matrix of intermediate demand, Y is a matrix of final demand, I is the identity matrix, A is the technological coefficient matrix (where each element represents ratio of intermediate input and corresponding output $A_{ij} = {T_{ij}}/{X_{ij}}$, where i represents country and j industry). L is the Leontief inverse (the coefficients of the Leontief inverse conveys direct and indirect effects on output in one industry required by a unit of output from another industry). The equation (2) represents a MRIO table for n-country model, where each country has only one industry producing a single product.

$$\begin{pmatrix} x_{11} & \dots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{n1} & \dots & x_{nn} \end{pmatrix} = \begin{pmatrix} L_{11} & \cdots & L_{1n} \\ \vdots & \ddots & \vdots \\ L_{n1} & \cdots & L_{nn} \end{pmatrix} \begin{pmatrix} y_{11} & \cdots & y_{1n} \\ \vdots & \ddots & \vdots \\ y_{n1} & \cdots & y_{nn} \end{pmatrix} (2)$$

Thus, the Leontief inverse was estimated based on the following matrix operations: $L = (I - A)^{-1}$. To calculate value chain participation indices, it is necessary to recover the matrix of value-added shares (or the matrix of the value-added coefficients) by diagonalizing a row vector of value added per unit of output by country (e.g. $v_1 = VA_1/x_1$, where VA_1 is the first components of the value added vector [e.g. the first element of the blue row in the Figure1] and x_1 is the first component of the gross output matrix). Then, it is essential to build a matrix of the gross export, which can be derived by diagonalizing a row of aggregate exports by countries (gross exports can be retrieved by summing intermediate inputs exported abroad [not used in the domestic production] and exports of final goods [again not included domestic final demand]). The value-added share matrix (the matrix of the value-added content of trade) can be obtained by multiplying (matrix multiplication) value added coefficients matrix, Leontief inverse and the matrix of gross exports.

$$T_v = vLe,$$

where T_v is the value-added share matrix, v is a value-added coefficient matrix, L is a Leontief inverse and e is the matrix of gross exports. The case of n countries with only one industry is presented in the equation (3).

$$\begin{pmatrix} T_{11}^v & \dots & T_{1n}^v \\ \vdots & \ddots & \vdots \\ T_{n1}^v & \dots & T_{nn}^v \end{pmatrix} = \begin{pmatrix} v_1 & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & v_n \end{pmatrix} \begin{pmatrix} L_{11} & \cdots & L_{1n} \\ \vdots & \ddots & \vdots \\ L_{n1} & \cdots & L_{nn} \end{pmatrix} \begin{pmatrix} e_1 & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & e_n \end{pmatrix} (3)$$

The T_v matrix is a key matrix of value chain analysis. The matrix describes how the value-added export of each country (and industry) is generated and distributed across countries. Table 1 represents case of N countries and only one industry (the results can be easily generalized

Source: UNCTAD (2013) for the N country and M industry case).

Table 1. The matrix of the value-added content of trade

	Country 1	Country 2	Country 3	….	Country k	….	Country N
Country 1	T_{11}^v	T_{12}^v	T_{13}^v	….	T_{1k}^v	….	T_{1N}^v
Country 2	T_{21}^v	T_{22}^v	T_{23}^v	….	T_{2k}^v	….	T_{2N}^v
Country 3	T_{31}^v	T_{32}^v	T_{33}^v	….	T_{3k}^v	….	T_{3N}^v
….	….	….	….	….	….	….	….
Country k	T_{k1}^v	T_{k2}^v	T_{k3}^v	….	T_{kk}^v	….	T_{kN}^v
….	….	….	….	….	….	….	….
Country N	T_{N1}^v	T_{N2}^v	T_{N3}^v	….	T_{Nk}^v	….	T_{NN}^v

Domestic Value Added (DVA) content of export of Country 1

Indirect Value Added Exports (DVX) of Country 1

Foreign Value Added (FVA) content of export of Country 1

- The term T_{11}^v denotes the Domestic Value-Added (DVA) content of export of country 1. Thus, the diagonal elements of the T^v matrix correspond to the DVA content of exports of corresponding country.
- The term T_{k1}^v denotes the Foreign Value-Added (FVA) content of exports of country 1 generated by country k (with $k \neq 1$). Hanse, this term represents share of value added generated in country k (v_k) and imported by country 1 (L_{k1}) in order to produce its exports (e_1). Thus, the sum of the green cells (the elements of the first column) in the Table 1 gives total FVA for country 1 (total $FVA_{country\ 1} = \sum_{i=2}^{N} T_{i1}^v$). The sum of Domestic and Foreign Value-Added yields the total exports of country 1 (Gross Export = $DVA + FVA$ i.e. $Gross\ Export_{country\ 1} = \sum_{i=1}^{N} T_{i1}^v$). The other columns replicate the exercise for the other countries.
- The term T_{1K}^v denotes the Indirect Value-Added Exports (DVX)[11], which represents the share of exports of country k (e_k) that depends on the value added sourced by country 1 ($v_1 L_{1k}$). Thus, the sum of the blue cells (the elements of the first row) in the Table 1 gives total DVX for country 1 (total $DVX_{country\ 1} = \sum_{i=2}^{N} T_{1i}^v$). It is notable that at the world level, DVX should be equal to the FVA. In addition, part of the DVA exported and used in the third country, could return back home ("$re-imported\ DVA$") that

[11] The mane of this term comes from Koopman et al. (2011).

creates double counting problem. However, the literature shows that the latter is relatively minor in the world level[12].

The Global Value Chain (GVC) participation index simply adds the FVA and DVX shares for country i and industry k and can be expressed the following way:

$$GVC_{ik} = \frac{FVA_{ik}}{Gross\ Export_{ik}} + \frac{DVX_{ik}}{Gross\ Export_{ik}} \quad (4)$$

The higher the ratio, the greater the intensity of involvement of a particular country in the GVCs. Moreover, the first component of the GVC index (FVA/Gross Export) measures "backward participation", given that it includes imported intermediate inputs used to generate output for export. The second component of the GVC index measures "forward participation", given that it includes exports of intermediate goods that are used as an input for export production of the other countries. Regional Value Chain (RVC) participation indices (calculated for CAREC region in this research) can be estimated by the same formula (4), restricting value chain participation and trade relations within the particular region.

[12] e.g. Koopman et al. (2011) estimated 4% of gross export in 2004; Stehrer et al. (2012) 2.9% in 2009 [based on WIOD database], OECD-WTO initiative – 0.6% in 2009.

Results[13]

Patterns of GVC and RVC integration among CAREC countries

In the first stage of the study we show how integrated are CAREC countries in one another's value chain production process (RVC) vs. how much they are plugged into the global value chains (GVC), and how these patterns changed over time.

The graphs below (Figure 2) and Table 2 trace CAREC countries value chain participation index at three crucial junctures: 2006 (before the global financial crisis of 2008), 2012 (the year after the global financial crisis but before the oil price collapse and regional currency crisis in the ECA region countries), 2015 (the year of regional growth and demand slow down driven by low oil prices, political instability in parts of the region, trade wars between US and China and the move towards higher protectionism on the global scale).

Figure 2. Value Chain Participation for CAREC countries.

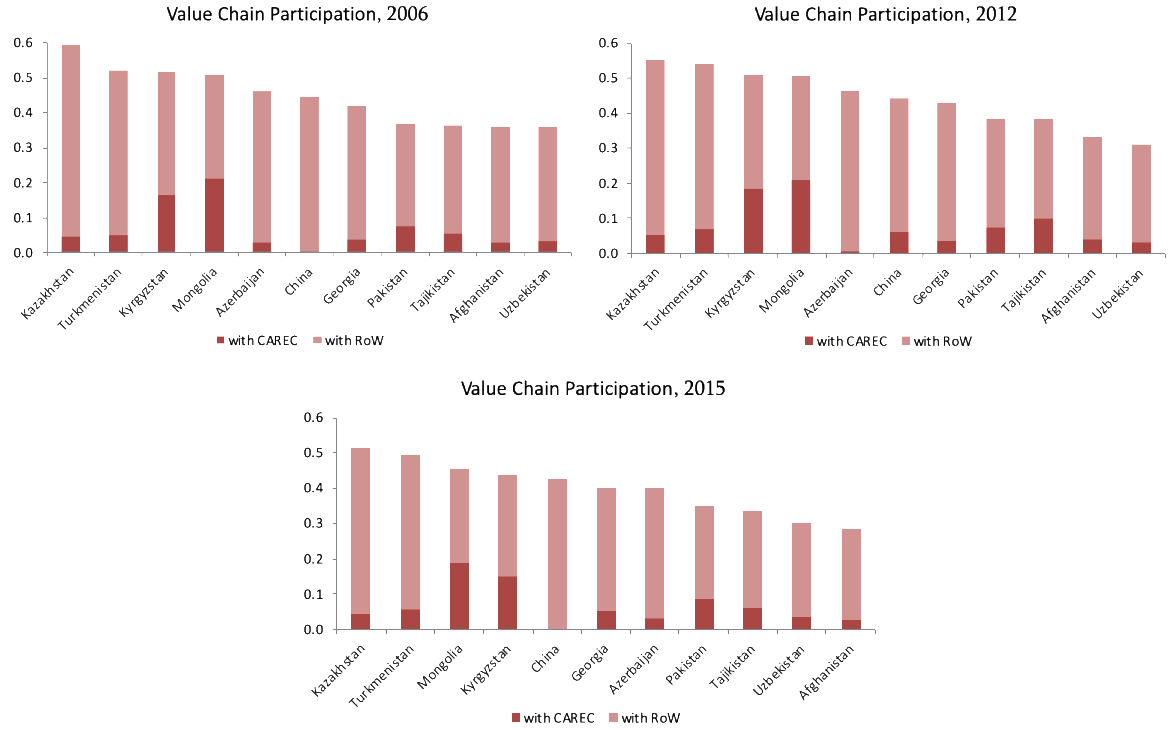


Figure 1 clearly shows that CAREC countries are not well integrated into production processes of the CAREC region. The countries which are most integrated into the CAREC RVC are Mongolia and Kyrgyzstan (18.9% and 15.2% RVC participation index respectively), followed by Pakistan and Tajikistan (8.8% and 6%) in 2015. What is also notable is that CAREC countries are not integrated enough into GVC, given their size. The average GVC participation index for CAREC countries is 40.1% in 2015. Georgia, for example, has GVC index of 40%, while OECD countries with similar relatively small populations (e.g. Lithuania, Latvia, Estonia, Finland, Norway), all have GVC index over 50% according to 2009 data (OECD, 2013)

[13] Results discussed here are preliminary

Table 2 presents nearly the same information as in Figure 2, but the dynamic of CAREC-RVC and GVC participation for all CAREC countries is clearer. In particular, it is easy to notice that the CAREC-RVC participation has been increasing for nearly all CAREC countries from 2006 to 2012, but then in 2015 there has been a retreat both in RVC and GVC participation. The pattern between 2006 and 2012 can be explained in part by the global financial crisis effects. The crisis likely forced many countries to look for fresh opportunities in their own neighborhood rather than rely mostly on global trade networks. In 2015, however, both RVC and GVC participation was on decline in nearly all countries. This can be explained by the global growth slowdown and regional economic and currency crisis affecting both oil-exporting and oil-importing groups of countries.

Table 2. GVC and RVC Participation Indices of CAREC Countries

Country	2006			2012			2015		
	RVC	GVC	RVC/GVC	RVC	GVC	RVC/GVC	RVC	GVC	RVC/GVC
Kazakhstan	4.69%	59.44%	**7.89%**	5.23%	55.25%	**9.46%**	4.53%	51.60%	**8.78%**
Turkmenistan	4.93%	52.10%	**9.47%**	6.86%	53.89%	**12.73%**	5.81%	49.60%	**11.72%**
Kyrgyzstan	16.38%	51.85%	**31.60%**	18.27%	50.89%	**35.91%**	15.17%	44.03%	**34.44%**
Mongolia	21.08%	50.76%	**41.52%**	21.05%	50.52%	**41.67%**	18.92%	45.62%	**41.47%**
Azerbaijan	2.85%	46.29%	**6.17%**	0.33%	46.62%	**0.70%**	3.27%	39.96%	**8.19%**
China	0.24%	44.47%	**0.53%**	6.21%	44.41%	**13.98%**	0.25%	42.73%	**0.59%**
Georgia	3.87%	41.80%	**9.25%**	3.47%	43.07%	**8.05%**	5.13%	40.01%	**12.83%**
Pakistan	7.38%	37.02%	**19.94%**	7.37%	38.48%	**19.16%**	8.81%	35.04%	**25.15%**
Tajikistan	5.22%	36.53%	**14.30%**	10.01%	38.27%	**26.16%**	6.00%	33.77%	**17.75%**
Afghanistan	2.74%	36.00%	**7.62%**	3.73%	33.43%	**11.17%**	2.75%	28.54%	**9.65%**
Uzbekistan	3.25%	35.89%	**9.05%**	3.09%	30.99%	**9.96%**	3.33%	30.39%	**10.96%**
Average for CAREC	6.60%	44.74%	**14.30%**	7.78%	44.17%	**17.18%**	6.73%	40.12%	**16.50%**

A closer look at the RVC and GVC participation on the country level: the case of Georgia.

Georgia presents an interesting case study among CAREC countries, because in some ways it illustrates important tendencies in the region. First, we construct the bilateral value chain participation index for Georgia and its top VC partner countries (abbreviated as CVC)
As Table 3 below shows Russia is the top VC partner country for Georgia, although it is not the topmost country in terms of the total volume of trade (in 2015 the top trade partner country for Georgia, based on gross trade flows was Turkey). Interestingly, between 2006 and 2012 Georgia's CVC (bilateral VC participation index) with Russia was growing, both forward and backward linkages were growing, even though Russia has imposed trade restrictions on a number of Georgian exports, including wine, mineral water, etc. As painful as this measure was for Georgia at the time, it did not much affect the value chain participation index with Russia.

Another interesting point is that with Turkey, another large and economically powerful neighbor, Georgia does not enjoy nearly as much integration as with EU countries like Germany, Italy. The explanation may be is that Turkey and Georgia are both integrated with EU countries through primary product exports (e.g. hazelnuts which are then exported to Italy for confectionaries) and their natural resources and capacities are mostly related to substitutes rather than complements in production.

Table 3. Bilateral Value Chain (CVC) Participation Indexes for Georgia and top VC partner countries

Country	2006			2012			2015		
	CVC	Forward	Backward	CVC	Forward	Backward	CVC	Forward	Backward
Russia	**6.59%**	**3.79%**	**2.81%**	**8.42%**	**3.83%**	**4.59%**	**7.80%**	**3.64%**	**4.16%**
Germany	**4.76%**	**3.47%**	**1.28%**	**4.96%**	**3.28%**	**1.68%**	**3.83%**	**2.73%**	**1.10%**
Italy	**3.55%**	**3.03%**	**0.52%**	**3.37%**	**2.72%**	**0.65%**	**3.08%**	**2.58%**	**0.50%**
France	**3.44%**	**3.07%**	**0.37%**	**3.12%**	**2.65%**	**0.46%**	**2.94%**	**2.59%**	**0.34%**
Turkey	**3.05%**	**1.46%**	**1.59%**	**3.46%**	**1.43%**	**2.02%**	**2.93%**	**1.31%**	**1.62%**
Azerbaijan	**1.91%**	**0.32%**	**1.59%**	**3.54%**	**0.30%**	**3.24%**	**2.80%**	**0.26%**	**2.54%**
Ukraine	**1.49%**	**0.71%**	**0.78%**	**1.78%**	**0.80%**	**0.97%**	**1.53%**	**0.74%**	**0.78%**
USA	**1.49%**	**0.65%**	**0.84%**	**1.64%**	**0.60%**	**1.04%**	**1.34%**	**0.53%**	**0.80%**
Netherlands	**1.39%**	**1.15%**	**0.24%**	**1.38%**	**1.07%**	**0.31%**	**1.26%**	**1.01%**	**0.25%**
UK	**1.42%**	**0.81%**	**0.61%**	**1.36%**	**0.74%**	**0.62%**	**1.12%**	**0.59%**	**0.53%**
China	0.84%	0.57%	0.27%	1.25%	0.75%	0.50%	1.07%	0.61%	0.46%
Iran	0.82%	0.52%	0.30%	0.89%	0.45%	0.43%	0.98%	0.59%	0.39%
Belgium	1.01%	0.83%	0.18%	0.94%	0.72%	0.23%	0.85%	0.67%	0.17%
Spain	0.76%	0.59%	0.17%	0.73%	0.50%	0.23%	0.65%	0.48%	0.17%
South Korea	0.48%	0.40%	0.08%	0.64%	0.53%	0.11%	0.59%	0.51%	0.09%
Japan	0.73%	0.47%	0.26%	0.72%	0.40%	0.32%	0.57%	0.37%	0.20%
Singapore	0.56%	0.52%	0.04%	0.57%	0.51%	0.06%	0.56%	0.51%	0.05%
Kazakhstan	0.54%	0.33%	0.22%	0.64%	0.33%	0.30%	0.53%	0.29%	0.24%
Switzerland	0.46%	0.20%	0.26%	0.63%	0.19%	0.44%	0.52%	0.16%	0.36%
Austria	0.49%	0.32%	0.17%	0.52%	0.30%	0.22%	0.44%	0.26%	0.18%
Other	12.71%	8.48%	4.23%	13.96%	8.36%	5.59%	11.93%	7.47%	4.46%

Interestingly, among top 10 VC partner countries there is only one CAREC member – Azerbaijan. The rest are EU countries, USA, and larger neighboring countries like Turkey, Russia and Ukraine.

A closer look at which industries are important for value-added trade in Georgia reveals the following insights: Italy is even more important than Russia as a destination country for wholesale retail value-added trade (i.e. Italy is importing more Georgia's value-added and using it in exports than Russia in the wholesale retail trade industry), even though Russia is more important overall as a value-added destination country. Forward linkages with Russia are maintained via metals, petroleum, motor fuel, mining products. As far as backward linkages (using foreign value-added in exports), Georgia by far relies mostly on Russia for imports of chemicals, basic metals, and even office machinery, computers and equipment. Turkey and Azerbaijan also very prominent source countries for VC participation, especially what concerns wholesale products, land and water transportation services, etc.

Table 4. Domestic value added (DVA) and Foreign value added (FVA) associated with forward and backward value-chain exports for Georgia, by industry and country

Forward CVC Participation Indicies of Georgia, 2015

Georgia	Russia	Germany	Italy	France	Turkey	Azerbaijan	Ukraine	USA	Netherland	UK
Wholesale trade and commission trade, except of motor vehicles a	14537.39	6827	17854	8277	1934	868	1313	1294	3555	1730
Manufacture of basic metals and fabricated metal products	10370.39	3879	4098	6934	4622	505	467	1477	1051	691
Retail trade of motor fuel	9231.199	1646	1978	1097	376	92	445	377	742	529
Mining and quarrying	9070.286	4052	3818	6845	4291	710	1463	1439	1529	839
Retail trade, including trade of motor vehicles and motorcycles	7392.577	3704	2854	3468	1694	343	923	756	1449	838
Manufacture of coke, refined petroleum products and nuclear fuel	5398.026	4096	3311	10330	2077	1334	1032	1624	3953	843
Real estate, renting and business activities	4671.894	5882	6048	5066	1926	449	947	933	2489	1602
Cargo handling and storage	4290.459	3464	3497	3494	1809	367	818	678	1281	817
Other land transport; sea and coastal water transport	3893.878	2602	1403	1575	3006	296	781	361	805	450
Growing of fruit, nuts, beverage and spice crops	3632.188	5679	1442	619	265	35	1966	225	570	252
Financial intermediation	3409.643	3212	2629	2937	2864	182	355	610	833	769
Other supporting transport activities	3388.402	4050	4321	4363	1433	417	718	707	1511	825

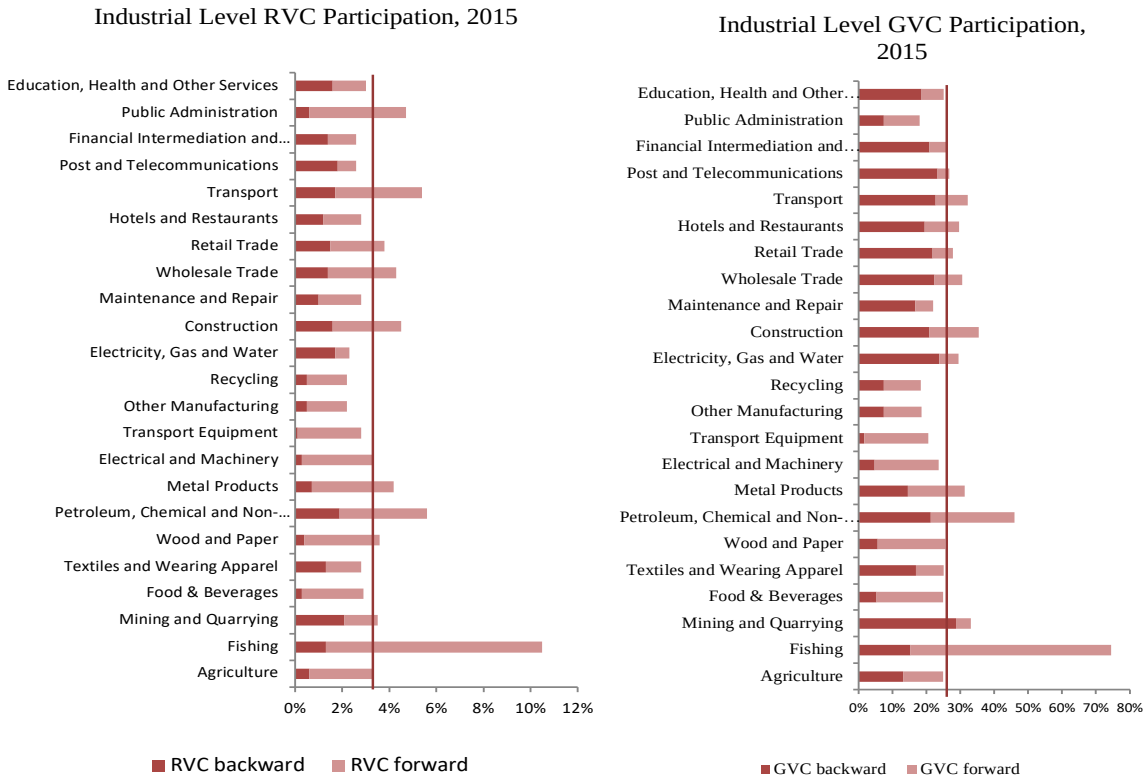
Backward CVC Participation Indicies of Georgia, 2015

Georgia	Russia	Germany	Italy	France	Turkey	Azerbaijan	Ukraine	USA	Netherland	UK
Chemicals, chemical products and man-made fibres	18991.93	2713	1327	973	4881	4198	1496	1210	573	1203
Basic metals and fabricated metal products	13630.66	3033	1337	895	4777	7195	2807	2263	569	1568
Office machinery and computers; machinery, equipment and appa	10434.7	3102	1346	883	4440	4662	2213	2332	580	1467
Fruit, nuts, beverage and spice crops	8190.279	1727	765	617	2523	4518	1016	1006	585	785
Alcoholic beverages	6717.127	2726	1154	949	3088	2985	1065	1418	834	1132
Wholesale trade and commission trade services, except of motor v	5039.526	1731	767	488	2836	7445	1794	1653	346	873
Other land transportation services; water transport services	4028.804	922	393	268	1393	8035	1328	855	189	519
Transport equipment	3416.664	988	428	283	1366	1384	641	638	182	459
Coke, refined petroleum products and nuclear fuels; industrial gas	2974.923	434	211	155	773	657	245	212	92	197
Retail trade services of motor fuel	2711.03	289	137	106	398	3936	590	412	76	264
Mineral waters and soft drinks	2536.002	1247	558	414	1967	976	397	624	253	516
Reexport/reimport	2487.179	822	352	220	1543	92	1038	1580	172	444
Other food products	2429.618	514	240	154	723	622	214	264	181	155
Public administration and defence services; compulsory social sec	1982.251	420	226	122	816	2938	428	232	107	168
Wood and products of wood and cork (except furniture); articles o	1695.981	798	451	251	1406	1011	316	374	165	341
Collected and purified water; distribution services of water	1687.426	56	23	17	53	125	52	52	11	31
Air transport services	1610.521	836	323	213	911	3888	696	609	147	415

Georgia and CAREC countries: Identifying forward and backward RVC linkages on industry level

We have already established that CAREC countries in general, and Georgia in particular, are not well integrated with each other on the value-chain level. Nevertheless, it would be important to establish a baseline which can serve as a springboard for further cooperation initiatives between these countries. Specifically, one needs to examine the existing value-chain linkages on the industry-level, and use a diagnostic method to identify the sectors with highest RVC potential. Figure 3 below breaks down Georgia-CAREC (RVC) and Georgia-World (GVC) participation indexes by industry, with a vertical line representing the median value of RVC and GVC participation respectively.

Figure 3. RVC Participation Index for Georgia, by Industry, 2015



Clearly, as the table shows, a number of sectors appear to have high level of value-chain integration. For example, Fishing; Petroleum, Chemical and Non-Metallic Mineral; Construction, Wholesale Trade; Transport, etc. It is also evident that there exists correlation between the degree of GVC and the degree of RVC participation on the industry level: industries which have high GVC participation index tend to be above the median value for RVC participation as well. Our purpose in this study, however, is to identify the sectors which have both a high potential for value-chain integration and those in which the RVC capacity is yet under-developed. The situation in those sectors would warrant further scrutiny from policy-makers.

Sector-identification diagnostics

Our first step in our sector-identification diagnostic methodology is to compare the industries' GVC and RVC participation indexes. Clearly, GVC participation indexes for every industry will be much higher than the RVC, so one strategy would be to first rank industries by the GVC and RVC participation indexes and then compute the difference in ranking (the so-called "rank gap"). The rank gap for industry *k* will be defined as follows:

$$Rank\_gap_k = rank_{k,\,RVC} - rank_{k,\,GVC} \qquad (5)$$

where $rank_{i,\,RVC}$ ($rank_{i,\,GVC}$) is industry's i ranking by RVC or GVC participation index among 26 industries. The industry with the highest RVC or GVC participation index receives the ranking of 1.

For example, if an industry is ranked 9th in the GVC participation index and in the same time it is ranked 18th in the RVC participation index (this is the case for Hotel and Restaurants

industry in Georgia), the rank gap between RVC and GVC will be 9, indicating that GVC participation is much higher than RVC participation, then one would question what causing such a big disparity in rankings for that particular industry.

Another strategy would be to compare the industry's GVC and RVC participation indexes taking into account where each industry-specific index stands relative to the mean value (compute the so called "distance from the mean gap" for each industry *k*). For example, if an industry X has a high GVC participation index relative to the overall GVC mean for all industries, but in the same time its RVC participation index is far below the overall RVC mean, the question needs to be asked what is causing the industry that is so well integrated into the global value chain to lag behind in the regional value chain participation. The distance from the mean gap (DM_gap) for industry *k* can be defined as follows:

$$DM\_gap_k = \frac{GVC_k}{\sum_{k=1}^{n} GVC_k/n} - \frac{RVC_k}{\sum_{k=1}^{n} RVC_k/n} \quad (6)$$

For example, in the already mentioned Hotel and Restaurant industry, the GVC index is 4.3% above the mean GVC value for all relevant industries (indicating that the industry is relatively well integrated into global value chains) but is in the same time the RVC participation index is 21.6% below the RVC mean for all industries. The "distance from the mean" GVC-RVC gap would then be 25.9% for Hotel and Restaurants. The table below summarizes the "rank gap" and the "distance from the mean" gap for all industries under consideration. Large positive gaps in both cases indicate that the industry in question is much better integrated into the global value chains and into the regional (CAREC) value chains.

Table 5. Sectoral gaps[14], order by the "distance from the mean" gap

Sector[15]	*distance from the mean gap (GVC-RVC)*	*rank gap, RVC-GVC*	*industry rank (out of 26) in overall export to CAREC*
Public Administration	-68.0%	-21	11
Transport	-36.9%	-2	1
Fishing	-35.2%	0	26
Wholesale Trade	-15.1%	-1	3
Wood and Paper	-11.5%	-4	19
Metal Products	-9.0%	1	6
Electrical and Machinery	-8.8%	-6	7
Retail Trade	-8.7%	-2	8
Transport Equipment	-8.0%	-5	12
Agriculture	-5.8%	-5	5
Maintenance and Repair	-3.5%	-5	22
Construction	-3.3%	2	20
Other Manufacturing	3.1%	-1	21
Recycling	3.1%	-1	24

[14] Positive value of the gap indicates that the industry is better integrated into GVC than into RVC. Negative value of the gap indicates a better RVC integration/participation, relative to GVC integration/participation.
[15] Re-export/re-import sector is excluded from the list as an outlier.

Sector[15]	*distance from the mean gap (GVC-RVC)*	*rank gap, RVC-GVC*	*industry rank (out of 26) in overall export to CAREC*
Education, Health and Other Services	3.1%	-2	18
Petroleum, Chemical and Non-Metallic Mineral Products	3.5%	0	9
Food & Beverages	4.2%	-3	4
Textiles and Wearing Apparel	10.7%	4	17
Mining and Quarrying	17.9%	6	10
Financial Intermediation and Business Activities	19.0%	8	2
Post and Telecommunications	20.5%	8	14
Hotels and Restaurants	25.9%	9	13
Others	30.2%	5	23
Private Households	34.5%	3	16
Electricity, Gas and Water	37.9%	12	15

A look at Table 5 already gives an idea which sectors would be interesting cases for further diagnostics. Sectors with high positive value of gap measures are of particular interest, as well as sectors with high negative values of the gap (in this case the sector exhibits an already revealed high RVC potential and can be analyzed as such).

Industry selection criteria

Different cutoff points for the positive and negative gap can be considered. In this study we first look at the industries with the 'distance from the mean' gap of above 10% and below -10%. Rank gap normally correlates but is not always consistent with this measure. This is not a problem, as 'distance from the mean' gap can be more accurately gauging a relative GVC/RVC participation intensity of the industry.
In Georgia we identify 8 industries with relatively high GVC and relatively low RVC participation. Out of the eight, "Private Households" and "Other" can be excluded, since they are not subject to policy intervention.

Thus, *Electricity, Gas and Water; Hotels and Restaurants; Post and Telecommunications; Financial Intermediation and Business Activities; Mining and Quarrying; Textiles and Wearing Apparel* are the remaining 6 industries to be considered more closely.
Among these *Post and Telecommunications* as well as *Financial Intermediation and Business Activities* are the type of sectors that are typically servicing existing trade linkages between countries. If RVC linkages between Georgia and CAREC countries increase, the participation index of these industries will increase as well. Thus, the four remaining industries which are of interest to policy makers are:

- *Electricity, Gas and Water*
- *Hotels and Restaurants*
- *Mining and Quarrying*
- *Textiles and Wearing Apparel*

The final step is to check whether these industries are economically significant for the country, meaning that export volumes of these industries to CAREC countries are not negligible. The industries' rank in overall exports to CAREC countries (column 3, Table 5) are 15th, 13th, 10th and 17th out of 26, respectively. Thus, we can be sure that we are not dealing with outlier type of industries, or industries which are not economically meaningful for the country's export.

The remaining industries to consider are those which have significantly higher relative RVC participation (and thus a demonstrated capacity for RVC trade). These are *Public Administration, Transport, Fishing, Wholesale Trade, Wood and Paper* industries. Once again, we can exclude *Public Administration* since it is not relevant for trade policy analysis. Among the remaining industries Fishing can also be excluded as not economically meaningful (very low volume of exports). The remaining three industries:

- *Transport*
- *Wholesale Trade*
- *Wood and Paper*

are identified as potential subjects for further analysis.
In this study we will only present case studies for two out of seven industrial sectors identified through our diagnostics methodology in Georgia: Textiles and Apparel sector as well as Wood and Paper sector. These industrial sectors are sufficiently narrow in focus to be examined the scope of the paper, and in the same time economically significant for the country.

Case studies

Case Study 1: The Value Chain in Textile and Apparel Sector

Georgia has a long history of producing textile and apparel, which originates from the period of the Soviet Union. In those times, Georgia had the most developed textile and apparel industry among all of the Soviet countries, producing and distributing high quality apparel, silk and wool throughout the Soviet Union. In the early stages of transition, wars and cascades of unsuccessful reforms resulted in destroyed infrastructure, severe recession, hyperinflation, problems with tax collection, increased criminal activities and high corruption. As a result, almost all of the factories in the textile and apparel sector have been shut down (except very few factories, which managed to survive – e.g. "Imeri" in Kutaisi) and the industry experienced a long-lasting (around 20 years) stagnation. Since then, Georgia has not been able to restore its textile production (nowadays Georgia is a large net importer of textile goods, mainly employed as an input in apparel production process), but has established the modern apparel factories involved in a CMT (Cut, Make & Trim) operations in the global value chain of apparel[16] (EU4Business, 2015).

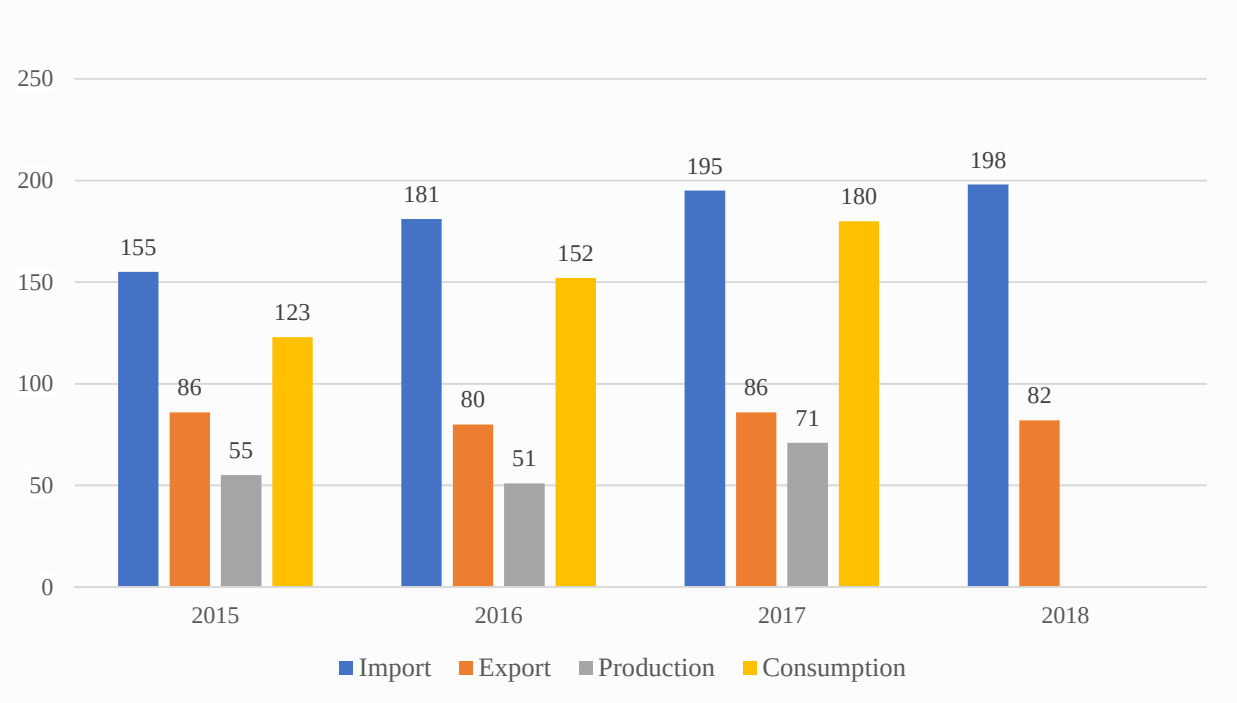
Apparel Production, Trade Flows and Consumption in Georgia

According to the Ministry of Economy and Sustainable Development of Georgia[17], apparel production has increased from 10 million USD in 2008 to 71 million USD in 2017. Despite

[16] The first new modern apparel factory was established in 2007. CMT production is the lowest productive in the textile and apparel value chain.
17 "Investment Opportunities in Manufacturing of Apparel, Footwear and Bags in Georgia 2019" – Enterprise Georgia, Ministry of Economy and Sustainable Development of Georgia.

the growth slowdown of apparel production in 2013 and 2016, the overall trend is positive and sector experienced significant growth from 2008 to 2018. With an active inflow of the foreign direct investment in the Georgia's apparel sector, the export of apparel increased by around 3.4 times from 24 million USD in 2009 to 82 million USD in 2018. However, after steady growth from 2011 to 2014, apparel export plateaued to the level of 80-86 million USD. Apparel imports to Georgia also experienced rapid growth from 77 million USD in 2009 to 189 million USD in 2018. In fact, imports did not change from 2011 to 2013, and experienced steady growth from 2015 to 2018. The consumption of apparel has had a pronounced increasing trend in the recent 5 years (the Figure 4 summarizes statistical information about trade flows, production and consumption of apparel from 2015 to 2018).

Figure 4. Trade Flows, Production and Consumption of Apparel, million USD



Source: Ministry of Economy and Sustainable Development, Geostat

Trade Flows by Major Product Categories

According to Geostat, there are two broad categories which cover great majority of the apparel trade inflows: trade flows of men's or boy's suits, ensembles, trousers, knitted or crocheted[18], and t-shirts, singlets and other vests, knitted or crocheted[19]. In case of the first group of products, production and exports were quite close to zero from 2000 to 2008[20], and hence, imports were notably higher than exports of these goods. Nevertheless, the exports have exceeded imports since 2010 and positive trade balance has even been widening since then. Moreover, the second group of products have a similar pattern, the only difference was the turning point (year 2013) after which the volume of exports has exceeded the volume of imports (Figure 6). Thus, the positive dynamics of the apparel production and exports,

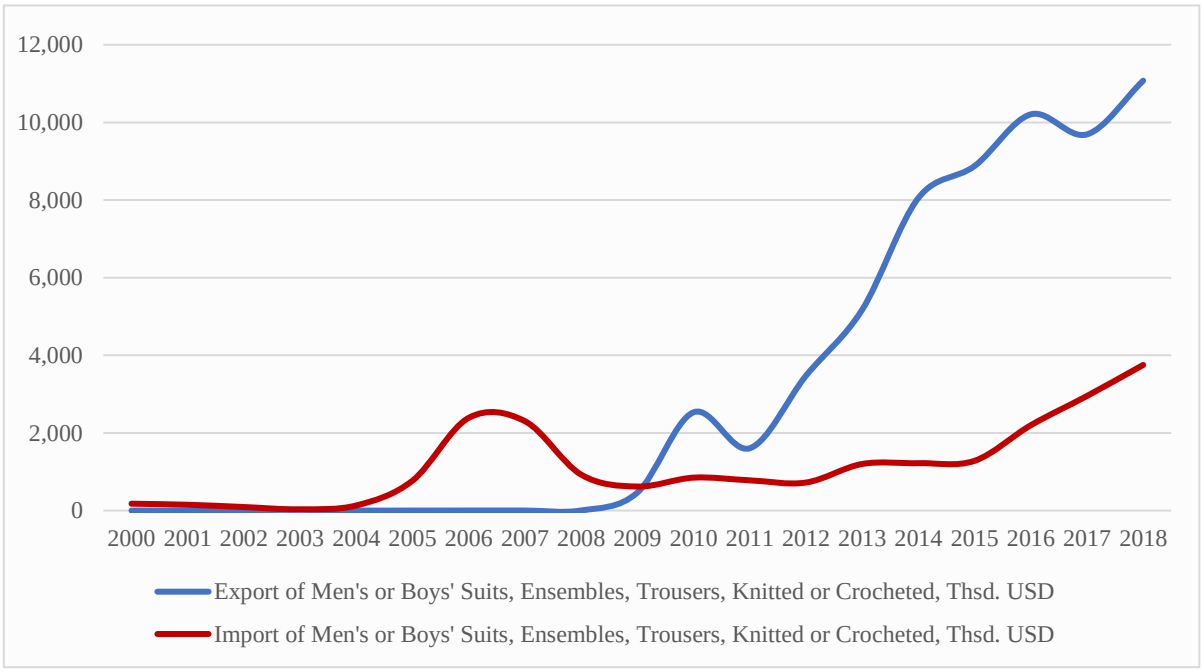
[18] Trade flows of men's or boy's suits, ensembles, trousers, knitted or crocheted – corresponding code of 6103 in HS 4-digit level classification.

[19] T-shirts, singlets and other vests, knitted or crocheted – corresponding code of 6109 in HS 4-digit level classification.

[20] As mentioned in the previous paragraph, great majority of the apparel factories were shut down in the early stages of transition, and apparel industry requited more than ten years

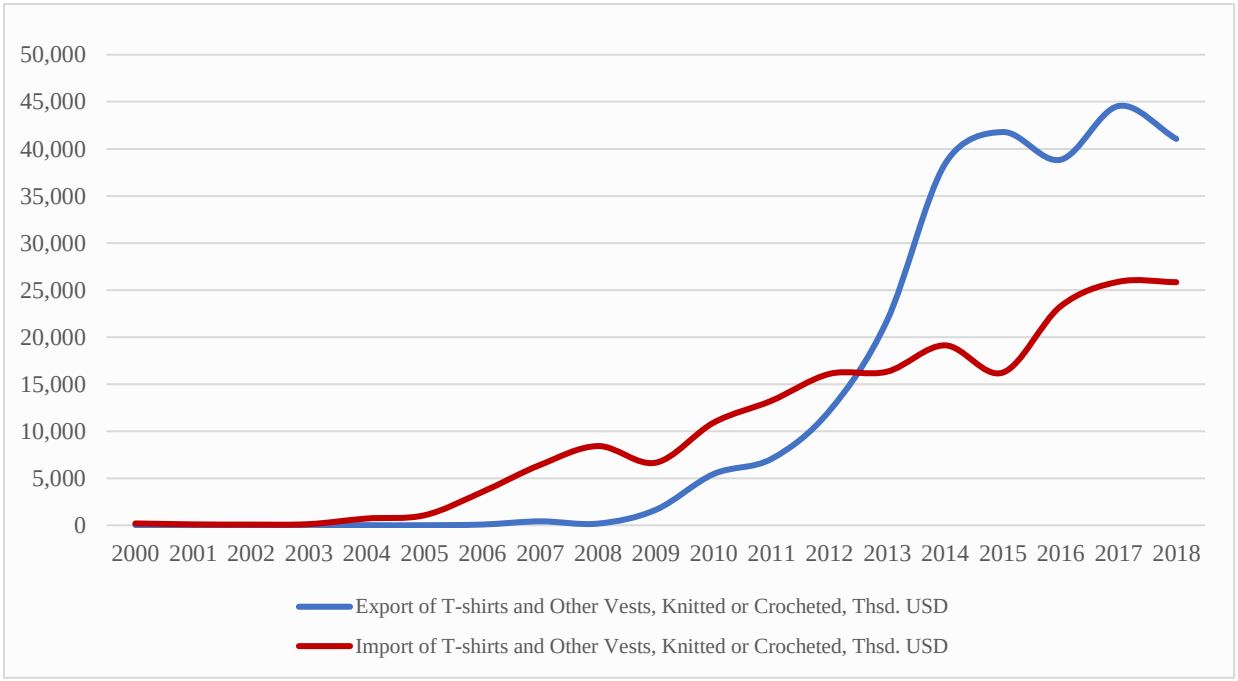
generates further motivation to overview value chains in this sector and identify opportunities of further integration for CAREC countries.

Figure 5. Trade Flows of Men's or Boy's Suits, Ensembles, Trousers, Knitted or Crocheted, Thousand USD



Source: Geostat

Figure 6. Trade Flows of T-shirts and Other Vests, Knitted or Crocheted, Thousand USD



Source: Geostat

Decomposition of Apparel trade by Countries

Decomposition of the apparel trade flows by partner countries shows that Georgia' apparel production is quite dependent on Turkish apparel sector. According to the United Nations Comtrade Database for 2018, Turkey accounted for slightly more than 92% of Georgia' apparel export, while the share of other three notable partners Armenia, Germany and Italy in the total exports amounted to only 2.8%, 2.1% and 1.1% respectively. In case of Turkey, Germany and Italy, these apparel goods are mainly exported by foreign partner factories situated in these countries for further processing (Georgia is a part of global value chain (GVC)).

Georgia's apparel imports are much more diversified compared to exports: Turkey accounts for 42.6% of total exports, while other three significant partners are China, Italy and Spain with 17.5%, 10.6% and 7.2% shares in total volume of exports. Textile, which is an important input in apparel production process is mainly imported from Turkey, China and Italy[21] and the structure of the textile imports is largely determined by the Global value chains operating in the apparel sector (the other players of the value chain take over the supply of textile [as an input] to Georgia's apparel fabrics). Trade decomposition indicates that there are quite limited trade flows for textile and apparel industry between Georgia and CAREC countries.

Description of Georgia's Apparel Industry

Nowadays, apparel industry consists of more than 200 factories, with great majority of them being small businesses (approximately 95%) employing 5-10 workers each. There are only 15 enterprises employing more than 40 workers and total employment in apparel industry exceeds 6'500 people. There are three main geographic locations for apparel industry clusters: Batumi, Kutaisi and Tbilisi. The main companies of the industry could be divided into two groups: purely Georgian producers and Turkish-owned subsidiary producers. These two groups of factories work with quite different business models (EU4Business, 2015).

Turkish-owned companies are mainly operating in Batumi (one more large factory in Tbilisi was created by a Turkish investment as well) and leading Georgian apparel industry not only in terms of employment and capacity, but also in terms of investments made. Turkish-owned companies usually get orders from Turkish parent companies, import textile goods (as an input for apparel production) from them, simply provide cut, make and trim (CMT) operations without involving in more advanced operations of value chain (e.g. branding, design, marketing and distribution).

Georgian factories, on the other hand, have two additional buyers from EU: Moncler from Italy and Lebek from Germany (the latter one mainly orders goods to Imeri, quite old factory from Kutaisi). Large companies situated in Tbilisi are mainly producing uniforms for Georgian police, army and state guards (MoESD, 2015).

[21] Decomposition of Georgia's imports of textile goods: cotton – Turkey 68%, China 15% and Italy 10%; fabrics – turkey 57%, Italy 17% and Hungary 14%; man-made filament fibres Turkey 31%, Belarus 28% and Italy 20%; Staple fibres: Turkey 49%, China 31% and UAE 12%, Textile fabrics: China 47%, Turkey 22% and Ukraine 10%. Silk is mainly imported from Turkey and China, while the main importer of wool is Germany.

Figure 7. Geographic Distribution of Apparel Industry in Georgia

Source: EU4Business Project, Textile and Apparel in Georgia An Industry Study

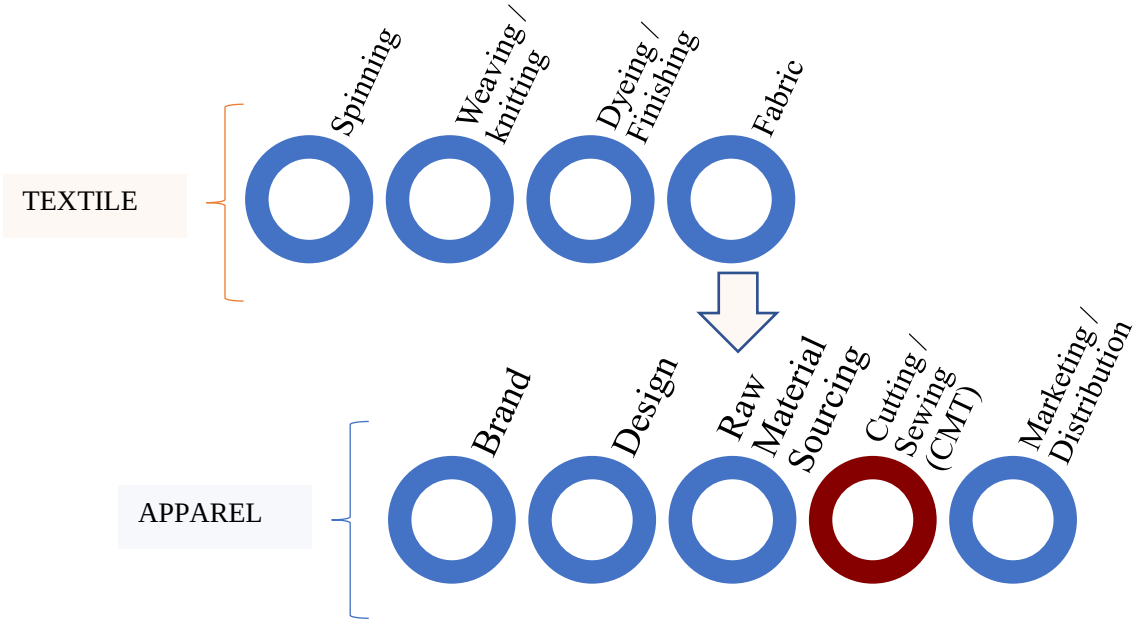
The Role of the Georgian Companies in Textile and Apparel Global Value Chains

Fernandez-Stark, Frederick and Gereffi (2011) identify four stages of value chain development in the textile and apparel industry: Cut-Make-Trim (CMT), Original Equipment Manufacturing (OEM/FOB), Original Design Manufacturing (ODM) and Original Brand Manufacturing (OBM). CMT is the simplest business model, where companies are only involved in the cutting and sewing process, without participating in a process of purchasing and suppling raw materials, branding, designing and even marketing/distribution of the final product. In general, CMT creates the smallest value among the apparel industry business models due to being involved in a lowest productive cutting and sewing operation[22]. OEM/FOB additionally includes purchase and supply of raw materials, ODM also includes design capability to the production process and OBM covers all of the stages in the apparel production: brand, design, raw material sourcing, cutting/sewing and marketing/distribution. Being involved in more stages of the value chain, increases value added created in the apparel industry.

[22] Fernandez-Stark, Frederick and Gereffi (2011) compares business operations in (stages of value chain) the apparel sector in terms of value added and found that the distribution of stages has U shape. The stages with the highest value added are R&D and services, while the stage with the lowest value added is a CMT production.

Figure 8. Map of Textile and Apparel Value Chain

Georgia's apparel industry mainly employs CMT business model: getting orders from the



Source: Fernandez-Stark, Frederick and Gereffi (2011) - The Apparel Global Value Chain: Economic Upgrading and Workforce Development.

partner companies from Turkey (the great majority), Italy and Germany, importing textile from them (provided directly from the partner company and this is quite easily visible in the textile export statistics), being involved in a cutting/sewing process and re-exporting final product to the countries, where partner companies are located (without being involved in a branding, design and marketing operations). Hence, Georgia creates the lowest value in the global value chains. However, there are initiatives to establish the first Georgian OBMs. Georgian fashion houses have already been producing their own brands participating in the majority of stages of apparel value chain and even own several stores outside Georgia. But it is considerable that the scale of production for these companies is still quite small (EU4Business, 2015).

Strengths and Weaknesses of Establishing Global and Regional Value Chains in Apparel Industry

One of the most important advantages that Georgia has in an apparel sector is relatively low labor costs compared to the Turkey, Eastern European countries and some of the Eastern Asian countries. For example, the average gross salary in the sub-sector of garment and footwear was more than 3.7 times lower than Poland, 2.5 times lower than Romania, 2.4 times lower than Turkey and close to the level of Ukraine, Vietnam, Bangladesh and Pakistan – ranging from the level of GEL 150 per month to GEL 250-300 per month (in Tbilisi) and even reaching GEL 400-500 for sewing staff in a small-scale designer house. In the labor-intensive apparel production labor costs usually plays an important role in production process (MoESD, 2015; Enterprise Georgia, 2019a; Enterprise Georgia, 2019b).

Moreover, Georgia has low electricity prices (0.065 USD per kwh2) compared to Eastern European countries, Turkey (electricity even twice cheaper in Georgia) and Vietnam, and well-developed transmission and distribution systems. Electricity cost is another important cost in the total costs structure of apparel production. Georgia also has an average construction costs per square meter equal to 319 USD (2017), which is notably lower than the same measure in Poland (439 USD), Romania (443 USD) and Turkey (414 USD) and even slightly lower than Vietnam (Enterprise Georgia, 2019a; Enterprise Georgia, 2019b).

In addition, the other strengths of the Georgian apparel market include:

- Favorable legislative and regulatory frameworks;
- Low taxes, simple and flat corporate tax rate. For example, according to the Doing Business project of World Bank, total tax & contribution rate in Georgia amounted to 9.9% in 2018, while the same measure reached 40.5% in Poland, 40% in Romania, 41.7% in Ukraine, 37.8% in Vietnam and 40.9% in Turkey.
- Credible monetary and fiscal policy guaranteed by Liberty Act effective from January 2014[23];
- Favorable geographic location, being close to big exporting markets;
- Favorable trade agreements with big markets: Deep and Comprehensive Free Trade Agreement with EU, Free Trade Agreement with China and Turkey. Free Trade Agreements with majority of the neighboring countries (including Azerbaijan) and favorable trade agreements with many of the CAREC countries;
- Long history of producing textile and apparel (particularly being the main producer of textile and apparel in Soviet Union).

However, Georgia's apparel industry has some weaknesses that prevents further development of the sector and limits participation in a highly productive operations in the global and regional value chains:

- Ageing and lack of skills of the staff working in the apparel factory. According to the EU4Business report "Textile and Apparel in Georgia An Industry Study", interviewed designers stated that the average age of the primary female sewing staff was generally 45+ and sometimes even 55+;
- Outdated building and equipment, and no R&D facilities. There is big difference in this regard among Turkish-owned and Georgian companies. Turkish-owned factories tend to have much advanced technologies. As a result, apparel sector in Georgia is a low productivity sector;
- Georgian producers frequently do not comply with international standards of production;
- Low level of horizontal integration in the industry;
- Relying on imported raw materials (Georgia produces very limited amount of textile available for apparel production (EU4Business, 2015; MoESD, 2015; Enterprise Georgia, 2019a; Enterprise Georgia, 2019b).

What is Georgia's potential for improving value chain participation in the CAREC region? Employing more sophisticated business model in the apparel industry and undertaking more business operations including design, raw material resourcing and marketing/distribution

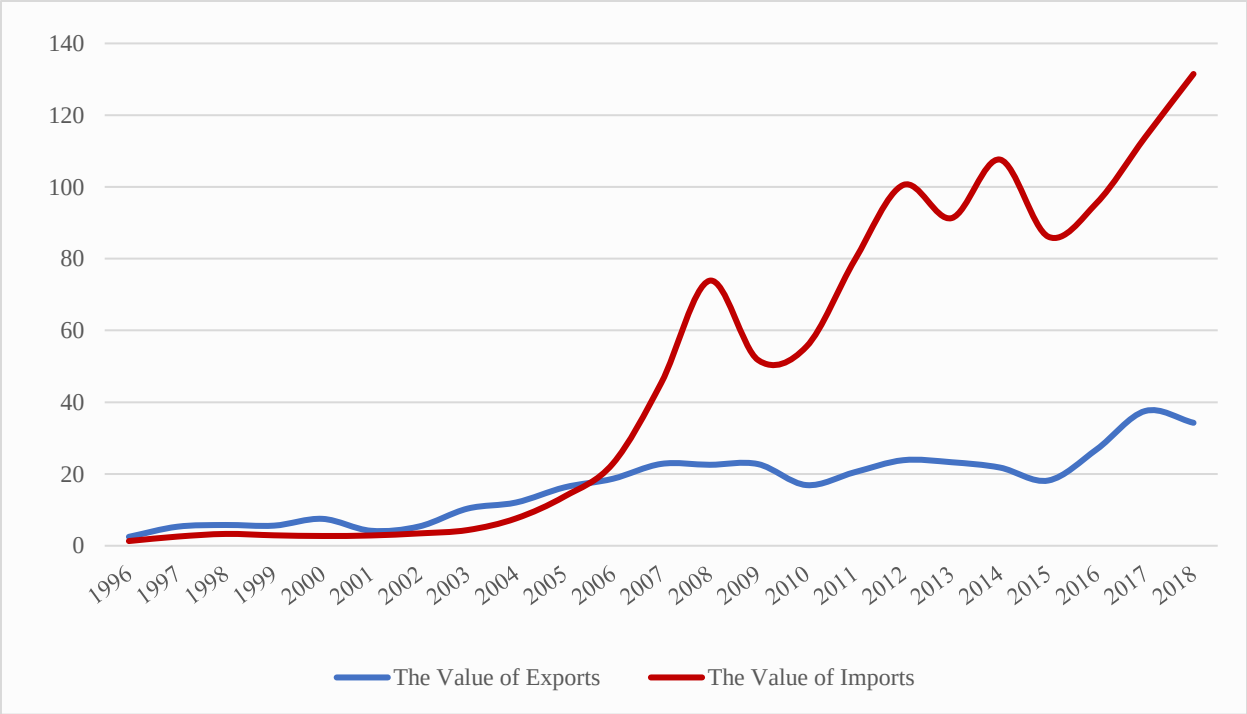
[23] Liberty Act limits Georgian Government to increase any of the taxes without referendum except excise tax and sets limits for the budget deficit (3%) and public debt to GDP ratio (60%).

requires collaboration with the textile exporting (e.g. Uzbekistan, Azerbaijan and Kazakhstan) and large apparel producing countries (e.g. China) in the region.

Case Study 2: The Value Chain in Furniture Industry

Wood processing and furniture production industries are among the most rapidly growing sectors in Georgia in the last 5-7 years. According to National Forest Agency, forest area is approximately 2.8 million ha in Georgia, which covers 40% of the country's territory. In addition, Georgia has 4100 different varieties of trees (out of 6500 varieties found in the world) including Beech (54%), Oak (11%), Fir (9%) and others (26%). Before 2005, the value of the wood export slightly exceeded the value of the wood import. However, after conducting reforms in Georgia's forest resource management system (a system stimulating wood import) and increased demand from the domestic market, the value of imports started to increase much faster than exports and the gap increased in particular since 2015 (Enterprise Georgia, 2019b).

Figure 9. Trade Flows of Wood and Articles of Wood, Wood Charcoal, million USD



Source: United Nations Comtrade Database

Decomposition of the Trade Inflows in Woods Industry

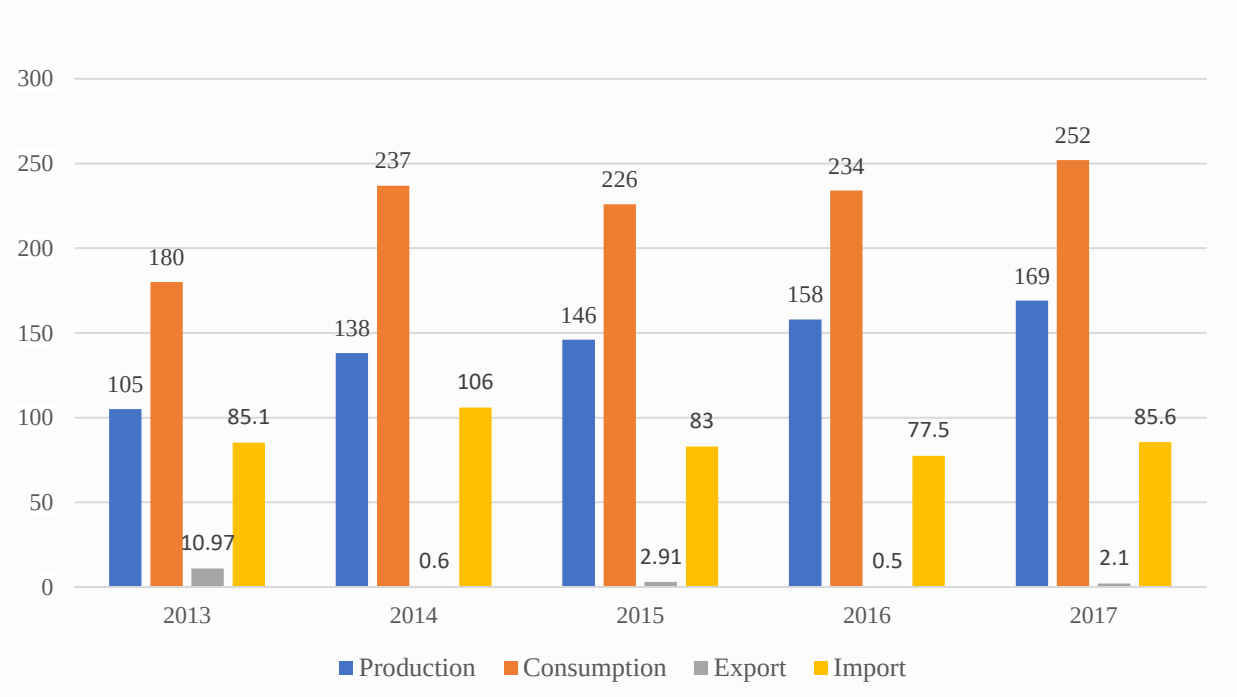
Decomposition of the wood trade flows by partner countries shows that Iran (38.3%), Armenia (19.9%), Germany (8.2%), Poland (7.8%) and Belgium (6.4%) are main partner countries in terms of Georgia's export, while Turkey (36.0%), Russian Federation (18.6%) and China (16.9%) are the countries with the largest share in the total value of imports.

Trade Flows, production and Consumption of Furniture

Despite the fact that wood processing and furniture production are increasing steadily, the imported furniture products still compose about half of the local market. According to Geostat, furniture production was growing on average by 13% from 2013 to 2017, while the average growth rate of consumption amounted to 10% during the same period. Furthermore, the value

of export remained minor in 2013-17, while imports on average increased by 2%, while fluctuating notably during the same period. The main partner countries in terms of furniture exports are Azerbaijan and Turkey. Georgia also has a rapidly growing pet furniture industry, exporting about 7 million USD per furniture to Germany, Netherlands and Belgium (Goliadze, 2019; Georgian Furniture Cluster, 2019).

Figure 10. Trade Flows, Production and Consumption of Furniture, million USD



Source: Ministry of Economy and Sustainable Development, Geostat, Trademap.org

Main Players of Wood Processing and Furniture Industries

There are more than 700 wood processing factories and more than 200 furniture producing companies in Georgia. Most of these companies are small and medium enterprises, but there are also large foreign companies from China and Iran, as well as trade centers and furniture clusters operating in this sector. One of the largest players in the wood processing market is Chinese company Hualing Group, which owns wood processing power plant located in the Poti free industrial zone, annually harvesting 30 000 cubic meters timber and exporting 95% of it to Central Asia, Iran, Egypt, Iraq and UAE.

In addition, Georgian Furniture Cluster is the biggest player in the furniture market, including 30 furniture producers, covering 3.5 ha area, employing 1’200 people and being the largest producer in the furniture industry. Another large furniture cluster operating in the country is Trade Center Saba, including hundreds of furniture producers, covering 4900 square meter shopping space and having 5 furniture salons. Moreover, exports of the furniture products are dominated by the large Azerbaijani company Embawood (Goliadze, 2019; Georgian Furniture Cluster, 2019).

Opportunities of Value Chain Participation in the Furniture Industry

Value chains in the furniture industry usually consists of six stages: (1) forestry, (2) timber harvesting and transportation, (3) timber processing (wood processing), (4) timber trade, (5)

furniture industry, and (6) furniture outlets. Georgian companies are more or less involved in all of the stages of the furniture value chain except the last one – furniture outlets. Rapid expansion of the wood processing and furniture sector, with increased employment and raised value added since 2012 creates positive picture in terms of Georgia's participation in the regional and global value chains, including value chains within the CAREC region, in particular Azerbaijan (Georgia already have an experience to participate in the regional value chain with Azerbaijan) and China. There are the other strengths that can potentially make Georgia more competitive in these regard (attractive to be involved in the value chains):

- Cheap labor, electricity and construction costs (described in the previous paragraph);
- Favorable business environment and taxation system;
- DCFTA with EU, Free Trade Agreements with China and neighboring countries (including Turkey and Azerbaijan);
- Notable number of furniture producers for clustering and pulling off export scale;
- Large number of recyclable wood resources (Georgian Furniture Cluster, 2019).

Conclusions

This study is the first attempt to offer a comprehensive mapping of the GVCs and RVCs for CAREC region by using the inter-country input-output matrices. While the study's main focus is on Georgia, the methodology for industry/sector level identification and analysis can be used for any CAREC country. Indeed, further analysis must be done for each CAREC country in order further identify potential areas for value-chain cooperation. The study concludes with several important insights about CAREC countries' status-quo and potential for cooperation.

In particular, we find clear evidence that CAREC countries are not well integrated into each other's production processes. Moreover, most CAREC countries are also not integrated enough into the global value chains, given their respective sizes. This points both to the challenges associated with CAREC countries economic systems, as well as the opportunities for cooperation and development. Secondly, we find that the value-chain integration process is dynamic, and the linkages can strengthen or weaken depending on the economic climate. In particular, regional value chain participation for CAREC countries increased between 2006 and 2012, following the global financial crisis, but then declined again in 2015 as a result of the region-specific economic and currency crisis.

Studying Georgia's value chain participation patterns, we find that value-chain ties to larger neighbors and more traditional trade partners (such as Russia) can be quite resilient, even persist through conflict and trade sanctions. Value-chain ties are not solely a function of the size of the economy and geographical proximity. For example, Georgia enjoys stronger value-chain ties with Germany, Italy and France than with Turkey. Russia still leads the list of value-chain integrated countries with Georgia, but with notable exceptions in some industries.

Finally, we identify Georgian industries/sectors which can present particular interest to policy makers: one set of industries appear to be much better integrated into GVC, than into CAREC-RVC, while another set of industries tends to have high CAREC-RVC participation

index relative to the GVC. Both types of industries can be subject for further in-depth analysis to reveal potential constraints and opportunities for regional cooperation.

Specifically, we find that Textiles and Apparel industry in Georgia is connected with the global value chains mainly through Turkey, which serves as a regional focal point for import and export of textiles. Georgia tends to import raw material (cotton, fabrics) mainly from Turkey (through Turkish-owned subsidiary companies established in Ajara region) and export the unfinished goods (apparel) for further processing to Turkey. Georgia's value added in this process tends to be very low. Many CAREC countries import textiles and apparel from Turkey as well. Therefore, there is clearly potential for Georgia to both move up in the value-chain to higher domestic value added, and in the same time strengthen value-chain linkages with those CAREC countries that are importing and exporting textile products.

Another case study of the Wood/Furniture value chain in Georgia reveals that regional CAREC value-chain linkages can be strengthened. Georgia and Azerbaijan, both CAREC countries, are strongly emerging as regional producers of furniture, with Georgia also serving as a source of raw material (wood). The position of both countries in the global and regional value chains can be strengthened as they work to expand their market share (without compromising natural resources) and create a higher domestic value added. This would require working out strategies for complementarity and cooperation rather than competing on the low value-added segments of the chain.

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