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Raising Armenia's Export Potential

Klakow Akepanidtaworn, Lili Karapetyan, Nathalie Reyes, and Yulia Ustyugova.

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ABSTRACT: Raising Armenia's long-term growth prospects is critical to meet the pressing need for jobs, achieve higher living standards, and arrest emigration. Armenia's long-term growth prospects have weakened since the global COVID-19 crisis, while recent global and regional the geopolitical developments added new shocks. This paper argues that there is a need to boost the potential of the tradable sector by focusing on products with higher complexity to sustainably increase Armenia's growth rate. It provides an overview of Armenia's export performance, analyzes factors and policy valuables that affect export outcomes in terms of volumes and composition, and draws policy implications.

WORKING PAPERS

Raising Armenia's Export Potential

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Contents

I.   Introduction

The role of exports as a driver of economic growth in Armenia has been uneven over the past decades. While fast-growing exports fueled Armenia's high growth rates in the early 2000s, private consumption and housing-related investment subsequently overtook exports as the key engines of economic growth until the Global Financial crisis, contributing 6.9 and 6.5 percentage points, respectively, to the average annual growth of 11.6 percent in 2004-08. The average contribution of exports to growth during this period was close to zero. Only after 2009 did exports regain their role as an important engine of economic growth, contributing 3.6 percentage points to the average annual growth of 4.5 percent.

Armenia's policymakers widely recognize the importance of exports as a growth driver as reflected in government past strategies. The strategy of 2017-22 aspired "to achieve a significant growth in exports with the exports of goods and services reaching 40-45 percent as a share of GDP." The strategy of 2019 stipulated that "the significant growth of export of goods and services must become the main driving force for the economic progress in Armenia. At the end of the program period, exports of products and services must reach 43-45 percent of GDP. At the same time, there has to be a significant increase in the role of technological

Growth Decomposition by Expenditure
(Percentage points)

Source: Armstat and IMF staff calculations.

products in the structure for exports". The latest government program (2021) puts emphasis on promoting exports and diversifying export markets. This is to be achieved by expanding export insurance toolkit, developing trade and economic cooperation with EEU, implementing the provisions and arrangements for trade-related issues in the Armenia-EU Comprehensive Extended Partnership Agreement (CEPA), promoting bilateral and multilateral cooperation within the framework of the EU Eastern Partnership, expanding and deepening cooperation with the World Trade Organization (WTO).

However, export-led growth per se does not necessarily promote higher sustainable economic growth. There are ample theoretical and empirical studies that discuss the benefits of international trade and present arguments why small open economies with insufficient market size cannot opt out the growth strategies oriented on external demand. Yet, not all export-led growth is created equal. One particular concern is that export growth driven by low value-added products could promote an increasingly less competitive product structure for an economy, ultimately weighing on long-term growth potential. Another concern relates to dependence on a narrow range of exports that focuses on narrow specialization amid small economies' efforts to integrate into the global value chains (GVCs) and achieve economies of scale in production. Such export development patterns can amplify an economy's vulnerability to trade volatility from particular products and fluctuations in foreign demand.

All these concerns apply to Armenia's economy, as the export developments patterns of the past decade have been diluting its export potential. Armenia's exports have become less diversified mainly due to low complexity products, and Armenia has been losing positions in export complexity ranking, both in goods and services. This is concerning because more complex products deliver higher value added, promote growth, and facilitate the countries to move up the international value chain. Moreover, Armenia backtracked in GVC participation, with lower forward participation that boosts domestic value-added participation in global value chains has also fallen below that of its peers. Reversing this trend and upgrading exports to more complex products and diversifying into products that offer greater opportunity for future growth will require a broad set of reforms. Accordingly, this paper seeks to identify the scope for promoting more dynamic and sustainable export-led growth in Armenia and suggests supportive economic policies and reforms in trade, infrastructure, education, and social areas.

The rest of the paper is structured as follows. Section 2 analyzes various aspects of Armenia's export performance. Section 3 describes data and methodology. Section 4 identifies the factors that affect export outcomes. Section 5 identifies policy-related variables that determine export composition. Finally, we conclude and discuss policy implications.

II. Armenia's Export Performance

During the pre-COVID decade, Armenia's exports exhibited higher dynamism and less volatility than in 2000-08 period. This earlier period was underpinned by a robust growth in export volumes. Since 2010, real export growth has remained remarkably stable, at about 12 percent on average. It outpaced overall economic growth, with exports becoming an important growth driver. The average annual real growth rate of goods exports exceeded services by about 2-3 percentage points.

Export Growth
(Year-on-year percent changes)

Real Export Growth: Goods and Services
(Year-on-year percent changes)
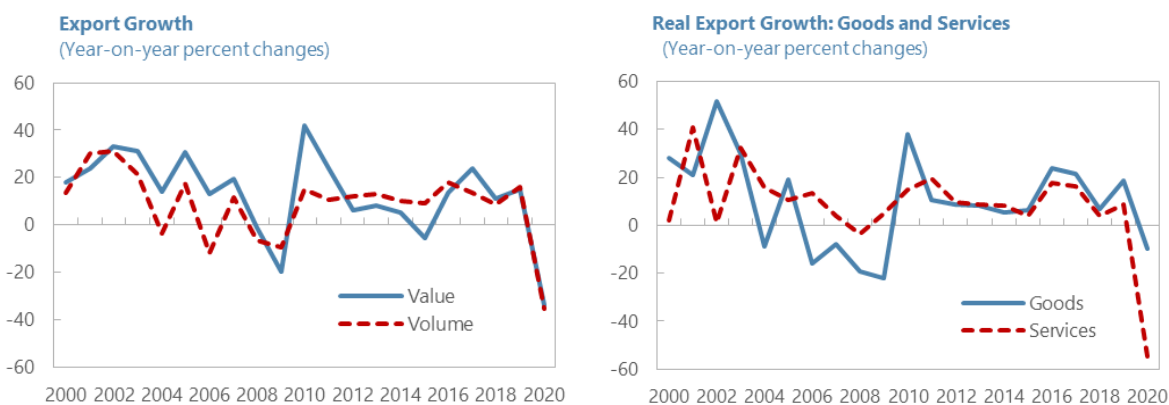
Sources: International Monetary Fund, World Economic Outlook, and IMF staff calculations.

Concurrently, Armenia has been rapidly gaining merchandise and service market shares since 2010. In 2010, Armenia originated US$7 out of every US$100,000 of merchandise exported globally. This increased to US$14 by 2019. Armenian merchandise exports not only grew faster than the average growth in world exports but also Armenia's market share during the pre-COVID decade has grown more than its peers from countries in the Caucasus and Central Asia (CCA) and other Emerging Market Europe countries (Table 1).[2] Furthermore, Armenia's expansion of the services in global market share has been particularly impressive over the last two decades. In 2019, Armenia originated US$34 out of every US$100,000 of services exported globally, which is US$26 more than in 2000 and the second highest CAGR[3] among the peers (Table 2).

Table 1. Global Market Shares, Export of Goods

CCA	2000	2005	2010	2015	2019	GAGR 2010-19	GAGR 2015-19	GAGR 2000-19
Armenia, Rep. of	0.005	0.009	0.007	0.009	0.014	8.31%	11.5%	6.0%
Azerbaijan, Rep. of	0.027	0.041	0.141	0.078	0.104	-3.24%	7.7%	7.4%
Kyrgyz Rep.	0.008	0.006	0.010	0.009	0.010	0.73%	4.8%	1.5%
Georgia	0.005	0.008	0.011	0.013	0.020	6.95%	10.7%	7.6%
Kazakhstan, Rep. of	0.152	0.265	0.375	0.281	0.307	-2.20%	2.3%	3.8%
Tajikistan, Rep. of	0.012	0.009	0.008	0.007	0.008	-1.06%	3.5%	-2.4%
Uzbekistan, Rep. of	0.064	0.062	0.053	0.035	0.079	4.55%	23.1%	1.2%
Turkmenistan	0.045	0.045	0.018	0.059	0.055	13.29%	-1.5%	1.1%
EM Europe								
Albania	0.004	0.006	0.010	0.012	0.016	5.10%	6.6%	7.6%
Belarus, Rep. of	0.113	0.152	0.166	0.163	0.175	0.59%	1.9%	2.3%
Bulgaria	0.074	0.109	0.135	0.155	0.177	3.05%	3.4%	4.7%
Bosnia and Herzegovina	0.008	0.021	0.031	0.030	0.035	1.23%	3.5%	8.1%
Croatia, Rep. of	0.068	0.083	0.078	0.079	0.091	1.83%	3.7%	1.5%
Hungary	0.432	0.598	0.628	0.602	0.659	0.53%	2.3%	2.2%
Kosovo, Rep. of	0.000	0.000	0.002	0.002	0.002	-1.00%	0.1%	…
Moldova, Rep. of	0.007	0.010	0.010	0.012	0.015	4.30%	5.2%	3.8%
Montenegro	0.000	0.000	0.003	0.002	0.002	-1.69%	3.5%	…
Romania	0.160	0.263	0.326	0.370	0.409	2.56%	2.5%	5.1%
Poland, Rep. of	0.487	0.849	1.051	1.216	1.418	3.39%	3.9%	5.8%
Russian Federation	1.585	2.271	2.493	2.098	2.233	-1.22%	1.6%	1.8%
Serbia, Rep. of	0.000	0.000	0.064	0.082	0.101	5.10%	5.4%	…
Turkey	0.428	0.698	0.749	0.879	0.962	2.82%	2.3%	4.4%
Ukraine	0.224	0.320	0.338	0.233	0.265	-2.66%	3.3%	0.9%
North Macedonia, Republic of	0.020	0.016	0.020	0.028	0.038	7.73%	7.8%	3.4%

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[2] Amongst the CCA, Turkmenistan is an exception due to the base effect of a narrow 2010 market share.
[3] CAGR: Compound Annual Growth Rate.

Table 2. Global Market Shares, Export of Services

CCA	2000	2005	2010	2015	2019	GAGR 2010-19	GAGR 2015-19	GAGR 2000-19
Armenia, Rep. of	0.008	0.014	0.022	0.026	0.034	5.00%	6.9%	8.2%
Azerbaijan, Rep. of	0.014	0.022	0.044	0.076	0.052	1.84%	-8.9%	7.2%
Kyrgyz Rep.	0.003	0.008	0.013	0.015	0.016	2.41%	2.3%	8.6%
Georgia	0.019	0.023	0.034	0.052	0.064	7.11%	5.0%	6.5%
Kazakhstan, Rep. of	0.057	0.066	0.089	0.106	0.108	2.26%	0.6%	3.5%
Tajikistan, Rep. of	0.003	0.005	0.008	0.004	0.003	-9.49%	-6.0%	0.1%
Uzbekistan, Rep. of	0.024	0.026	0.028	0.040	0.043	4.72%	1.6%	3.1%
Turkmenistan	0.014	0.010	0.015	0.010	0.007	-7.82%	-9.1%	-3.6%
EM Europe								
Albania	0.024	0.038	0.056	0.039	0.053	-0.59%	8.3%	4.3%
Belarus, Rep. of	0.054	0.074	0.104	0.115	0.134	2.85%	4.0%	4.9%
Bulgaria	0.162	0.193	0.143	0.139	0.159	1.17%	3.4%	-0.1%
Bosnia and Herzegovina	0.024	0.031	0.037	0.029	0.033	-1.25%	3.2%	1.6%
Croatia, Rep. of	0.242	0.326	0.254	0.200	0.239	-0.68%	4.6%	-0.1%
Hungary	0.396	0.414	0.418	0.385	0.419	0.04%	2.1%	0.3%
Kosovo, Rep. of	0.007	0.011	0.016	0.018	0.026	5.31%	9.6%	…
Moldova, Rep. of	0.010	0.014	0.017	0.017	0.021	2.66%	6.3%	4.1%
Montenegro	0.000	0.013	0.023	0.023	0.026	1.56%	3.5%	…
Romania	0.180	0.305	0.224	0.326	0.421	7.30%	6.6%	4.6%
Poland, Rep. of	0.559	0.569	0.746	0.755	0.972	3.00%	6.5%	3.0%
Russian Federation	0.607	0.909	1.057	0.884	0.861	-2.25%	-0.6%	1.9%
Serbia, Rep. of	0.028	0.051	0.076	0.081	0.108	4.05%	7.4%	…
Turkey	1.040	0.876	0.778	0.950	0.885	1.43%	-1.8%	-0.8%
Ukraine	0.204	0.295	0.367	0.213	0.241	-4.55%	3.2%	0.9%
North Macedonia, Republic of	0.017	0.022	0.021	0.026	0.025	1.99%	-0.7%	2.1%

Source: IMF, DOTS and IMF staff calculations

Yet selected export integration indicators suggest that Armenia's export potential remains untapped. Armenia's exports—averaging around 32 percent of GDP during the past decade—are among the lowest in its peer group. While for an average ratio of exports in services-to-GDP during the recent years Armenia is only behind Georgia and Albania, the exports of goods – at about 20 percent of GDP – weighs on Armenia's ranking among the peers (Figure 1, top-left).

Figure 1. Armenia's Exports and Its Structure

Armenia's ratio of exports of goods to GDP is among the lowest compared to its peers...

Exports of Goods, 2015 - 20 Average
(In percent of GDP)
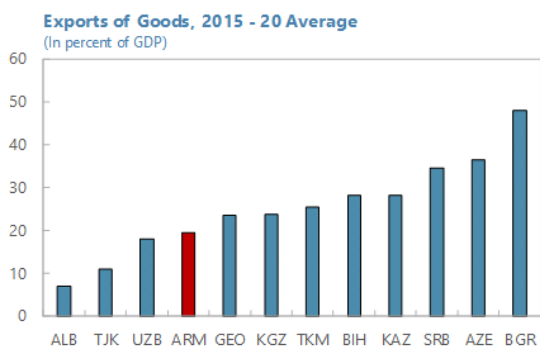
Armenia ranks well in terms of exports of services relative to GDP.

Exports of Services, 2015 - 20 Average
(In percent of GDP)
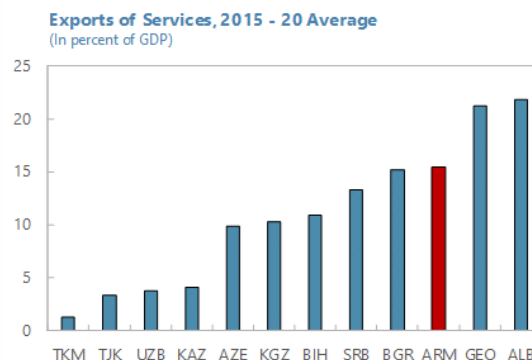
There is room to further diversify Armenia's trade markets.

HH Market Concentration Index
(The lower, the more diversified)
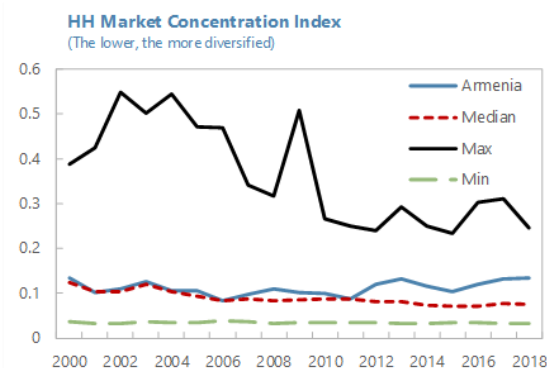
Russia and EU remain Armenia's largest trading partners.

Share of Armenia's export market, 2019
(As percentage of total Armenia's export)

- Russian Federation 28%
- European Union 22%
- Middle East and Central Asi 18%
- China, P.R.: Mainland 7%
- Other 25.0%
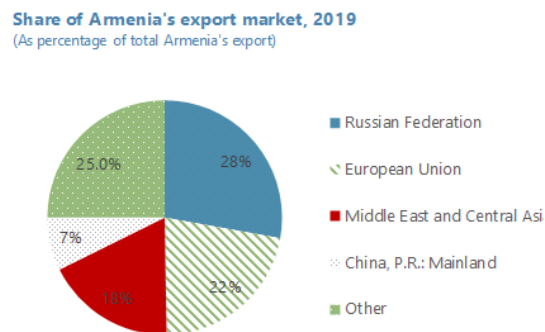
Mining and metal-related exports contribute to 60 percent of goods exports.

Exports by Commodity Groups
(Share in total, percent)

- Other
- Textile products
- Food products
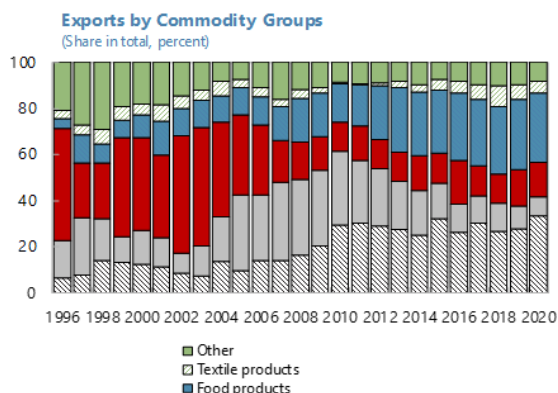
There is close correlation between export earnings and the price of copper and other traded minerals.

Exports and metal prices
(Percent change)

- Exports of Goods and Services
- PMETA
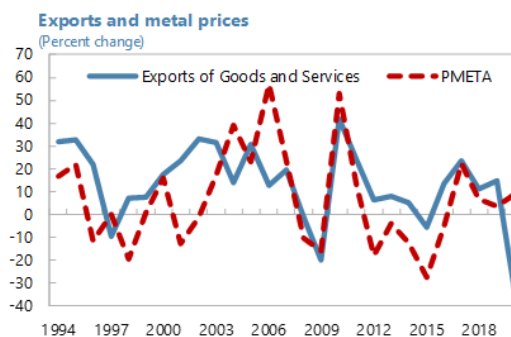
Source: IMF WEO, World Bank, Armstat, IMF commodity prices database, IMF staff calculation
Note: Sample of peer countries from CCA and Emerging Markets Europe includes: Albania, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Moldova, Republic of Montenegro, North Macedonia, Poland, Romania, Russian Federation, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan.

Figure 2: Armenia's Participation in Global Value Chains
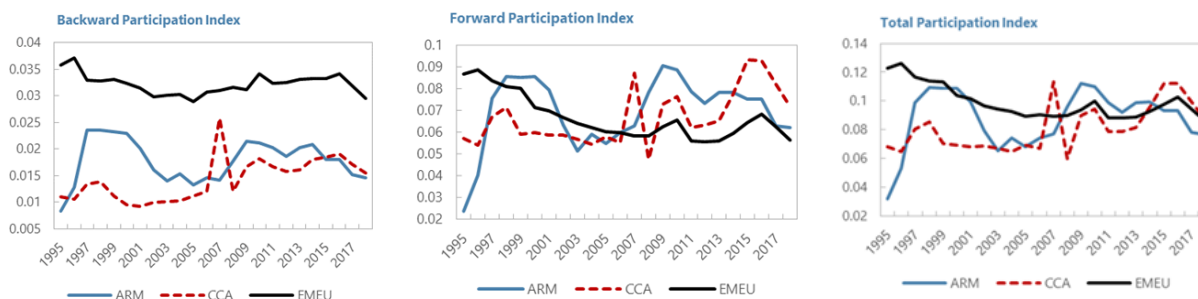
Source: UNCTADstat and IMF staff calculation.
Note: Sample of peer countries from CCA: Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan. Sample of peer countries from Emerging Europe: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Moldova, Republic of Montenegro, North Macedonia, Poland, Romania, Russian Federation, Serbia, Turkey, and Ukraine.

Armenia's lower participation in Global Value Chains (GVC)[4] - as shown in Figure 2 - that deliver productivity spillover and facilitate structural transformation also suggest untapped potential. Empirical evidence suggests that increasing GVC participation leads to higher domestic value-added for middle-income countries like Armenia (Raei et al, 2018). GVC participation has also been shown to positively effect productivity while being positively correlated with income per capita. Kireyev et al. (2017) show that

participation in GVC, both through forward and backward integration, helps build resilience and spur growth for EM countries.[5] Armenia's participation in the GVCs, however, has been volatile. It performed better than peer countries between 2008-2014 while falling below the peers in CCA and Emerging Europe since 2015. Concurrently Armenia's domestic value-added sent to third economies in exports (forward participation),[6] which accounts for about 75 percent of Armenia's total participation in GVCs, declined, placing Armenia below that in CCA countries and near to that in Emerging Europe peers.

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[4] The GVC participation rate is measured as the sum of value added of intermediate imports and exports as a share of gross exports.

[5] Rapid integration with the global value chains that coincides with increased concentration of exports can make the domestic economy more exposed to external shocks given large sectoral interconnectedness.

[6] Backward integration reflects the share of foreign value-added that is embedded in a country's exports. Forward integration reflects the share of domestic value-added exports that is embedded in the exports of third countries.

Over the last decade, Armenia has also lost some of its previous gains in export diversification by product, with measures of product concentration increasing from 0.19 in 2012 to 0.3 in 2019.[7] While the exports increased in almost all sectors, the strongest performances were in crude materials, food products and non-durable consumption goods. These sectors have increased their shares in total exports since 2010, while the share of intermediate goods has declined. As such, the composition of exports became less diversified mainly due to low complexity products. [8]

Export Shares by Industry
(In percent of goods exports)

Export Shares by Industry
(In percent of GDP)
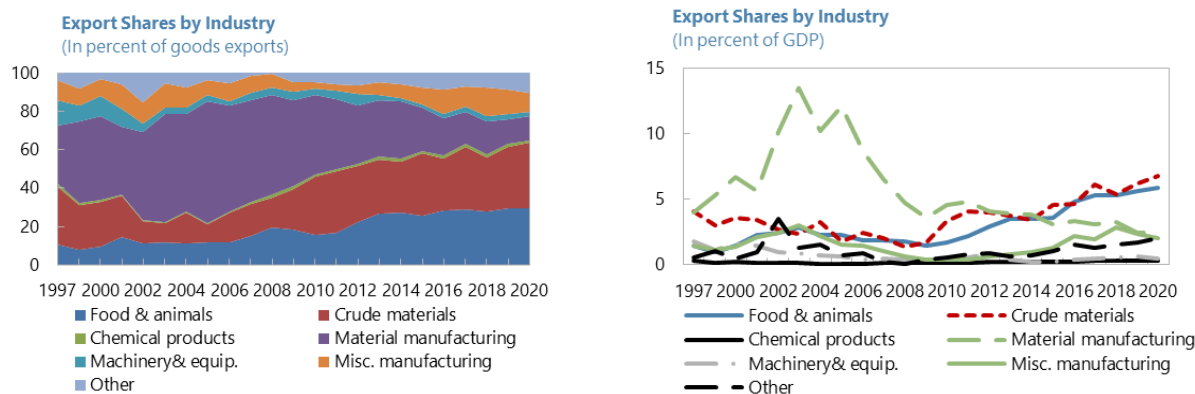
Source: UNCTADstat, UN Comtrade and IMF staff calculations.

In addition, Armenia has been exporting fewer export products with high "revealed comparative advantage" (RCA).[9] When compared to the other countries, the number of Armenia's high-RCA export products is in line with the countries of the similar size by population.[10] However, over the past 25 years the number of high-RCA products exported by Armenia has been consistently dropping. Currently Armenia exports fewer high-RCA products compared to the CCA and EMEU countries, and fewere than it did just a decade ago.

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[7] Literature suggests that diversification in exports and domestic production accelerates economic growth and is associated with lower output volatility and greater macroeconomic stability (Stanley and Bunnag, 2001; Mobarak; 2005; Agosin, 2007; Koren and Tenreyro, 2007; and Bertinelli et al., 2009; IMF, 2014).

[8] According to *The Atlas of Economic Complexity,* Armenia included into its export basket 22 new products between 2003-18, but many of them are low complexity agriculture products.

[9] The RCA score is commonly used to calculate the relative importance of a product in a country's export basket. An RCA score above one for an export product of a country means that the product's share in the country's export portfolio is greater than its share in the total world exports. This is indicative of that country having a comparative advantage in the product. We refer to such export products as high-RCA export products.

[10] The number of high-RCA exports is positively correlated with country size: smaller countries with fewer resources and limited opportunities to ensure sustainable scale of production tend to produce fewer product categories than larger countries.

Figure 3: Revealed Comparative Advantage
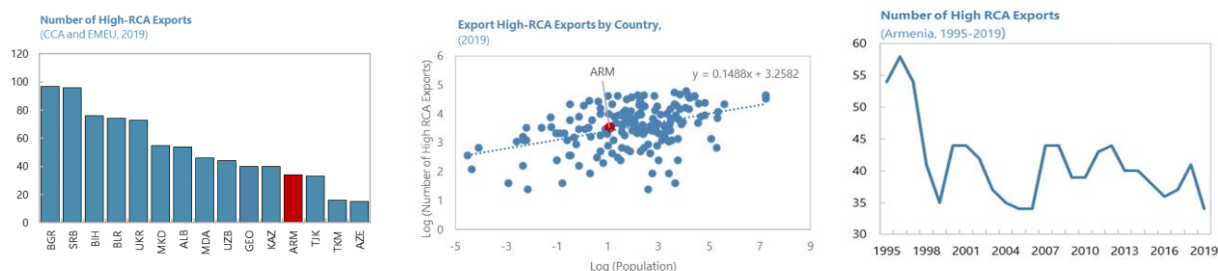
Source: UNCTAD; International Monetary Fund, World Economic Outlook April 2021 and IMF staff calculations.

Figure 4: Armenia's Economic Complexity
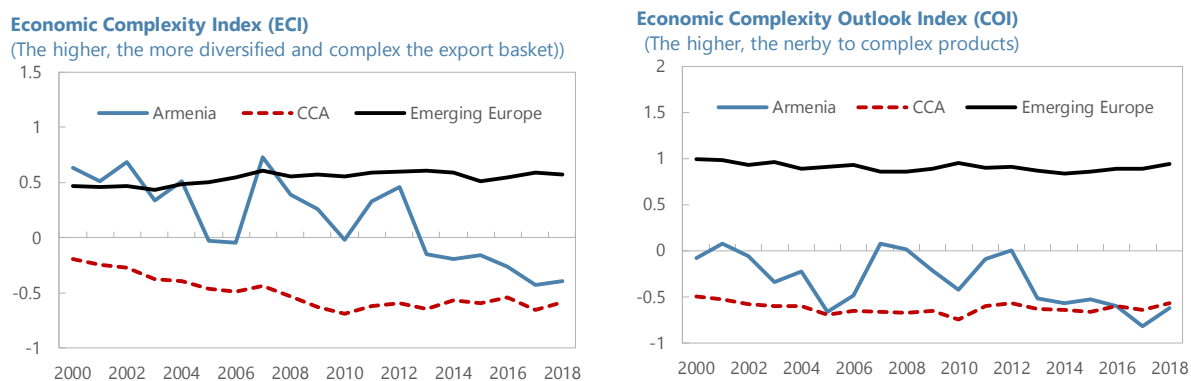
Source: UNCTADstat; IMF staff calculation
Note: Sample of peer countries from CCA and Emerging Europe includes: Albania, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Moldova, North Macedonia, Polania, Romania, Russian Federation, Serbia, Tajikistan, Turkey, Turkmenistan, Ukraine and Uzbekistan.

What is particularly concerning is that Armenia has been losing positions in export complexity ranking, both in goods and services. More complex products deliver higher value added, promote growth, and facilitate the countries to move up the international value chain. Armenia has dropped from the 32nd position in the global export complexity ranking two decades ago to the 79th[11]. Accordingly, Armenia's largest goods exports are in low complexity and low value-added products, such as minerals and agriculture, bringing less profit and a limited contribution to GDP per unit of goods exported. Moreover, the most significant contribution to export growth over the recent years came from moderate and low complexity products, particularly travel and tourism and ores, slag and ash products, and beverages, apparel, and tobacco.

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[11] The Growth Lab at Harvard University, (2020), The Atlas of Economic Complexity, http://www.atlas.cid.harvard.edu. Product space analysis captures two aspects: (1) a country's prospects for economic diversification which depend, in part, on what it currently produces and exports; and (2) what a country produces and exports reflects its underlying productive factors, including skills, technological know-how, and institutions.

Armenia's potential to diversify exports to more complex products without supportive policies appears to be limited. According to product space analysis, Armenia's product diversification patterns over the last two decades have not moved it closer to having the potential to produce and export more complex products.[12] A comparison of Armenia's product space in 2000 and 2018 suggest that in 2000, Armenia's merchandise exports with comparative advantage - mostly machinery – were located in the middle of the product space with multiple links to more complex products that Armenia could diversify into. In 2018 – there were more agriculture products with comparative advantage expanded to the middle part of the product space, resulting in fewer links to the know-how required to produce more complex products.

Relatedly, Armenia's economic complexity outlook index, which measures how many complex products are near a country's current set of productive capabilities and captures the ease of diversification for a country, has deteriorated to levels below the average for the CCA countries. This means that acquiring new know-how and increasing the economic complexity of exports is less likely to happen naturally but would rather require a concerted policy effort.

Upgrading exports to more complex products and diversifying into products that offer greater opportunity for future growth is a challenging but not an impossible task, as evidenced by the experience of several countries. Successful examples of countries that have managed to climb up the production ladder of global value chains to capture higher value-added activities include Korea, in the electronics value chain, India in the automotive value chain, and China and Central America in the apparel value chain. As documented by Jankowska, et. al. (2012), Taiwan, Province of China; Hong Kong, China; Korea and Singapore (the East Asian Newly Industrialized Countries or NICs) have been successful in attaining income convergence with high-income countries in a relatively brief period of time. They benefitted from trade-led growth which heavily relied on upgrading into high-value added products while implementing the right combination of productive and complimentary policies. Also, Serbia offers a good example of how decisive efforts, including education policies to ensure a sustained supply of skilled labor, can help information technology services exports to take off (Ilahi et al, 2019).

III. Data & Methodology

a. Data

The analysis in this paper uses a variety of data sources for macroeconomic, trade, and institutional characteristics. Most of the analysis spans 1995 to 2019, subject to data availability. The sources for trade data

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[12] Ibid

include UN Comtrade, IMF April 2021 Direction of Trade Statistics (DOTS), Mario Larch's Regional Trade Agreement Database[13], UNCTAD, IMF Balance of Payment Database, and Observatory of Economic Complexity. Macroeconomic data comes from IMF April 2021 World Economic Outlook (WEO) Database. Institutional characteristics data come from CEPII (2020), BACI International Trade Database, The World Bank's World Development Indicators, and MIT's Observatory of Economic Complexity. Table 3 present summary statistics for variables used in the gravity analysis (Panels A and B) and in the determinants of export composition (Panel C).

Table 3: Summary Statistics

Panel A: Country Level Summary Statistics								
Variables	N	mean	sd	min	p25	p50	p75	max
Total Export (USD)	30754	4.11E+09	1.71E+10	2	1.83E+07	1.74E+08	1.57E+09	4.81E+11
Contiguity Indicator	30754	0.10	0.30	0.00	0.00	0.00	0.00	1.00
Shared Language Indicator	30754	0.06	0.25	0.00	0.00	0.00	0.00	1.00
Shared Colonial Origin Indicator	30754	0.04	0.21	0.00	0.00	0.00	0.00	1.00
Log(Distance)	30754	7.88	0.79	5.08	7.37	7.94	8.43	9.41
Secondary School Enrollment (%gross)	28797	95.36	18.88	34.90	88.03	96.00	103.23	163.93
Tertiary School Enrollment (% Gross)	27752	49.35	23.77	2.81	31.05	49.03	64.79	142.85
Log(GDP Host)	29254	12.11	2.19	6.76	10.68	12.28	13.76	16.89
Log(GDP Counterpart)	28977	12.10	2.21	6.76	10.64	12.28	13.78	16.89
Regional Trade Agreement Indicator	29689	0.36	0.48	0.00	0.00	0.00	1.00	1.00
Quality of overall infrastructure	9929	4.75	1.08	2.48	3.96	4.58	5.76	6.77
Panel B: Product Level Summary Statistics								
Trade Value (USD)	114817	8.82E+08	4.15E+09	0	1503699	2.22E+07	2.59E+08	2.10E+11
Contiguity Indicator	114817	0.10	0.30	0.00	0.00	0.00	0.00	1.00
Shared Language Indicator	114817	0.08	0.27	0.00	0.00	0.00	0.00	1.00
Shared Colonial Origin Indicator	114817	0.05	0.22	0.00	0.00	0.00	0.00	1.00
Log(Distance)	114817	7.88	0.81	5.08	7.35	7.93	8.46	9.41
Secondary School Enrollment (%gross)	93357	102.11	16.86	37.79	95.05	100.62	105.42	105.42
Tertiary School Enrollment (% Gross)	93951	59.31	19.86	7.59	48.80	60.34	69.58	69.58
Log(GDP Host)	110636	12.77	1.99	6.76	11.66	12.93	14.30	16.89
Log(GDP Counterpart)	108209	12.35	2.15	6.76	10.88	12.42	14.10	16.89
Regional Trade Agreement Indicator	114817	0.41	0.49	0.00	0.00	0.00	1.00	1.00

Variables	Observations	mean	St. Dev.	Min	Max
RCA in high-skill goods	387	0.575	0.427	0.006	3.661
RCA in modern services	331	0.187	0.121	0.007	1.498
Share of high-skill products in exports of goods	322	7.329	5.480	0.060	29.19
Share of modern services in exports of services	331	18.38	9.785	0.692	54.40
Economic complexity index	400	-0.039	0.586	-1.609	1.177
Complexity of export services	356	-0.474	0.125	-0.735	-0.137
Infrastructure score	391	0.179	0.104	0.020	0.407
Information flows,score	391	0.190	0.148	0.008	0.589
Cost to export, USD	400	278.7	187.7	39.7	803.5
REER, index	150	93.42	15.93	46.22	136.8
Tertiary education enrollment rate, percent	394	36.71	19.90	7.97	93.54
R&D expenditure in GDP, percent	368	0.345	0.264	0.015	1.192
Gini index	199	32.58	4.92	24.00	46.40
Income share held by lowest 20 percent	400	7.420	1.822	3.700	10.90
GDP per capita,in logarithm	397	8.795	0.741	6.801	10.21

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[13] The Regional Trade Agreements Database is available online at https://www.ewf.uni-bayreuth.de/en/research/RTA-data/index.html. The database spans 1950 to 2019.

b. Methodology

Apart from documenting trends from export performance, this paper analyzes Armenian exports in two main ways. It first applies gravity models to bilateral export volume to estimate export potential and its drivers. Second, it uses panel regression on cross-country data to find determinant of export composition, particularly high value-added and complex exports.

Table 4. List of Countries in the Analysis

Gravity Analysis			Determinant of exports		
ISO-3 code	Name	Code	ISO-3 code	Name	Code
ARM	Armenia	911	ARM	Armenia	911
AZE	Azerbaijan	912	AZE	Azerbaijan	912
BLR	Belarus	913	BLR	Belarus	913
BEL	Belgium	124	BIH	Bosnia and Herzegovina	963
BGR	Bulgaria	918	BGR	Bulgaria	918
CAN	Canada	156	GEO	Georgia	915
CHN	China	924	KAZ	Kazakhstan	916
CZE	Czech Republic	935	KGZ	Kyrgyz Republic	917
FRA	France	132	MKD	FYR Macedonia	962
GEO	Georgia	915	MDA	Moldova	921
DEU	Germany	134	SRB	Serbia	942
GRC	Greece	174	TJK	Tajikistan	923
HUN	Hungary	944	TKM	Turkmenistan	925
IRN	Iran	429	UKR	Ukraine	926
IRQ	Iraq	433	UZB	Uzbekistan	927
ISR	Israel	436			
ITA	Italy	136			
KAZ	Kazakhstan	916			
KGZ	Kyrgyz Republic	917			
NLD	Netherlands	138			
POL	Poland	964			
ROU	Romania	968			
RUS	Russia	922			
ESP	Spain	184			
CHE	Switzerland	146			
SYR	Syria	463			
TJK	Tajikistan	923			
TUR	Turkey	186			
TKM	Turkmenistan	925			
UKR	Ukraine	926			
ARE	United Arab Emirates	466			
GBR	United Kingdom	112			
USA	United States	111			
UZB	Uzbekistan	927			

Gravity analysis controlling for structural drivers of trade patters can reveal the determinants of export performance that inform about the factors which may be important for upgrading Armenia's export. To evaluate Armenia's export potential, we use a gravity model of bilateral export volume for CCA and EMEU countries as shown in Table 4, estimated at country or product levels. The baseline specifications are as follows:

At a country level,

$$ExportVolume_{i,j,t} = \beta_1 ln\left(Distance_{i,j}\right) + \beta_2 1_{i,j} Sharedborder + \beta_3 1_{i,j} Sharedcolonialorigin + \gamma_1 ln\left(GDP_{i,t}\right) +$$
$$\gamma_2 ln\left(GDP_{j,t}\right) + \gamma_3 1_{i,j,t} RegionalTradeAgreement(RTA) + \gamma_4 Education_{i,t} +$$
$$\gamma_5 Landlock_{i,j} + \gamma_6 BorderClosure_{i,j,t} + \mu_i + \mu_j + \mu_t. \qquad (Eq\ 1)$$

At a product(sector) level, we allow for coefficients to be heterogenous across sector:

$$ExportVolume_{i,j,s,t} = \sum_{s=1}^{S}[\beta_{1,s} ln\left(Distance_{i,j}\right) + \beta_{2,s} 1_{i,j}\{Shared\ border\} + \beta_{3,s} 1_{i,j}\{Shared\ colonial\ origin\} +$$
$$\gamma_{1,s} ln(GDP_{i,t}) + \gamma_{2,s} ln(GDP_{j,t}) + \gamma_{3,s} 1_{i,j,t}\{RTA\} + \gamma_4 Education_{i,s,t} + \gamma_5 Landlock_{i,j} + \gamma_6 BorderClosure_{i,j,t}] + \mu_i +$$
$$\mu_j + \mu_t. \qquad (Eq\ 2)$$

where i,j,t,s denote exporting countries, counterparty countries, year, and sector respectively. μ denotes fixed effects.

Table 5: Main Variables in the Analysis

Panel A: Gravity Analysis

Variable	Source
GDP, current prices (Billions of U.S. dollars)	International Monetary Fund, World Economic Outlook April 2021.
Distance, common language, and colonial tie	CEPII, (2020), BACI International Trade Database, http://www.cepii.fr/CEPII/fr/bdd_modele/bdd_modele.asp
Regional trade agreements	Larch, Mario. 2020. Regional Trade Agreements Database. See: https://www.ewf.uni-bayreuth.de/en/research/RTA-data/index.html.
School enrollment, secondary (% gross)	World Development Indicators, The World Bank
School enrollment, tertiary (% gross)	World Development Indicators, The World Bank
Goods, Value of Imports, Free on board (FOB), US Dollars (TMG_FOB_USD)	International Monetary Fund, The Direction of Trade Statistics (DOTS) April 2021.
Goods, Value of Imports, Cost, Insurance, Freight (CIF), US Dollars (TMG_CIF_USD	International Monetary Fund, The Direction of Trade Statistics (DOTS) April 2021.
Goods, Value of Exports, Free on board (FOB), US Dollars (TXG_FOB_USD)	International Monetary Fund, The Direction of Trade Statistics (DOTS) April 2021.
Outward Direct Investment Positions, US Dollars (IOW_BP6_USD)	International Monetary Fund, The Direction of Trade Statistics (DOTS) April 2021.
Inward Direct Investment Positions, US Dollars (IIW_BP6_USD)	International Monetary Fund, The Direction of Trade Statistics (DOTS) April 2021.

Panel B: Determinant of Exports Analysis

Revealed comparative advantage (RCA) compares the share of a certain good in a country's total exports with the share of that product's world exports in total world exports of all goods (services). RCA>1 indicates that a country exports more than its "fair" share of certain product. RCA of goods is from UNCTAD dataset, while RCA of services is calculated using the IMF Balance of Payment Database. RCA of goods comes from United Nations Commodity Trade Statistics (UN COMTRADE) database,

Share of high skill products in export of goods is calculated based on the UN COMTRADE database. We match disaggregated 4-digit product-level series of Standard International Trade Classification to the skill and technology-intensity product classification (Manufactured goods by degree of manufacturing groups, UNCTAD).

Share of modern services products in export of services is calculated using the IMF Balance of Payment Database. Modern services include business, computer and Information, finance, and intellectual property services.

Complexity is related to the amount of productive knowledge that is embedded in a country's products. Data for complexity it derived from the Observatory of Economic Complexity (atlas.media.mit.edu). We make use of two data series: the product complexity index (PCI) and the country-level economic complexity index (ECI).

Quality of infrastructure is measured by rail density (rail lines per square kilometer of land area), fixed telephone subscriptions (per 100 inhabitants) and individuals using the internet (% of population) from the WDI.

Education level in the regressions is measured by expenditure in R&D (percent of GDP) and percentage of tertiary enrollment from the WDI database.

Cost to export (border and documentary) data series retrieved from the WDI.

Real effective exchange rate (REER) is from WB WDI database.

Income per capita is the GDP per capita in logarithm from the IMF WEO database.

The independent variables, summarized in Table 5 Panel A, include the following:

a. GDP of exporting country and GDP of importing country to control for the size of economies and economic cycles;

b. distance between trading countries, as greater distance raises transportation costs and negatively influences bilateral trade flows;

c. presence of shared border and colonial origin between trading countries, assuming that countries with larger cultural similarities and shared history tend to trade more than countries with smaller or without those linkages;

d. dummy variable *landlocked* which captures the presence of outlet to the seacoast in the exporting and importing countries. If one/both of the countries is/are landlocked it negatively influences on bilateral trade flows, it increases the cost of trade as trade flows are limited in the choice of transportation (international trade flows are mostly carried by sea transport);

e. dummy variable *border closure* to capture Armenia border closure with Azerbaijan and Turkey;

f. membership in regional trade agreements, assuming that such memberships positively affect bilateral trade flows;

g. education levels to control for different education and skill levels affecting trade.

The estimations are performed using the Pseudo Poisson Maximum Likelihood (PPML) estimator. The PPML performs better than the OLS in the presence of many zeroes in the dependent variable (Silva and Tenreyro, 2010). Coefficients can be interpreted as semi-elasticities: a unit change in the independent variable leads to a $100*(e^{\beta} -1)$ percent change in bilateral exports. For log-transformed variables, the coefficient represents elasticity of exporters to those dependent variables.

In the second set of analysis, we investigate factors that can facilitate the much-needed shift in export composition towards more complex exports with higher value-added. We seek to identify structural factors that could enable boosting economic complexity. We also analyze whether these structural factors promote the revealed comparative advantage (RCA) in high-skill goods and modern services and the share of high-skill and technology-intensive products in exports, which are the alternative indicators capturing the tilt in export composition toward more complex products. The analysis moves beyond the usual focus on goods and also considers services. The set of countries used in the analysis include CCA and EMEU countries[14]. The detailed description of the variables is presented in Table 5 Panel B.

We then estimate panel regressions for goods specified as follows:

$$y_{it} = a_i + \beta X_{it} + \varepsilon_{it}. \qquad (Eq\ 3)$$

The dependent variable y_{it} refers to one of the dimensions of export composition: (1) economic complexity of goods for country i at time t; (2) the RCA in high skill and technology intensive products; (3) the share of high skill and technology-intensive products in exports; X_{it} stands for the set of explanatory factors that include (1) real effective exchange rate (REER); (2) physical infrastructure quality; (3) border compliance and documentary costs to export goods; (4) enrollment rate in tertiary education[15] and (5) income equality indicator. We control for differences in income per capita across countries and include time fixed effects in order to control for time-specific (global) factors. We include all explanatory variables simultaneously to control for the effect of all factors.

We use a similar panel regression specification for services, where the dependent variable y_{it} refers to one of the dimensions of export composition: (1) economic complexity of services for country i at time t; (2) the RCA in modern services; (3) the share of high skill and technology-intensive modern services in exports. X_{it} stands for the set of explanatory factors that include (1) REER; (2) quality of IT infrastructure captured by an indicator that reflects information flows measured by fixed telephone subscriptions (per 100 inhabitants) and individuals using the internet (% of population) from the WDI; (3) expenditure in R&D[16][17]; and (4) an indicator capturing income equality.

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[14] Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Moldova, North Macedonia, Serbia, Ukraine.

[15] Expenditure in R&D was found to be an insignificant determinant of RCA in high-skill goods and modern services and the share of high-skill and technology-intensive products in exports (Annex III, Table D).

[16] Gross domestic expenditures on research and development (R&D), expressed as a percent of GDP. They include both capital and current expenditures in the four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development.

[17] Enrollment rate in tertiary education was found to be an insignificant determinant of export complexity in this specification.

IV. Armenia's Export Potential and its Determinants

We now present and discuss the results of empirical tests, described in Section III.b. The first set of tests applies gravity models to estimate export potential and its drivers. The gravity analysis suggests Armenia's exports have been recently overperforming the potential defined by the gravity estimates, driven by mostly basic low-value-added products. However, there remains untapped potential to increase exports to large markets such as USA or China. The second set of analyses uses panel regression on cross-country data to find the determinants of export composition, particularly high value-added and complex exports. The analysis points to the need for a broad set of structural reforms to boost economic complexity of Armenia and exports of high-skill products and modern services. The quality of physical infrastructure and education, export costs, and income equality are the important factors for upgrading the quality of goods exports. The quality of digital infrastructure, R&D expenditure, REER, and income equality are the factors that matter for the composition of service exports.

a. Gravity Analysis

We estimated a gravity model, as described in Section II and under the various specification in Equation 1.

Baseline results are presented in Table 6.

Table 6: Gravity Estimates at a Country Level

Dependent Variable: Export Volume	(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Shared Border	0.662*** (5.79)	0.276** (3.01)	0.276** (3.01)	0.310*** (3.41)	0.309*** (3.39)	0.323*** (3.46)	0.302** (2.96)	0.307*** (3.36)	0.322*** (3.44)	0.301** (3.16)	0.320**** (3.42)	0.301** (3.16)
Common Ethnicity and Language	0.223 (1.87)	0.0843 (0.69)	0.0847 (0.69)	0.115 (1.03)	0.121 (1.09)	0.110 (0.99)	0.0659 (0.54)	0.124 (1.10)	0.140 (1.26)	0.155 (1.37)	0.132 (1.2)	0.155 (1.36)
Shared Colonial Origin	-0.292 (-1.77)	0.135 (1.21)	0.134 (1.20)	0.182 (1.93)	0.191* (2.02)	0.186* (1.96)	0.119 (1.19)	0.186* (1.96)	0.175 (1.86)	0.160 (1.69)	0.177 (1.87)	0.160 (1.69)
log(Distance)	-0.567*** (8.06)	-1.058*** (-16.35)	-1.058*** (-16.33)	-0.742*** (-9.49)	-0.736*** (-9.39)	-0.723*** (-8.95)	-0.767*** (-8.68)	-0.734*** (-9.29)	-0.723*** (-9.03)	-0.727*** (-8.82)	-0.718*** (-8.89)	-0.727*** (-8.82)
log(GDP Host)	0.801*** (18.80)	0.653*** (22.16)	0.682*** (26.02)	0.679*** (23.89)	0.678*** (23.91)	0.672*** (22.75)	0.434*** (10.44)	0.624*** (18.62)	0.630*** (20.49)	0.641*** (19.78)		0.641*** (19.78)
log(GDP Countertpart)	0.812**** (17.96)	0.630*** (17.22)	0.661*** (15.06)	0.657*** (14.91)	0.657*** (14.95)	0.649*** (14.32)	0.659*** (10.72)	0.640*** (14.76)	0.667*** (15.16)	0.641*** (13.70)		0.641*** (13.70)
EAEU Indicator				0.495 (1.80)								
RTA Indicator	0.223 (1.68)			0.734*** (6.68)	0.752*** (6.79)	0.750*** (6.56)	0.570*** (4.45)	0.757*** (6.81)	0.754*** (6.69)	0.772*** (6.63)	0.771*** (6.73)	0.772*** (6.63)
FX Depreciation Host(%)						-0.0482*** (-3.59)						
FX Depreciation Counterpart(%)						-0.0166* (-2.14)						
Infrastructure Quality Index Host							0.00724 (0.33)					
Infrastructure Quality Index Counterpart							0.00102 (0.06)					
Secondary Schooling Index Host	0.002 (0.99)							0.00242 (1.31)				
Tertiary Schooling Index Host	-0.003 (-1.05)							0.00383** (3.02)	0.00520**' (4.96)	0.00525*** (5.34)		0.00525***' (5.34)
Secondary Schooling Index Counterpart	0.002 (1.01)							0.00112 (0.88)				
Tertiary Schooling Index Counterpart	0.006* (2.62)						(0.06)	0.00223 (1.92)		0.00245* (2.06)		0.00245* (2.06)
Landlock Indicator Host	-0.172 (-1.05)											
Landlock Indicator Counterpart	-0.028 (-0.18)											
Indicator Armenia Border Closure												-3.402*** (-10.48)
Importer FE	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Exporter FE	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Time FE	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Importer x Year FE	N	N	N	N	N	N	N	N	N	N	Y	N
Exporter x Year FE	N	N	N	N	N	N	N	N	N	N	Y	N
N	21155	27537	27537	26580	26580	24844	7584	25799	23915	21470	23915	21470
Pseudo R-square	0.9027	0.938	0.940	0.946	0.946	0.946	0.939	0.947	0.947	0.947	0.95	0.947

t statistics in parentheses
="* p<0.05   ** p<0.01 *** p<0.001"

Gravity models point to the importance of structural and macroeconomic factors, regional trade agreement, and education. The signs of the coefficient estimates correspond to economic theory in the following ways:

    a.   Structural determinants point to Armenia being disadvantaged due to limited borders and distance from major markets. Having a shared border could increase bilateral exports by 35

percent. Being located closer (1 percent shorter distance) is associated with 0.73 percent increases in bilateral export. Since Armenia is landlocked with limited border sharing, Armenia lack benefits from this channel.

b.   Macroeconomic factors suggest lower trade volume relative to pre-pandemic volume given the current conjuncture. Trade volumes are procyclical to the GDP levels of host and counterparty countries with elasticity around 0.64. Given the drop in the output level in both Armenia and other countries due to the pandemic, volume of exports is predicted to be significantly lower than its pre-pandemic trend.

c.   Regional determinants indicate the potential for substantial gains from trade agreements, with regional trade agreements possibly more than doubling bilateral exports between two the parties. For Armenia, entering new and high-quality trade agreement presents large potential gains for Armenia that could offset the reduction in exports from landlocks and drop in GDP.

d.   Better education also boosts exports. In particular, the completion rate of tertiary education is a statistically significant determinant of export of that country. A 1 percent increase in the population with tertiary education is associated with a boost in export by 0.52 percent.

We define export performance as a difference between actual export volumes and those predicted by the model (export potential). Armenia export volumes have recently overperformed the potential suggested by our gravity estimates, but this follows the period 2008-14 during which Armenia's exports significantly underperformed.

Table 7. Export Performance Relative to the Model by Country

| | Export performance Relative to the model | | | | | |
| | 2018-19 | | 2014-19 | | 1995-2014 | |
Counterpart	%	mil USD	%	mil USD	%	mil USD
USA	-83%	-254.0	-79%	-219.0	-63%	-86.6
DEU	-61%	-158.0	-18%	-28.2	23%	13.5
FRA	-94%	-126.0	-92%	-75.6	-90%	-29.3
GBR	-96%	-125.0	-95%	-77.2	-71%	-24.8
CHN	-40%	-98.4	-34%	-74.1	-74%	-57.1
ESP	-99%	-86.4	-98%	-51.5	-55%	-12.6
ITA	-60%	-83.6	-47%	-40.1	-68%	-26.4
POL	-82%	-48.8	-69%	-24.4	-89%	-11.6
HUN	-97%	-30.4	-95%	-17.5	-95%	-7.7
GRC	-99%	-30.3	-98%	-18.3	-90%	-8.2
CZE	-90%	-29.6	-87%	-16.9	-86%	-6.2
UKR	-52%	-22.9	-66%	-24.9	-51%	-11.8
ISR	-72%	-19.0	-78%	-18.6	195%	28.7
KAZ	-69%	-17.0	-73%	-16.8	-75%	-8.1
BEL	-18%	-10.2	41%	14.0	438%	74.5
KGZ	-65%	-3.8	-76%	-4.0	-93%	-2.2
BLR	-13%	-2.3	-33%	-5.4	-42%	-2.2
TUR	-38%	-1.5	-55%	-1.9	28%	0.4
TKM	-24%	-1.3	78%	3.8	182%	9.6
TJK	-40%	-1.2	-59%	-1.5	-58%	-0.4
UZB	-29%	-1.0	-40%	-1.6	-43%	-0.9
CAN	54%	16.6	165%	47.2	37%	6.6
GEO	133%	39.4	297%	79.5	222%	28.3
NLD	64%	55.8	74%	38.9	147%	29.2
IRQ	533%	138.0	464%	109.0	-13%	-2.3
BGR	1225%	195.0	1719%	161.0	1173%	35.9
CHE	1926%	378.0	967%	179.0	132%	12.0
RUS	240%	494.0	150%	286.0	31%	30.9
AZE			-100%	-0.5	-73%	-0.1

Our results suggest that Armenia has potential to expand its export to 21 countries all over the world. The top ten countries where Armenia has the maximal potential for export expansion include advanced economies, China, and key European trading partners (Table 7), which presents the possibility to increase the export volumes of goods of Armenia by about 1 US$ billion. At the same time, Armenia has exceeded its export potential with nine countries. Countries where Armenia has maximally exhausted its export potential, are RUS, CHE, BGR, IRQ, NLD, GEO CAN, in this order.

Table 8: Gravity Estimates at a Sector Level

Dependent Variable: Export Volume	Capital Goods (Base Category)	Consumption Goods	Food and Beverages	Fuel and Lubricants	Unclassified Goods	Industrial Supplies	Transportation Equipment
Shared Border	0.201 (1.24)	0.0690 (0.57)	0.363 (1.96)	1.059* (2.27)	0.0705 (0.28)	0.292* (2.43)	0.388* (2.11)
Common Ethnicity and Language	-0.0474 (-0.29)	0.0287 (0.22)	-0.175 (-0.89)	0.570 (1.56)	0.162 (0.67)	0.181 (1.41)	-0.229 (-1.31)
Shared Colonial Origin	0.0441 (0.27)	0.152 (1.15)	0.357 (1.44)	-0.321 (-0.72)	0.788* (2.51)	0.0942 (0.70)	0.481* (2.09)
log(Distance)	-0.559*** (-4.63)	-0.162* (-2.35)	-0.133 (-1.42)	-0.134 (-0.45)	-0.406 (-1.91)	0.0197 (0.25)	0.0545 (0.53)
log(GDP Host)	0.847*** (15.23)	-0.0947** (-2.65)	-0.293*** (-5.10)	-0.582*** (-6.22)	-0.116 (-1.28)	-0.271*** (-6.22)	-0.116* (-2.33)
log(GDP Counterpart)	0.731*** (9.31)	-0.0332 (-0.96)	0.00341 (0.08)	-0.160 (-1.61)	-0.0360 (-0.32)	-0.0773* (-2.11)	0.133* (2.50)
RTA Indicator	0.930*** (4.46)	-0.194 (-1.18)	0.416* (1.97)	-1.654*** (-2.72)	-0.511 (-1.24)	0.0310 (0.17)	0.866*** (4.50)
Tertiary Schooling Index Host	-0.0111*** (-4.00)	-0.0107*** (-4.47)	0.0311*** (8.50)	0.0336*** (4.76)	0.0564*** (9.83)	0.0184*** (7.26)	0.0179*** (4.53)
Tertiary Schooling Index Counterpart	-0.00306 (-1.18)	0.00711* (2.47)	-0.00277 (-0.56)	0.0146 (1.76)	0.00780 (1.55)	-0.00214 (-0.88)	-0.000852 (-0.22)
Importer FE				Yes			
Exporter FE				Yes			
Time FE				Yes			
N				68238			
Pseudo R-square				0.864			

t statistics in parentheses
* p<0.05, **p<0.01, ***p<0.001
Cofficients for each category is base category(Capital goods) + coefficients in each category

Looking at performance by product groups, Armenia's export outperformance is concentrated in food and beverages, and consumer goods. The results of the gravity analysis by sector, per Eq 2, are presented in Table 8. We again define export performance/potential as a difference between actual export volumes by product and those predicted by the model in millions of USD. The recent drivers of large trade volumes seen by Armenia were concentrated in basic low-value-added products, including food and beverages and consumer goods. In contrast, high-value-added export volumes underperform relative to the gravity model. This underscores the need for policy action to rebalance the composition of exports towards more complex exports with higher value-added.
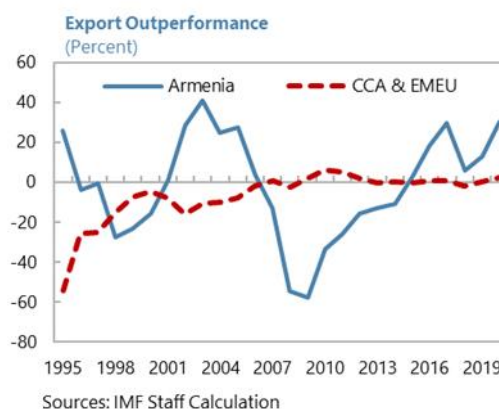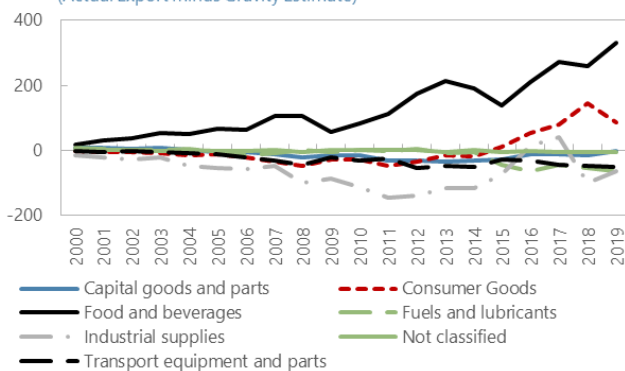

Export Outperformance
(Percent)

Sources: IMF Staff Calculation

Table 9. Export Potential by Country and Sector

		Capital goods			Consumption goods			Food and Beverages			Fuels and lubricants			Unclassified			Industrial supplies			Transport equipment, and parts		
	Rank	Country	mil USD	%	Country	mil USD	%	Country	mil USD	%	Country	mil USD	%	Country	mil USD	%	Country	mil USD	%	Country	mil USD	%
Pre-2014 Top 5	1	TKM	0.7	243%	IRQ	14.1	707%	RUS	95.3	649%	TKM	-0.1	-83%	KAZ	0.0	-60%	BEL	81.7	888%	CZE	0.6	99%
	2	GEO	0.6	57%	ITA	7.0	87%	GEO	8.2	532%	GEO	-1.1	-15%	UZB	0.0	-100%	DEU	68.0	208%	GEO	0.3	41%
	3	UZB	0.3	131%	TKM	3.8	977%	UKR	5.8	210%	UKR	-3.5	-100%	KGZ	0.0	-100%	NLD	57.3	379%	TKM	-0.1	-95%
	4	TJK	0.1	57%	GEO	2.0	114%	RUS	2.5	423%	RUS	-10.1	-100%	CZE	0.0	-100%	BGR	54.6	2824%	KGZ	-0.1	-64%
	5	BGR	-0.3	-74%	UZB	0.3	106%	BEL	0.1	21%	BEL	-14.5	-100%	ISR	0.0	-100%	ISR	37.1	666%	BGR	-0.1	-73%
Bottom 5	1	ITA	-5.9	-95%	TUR	-9.8	-99%	GBR	-3.1	-99%	ESP	-24.9	-100%	ITA	-0.5	-100%	ITA	-18.1	-91%	TUR	-3.4	-99%
	2	GBR	-6.0	-97%	DEU	-10.8	-80%	DEU	-4.0	-80%	FRA	-40.2	-100%	DEU	-0.8	-94%	FRA	-18.3	-98%	FRA	-3.8	-100%
	3	DEU	-9.7	-96%	RUS	-12.4	-63%	CHN	-6.3	-74%	GBR	-40.4	-100%	USA	-1.1	-99%	RUS	-26.6	-49%	CHN	-5.5	-98%
	4	CHN	-12.7	-94%	CHN	-15.7	-99%	USA	-7.7	-66%	DEU	-72.6	-100%	CHN	-1.6	-100%	TUR	-28.5	-99%	USA	-20.3	-99%
	5	USA	-26.6	-93%	USA	-16.1	-51%	TUR	-8.1	-100%	USA	-138.0	-100%	RUS	-1.7	-98%	USA	-37.1	-45%	RUS	-23.7	-91%
Post-2014 Top 5	1	RUS	1.7	8%	IRQ	124.0	4950%	RUS	247.0	1121%	UZB	-3.4	-100%	BGR	-0.1	-63%	CHE	181.0	1922%	CHE	1.9	151%
	2	GEO	1.0	57%	RUS	67.2	250%	GEO	7.6	275%	BGR	-5.3	-99%	BLR	-0.2	-83%	BGR	167.0	3519%	ARE	0.8	24%
	3	CHE	0.3	12%	ARE	25.9	260%	BLR	4.8	268%	UKR	-5.4	-100%	KAZ	-0.2	-94%	NLD	59.0	187%	GEO	0.0	-1%
	4	TJK	-0.2	-77%	ITA	21.5	165%	UKR	4.7	130%	GEO	-6.0	-49%	AZE	-0.3	-100%	CAN	57.1	380%	UZB	-0.1	-83%
	5	UZB	-0.4	-91%	GEO	12.5	456%	IRQ	2.8	264%	CZE	-8.2	-100%	CHE	-0.3	-96%	CHN	55.2	67%	TJK	-0.2	-93%
Bottom 5	1	FRA	-11.0	-95%	FRA	-10.7	-84%	GBR	-8.2	-99%	ESP	-22.6	-100%	GBR	-1.6	-99%	ITA	-31.2	-80%	ITA	-14.7	-100%
	2	GBR	-11.4	-89%	GBR	-13.7	-98%	ISR	-9.6	-100%	ISR	-22.9	-100%	CHN	-1.9	-100%	GBR	-35.8	-93%	GBR	-17.6	-100%
	3	DEU	-20.4	-95%	TUR	-13.9	-96%	USA	-10.9	-56%	AZE	-25.7	-89%	DEU	-2.3	-99%	GBR	-40.7	-96%	DEU	-21.0	-93%
	4	CHN	-28.2	-100%	CHN	-31.3	-99%	CHN	-12.4	-94%	DEU	-36.0	-100%	RUS	-2.5	-72%	TUR	-42.5	-98%	USA	-33.9	-100%
	5	USA	-44.5	-99%	USA	-44.4	-95%	DEU	-12.8	-88%	USA	-141.0	-100%	USA	-3.2	-99%	USA	-81.2	-64%	RUS	-36.9	-95%

Table 9 shows Armenia still has potential to expand its export of various products. Export to the USA represents the largest potential of around 350 million USD (post-2014) in total in almost all export categories. Exporting capital goods, consumption goods, and food and beverages to China also represents second-largest potential gains. The model mechanically suggests that Armenia still has relatively large potential to export transportation equipment to Russia, and industrial supplies to Turkey.

Export Outperformance (million USD)
(Actual Export minus Gravity Estimate)

Legend: Capital goods and parts; Consumer Goods; Food and beverages; Fuels and lubricants; Industrial supplies; Not classified; Transport equipment and parts

Source: IMF staff calculations.

b. Determinants of Export Composition

Various empirical studies document that what a country produces and exports matters for economic outcomes. The level of economic complexity (the amount of productive knowledge that is embedded in a country's products) have been shown as important and robust factors that determine subsequent economic growth and differences in income per capita (Hausmann, Hwang, and Rodrik, 2007; Hausmann et al. 2014; Lall and others, 2005; Cherif, Hasanov, and Wang, 2018). This means that small open economies striving to promote higher and more sustainable growth would benefit from pursuing policies that focus on the expansion of the well-diversified sophisticated tradable sector rather than relying on measures that support any export-oriented production.

Table 10. Determinants of the Exports of Goods Composition

	Complexity of goods		RCA in high skill products		Share of high skill products	
	I	II	III	IV	V	VI
REER	-0.1194*	-0.1208*	-0.1283***	-0.1133**	-0.0116*	-0.0109*
	(0.0842)	(0.0611)	(0.009)	(0.025)	(0.0656)	(0.0866)
Infrastructure	0.3082***	0.3100***	0.018***	0.0990***	0.1905***	0.2435***
	(0.000)	(0.000)	(0.0001)	(0.0002)	(0.000)	(0.000)
Export costs	-0.0601**	-0.0599**	-0.0507**	-0.0522**	-0.0069**	-0.0066**
	(0.0306)	(0.0297)	(0.0109)	(0.0105)	(0.0129)	(0.0182)
Education	0.1017***	0.1016***	0.1931*	0.2535**	0.0436***	0.0397***
	(0.000)	(0.000)	(0.085)	(0.0267)	(0.003)	(0.006)
Equality	0.0069**	0.0069**	0.0036	0.004	0.1234*	0.0078*
	(0.0252)	(0.0251)	(0.566)	(0.4808)	(0.0684)	(0.0874)
Income per capita	0.0207*		0.226***		0.137**	
	(0.095)		(0.000)		(0.038)	
constant	-0.6149*	-0.6019***	0.2308***	0.2908*	0.004	0.003
	(0.0538)	(0.0072)	(0.000)	(0.083)	(0.6030)	(0.704)
Observations	199	199	386	387	322	322
R-squared	0.58	0.58	0.40	0.35	0.37	0.36

pval in parentheses *** p<0.01, ** p<0.05, * p<0.1
Note: estimation period 1995-2019

Table 11. Determinants of the Exports of Services Composition

|	Complexity of services		RCA in modern services		Share of modern services	
	I	II	III	IV	V	VI
REER	-0.0506**	-0.0365*	-0.0258***	-0.0144***	-0.0586***	-0.0593***
	(0.0128)	(0.0736)	(0.000)	(0.0002)	(0.0001)	(0.0002)
Infrastructure	0.0502***	0.0913	0.1379***	0.0373	0.5091***	0.2305**
	(0.0035)	(0.4977)	(0.000)	(0.1369)	(0.0001)	(0.0272)
R&D expenditure	0.0681***	0.065*	0.1338***	0.1494***	0.088***	0.0683***
	(0.0002)	(0.0756)	(0.000)	(0.000)	(0.000)	(0.000)
Equality	0.0035*	0.001*	0.129	0.1617	0.0775*	0.0437
	(0.0908)	(0.0621)	(0.6887)	(0.6569)	(0.0624)***	(0.3019)
Income per capita	0.005***		0.0154***		0.0045***	
	(0.0002)		(0.000)		(0.000)	
constant	-0.0557***	-0.4438**	1.4876***	0.6406***	0.3455***	0.104***
	(0.000)	(0.03)	(0.000)	(0.000)	(0.0079)	(0.000)
Observations	197	197	192	192	307	307
R-squared	0.299	0.237	0.341	0.134	0.255	0.209

pval in parentheses *** p<0.01, ** p<0.05, * p<0.1
Note: estimation period 1995-2019

The estimation results for goods and services are shown in Tables 10 and 11, respectively. Estimates suggest that higher infrastructure quality, better education, lower export costs, a weaker real effective exchange rate (REER), and lower income inequality are conducive for promoting more complex exports of goods. Complexity, the RCA in high-skill goods and the share of high-skill and technology-intensive products in exports are all positively associated with a higher enrollment rate in tertiary education, better infrastructure, lower export costs and weaker REER. Also, lower income inequality seems to matter for promoting more complex exports of goods and a larger share of high-skill and technology-intensive products in exports.

The empirical findings also indicate that IT infrastructure quality, R&D expenditure, a weaker REER, and better income equality are important factors for the composition of the exports of services. Better infrastructure, higher R&D expenditure, and weaker REER are associated with a higher complexity and RCA of services exports, as

well as a larger share of modern services in total exports of services. Also, lower income inequality seems to matter for promoting more complex exports of services and a larger share of modern service in exports.
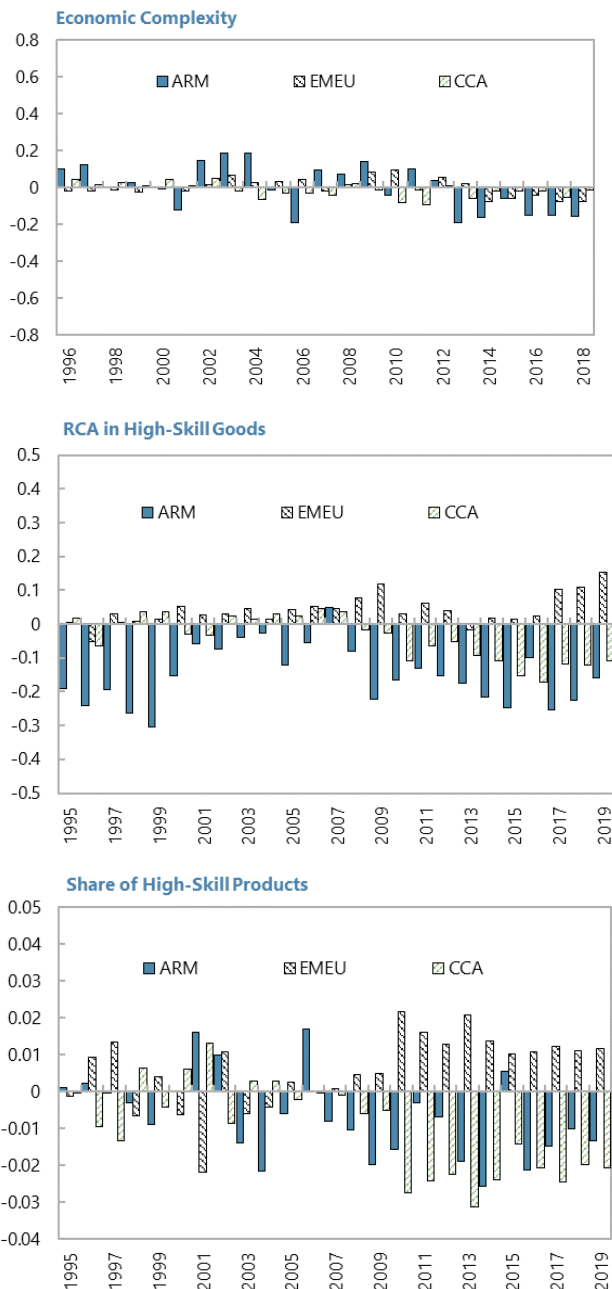
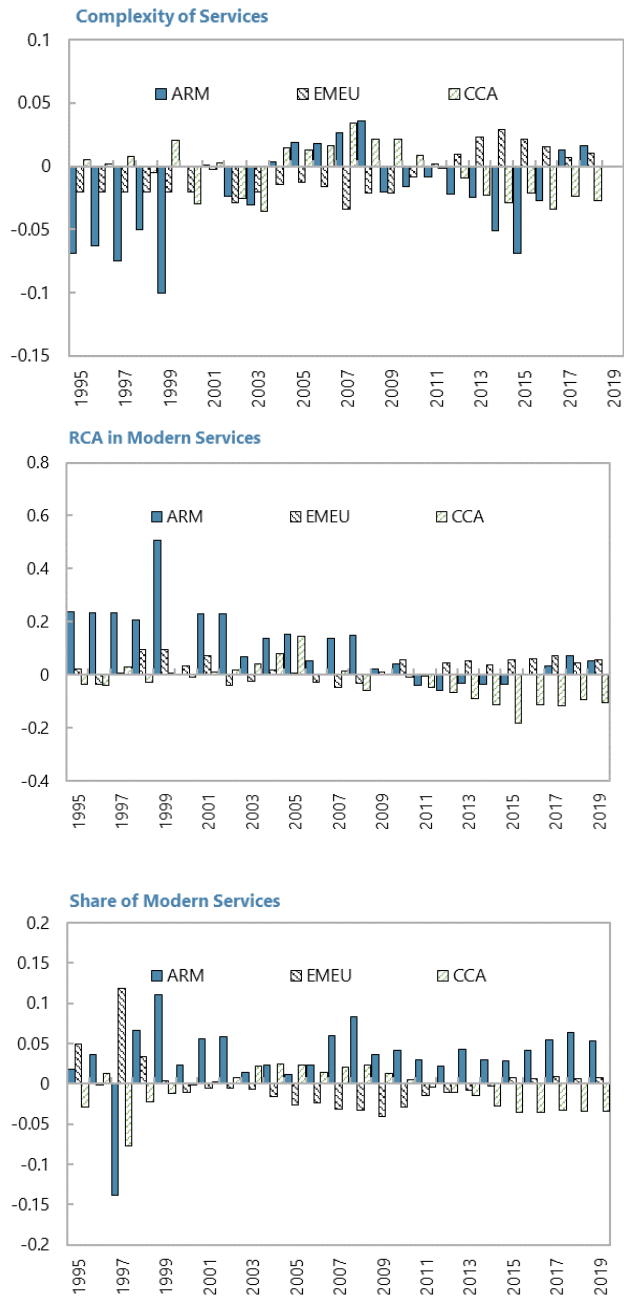## Figure 5: Armenia's Export Characteristics
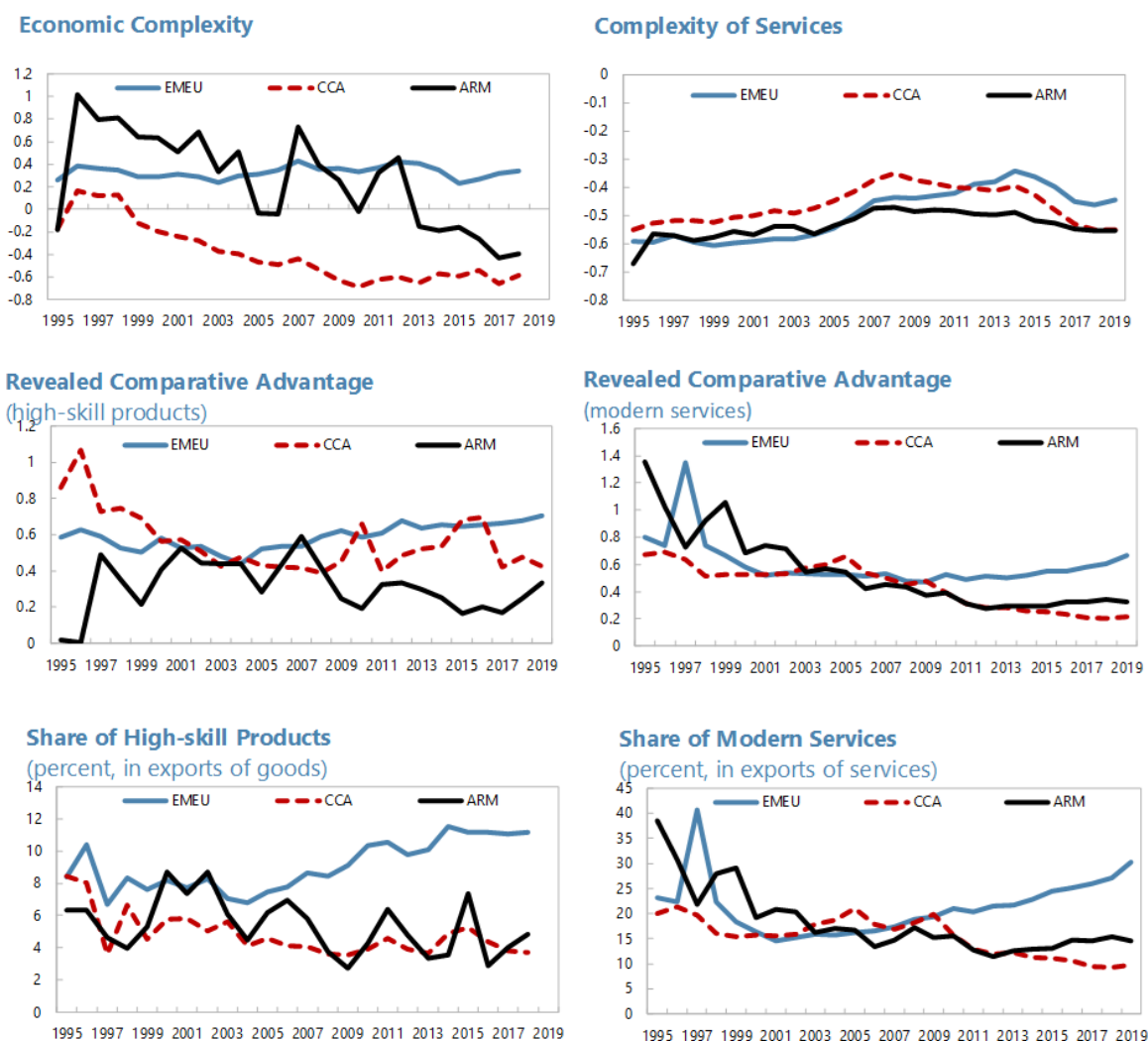
Source: UNCTADstat; IMF staff calculation.
Note: Sample of peer countries as indicated in Table 4

Figure 6: Export Complexity: Armenia and its Peers

Residuals from Panel Regressions for Exports of Goods   Residuals from Panel Regressions for Exports of Services

Note: IMF Staff Calculation

Armenia's exports of goods have been underperforming model predictions across all the analyzed dimensions (Figure 6). Armenia's share of high-skill and technology-intensive products in exports and the revealed comparative advantage (RCA) in high-skill goods have been consistently below the model predictions since 1995, while it seems to have started lagging behind its peers in complexity of exports of goods since 2013. Armenia's exports of services, however, has been mostly performing stronger than predicted by the model estimates, with the most consistent overperformance in higher share of modern services in exports.

Figure 7: Decomposition of Change in Export Composition
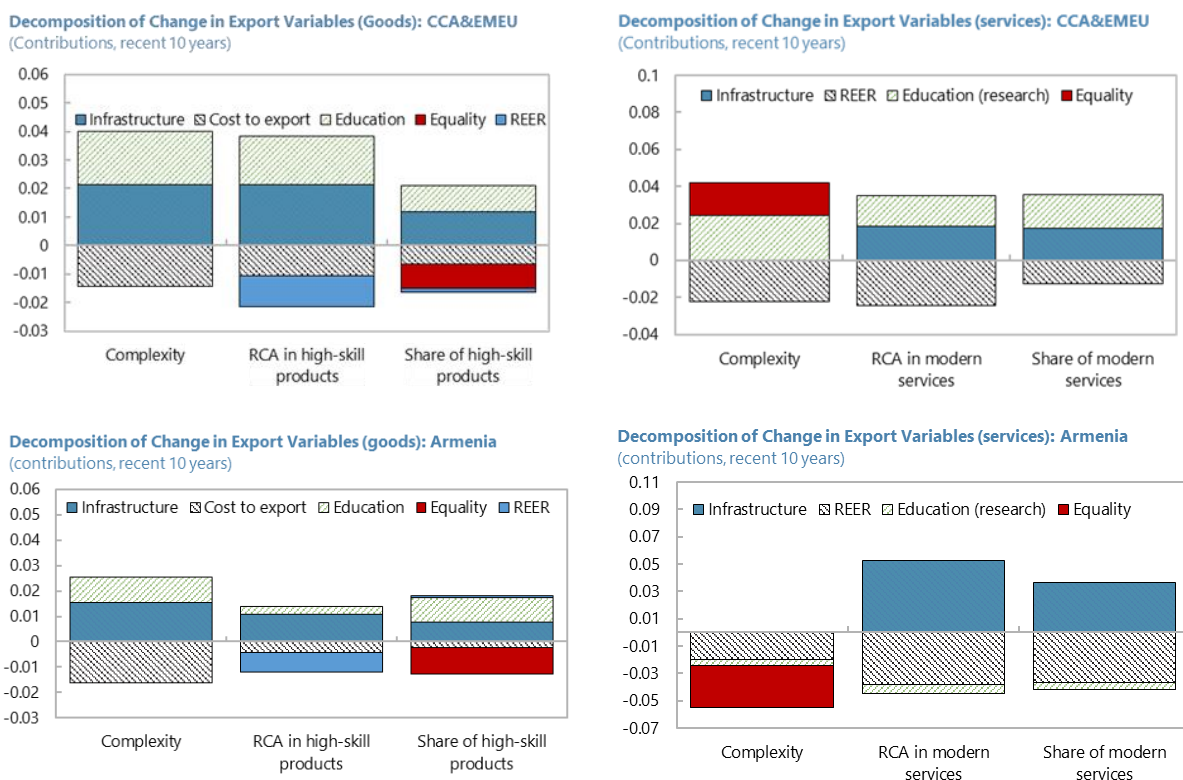
Source: IMF staff calculations.

Figure 7 computes contribution to change in good and services exports, based on the regression estimates. During the pre-COVID decade, improvements in infrastructure in Armenia and its peers seems to have provided the largest support to export composition towards more complex products, particularly of goods. Education and research have also positively contributed to higher complexity of exports of products among the peers, although in Armenia the positive impact was limited to goods only given the declining share of R&D expenditure in GDP over the last decade. Higher inequality and appreciation of the exchange rate in real effective terms were the main factors weighing on export composition of services.

V.   Conclusion

The results of the analysis call for coherent policy efforts to boost export complexity. While exports have been recently overperforming the potential defined by the gravity estimates, the drivers of such overperformance were mostly basic low-value-added products. Concurrently, export complexity and outlook have slid relative to the peers. In addition, Armenia backtracked in global value chain participation, with lower forward participation that boosts domestic value-added. Reversing these trends would offer a higher economic return but requires concerted policy efforts directed to the expansion of the well-diversified sophisticated tradable sector. Policy efforts can raise Armenia's export potential by further integrating with global trade network by leveraging trade agreements (Table 12); reducing nontariff barriers including documentary and border costs; improving the quality of infrastructure, including transport network and telecommunication; strengthening education and research, including tertiary education in STEM; and reducing raising income inequality.

Table 12. Armenia Trade Agreements

RTA Name	Coverage	Type	Date of Signature	Date of Entry into Force
Armenia - Moldova, Republic of	Goods	FTA	12/24/1993	12/21/1995
Kyrgyz Republic - Armenia	Goods	FTA	7/4/1994	10/27/1995
Armenia - Ukraine	Goods	FTA	10/7/1994	12/18/1996
Georgia - Armenia	Goods	FTA	8/14/1995	11/11/1998
Armenia - Turkmenistan	Goods	FTA	10/3/1995	7/7/1996
Armenia - Kazakhstan	Goods	FTA	9/2/1999	12/25/2001
Treaty on a Free Trade Area between members of the Commonwealth of Independent States (CIS)	Goods	FTA	10/18/2011	9/20/2012
Eurasian Economic Union (EAEU) - Accession of Armenia	Goods & Services	CU & EIA	10/10/2014	1/2/2015
EU - Armenia	Services	EIA	11/24/2017	6/1/2018

Source: World Trade Organization, Regional Trade Agreements Database.

Annex I. Unit Root Tests

Panel Unit-root tests of a Fischer type show that log (GDP) has unit root while total export, and education indexes do not. The null hypothesis is that there are unit roots in all panels, after demeaning cross-sectionally, including two lags, and removing time trend. Fischer test allowed for testing unit roots in unbalanced panel data. We reject the null hypothesis for log (GDP) while failing to reject the null hypothesis for other variables.

Non-stationarity concern for gravity model is often ignored and, in fact, mild. Fidrmuc (2009) showed that estimates from conventional gravity models with fixed effect are similar to estimates from error-correction models. In addition, gravity theory suggests that output enters the equation in level. Empirically, researchers already estimate the exact structural equation that the gravity theory postulates. To alleviate this concern further, we included country times year fixed effects, exploiting only pairwise variations within each year, as in Table 6 Specification (13). This specification removes all non-stationary variables in the estimation and results are similar to those from other specifications.

Variable	Fischer - ADF		Fischer - Phillips-Perron	
	z	p-value	z	p-value
Total Export	50.1	1	30.3	1
log(GDP)	-27.8	0	-39.4	0
Secondary Education Index	1.9	0.9743	-2.2	0.0152
Tertiary Education Index	9.2	1	28.0	1

H0: All panel contains unit root

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