Trade Patterns in Armenia

Karine Torosyan
Oregon State University
torosiak@onid.orst.edu

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Abstract

This paper provides a framework for understanding trade patterns between Armenia and developed countries. An augmented generalized gravity model is used to compare the actual with expected levels of trade. All standard gravity-type variables are significant and have signs as expected. High exporter and importer GDP levels promote Armenia's exports in raw materials, chemicals and basic manufactures. Factor endowments play an important role in explaining country trade flows. In all industries Armenia's exports appear to be less capital- and skill-intensive, being at the same time more land-intensive than Armenia's imports from developed countries. Skill is one of the most important factors boosting trade with the developed countries. It has particularly high effect on export development in machinery and transport equipment and miscellaneous manufactures. Substantial inputs of physical capital are required to increase export levels in chemicals and machinery and transport equipment. Border effect, geographic distance and presence of free trade agreements all have a very strong impact on country trade patterns. Exports in raw materials and manufactures will benefit the most from reduced trade costs. The analysis is comparing the estimated and actual comparative advantage index for Armenia. With time country trade patterns show tendency to better follow comparative advantage.

Introduction

After the collapse of the communist regime in 1991 Armenia, together with a wide range of countries in Eastern and Central Europe and Western Asia had begun the process of transition from socialism to capitalism. A very important part of this process was and still is a better integration into world economy. The beginning of the transition was marked by profound changes in country trade and industrial structures. After the collapse of the soviet regime, Armenia's trade with its traditional partners practically collapsed, while reorientation of trade flows towards new markets appeared to be rather difficult and slow.

In the years that followed, geography and structure of trade patterns in Armenia changed substantially. Trade relations with some of the Former Soviet Union (FSU) states were restored and expanded (particularly with Russia). In the meantime, development of trade relations with the developed capitalist countries has become one of the most global challenges of the transition period.

Some transition economies (TEs) have been more successful in entering western markets than the others. For better trade performance in the developed world it is crucial to understand factors driving trade flows between transition economies and developed countries. Unfortunately, there is very limited and rather controversial body of research analyzing this issue. Partially that is due to data problems specific to TEs, the short time-span that limits research to just a few early years of transition. Somewhat limiting is the fact that most of the papers concentrate on trade in countries in Central and Eastern Europe, leaving the rest of the region out of study. The former Soviet Union republics, particularly the Asian States and the Caucasian region, received the least attention so far. Another drawback in literature is the poor theoretical framework used to analyze trade patterns in TEs.

The goal of the current paper is to overcome some of the existing limitations in literature by carrying out an extensive analysis of Armenia-West trade patterns. This is done by using the "generalized" gravity model to perform robust empirical analysis of the data on trade patterns in a wide range of TEs during 7 years in transition (1993-1999).

The paper is organized as follows: sections 1 talks about specifics of trade relations in Armenia before and after the collapse of the communist bloc; section 2 discusses literature relevant to the topic; section 3 summarizes theoretical foundation for the gravity equation; section 4 derives the empirical model; section 5 talks about data used in the study; section 6 summarizes the results, and section 7 concludes the paper.

1. Trade in Armenia before and after the Communist Regime

For several decades Armenia was part of the soviet bloc, ran mostly by central directives rather than through a decentralized market mechanism. But by the end of 1991 this situation had changed dramatically with the fall of the communism. Armenia, together with other former Soviet republics and Eastern European nations, had launched economic reforms and started the process of transition to market economy. The immediate results of the breakup of centrally planned economic system were very large decline in output and high inflation in the region.

One major reason for difficulties that stroke TEs early in transition was the breakdown of traditional trading relations both among the former communist nations and among the republics of the former Soviet Union. Sharp falls in exports of Eastern European nations to the Soviet Union and to each other, a marked worsening in many countries' terms of trade, widespread shortages – especially in the former Soviet Union – including shortages of raw materials for industry hit very hard economies of TEs. After the disintegration of the soviet bloc, former communist countries faced the problem of adjustment and reorientation of their economies in the face of new competition for their low quality exports and much higher prices for many of their imports. As a result, after the disintegration Armenia lost substantial amount of exports that were highly processed and had relatively high technological content (such as electronics, and machine tools), while increasing shares of exports of goods with a relatively high resource content, low-skill, labor-intensive goods, which were less processed and had relatively low potential value-added content.

Early in transition Armenia traded heavily with its old partners among CIS countries, with Russia being the biggest trade partner, while trade with the developed countries constituted a smaller share of country total trade. With the time, however, Armenia has been withdrawing gradually from the Russian and other CIS markets, while increasing its trade with the developed countries (see table 1). In 1998 Armenia exported to the EU, the USA and Canada 88 million dollars and imported from these countries 353 million dollars worth of goods, while the corresponding numbers for the CIS countries were 80 and 230 million dollars. Armenia's trade deficit in 1998 reached looming 682 million dollar, almost 40% of which was due to westbound trade, and another 22% due to trade with the CIS.

Table 1. Share of Selected Partners in Exports and Imports, 1994, 1998

Region	Share in Exports (%)		Share in Imports (%)	
	1994	1998	1994	1998
CIS	73.3	36.5	52.2	25.5
Developed Countries*	16.6	40.0	33.9	39.1
Rest of the World	10.4	23.5	13.9	35.4

Source: Polyakov (2000)

* - Includes EU, USA and Canada

2. Literature review

Because of data and statistical difficulties, eastern trade development before 1992 has always been a slippery area for trade analysts. During the communist period it was due to numerous distortions, mutual trade settlements and other characteristic features. After the collapse of the soviet regime new data problems emerged, connected mainly to the formation of new states and with changes in system of statistical reporting in TEs. Hence, early papers on trade in transition were mostly verbal (descriptive) in nature and did not offer much statistical analysis to support their findings. Another feature of the early literature on trade in transition was that most of the papers were focusing on one or several Central and Eastern European countries (CEECs), leaving situation in the Former Soviet Union (FSU) republics out of the discussion.

One of the early hypothesis about trade pattern development in TEs was that these economies had well-educated labor force and spend a relatively large share on education hence, they had to have comparative advantage in production of skill-intensive, high-tech products (see, e.g.: Dobrinsky (1994), Gacs (1994), Halpern (1994), Landesmann (1994), Neven (1994), Rosati (1994), and others). At the same time it was expected that exports of energy- and material-intensive and labor-intensive sectors should gradually lose their positions.

However, in the first phase of transition TEs tended to export a wide variety of raw materials, natural-resource based products, and low-technology manufactures, there had been no clear tendency to develop exports of more skill-intensive or human-capital-intensive products. It is still not clear if in the long-run the commodity composition of trade in TEs would change towards more skill- and technology-intensive products.

Winiecki (2000) argues that this "new" labor- and natural resource-intensive, low-technology structure of TE exports reflected the true comparative advantage of TEs, and hence will prevail in the long-term.

One very popular tool used in literature to describe comparative advantage in TEs is the revealed comparative advantage (RCA) index. There are many different modifications of RCA that are very similar in nature. Most commonly used formula is:

$$RCA_i=(X_i / M_i – X / M)/ (X_i / M_i + X / M) \qquad (1)$$

where X_i and M_i are exports and imports of products in industry i, X and M are total country exports and imports respectively. This measure lies between –1 and 1 and equals 0 if the import-export ratio of industry i corresponds to the average. A positive value for RCA index is associated with (revealed) comparative advantage of a country in that sector; a negative value corresponds to (revealed) comparative disadvantage.

The problem with using the RCA index in this context is the fact this index does not offer any explanation of the observed pattern of trade and its evolution over time. As a matter of fact it is nothing more than a way to describe the actual composition of a country's

trade, and its changes in time. Table 2 contains values of the RCA index calculated for Armenia's trade in different (SITC, Rev3) industries years 1993, 1996 and 1999.

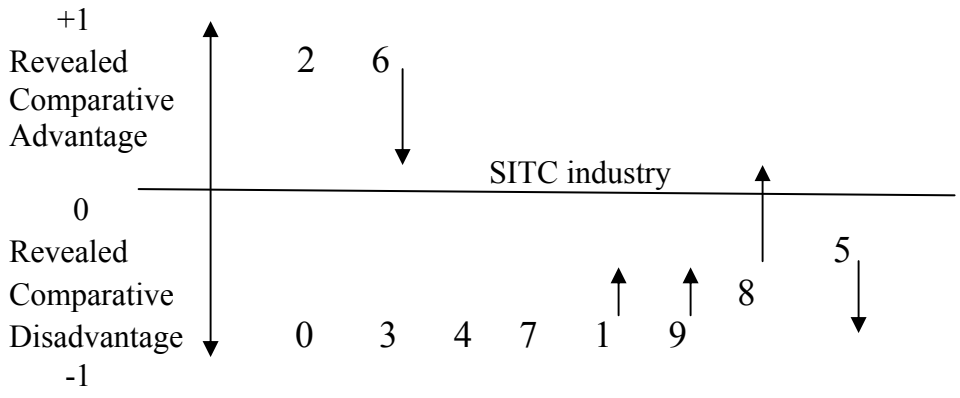
Table 2. Revealed Comparative Advantage in Armenia

SITC category:		RCA Index		
		1993	1996	1999
0	Food and live animals	-0.92	-0.81	-0.94
1	Beverages and tobacco	-1.00	-0.84	-0.55
2	Raw materials	0.96	0.82	0.83
3	Fuels	-1.00	-1.00	-1.00
4	Animal and vegetable oil and fats	-1.00	-1.00	-1.00
5	Chemicals	-0.28	-0.84	-0.89
6	Basic manufactures	0.91	0.47	0.32
7	Machinery and transport equipment	-1.00	-0.91	-0.89
8	Miscellaneous manufactures	-0.38	-0.14	0.16
9	Goods not classified by kind	-0.96	-0.96	-0.57

Source: the Supplement to the World Trade Annual, United Nations Statistical Division

According to this table, in 1993-1999 Armenia's revealed comparative advantage is strong in raw materials (SITC categories 2) for the entire period, while basic manufactures (category 6) starts as an area of strong advantage but partially loses its position by the year 1999. Revealed disadvantage is in food and live animals, fuels, animal and vegetable oil and fats, and machinery and transport equipment (categories 0, 3, 4, 7 correspondingly), where values of RCA index remain close to the minimum. Situation improves somewhat in beverages and tobacco (category 1), goods not classified by kind (9), and miscellaneous manufactures (8) sectors, which become less disadvantaged with the time, with category 8 even showing some moderate revealed advantage. On the other hand, comparative disadvantage in chemicals (5) deepens with the time. This information is summarized in figure 1 below.

Figure 1: Movements in the Revealed Comparative Advantage Index in Armenia over 1993-1999



To understand these movements in the structure of Armenian trade it is important to analyze factors that are responsible for development of westbound trade patterns.

Search for ways to understand and predict trade patterns in TEs has brought researchers to the so-called "gravity model" of trade. The advantages of using the gravity model for studying bilateral trade flows are comparatively little data requirements by the model and its theoretical validity (even in the case of TEs). Hence, the simple gravity model has become a very popular tool for estimating potential trade flows between TEs and the West. But again, special attention has been given to modeling trade relations between the European Free Trade Association (EFTA), the EU, Central and Eastern Europe countries and Baltic Rim countries (Wang and Winters (1991), Winters and Wang (1994), Baldwin (1993) and (1994) Gros (199x); Dominique (1996), Iversen (1998), Paas (2000)), while leaving the rest of TEs out of discussion.

Polyakov (2001) uses estimates from the gravity model of Baldwin (1994) to assess the potential export flows in industrial products outside the natural resources among the South Caucasus countries and their major trade partners. According to their calculations, Armenia's gap between actual and potential average annual (calculated over 1995-1998) exports to the EU and the USA was over 260 million dollars according to a "no growth" scenario, and almost 500 million dollars using World Bank projections of the country GDP and population levels in 2002.

Clearly, these results are overestimating Armenia's westbound export potential, since they are based on estimates from trade flows among the developed countries (EC, EFTA, the USA, Canada, Japan, and Turkey). It is unrealistic to expect Armenia to have export performance comparable to that of Switzerland, for example. A more reasonable approach would be to estimate the gravity model based on trade flows among all the TEs and the developed countries, and use the results to evaluate Armenia's trade performance in the western markets.

3. Theoretical Background

One very popular way of modeling export-import patterns in the "old" theory of international trade was the Heckscher-Ohlin (H-O) model, which explained countries' comparative advantage based on their differences in factor endowments. The idea was initially developed by Eli Heckscher (1919) and Bertil Ohlin (1933), and was formally captured by the Heckscher-Ohlin (H-O) theorem. The theorem simply states that a country exports those commodities produced with relatively large quantities of the country's relatively abundant factor. Given the difference between the mixture of factors needed to produce different types of products, say, capital-intensive and labor-intensive goods, what determines a country's comparative advantage as between these two sorts of goods in the relative abundance of factors. Country with high ration of capital to labor will export capital-intensive goods, while the one with the low ratio of capital to labor will export labor-intensive goods.

This theory, however, is based on a range of very strong assumptions (2x2x2 setting, identical tastes/technologies across countries, constant return to scale in production, to

name just a few) that oversimplify the reality, making H-O model in its "pure" state highly stylized and ineffective in explaining the full richness of the world trade.

For several decades now, the gravity model has been used in empirical studies to model international trade patterns and their changes. According to the gravity approach in its basic form (Linnemann, 1966), bilateral trade between two regions (countries) is directly related to their incomes and populations and inversely related to the distance between them. Initially, this model was criticized for its weak theoretical foundation.

The increased popularity of the gravity model during the recent years came from the development of an improved theoretical foundation of the model (Andersson (1979), Bergstrand (1985), (1989), and (1990), Deardorff (1995) and (1998), Evenett and Keller (1998), and its successful empirical performance (Bergstrand (1989)).

Current paper follows the theoretical derivation of the gravity model by Bergstrand (1989), which extends microeconomic foundations of the gravity equation to incorporate factor-endowment variables in the spirit of Heckscher-Ohlin (H-O) and taste variables in the spirit of Linder. He uses a general equilibrium model of world trade with two differentiated-product industries and two factors to derive the "generalized' gravity model that includes relative factor-endowment differences and non-homothetic tastes. The paragraphs below summarize theoretical foundations for the gravity equation.

On the demand side the representative consumer in each country is assumed to maximize a Cobb–Douglas–CES–Stone-Geary utility function subject to income constraint. As a result set of bilateral import demand functions can be derived. Aggregating demand functions across (identical) consumers in a given country we can derive country inverse market demand function for the output of single firm in each of the two (A, B) industries and countries:

$$P_{aij} = \delta^{1/\sigma^a} X_{agij}^{-1/\sigma^a} (Y_j)^{1/\sigma^a} g_a (y_j)^{1/\sigma^a} T_{aij}^{-1} E_{ij} \left[\sum_n \sum_{h=1}^{H_a} \left(P_{ahjn} T_{anj} / E_{nj} \right)^{1-\sigma^a} \right]^{-1/\sigma^a} \qquad (2)$$

$i = 1, \ldots N;\ a = A, B$

where X_{agjl} is country j's the demand for output of industry a's firm g in country i, σ^a is the elasticity of substitution in consumption for industry a, Y_j is j's nominal GDP, y_j is j's "per capita" consumption in terms of the minimum consumption requirement of B by the population, f_a is an inverse-liner function of y_j; T_{anj} is one plus the exogenous tariff rate on industry a exports from n to j, E_{nt} is the exogenous exchange rate between the two countries (n's currency per unit of j's currency), and P_{anj} is the f.o.b. price of firm h's output in industry a exported from n to j (it is assumed that all firms in country n in an industry charge the same price in market j).

On the supply side the representative firm in each industry in each country produces a uniquely differentiated product in a monopolistically competitive setting, using two factors of production, labor (L) and capital (K). Technologies are assumed the same

across firms and across countries. It is also assumed that labor and capital are in fixed supply in each country.

Maximizing profit function for the representative firms in all industries gives the optimal production level of supply to any market *j*:

$$X_{agij} = H_{ai}^{-1}\alpha_a(\beta_{a1}K_i^* - \beta_{a2}L_i^*)(P_{aij}/C_{aij})^{\gamma^a} C_{aij}^{-1}\left[\sum_n (P_{ain}/C_{ain})^{1+\gamma^a}\right]^{-\gamma^a/(1+\gamma^a)} \quad (3)$$

$g = 1,\ldots, H_{ai};\ a = A, B;\ i = 1,\ldots, N$

where γ^A and $\alpha_a, \beta_{a1,a2}$ are coefficients entering from the underlying supply and technology functions correspondingly; $K_i^*(L_i^*)$ is country *i*'s capital (labor) stock net of fixed (set-up) resources.

Based on the above demand and supply equations, the following "generalized" gravity equation can be derived:

$$PX_{aij} = \varphi_0 (Y_i^K)^{\varphi_1} f(K_i^*/L_i^*)^{\varphi_2} (Y_j)^{\varphi_3} g(y_j)^{\varphi_4} C_{aij}^{\varphi_5} T_{aij}^{\varphi_6} E_{ij}^{\varphi_7} P_{aij}^{\varphi_8} \quad (4)$$

Where PX_{aij} is the value of the trade from i to j in industry *a;* φ_i-s are theoretically derived multipart coefficients; Y_i^K is i's national output in terms of units of capital, and P_{aij} is a complex price term of i's industry *a* output in county *j*.

Generalization of H-O theory beyond two industries and two factors is not straightforward. However, its "weak" generalization for more than two factors is that countries tend to export those goods which use intensively their abundant factors. Similarly, the Rybczynski theorem can be generalized to show that in a multi-industry world an increase in a country's endowment of capital (labor) tends to increase the output of relatively capital (labor)-intensive industries. Consequently, a weak inference of the relative factor intensity of the industry can be made based on exporter per capita income (as proxy for capital/labor ratio) coefficient estimates.

4. Empirical Model

Following Bergstrand, this paper analyses the generalized gravity equation distinguishing industries by single-digit Standard Industrial Trade Classification (SITC) categories 0 through 9. In addition to capital and labor we include land and human capital as two more factor endowments. Generalization of equation (1) for the case of more that two factors is beyond the scope of the current paper. The version of the gravity model (in log-log form) that is analyzed in this paper assumes that additional factors of production enter the equation in a similar way capital-labor ratio does, hence we propose the following equation:

$$\log(PX_{aij}) = \log(\varphi_0) + \varphi_1 * \log(GDP_i) + \varphi_2 * \log(GDP_j) + \varphi_3 * \log(gdp_j) + \varphi_4 * \log(gdp_i) + \\ + \varphi_5 * \log(Land_i / L_i) + \varphi_6 * \log(Skill_i / L_i) + \varphi_7 \log(Dist_{ij}) + \\ + \beta_1 * Border_{ij} + \beta_2 * FTA_{ij} + \beta_3 * Mkt_{ij} + \varepsilon_{aij} \quad (5)$$

In this equation exporter GDP is proxy for i's national output in terms of units of capital, exporter's GDP per capita is a proxy of i's capital-labor endowment ratio. Importer GDP is j's national income. Importer's GPD per capita is j's per capita income. As a measure of skill per capita I use Human Development Indicator (see below). Further, a dummy variable *FTA* indicating the presence of free trade agreements, as well as the EBRD markets and trade restructuring indicator - *Mkt* (defined and discussed below) proxy for the tariff variable in (1). The transport cost variable is proxied by the distance between i's and j's capital cities - $Dist_{ij}$, and a dummy variable $Border_{ij}$ for common border/shoreline. Also, since analysis below is done using real current $US values of trade flows, it already takes into account the variation in exchange rates as well as the relative variation in prices, hence inclusion of these terms into our version of gravity equation is not necessary.

Expected coefficient signs are as follows: a rise in j's income, adjacency, and the presence of trade agreements should increase the trade flow from i to j. Bigger distance between these countries should decrease trade flows. If elasticity of substitution in consumption for the industry (σ) is more (less) than one, coefficient on i's income will have positive (negative) sign (see Bergstrand 1989). If σ is more than one, then a positive (negative) coefficient for exporter per capita income indicates a tendency for this industry to be capital (labor) intensive. A similar interpretation can be given with respect to the signs of the coefficients on per capita land and skill variables. A positive (negative) coefficient for importers per capita income indicates that industry output is luxury (necessity) in consumption. This scenario is presented in table 3 below. If σ is less than one the interpretation of these coefficients is reversed.

Table 3. Expected coefficient signs on the main variables, σ >1

Variable	Sign	Explanation
Exporter GDP	+	Elasticity of substitution in consumption σ >1
Importer GDP	+	
Importer GDP per capita	+ (-)	Industry output is luxury (necessity)
Exporter GDP per capita	+ (-)	Relatively capital-intensive (labor-intensive) industry
Exporter Land/Labor	+ (-)	Relatively land-intensive (labor-intensive) industry
Exporter Skill/Labor	+ (-)	Relatively human capital-intensive (labor-intensive) industry
Distance	-	Bigger distance decreases trade flows
Border	+	Trade with adjacent countries should be more intense
FTA	+	Presence of FTA should boost trade relations
Markets and Trade Index	+	Less trade restrictions increase trade intensity

Estimations are done using equation (5) augmented with time dummy variables (to capture effects of global business cycles) and regional dummy variables (to describe regional differences not capture by the other variables). Grouping of countries into regions is described in the appendix (table A1).

5. Data

Analysis in the current paper concentrates on trade flows between countries in transition and developed (industrial) countries during 1993-1999. Tables A2 and A3 in the appendix contains basic summary statistics for the variables used in the analysis.

5.1 Trade Data

The main source of trade data used in this study is the Supplement to the World Trade Annual, United Nations Statistical Division, which reports annual data at the various levels of the Standard International Trade Classification, Revision 2 (SITC, Revision 2) for trade among 23 developed countries (see table A1 in the appendix) and other countries and areas of the world (more than 165 countries or areas), including countries in transition.

Trade values are in thousands of US dollars converted from national currency to US dollars based on weighted averages of exchange rates, the weights being the corresponding monthly or quarterly values of imports or exports (consult data source for additional details). Trade data are converted into real 1995 $US using the Consumer Price Index for the US with 1995 as the bases year, as reported by World Development Indicators database, International Board for Reconstruction and Development, World Bank.

5.2 Explanatory Variables

Exporter and importer GDP (billion PPP current international $US) and GDP per capita (PPP current international $US) data are taken from World Development Indicators database, and are converted to 1995 constant real $US as described above.

Exporter skill per worker is captured through the Human Development Index that ranges between 0 (the least developed) and 1 (the highest development level). The HDI is annually reported by the United Nations in its annual Human Development Report, and it combines indicators of national income, life expectancy and educational attainment to give a composite measure of human progress. Compared to mean years of schooling, often used in literature as a proxy for country skill level, HDI better reflects quality differences in human capital across countries, than mean years of schooling, as it combines several indicators of human progress, including mean years of schooling. UN

Human Development Report provides further detail on HDI in various years and its calculation.

Land per worker (sq. km. per worker) is the ratio of country land territory measured in square kilometers and the total number of people in the workforce, as reported by World Development Indicators, WB.

Distance variable measures bilateral flying distance between capital cities in kilometers and is constructed using http://www.etn.nl/distance.htm website as the main source. Markets and Trade index is an average of price liberalization, trade and foreign exchange system, and competition policy indicators developed by European Bank for Reconstruction and Development among several other indicators to measured progress in transition in central and Eastern Europe, the Baltic states, and the CIS. More information on these indicators can be obtained from EBRD annual Transition Reports. Foreign trade agreements variable indicates the presence of such an agreement between a pair of countries (as a bilateral or as part of a multilateral agreement), and is composed based on WTO list of Regional Trade Agreements notified to the GATT/WTO and in force. Border dummy indicates the presence of common border and/or shoreline between a given pair of countries.

6. Results

The appropriate technique for estimating industry level export-import flows based on (econometric model) would be the seemingly unrelated regression framework including all industries, since error terms across industries are most likely to be correlated. However, it can be shown that in the case when all the right-hand-side variables of all the regressions of interest are the same, running separate OLS regressions for each industry will be equivalent to estimating the model using the seemingly unrelated regression approach (Greene (2000), p.616).

Another fact requiring special attention is the presence of zeros in the dependent variable (when there is no or little trade in a given industry between a particular pair of countries). The common solution in these types of cases is to omit all zero observations when performing the estimation (tobit regression). This would however lead to deletion of 30-90% of our sample depending on the industry, which would introduce a significant survivorship bias into the analysis.

Hence, the estimation of model (5) is done via separate OLS regressions for export and import flows in each industry. All zero bilateral trade flows are replaced by a very small number ($1000) to allow taking logarithms. Tables 4 and 5 present robust OLS estimation results from an augmented generalized gravity equation (5) for exports from TEs to the West and exports from the West to the TEs correspondingly.

Table 4. Exports from TEs to the West

Right-Hand-Side Variables	SITC 0 *Food & Live Animals*		SITC 1 *Bevrgs. & Tobacco*		SITC 2 *Raw Materials*		SITC 3 *Fuels*		SITC 4 *Animal & Veg. Oil & Fats*		SITC 5 *Chemicals*		SITC 6 *Basic Manuf.*		SITC 7 *Machinery & Trans. Equipment*		SITC 8 *Miscella-neous Manuf.*		SITC 9 *Goods not Classified*	
Gravity-Type Variables																				
Exporter GDP	1.178	**	0.770	**	1.521	**	1.438	**	0.231	**	1.480	**	1.371	**	0.994	**	0.850	**	0.848	**
Importer GDP	0.949	**	0.612	**	1.193	**	0.665	**	0.230	**	1.070	**	1.211	**	0.843	**	0.955	**	0.851	**
Importer GDP per capita	1.281	**	2.156	**	-0.981	**	-0.753	**	0.075		0.702	**	0.357		-0.021		3.550	**	2.569	**
H-O Type Variables																				
Exporter GDP per capita	-0.761	*	-0.741	**	-1.505	**	-2.138	**	-0.037		0.459	**	-0.007		0.964	**	-0.057		-0.388	*
Exporter HDI	3.895		-0.532		4.041	**	3.550	**	-0.364		4.229	**	3.719	**	6.787	**	4.728	**	1.657	
Exporter Land/Labor)	0.255	**	0.484	**	0.067		1.516	**	0.106		-0.139		0.125		-0.273	**	-0.196	**	0.273	**
Trade Cost Variables																				
Distance	-0.993	**	-0.247	**	-1.791	**	-1.298	**	-0.458	**	-1.022	**	-1.428	**	-1.086	**	-1.035	**	-0.403	**
Markets and Trade Index	0.872	**	0.563	**	-0.496	**	0.260	*	0.160	**	0.907	**	0.449	**	0.218	*	-0.113		0.613	**
Border Dummy	1.588	**	0.860	**	1.351	**	2.969	**	1.482	**	1.349	**	0.723	**	1.263	**	1.546	**	2.395	**
FTA Dummy	0.333	**	0.784	**	0.925	**	1.141	**	0.309	**	0.750	**	0.569	**	1.081	**	1.023	**	0.508	**
Time Dummies																				
Year 1994	-0.174		-0.095		0.643	**	-0.246		0.207		0.110		0.300	*	0.367	**	0.392	**	0.009	
Year 1995	-0.072		-0.253		0.741	**	-0.387	*	-0.151		0.230		0.564	**	0.618	**	0.420	**	-0.050	
Year 1996	-0.256	*	-0.299	*	0.701	**	-0.612	**	-0.174		-0.086		0.270		0.524	**	0.467	**	-0.264	
Year 1997	-0.316	*	-0.250		0.636	**	-0.731	**	-0.242	*	-0.262		0.442	**	0.709	**	0.504	**	-0.224	
Year 1998	-0.327		-0.066		0.405	*	-0.579	**	-0.259	*	-0.371	**	0.314	*	0.705	**	0.500	**	-0.133	
Year 1999	-0.481	*	-0.265		0.542	**	-0.184		-0.278	*	-0.627	**	0.306	*	0.616	**	0.406	**	-0.523	**
Sub-Region Dummies																				
Caucasus, w/o Armenia	-0.802	**	-0.732	**	-0.258		0.510	*	0.047		-0.704	**	-1.080	**	-0.128		-2.066	**	0.152	
Asian republic of FSU	-2.081	**	-1.893	**	0.543	*	-2.526	**	0.048		-0.541	*	-0.309		-1.113	**	-2.594	**	-0.279	
Baltic States	1.693	**	-0.785	**	3.232	**	3.360	**	-0.566	**	0.524		1.307	**	-0.572	**	1.105	**	-0.302	
Central-Eastern Europe	1.149	**	2.512	**	1.054	**	0.265		0.254	*	0.004	**	0.852	**	0.295		1.417	**	0.398	*
South-Eastern Europe	1.030	**	1.801	**	0.484	*	1.180	**	0.675	**	-0.540	**	0.805	**	0.754	**	1.379	**	1.024	**
Armenia	-1.159		0.138		-0.560	*	0.792	**	0.220	**	-0.936	**	-0.809	**	-1.278	**	-2.183	**	0.563	**
Contant term	-47.98	**	-46.13	**	-25.37	**	-8.91	*	-8.13	**	-63.63	**	-51.26	**	-40.58	**	-66.31	**	-60.40	**
R^2	0.657		0.510		0.599		0.544		0.260		0.731		0.725		0.776		0.800		0.495	
Root Mean Square Error	2.360		2.212		2.576		2.862		1.678		2.207		2.235		2.047		1.911		2.331	

Notes: All variables except dummies are expressed in natural logarithms.

Estimation uses White's heteroskedasticity consistent covariance matrix estimator.

* Significant in two-tail t-test at the 5% level, ** Significant in two-tail t-test at the 1% level, Number of observations - 4140

Table 5. Exports from the West to TEs

Right-Hand-Side Variables	SITC 0		SITC 1		SITC 2		SITC 3		SITC 4		SITC 5		SITC 6		SITC 7		SITC 8		SITC 9	
Gravity-Type Variables	*Food & Live Animals*		*Bevrgs. & Tobacco*		*Raw Materials*		*Fuels*		*Animal & Veg. Oil & Fats*		*Chemicals*		*Basic Manuf.*		*Machinery & Trans. Equipment*		*Miscella-neous Manuf.*		*Goods not Classified*	
Exporter GDP	0.845	**	0.930	**	0.759	**	0.773	**	0.529	**	0.899	**	1.130	**	1.128	**	1.071	**	1.224	**
Importer GDP	1.456	**	1.081	**	1.190	**	1.073	**	0.906	**	1.200	**	1.283	**	1.205	**	1.268	**	0.975	**
Importer GDP per capita	-0.791	**	-0.297	*	0.201		-0.514	**	-0.701	**	0.084		0.108		0.341	**	0.303	**	-0.172	**
H-O Type Variables																				
Exporter GDP per capita	0.962	**	-1.129	**	-0.238		-1.215	**	0.411		2.179	**	-0.214		1.696	**	1.174	**	3.448	**
Exporter HDI	3.984		9.607	**	16.850	**	28.495	**	15.701	**	9.885	**	8.917	**	21.585	**	-2.384		8.504	**
Exporter Land/Labor)	-0.023		-0.218	**	-0.063	**	-0.081	*	-0.199	**	-0.580	**	-0.262	**	-0.458	**	-0.294	**	0.115	**
Trade Cost Variables																				
Distance	-1.773	**	-1.862	**	-1.071	**	-1.662	**	-1.001	**	-1.755	**	-2.064	**	-1.731	**	-1.773	**	-0.958	**
Markets and Trade Index	0.255	*	0.775	**	0.371	**	0.007		0.233	**	0.508	**	0.132		0.257	**	0.429	**	0.072	**
Border Dummy	0.544	**	0.716	**	2.043	**	3.015	**	2.228	**	0.449	**	0.535	**	0.555	**	0.483	**	1.403	**
FTA Dummy	0.284	*	0.885	**	0.315	*	0.298	*	1.281	**	0.270	**	0.126		-0.272	**	-0.060		0.780	**
Time Dummies																				
Year 1994	0.132		0.187		0.071		0.182		0.113		0.317	*	0.393	**	0.342	**	0.369	**	0.107	**
Year 1995	0.357	*	0.136		0.288	*	0.261		0.055		0.444	**	0.747	**	0.525	**	0.566	**	0.413	**
Year 1996	0.627	**	0.485	**	0.632	**	1.066	**	0.471	**	0.695	**	1.273	**	1.193	**	0.729	**	0.266	**
Year 1997	0.609	**	0.159		0.847	**	1.389	**	0.733	**	0.860	**	1.405	**	1.497	**	0.761	**	0.896	**
Year 1998	0.640	**	-0.051		0.924	**	1.288	**	0.628	**	0.846	**	1.555	**	1.494	**	0.842	**	0.964	**
Year 1999	0.137		-0.449	**	0.721	**	0.923	**	0.245		0.558	**	1.161	**	1.182	**	0.646	**	0.627	**
Sub-Region Dummies																				
Caucasus, w/o Armenia	0.689	**	0.663		-0.094		0.288		0.372	*	0.556	**	0.573	**	0.950	**	0.930	**	0.080	**
Asian republic of FSU	-0.585	**	0.092	**	-0.353	*	-0.058		-0.194		0.093		-0.078		0.520	**	0.102		-0.384	**
Baltic States	2.266	**	0.645		1.128	**	1.261	**	0.524	**	1.064	**	1.409	**	1.336	**	1.441	**	0.623	**
Central-Eastern Europe	1.361	**	-0.346	**	1.463	**	1.183	**	0.410	*	0.767	**	1.164	**	0.938	**	0.695	**	0.974	**
South-Eastern Europe	0.218		-1.779	**	1.411	**	0.739	**	-0.697	**	0.317	*	0.851	**	0.946	**	0.308	*	0.297	**
Armenia	1.587	**	0.644	**	0.007		0.005		0.593	**	0.038		0.242		-0.054		0.364		0.217	**
Contant term	-41.64	**	-20.26	**	-36.73	**	-13.29	**	-24.68	**	-58.53	**	-38.90	**	-59.28	**	-55.98	**	-77.69	**
R2	0.543		0.576		0.625		0.565		0.434		0.764		0.783		0.787		0.798		0.550	
Root Mean Square Error	2.614		2.434		2.304		2.449		2.377		1.919		1.867		1.821		1.675		2.537	

Notes: All variables except dummies are expressed in natural logarithms.
Estimation uses White's heteroskedasticity consistent covariance matrix estimator.
* Significant in two-tail t-test at the 5% level, ** Significant in two-tail t-test at the 1% level, Number of observations – 4140

Table 6. Exports from TEs to the West: Interpretation of dummy variables

Right-Hand-Side Variables	SITC 0		SITC 1		SITC 2		SITC 3		SITC 4		SITC 5		SITC 6		SITC 7		SITC 8		SITC 9	
Trade Cost Dummies	*Food & Live Animals*		*Bevrgs. & Tobacco*		*Raw Materials*		*Fuels*		*Animal & Veg. Oil & Fats*		*Chemicals*		*Basic Manuf.*		*Machinery & Trans. Equipment*		*Miscella-neous Manuf.*		*Goods not Classified*	
Border Dummy	389.5	**	136.4	**	286.2	**	1846.6	**	340.1	**	285.2	**	106.1	**	253.7	**	369.3	**	996.8	**
FTA Dummy	39.6	**	119.0	**	152.2	**	213.0	**	36.1	**	111.7	**	76.6	**	194.9	**	178.2	**	66.2	**
Time Dummies																				
Year 1994	-16.0		-9.1		90.2	**	-21.8		23.0		11.7		35.1	*	44.3	**	48.1	**	0.9	
Year 1995	-7.0		-22.4		109.8	**	-32.1	*	-14.1		25.8		75.7	**	85.5	**	52.1	**	-4.9	
Year 1996	-22.6	*	-25.9	*	101.6	**	-45.8	**	-16.0		-8.2		31.0		68.9	**	59.6	**	-23.2	
Year 1997	-27.1	*	-22.1		88.9	**	-51.8	**	-21.5	*	-23.0		55.6	**	103.2	**	65.5	**	-20.0	
Year 1998	-27.9		-6.4		49.9	*	-43.9	**	-22.8	*	-31.0	**	36.9	*	102.5	**	64.9	**	-12.4	
Year 1999	-38.2	*	-23.3		71.9	**	-16.8		-24.2	*	-46.6	**	35.8	*	85.1	**	50.1	**	-40.7	**
Sub-Region Dummies																				
Caucasus, w/o Armenia	-55.1	**	-51.9	**	-22.7		66.5	*	4.9		-50.5	**	-66.0	**	-12.0		-87.3	**	16.4	
Asian republic of FSU	-87.5	**	-84.9	**	72.1	*	-92.0	**	4.9		-41.8	*	-26.5		-67.1	**	-92.5	**	-24.4	
Baltic States	443.7	**	-54.4	**	2432.0	**	2780.2	**	-43.2	**	68.8		269.6	**	-43.6	**	201.8	**	-26.0	
Central-Eastern Europe	215.6	**	1132.7	**	186.9	**	30.4		29.0	*	0.4	**	134.3	**	34.3		312.4	**	48.9	*
South-Eastern Europe	180.2	**	505.4	**	62.2	*	225.4	**	96.3	**	-41.7	**	123.8	**	112.6	**	297.3	**	178.5	**
Armenia	-68.6		14.8		-42.9	*	120.8	**	24.6	**	-60.8	**	-55.5	**	-72.1	**	-88.7	**	75.6	**

Notes: Calculations of the dummy variable effect on the dependent variable

* The corresponding coefficient estimate is significant in two-tail t-test at the 5% level

* *The corresponding coefficient estimate is significant in two-tail t-test at the 1% level

Table 7. Exports from the West to TEs: Interpretation of dummy variables

Right-Hand-Side Variables	SITC 0		SITC 1		SITC 2		SITC 3		SITC 4		SITC 5		SITC 6		SITC 7		SITC 8		SITC 9	
Trade Cost Dummies	*Food & Live Animals*		*Bevrgs. & Tobacco*		*Raw Materials*		*Fuels*		*Animal & Veg. Oil & Fats*		*Chemicals*		*Basic Manuf.*		*Machinery & Trans. Equipment*		*Miscella-neous Manuf.*		*Goods not Classified*	
Border Dummy	72.2	**	104.7	**	671.7	**	1939.6	**	828.0	**	56.7	**	70.8	**	74.2	**	62.1	**	306.6	**
FTA Dummy	32.8	*	142.3	**	37.0	*	34.8	*	260.0	**	31.0	**	13.5		-23.8	**	-5.9		118.2	**
Time Dummies																				
Year 1994	14.1		20.6		7.4		20.0		11.9		37.3	*	48.1	**	40.8	**	44.6	**	11.3	**
Year 1995	42.9	*	14.5		33.4	*	29.9		5.7		55.8	**	111.1	**	69.1	**	76.1	**	51.2	**
Year 1996	87.2	**	62.4	**	88.2	**	190.4	**	60.2	**	100.4	**	257.3	**	229.6	**	107.3	**	30.5	**
Year 1997	83.9	**	17.3		133.2	**	301.0	**	108.1	**	136.3	**	307.4	**	346.8	**	114.1	**	144.9	**
Year 1998	89.6	**	-4.9		152.1	**	262.4	**	87.4	**	133.1	**	373.6	**	345.4	**	132.1	**	162.3	**
Year 1999	14.7		-36.2	**	105.6	**	151.8	**	27.8		74.6	**	219.3	**	226.2	**	90.8	**	87.1	**
Sub-Region Dummies																				
Caucasus, w/o Armenia	99.3	**	94.0		-8.9		33.4		45.0	*	74.4	**	77.3	**	158.5	**	153.6	**	8.3	**
Asian republic of FSU	-44.3	**	9.7	**	-29.7	*	-5.6		-17.6		9.8		-7.5		68.3	**	10.7		-31.9	**
Baltic States	864.5	**	90.5		208.9	**	253.1	**	68.9	**	189.7	**	309.2	**	280.6	**	322.7	**	86.4	**
Central-Eastern Europe	290.2	**	-29.3	**	331.7	**	226.3	**	50.8	*	115.4	**	220.2	**	155.4	**	100.3	**	164.8	**
South-Eastern Europe	24.4		-83.1	**	309.8	**	109.4	**	-50.2	**	37.3	*	134.3	**	157.6	**	36.0	*	34.6	**
Armenia	388.9	**	90.3	**	0.7		0.5		81.0	**	3.9		27.4		-5.3		43.8		24.2	**

Notes: Calculations of the dummy variable effect on the dependent variable
* The corresponding coefficient estimate is significant in two-tail t-test at the 5% level
* *The corresponding coefficient estimate is significant in two-tail t-test at the 1% level

For the ease of interpretation, the tables, as well as the discussion below, group together explanatory variables that are similar in nature. For the generalization purposes, industries 0-3 (0.Food and Live Animals, 1.Beverages and Tobacco, 2.Raw Materials, and 3.Fuels) are referred to as primary products (PP) sectors, while industries 5-8 (5.Chemicals, 6.Basic Manufactures, 7.Machinery and Transport Equipment, and 8.Miscellaneous Manufactures) are referred to as manufactured products (MP) sectors. When relevant, remarks regarding industries 4.Aniamal and Vegetable Oil and Fats and 9.Goods not Classified by Kind are presented separately. Unless otherwise noted, the word "region" is used to refer to either the TEs and/or the developed countries as a group.

6.1 Gravity-type variables

The coefficient for exporter GDP is positive and statistically significant for all the industries for both regions, indicating that the elasticity of substitution in consumption is greater than unity for all countries/industries. Hence, the interpretation of all the coefficients will follow the scenario reported in table 3.

Results indicate that export elasticity with respect to exporter GDP is slightly higher in TEs for almost all industries, ranging from 0.8 to 1.5 (not including industry 4). Importer GDP reflects the market size of the partner country, and has a positive and highly significant effect on exports in all 10 industries in both regions, as expected. Elasticity of industry exports with respect to importer GDP is now lower for TEs for almost all industries and varies between 0.6 and 1.2 (again, not including industry 4). Export level in industry 4 has the lowest response to both exporter and importer GDP changes in both regions.

With respect to importer per capita income the following observations on the coefficient estimates can be made. Products in categories 2 and 3 imported by the West are necessities, while products in categories 0, 1, 5, 8, and 9 appear to be luxury in consumption. On the other side, TEs imports in PP sectors are mostly composed of necessities, while imports in MP sectors are mostly luxury in consumption. A bigger variation in TE export elasticity with respect to importer per capita income as can be attributed to a highly saturated nature of Western markets: developed countries already have a wide variety of products, and hence they will buy from TEs mostly necessities (such as raw materials, fuel) that are in short supply domestically or are some highly differentiated "Eastern wonders" (for example, glassware from Czech Republic).

6.2 H-O type variables

The second panel of results in Tables 4 and 5 contain coefficient estimates for the so-called H-O type variables measuring exporter factor abundance. Effect of these variables can be explained based on "classical" trade theory. More specifically, if we assume, that countries follow their comparative advantage in what they export, than, according to the extended version of H-O theorem, we should observe that countries relatively better

endowed with a given factor export more of the products that use that factor relatively more intensively. Also, according to the generalization of the Rybczynski theorem in a multi-industry world, an increase in a country's endowment of a factor tends to increase the output of industries that use that factor more intensively and reduce the output of industries that use that factor less intensively.

From this point of view, coefficient estimates for variables in this group all seem very plausible, in the sense that all the inferred industry factor-intensities are in line with common logic. It appears that TE exports in PP categories are not capital-intensive, with each 1% increase in country capital endowment reducing exports in these categories by 0.7-2.1%. MP exports range from capital-neutral categories 6 and 8 (coefficient on GDP per capita is insignificant) to the most capital-intensive industry 7 (coefficient is positive), where exports is almost unity elastic with respect to capital endowment. Western exports in chemicals, machinery and transport equipment, and miscellaneous manufactures are considerably more capital-intensive than products from the corresponding categories imported from TEs. Another interesting observation is a relatively high capital-intensity of food and live animals (category 0) products exported from developed countries.

In TE exports, skill level has a very pronounced positive effect on the exports of all MP categories (each 1% increase in the level of skill will lead to an average of 4.5% increase in the exports of manufactured products), has a somewhat smaller effect (2.6%) on PP categories, and is insignificant for categories 1 and 9. Products exported by developed countries are more skill-intensive than products exported by the TEs in all categories, except for miscellaneous manufactures, where skill-intensity of exports from TEs is higher than of the opposite flow.

With respect to land, PP exports from TEs are more land-intensive in all trade categories relative to Western exports in corresponding categories. Within TE exports, PP categories are more land-intensive than MP sectors. It is worth noting that the effect of land endowment on export levels is the smallest in absolute value. Also, the endowment of this resource is more or less fixed – it is limited to the territory of each country. Hence, it can be viewed as a "passive" factor for the purposes of export expansion.

To summarize, TEs appear to be capital and skill scarce relative to developed countries, while at the same time being relatively better endowed with natural resources (captured by land territory). Looking at TE exports, it appears that the way different factors affect export levels in different industries is in line with the perceived factor-intensities of different industries.

To compare labor-intensities of different sectors and regions, note that from (5):

$$\partial \ln(y_i) / \partial \ln(Labor_i) = -(\varphi_4 + \varphi_5 + \varphi_6) \qquad (6)$$

which can be easily calculated from tables 4 and 5. It appears that TE exports is more land-intensive in all categories compared to exports from developed countries, except for

miscellaneous manufactures (sector 8), which is the most labor-intensive export sector for developed countries. In TEs the highest labor-intensity is estimated for beverages and tobacco products (sector 1).

6.3 Trade cost variables

All variables in this group have the expected signs and are highly significant (with just a few exceptions) for all trade categories in both regions.

Distance is a big trade impediment for all the industries, affecting category 6 particularly hard (it contains many heavy and bulky goods). The smallest effect is on industries 4 and 9. On average, distance factor hits the imports into the TEs 0.5% harder than the exports from the TEs.

Markets and trade variable captures the progress of reformation in the spheres affecting foreign trade. It assesses the progress in promoting competition policy and price liberalization, and reformation of trade and foreign exchange system. The reformation process positively influenced trade in most of the industries. The least affected trade flows are western exports in sectors 3 and 6, and TE exports in category 8, the most affected once are TE exports in industries 0 and 5, and western exports in sector 1.

Tables 6 and 7 calculate the percentage changes that each of the dummies included in the regressions will have on the value of industry export and import flows correspondingly.

Common border has an immense effect on intensity of trade between countries. Both exports and imports volumes in all trade categories are higher for TEs that share a border or shoreline with any of the developed countries in the sample. Border effect plays a particularly important role for trade in fuels, intensifying trade in this category by a factor of 20 in the presence of common border/shoreline. TE exports in category 4 and imports in category 9 are also critically affected by border effect in both regions, jumping up by almost 10 times when border dummy is one. Border effect is the mildest for MP exports from developed countries, on average increasing western exports by only 60% with the presence of common border. In TEs, exports categories 1 and 6 are the least effected (which still means a 110%-140% increase in the volume of exports in these industries when there is a common border with the importer).

Foreign trade agreements (FTA) also play an important (although not as crucial as border effect) role in the intensity of trade. The effect of FTA is the most favorable for TE exports in industries 2, 3, 7, and 8 leading to a 150%-200% expansion of export volumes in these sectors. FTA affect Western exports the most in sector 4, which grow some 260%, and in sectors 1 and 9, which expand their sales by 120%-140%.

6.4 Time dummies

Time dummies capture the effect of business cycles on fluctuations in trade flows. Coefficient estimates for time dummies trace one major business cycle that is expanding in the beginning of our time period, picks in 1997-1998, and seems to start declining in 1999. Western exports fluctuates the most with this business cycle. The cycle is less pronounced in exports from TEs: it is still traceable in MP exports, being insignificant or even reversed in PP sectors. This deviation of TE exports from international business cycle can be attributed to the process of reformation that is still under way in many transition countries, and introduces its own internal fluctuations in the region. Moreover, since the process of transition started at different times and progressed with different speed on country as well as industry level, these internal fluctuations are not synchronic across countries and sectors.

6.5 Sub-Region dummies

Sub-regional dummies help to reveal differences between sum-regions not captured by other variable in the model (such as differences in climate, historical and cultural characteristics, political stability, etc.). Sub-regions in this subsection are as defined in table A1 of the appendix.

Compared to other TEs, Armenia's performance is the worst in MP sectors, as well as in some PP sectors. This poor relative export performance can be attributed to political instabilities in the region, particularly strong during the first years of transition. On the import side Armenia dummy for categories 0, 1, and 4 is among the highest, outperforming even Baltic states and CEE, which include the most open economies in the region. In MP imports, Armenia is indistinguishable from Asian republics of the FSU, Russia, Ukraine, Belarus and Moldova (RUBM).

7. Conclusion

Let us now revisit the concept of revealed comparative advantage discussed in section 2, and recalculate RCA values for Armenia using fitted trade values from our estimations. Table 8 reports fitted RCA index for years 1993, 1996, and 1999, as well as the difference between the actual and fitted RCA for the corresponding years.

Interpretation of fitted RCA is the same as before. Numbers in column 2 in the table reflect how close actual and fitted values of RCA index are for different industries, with positive (negative) numbers indicating (dis)similarity in trade composition. In general, it looks like fitted and actual RCA index values tend to converge with the time indicating that country trade flows gradually overcome the distortions inherited from its communistic past.

Table 8. Armenia's revealed comparative advantage revisited

SITC category:		***Column 1*** RCA Index Based on Fitted Trade Values			***Column 2*** Difference between values of Actual and Fitted RCA		
		1993	1996	1999	1993	1996	1999
0	Food and live animals	-0.67	-0.61	-0.20	-0.25	-0.21	-0.74
1	Beverages and tobacco	0.12	-0.07	0.22	-1.12	-0.77	-0.77
2	Raw materials	0.95	0.95	0.92	0.01	-0.14	-0.09
3	Fuels	0.86	0.73	0.75	-1.86	-1.73	-1.75
4	Animal and vegetable oil and fats	0.50	0.46	0.36	-1.50	-1.46	-1.36
5	Chemicals	-0.28	-0.16	-0.37	0.00	-0.68	-0.52
6	Basic manufactures	0.56	0.54	0.54	0.35	-0.07	-0.22
7	Machinery & transport equipment	-0.76	-0.70	-0.67	-0.24	-0.22	-0.22
8	Miscellaneous manufactures	0.12	0.12	0.11	-0.50	-0.26	0.05
9	Goods not classified by kind	0.40	0.55	0.14	-1.36	-1.51	-0.70

Based on information in this table and our findings from the previous section, several conclusions can be made regarding future development of Armenia's trade performance in different industries, in accordance with county's true comparative advantage. Below I present discussion of industry level trade development strategies, with a special stress on export development issues.

Sector 0. Food and Live Animals:

Armenia had strong comparative disadvantage in this sector in 1993, which partially weakened by 1999. However, actual trade flows did not adjust to this improvement falling behind the true comparative advantage. Apparently, some region-specific factors are responsible for relatively poor trade performance in the sector (Armenia dummy for industry exports is among the highest). Some of these regional barriers (such as, climate, quality of land, etc.) can not be changed; others (bad internal transportation system, for example) can be removed to promote industry development. In the meantime, this sector is the most responsive to improvements in markets and trade index, hence internal reformation will greatly facilitate industry export development. Based on difference between fitted and actual export flows in this sector (not reported), UK and Japan were the least exploited markets in 1999.

Sector 1. Beverages and tobacco

For all these years Armenia had (moderate) comparative advantage in this sector, which was not utilized before, but has been slowly exploited during the transition period. Further development of industry export performance can be achieved by targeting high

GDP per capita countries as potential markets. Exports to Germany, France, and Netherlands have the most potential for development.

Sector 2. Raw materials

This is industry where Armenia fully utilizes its trading capacity according to table 8 results. If sustained, high GDP growth rates in Armenia will have very sizeable stimulating effect on the development of exports in this industry. The main impediment for export development in this sector is high transport costs, which can be alleviated by developing better transportation system (including development of new trade routes through neighbor countries) and lower transportation costs per unit of volume/weight. The good news is that trade in raw materials does not seem to depend much on presence of common border, which is a big factor for Armenia. Trade negotiations can help to promote trade in this sector even further. Spain, Israel, and Japan are good markets to exploit.

Sector 3. Fuels

Although table 8 predicts comparative advantage in trade in fuels, this is probably the case where Armenia is an outlier in the sample, having little or zero exports in this category going to the West, and importing from only a few partners. The sector output is very land intensive, sensitive to distance and border effect, limiting development of this industry trade with developed countries.

Sector 4. Animal and Vegetable Oil and Fats

There is some (although, diminishing with the time) comparative advantage in this industry that is not utilized by Armenia. Relatively low trade costs and small border effect make this industry easier to develop. Potential export markets are Germany, Italy, USA, and France.

Sector 5.Chemicals

This is an area of (moderate) comparative disadvantage for Armenia; however Armenia's position in this industry after the beginning of transition quickly worsened beyond what was expected. Development of this industry requires significant inputs of capital, as it is one of the most capital-intensive sectors. It also crucially depends on human capital. Attraction of FDI and investment in human capital are critical for the development of this sector. Further reformation of trade and competition policy will also help to boost industry output. Another big positive factor in industry development is high GDP growth in Armenia. The facts that border effect is not big and distance costs are moderate make

chemicals industry a good candidate for export development. USA, UK, Germany, Italy, and Japan are the best markets to target.

Sector 6. Basic manufactures

This is the area of Armenia's comparative advantage; however, this industry does seem to worsen its performance compared to pre-transition and early transition years. As in the case of raw materials, development of exports in this industry critically depends on lowering transport costs. Border effect is the lowest for this sector. GDP growth in Armenia supports expansion of industry exports. Exports in this sector have the best potential for expansion in France, Italy, Japan, Austria, and Sweden.

Sector 7. Machinery and Transport Equipment

Comparative disadvantage sector, but some products in this category can be developed to improve the overall performance of this industry. HDI, FDI and FTA play a very important role in export development. Higher skill level achieved through better education, health, and living standards (in turn depending on income levels) will have a very favorable effect on Armenia's export expansion in this sector. Industry success also depends on attraction of capital investments and negotiation of trade agreements with partner countries. There are some country-specific factors that negatively influence trade performance in this sector and need to be addressed for better development of the industry. UK, Israel, Netherlands, and Spain are among countries that can become good markets form Armenian exports in this sector.

Sector 8.Miscellaneous manufactures.

From comparative perspective, this industry perforce as it should, fully exploiting its comparative advantage. Skill plays an important role in the development of this sector. FTA can help to promote industry exports. Border effect is relatively moderate role, but there are some substantial negative country effects that require attention. Output in this industry is highly sensitive to importer per capita income, hence it is important to target high per capita GDP countries. Countries that are good potential markets for this sector are Japan, Netherlands, Switzerland, Belgium, and UK.

Sector 9 Goods not Classified by Kind

Armenia's has some (slowly disappearing) comparative advantage in this industry, while performing worth than country characteristics assume. Low distance costs for this sector are more than overweighed by huge border effect – the biggest challenge in the development of exports in this sector. Potential markets for this sector are Italy, Japan, UK, and France.

Appendix

Table A1. Regional grouping of sample countries

Region 1: Transition Economies

Sub-region 1: Caucasus w/o Armenia

- Azerbaijan
- Georgia

Sub-region 2: Asian republics of the Former Soviet Union (FSU)

- Kazakhstan
- Kyrgyzstan
- Tajikistan
- Turkmenistan
- Uzbekistan

Sub-region 3: Baltic States

- Estonia
- Latvia
- Lithuania

Sub-region 4: Russia, Ukraine, Belarus, Moldova (RUBM)

- Russian Federation
- Ukraine
- Belarus
- Republic of Moldova

Sub-region 5: South-Eastern Europe (SEE)

- Albania
- Bulgaria
- Croatia
- Slovenia
- Former Yugoslav Republic Macedonia

Sub-region 6: Central-Eastern Europe (CEE)

- Czech Republic
- Hungary
- Poland
- Romania
- Slovakia

Region 2: Developed Countries

Australia,
Austria,
Belgium-Luxembourg,
Canada,
Denmark,
Finland,
France,
Germany,
Greece,
Iceland,
Ireland,
Israel,
Italy,
Japan,
Netherlands,
New Zealand,
Norway,
Portugal,
Spain,
Sweden,
Switzerland,
the United Kingdom,
the United States of America

Table A2. Summary Statistics for transition economies as exporters

Variable	Measurment Unit	Obs	Mean	Std.	Min	Max
Total Exports	(mln. $US)	4347	174.56	713.94	0	9954.17
Exports by Category:						
SITC0	(mln. $US)	4347	9.15	53.84	0	1351.09
SITC1	(mln. $US)	4347	0.82	3.85	0	75.84
SITC2	(mln. $US)	4347	13.49	53.93	0	840.78
SITC3	(mln. $US)	4347	28.82	254.33	0	6963.17
SITC4	(mln. $US)	4347	0.12	0.80	0	21.33
SITC5	(mln. $US)	4347	11.39	43.32	0	750.74
SITC6	(mln. $US)	4347	46.92	210.32	0	3987.94
SITC7	(mln. $US)	4347	33.32	211.53	0	6127.49
SITC8	(mln. $US)	4347	26.84	135.93	0	2699.73
SITC9	(mln. $US)	4347	3.68	51.68	0	1441.97
Exporter GDP	(bln. $US)	4140	82.9	167.8	5.1	1026.8
Exporter GDP per Capita	($US)	4140	5,196	3,059	846	13,979
Exporter HDI	(index)	4025	0.748	0.070	0.575	0.887
Exporter Land/Labor	(sq. km. per worker)	4186	0.06	0.08	0.01	0.36
Distance	(km.)	4186	4212	4291	56	18840
Markets and Trade Index	(index)	4347	2.6	0.6	1.0	3.5

Table A3. Summary Statistics for developed countries as exporters

Variable	Measurment Unit	Obs	Mean	Std.	Min	Max
Total Exports	(mln. $US)	4347	192.89	736.29	0.00	12830.97
Exports by Category:						
SITC0	(mln. $US)	4347	17.42	72.09	0.00	1422.12
SITC1	(mln. $US)	4347	3.41	15.48	0.00	396.92
SITC2	(mln. $US)	4347	3.50	12.60	0.00	217.71
SITC3	(mln. $US)	4347	4.17	20.67	0.00	506.67
SITC4	(mln. $US)	4347	0.90	5.05	0.00	111.55
SITC5	(mln. $US)	4347	20.84	81.82	0.00	1614.12
SITC6	(mln. $US)	4347	36.71	161.73	0.00	3363.56
SITC7	(mln. $US)	4347	78.36	329.92	0.00	5438.94
SITC8	(mln. $US)	4347	23.84	96.56	0.00	1357.71
SITC9	(mln. $US)	4347	3.76	26.01	0.00	1265.80
Exporter GDP	(bln. $US)	4347	836.6	1591.5	5.8	8165.7
Exporter GDP per Capita	($US)	4347	20,476	3,588	12,755	29,302
Exporter HDI	(index)	4347	0.921	0.018	0.858	0.960
Exporter Land/Labor	(sq.km.)	4347	0.13	0.23	0.00	0.87

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Abbreviations

CEEC	Central-Eastern Europe countries
CIS	Commonwealth of Independent States
EBRD	European Bank for Reconstruction and Development
EC	European Community
EFTA	European Fair Trade Association
EU	European Union
FSU	Former Soviet Union
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
HDI	Human Development Indicator
H-O	Heckscher-Ohlin
MP	Manufactured Products
PP	Primary Products
RCA	Revealed Comparative Advantage
RUBM	Russia, Ukraine, Belarus, Moldova
SEE	South-Eastern Europe
SI	Skill-Intensive
SITC	Standard International Trade Classification
TEs	Transition Economies
USSR	Union of Soviet Socialist Republics
WTO	World Trade Organization

Tables

Figures