



COMPARING THE REAL GROSS DOMESTIC PRODUCT (GDP) OF GEORGIA AND ARMENIA

EXECUTIVE SUMMARY

The comparison of prices and real expenditures between Georgia and Armenia was carried out principally to enable Georgia to be incorporated into the 2011 round of the International Comparison Program (ICP) which is being coordinated by the World Bank to cover nearly 200 economies. This report deals only with the results of the bilateral comparison between Georgia and Armenia. This is interesting in its own right as they are countries of a similar size and with close economic links.

With Georgia = 100, real per capita GDP in Armenia was 105.3 in 2011 compared with 114.3 in 2005. Armenia is still richer than Georgian in terms of per capita GDP but the gap is narrowing. With Georgia = 100, the price level for GDP in Armenia was 98.9 in 2011 compared with 95.7 in 2005. The GDP price level in Georgia is still higher than in Armenia but the gap has almost disappeared. Between 2005 and 2011 the two countries became more similar as regards both real per capita GDP and overall price levels.

Other key findings:

- In 2011, Armenians bought nearly twice the volume of food in shops as the Georgians: Georgians apparently make up the difference by eating more meals in restaurants.
- The same appears to be true regarding beverages. For example, in 2011 Armenians bought 83 per cent more non-alcoholic beverages in shops than the Georgians but Georgians drink more such beverages in bars and restaurants.
- In 2011, Georgians consumed 80 per cent more tobacco per capita than Armenians even though the average price of tobacco products was 12 per cent higher in Georgia.
- In 2011, compared with Armenians Georgians consumed significantly more health services, household furnishings, equipment and maintenance, and spent more on the operation of transport equipment, and on machinery and equipment for industry. Compared with Georgians, Armenians purchased significantly more clothing, footwear, transport equipment, communications services and construction.
- For most consumer goods and services price levels were similar in the two countries in 2011. The main exceptions are bakery and dairy products, alcohol, tobacco, accommodation, education and transport services which were all over 10 per cent more expensive in Georgia: oils and fats for cooking, fruit and vegetables, transport equipment, and communications services were all over 10 per cent more expensive in Armenia.
- The price levels for investment goods were higher in Armenia than in Georgia both in 2005 and 2011. The average prices of machinery and equipment were nearly 20 per cent higher in Armenia in 2011 (4 per cent higher in 2005): the price level index for building and construction was about 5 per cent higher in Armenia in 2011 (11 per cent higher in 2005).

This project required close collaboration between the two countries in the collection of prices for over 1200 items, in their verification to ensure that like was being compared with like, and in calculating Purchasing Power Parities and Real Expenditures. The successful completion of the project is a proof of the excellent professional cooperation between statisticians in ARMSTAT and GEOSTAT.

ACKNOWLEDGEMENTS

The comparison of prices and real expenditures was a joint project carried out by the national statistical agencies of Armenia and Georgia - ARMSTAT and GEOSTAT – together with the ICP Global Office hosted at the World Bank

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The ICP Global Office ensured that funding was provided by the World Bank and other donors to cover the participation costs of Armenian and Georgian staff in the nine consultations that were held in Tbilisi and Yerevan from 2010 to 2013. The ICP Global Office also provided three advisors to assist in the comparison: Derek Blades and David Roberts, international statistical consultants, and Sergey Sergeev, Senior Economist and Statistician in Statistics Austria.

The results of this comparison have been incorporated into the 2011 round of the International Comparison Program (ICP) which was coordinated by the ICP Global Office hosted at the World Bank.

This joint project has provided both countries with the opportunity to learn from each other and to adopt better international practices in the areas of price statistics and national accounts. It is an example of the excellent professional relations that exists between statisticians in the two countries.

Our thanks and congratulations to all concerned for the successful completion of this project.

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COMPARING THE REAL GDP OF GEORGIA AND ARMENIA

Introduction

In 2011 the statistical offices of Georgia and Armenia collected the prices of a large common set of goods and services. The purpose was to estimate the price levels in each country so that the Gross Domestic Products (GDP) and the main expenditure components of the two countries could be compared on a real basis. A “real basis” means that the comparison is made between the **volumes** of goods and services being consumed in each country. In the same way that we have to eliminate **price changes** from one year to the next when we measure the real growth of a single country’s GDP, so we must eliminate **price differences** between countries when we want to make a real comparison of their GDP at a single point in time.

This joint project between GEOSTAT and ARMSTAT is part of the *International Comparison Program* (ICP) which is being organized by the World Bank¹ to make global comparisons for nearly 200 countries for the year 2011. The report on the ICP 2011 was published in the first half of 2014 and shows the relative sizes of total and per capita real GDP for Georgia and Armenia in the world as a whole. This report deals only with the bilateral comparison between Georgia and Armenia. It shows the relative sizes of real GDP in each country, both total GDP and on a per capita basis. As well as GDP as a whole, this report also compares the relative sizes of the main expenditure components of GDP, namely: household consumption expenditure, government consumption expenditure, and gross fixed capital formation (or “investment”) and some important product groups within those expenditure components. In addition to these real GDP figures, this report also shows the relative price levels of various goods and services in the two countries.

The report on the 2011 ICP gives results for Georgia and Armenia in international dollars but the relative sizes of the two countries’ GDP and expenditure components are exactly the same as shown in this report.

How the real expenditure comparisons were made²

When we calculate a price index such as the *Consumer Price Index* we first calculate the price changes from one period to another by dividing the present price of each item selected for the index by its price in an earlier period. These price changes are then averaged to obtain the overall index using weights that represent the relative importance of each item. The Consumer Price Index is a “temporal” index: it measures price changes over time. When we calculate a “spatial” price index to compare price differences between countries, we proceed in exactly the same way. We divide the prices of different kinds of meat in Georgia with the prices of the same items in Armenia – each in their own currencies, Lari and Dram respectively. The price-relatives of the different kinds of meat are used to obtain the average price relative – or “Purchasing Power Parity” (PPP) - for the product group - *Meat*. Next, the PPPs for meat and other kinds of food are averaged using the shares of expenditures on meat and the other food items in GDP to get the PPP for *Food*. Subsequently, the PPP for food is averaged, again using expenditure weights that reflect their importance in GDP, with the PPPs for all other types of expenditures to get the overall PPP – or “inter-country price index” - for GDP. As the expenditure shares are different in Georgia and Armenia, we use each country’s expenditure shares as the weights and average two results.

Table A shows how PPPs are used to “deflate” nominal expenditures as reported by each country in their own currency to obtain **real expenditures**, which are the main objective of the comparison.

¹ The World Bank funded consultants to advise on this bilateral comparison, but the data collection and verification and the calculations were carried out by statisticians from GEOSTAT and ARMSTAT. For more information on the ICP 2011 see http://siteresources.worldbank.org/ICPEXT/Resources/ICP_2011.html

² A Technical Annex gives more details of the calculation of Purchasing Power Parities for this comparison.

Columns (1) and (2) give the expenditures on three consumer product groups as reported by Armenia and Georgia in their national accounts. Columns (3) and (4) show each country's expenditure relative to the other: there are two expenditure relatives - one with Armenia as the base country (ARM = 1) and one with Georgia as base (GEO = 1). Note that each is the inverse of the other – i.e. (GEO = 1) can be obtained as 1/ (ARM = 1)

Columns (5) and (6) show the price relatives or PPPs. There are again two ways to present these – either with Armenian currency as base (AMD = 1) or with Georgian currency as base (GEL = 1): each is the inverse of the other.

The last two columns show the real expenditures relatives which are obtained by dividing the nominal expenditure relatives in columns (1) and (2) by the PPPs in columns (5) and (6). There are again two real expenditure relatives depending on which country is chosen as the base country. Each one is just the inverse of the other.

Column (7) shows that when Armenia's real expenditure on *Food* is set at 100.0, Georgia's real expenditures on *Food* is only 72.0. Alternatively, column (8) shows that when Georgia's real expenditure is set at 100.0, Armenia's real expenditure on food is 138.9. Clearly Armenia's real expenditures on *Food* are substantially larger than Georgia's. The same is true for the other two product groups in Table A. Note that these are **total** real expenditures. They can be put on a **per capita** basis by dividing by each country's population. That has not been done here but per capita figures are shown in the main tables below.

Table A: EXAMPLE OF HOW PPPS ARE USED TO OBTAIN REAL EXPENDITURES								
	NOMINAL EXPENDITURES				PRICE RELATIVES (i.e. Purchasing Power Parities or PPP)		REAL EXPENDITURE RELATIVES	
	ARM	GEO	Expenditure Relatives					
	Mio Dram	Mio Lari	ARM=1	GEO=1	AMD=1	GEL=1	ARM=100	GEO=100
	(1)	(2)	(3) = (2)/(1)	(4) = (1)/(2)	(5)	(6)	(7) = [(3)/(5)] x 100	(8) = [(4)/(6)] x 100
Food	1 738 749	5 632	0,003239	308,73	0,004518	221,34	71,7	139,5
Non-alcoholic beverages	91 926	359	0,003905	256,06	0,004808	207,99	81,2	123,1
Alcoholic beverages	123 914	618	0,004987	200,51	0,005723	174,73	87,1	114,8

Comparing price levels in Georgia and Armenia

The price relatives - or PPPs - are the ratios of national prices in Lari in Georgia and in Dram in Armenia. As a result, the PPP does not look like a temporal price index such as the Consumer Price Index which is calculated as a ratio of prices in the same currency and is conventionally shown as 100.0 in the base year. To better understand and make use of PPPs they can be “normalized” by dividing them by the exchange rate between the Lari and Dram and multiplying by 100. This gives what are usually called “Price Level Indices” (PLIs): they show the price level differences that have to be eliminated to make proper volume comparisons. Table B shows how the PLIs are calculated for the same three product groups as in Table A.

Columns (1) and (2) are the PPPs taken from Table A. Columns (3) and (4) give the exchange rates – respectively, the number of Lari that can be bought for one Dram and the number of Drams for one Lari. Columns (5) and (6) give the Price Level Indices (PLIs) for the three product groups in Armenia and Georgia respectively: they are the PPPs divided by the exchange rates and multiplied by 100.

Food has similar price levels in both countries but *Non-alcoholic* and *Alcoholic beverages* have higher price levels in Georgia. When Armenians change their Dram to Lari they will find that these products are more expensive in Georgia and *vice versa* for Georgians visiting Armenia.

	PURCHASING POWER PARITIES (PPP)		EXCHANGE RATE		PRICE LEVEL INDEX (PLI)	
	AMD=1	GEL=1	AMD=1	GEL=1	ARM=100	GEO=100
	(1)	(2)	(3)	(4)	(5) = (1)/(3)	(6) = (2)/(4)
Food	0,004518	221,34	0,004526	220,932	99,8	100,2
Non-alcoholic beverages	0,004808	207,99	0,004526	220,932	106,2	94,1
Alcoholic beverages	0,005723	174,73	0,004526	220,932	126,4	79,1

Four problem areas

For most kinds of expenditures PPPs can readily be calculated by comparing purchasers' prices of the same goods and services in different countries, but for some expenditures special methods need to be adopted.

Rents for dwellings

Household consumption expenditure includes **rentals for dwellings**. According to the internationally agreed System of National Accounts (SNA)³ these include both rentals actually paid by tenants to owners and **imputed rents** for owner-occupiers who are considered by the SNA to be paying rent to themselves. The SNA suggests that rents "paid" by the owners of these houses or flats should be imputed using rents actually paid for similar houses or apartments. Both countries have difficulty in finding actual rents for the large variety of houses and apartments that are owner-occupied. As a result the national accounts estimates of rentals for dwellings may be of rather poor quality. Volume relatives are usually obtained by dividing expenditure relatives by PPPs but if the expenditure relatives are poorly estimated then the volume relatives will also be of poor quality. Therefore, instead of deriving relative volumes **indirectly** from PPPs and expenditure data, volume relatives for

³ The System of National Accounts (SNA) has been drawn up by a consortium of international agencies in consultation with their member countries. The 1993 version of the SNA is the recommended system for the ICP 2011. The SNA 1993 can be downloaded at <http://unstats.un.org/unsd/nationalaccount/sna.asp>

rentals for dwellings have been estimated **directly** by comparing the volumes of “dwelling services” consumed in the two countries.

The volume relatives have been calculated as follow:

- The floor-space of dwellings in square metres is taken as a quantity indicator of the dwelling services in the two countries;
- A quality indicator was calculated as the average of the percentages of dwellings in each country that have electricity, that have piped water, and that have an inside toilet;
- Each country’s total floor space is multiplied by the quality indicator to obtain a “quality-adjusted” indicator of the volume of dwelling services;
- The volume relatives are obtained as each country’s quality-adjusted quantity indicator divided by the other’s.

Building and construction

Gross fixed capital formation (GFCF) is one of the expenditure components of GDP for which prices had to be collected. GFCF includes **building and construction** and this causes a special problem because no two buildings or construction projects are exactly the same. This means it is not possible to compare the purchasers’ price of the same buildings, bridges, roads and so on in the two countries. Instead of comparing prices of actual buildings and construction projects, prices of inputs were collected i.e. prices of building materials, labour and hire of equipment. Technical coefficients were then used to combine these input prices in order to estimate the purchasers’ prices of a representative range of standard buildings and construction projects such as an apartment block, a kilometer of highway, a primary school, a supermarket, a factory building, and so on. The price comparison between Georgia and Armenia was based on the estimated costs of these various standard buildings and construction projects. These standard buildings and construction projects are “imaginary” as none were actually constructed in either country in 2011. However they are representative of the different sorts of structures that were actually put in place.

Government services

Government presents another problem. Government expenditure on providing services like defense, law and order, health, education, tax collection, and so on, is one of the components of the GDP. But none of these government services are sold so that there are no prices that can be compared between the two countries. Instead of comparing prices, therefore, the comparison has to be based on the **costs** of providing government services. Wages and salaries are the major cost and the comparison of government services between Georgia and Armenia was mainly determined by differences between the two countries in the wages and salaries of a range of government occupations – police officers, teachers, tax collectors, statisticians and the like.

Reference PPPs

The ICP Classification for GDP contains 183 detailed product groups. Prices have not been collected for some of these groups either because they account for a very small share of GDP or because prices are not available. Product groups for which no prices were collected have been assigned **reference PPPs**. Reference PPPs are either those that have been calculated for a product group whose price relatives are thought to be similar to those of the group for which no prices have been collected, or they are “neutral” PPPs meaning that they will have very little impact on the major expenditure aggregate to which the product group belongs. For example, the average PPP for all product groups for which prices have been collected under the major aggregate GFCF is used as a reference PPP for product groups under GFCF for which no prices have been collected. For this comparison between Georgia and Armenia, reference PPPs have been used for 41 product groups.

The reference PPPs and the solutions and decisions adopted for the other three problems have been agreed with the ICP Global office and similar methods are being used by the other countries participating in the 2011 ICP.

Reliability of the results

The reliability of the PPPs and the real GDP estimates shown below depends on:

- The accuracy and comparability of the GDP estimates in each country;
- The accuracy of the detailed expenditure weights; and
- The accuracy and comparability of the price data.

Both GEOSTAT and ARMSTAT have been compiling GDP estimates for more than two decades and have continued to improve the coverage and reliability of their estimates as new information becomes available and as better methods of compilation are adopted. Both countries follow the 1993 System of National Accounts (SNA) so their GDP estimates are compiled following the same definitions and rules.

For this comparison GEOSTAT and ARMSTAT were required to break down their total GDP into 183 detailed product groups. This is more detail than either country shows in their regular GDP estimates and some of these expenditure weights may be rather approximate at least for items that only account for small shares of total GDP. For the larger, more important, groups the weights are much more accurate. Note that this is not the first time that GEOSTAT and ARMSTAT have had to break GDP down in this amount of detail. Both countries have been participating in international comparisons for more than twenty years and so were able to build on past experience in estimating expenditures for the 183 product groups.

Both countries collected prices from a representative selection of outlets - supermarkets, convenience stores, covered markets, open markets, small shops, and kiosks. In Georgia, prices were collected only in Tbilisi and were converted to national average Georgia prices using adjustment factors taken from GEOSTAT's *Consumer Price Index* which covers the four largest cities after Tbilisi. In Armenia, prices were collected in the 3 largest cities (Yerevan, Gyumri, Vanadzor) and averaged to obtain national Armenian prices.

Care was taken to ensure that "like was compared with like". Each item to be priced was carefully defined to ensure strict comparability between the items whose prices were being collected in the two countries. Both countries used the *Structured Product Descriptions* developed by the ICP Global Office. For food items, for example, the quantity, type of packaging, and quality features were all specified to ensure that the items being priced were as comparable as possible. In many cases brands-names were used to ensure even better comparability - for example McDonald's cheeseburger, Nescafe instant coffee, Coca Cola Lite, Uncle Ben's rice, and Marlboro cigarettes.

It is obviously not feasible to collect the price of every single item available in each country so the prices used in these calculations were collected for only a selection of all the goods and services that can be found in Georgia and Armenia. The overall reliability of the price comparisons depends, therefore, on the extent to which the prices of this small selection reflect the prices of the items that were not selected. Care was taken to identify items that are most commonly purchased in each country and most of the prices collected were for goods and services judged to be important in each country.

All statistics are subject to error, but the World Bank advisors have concluded that the estimates given here are based on statistics that have been carefully collected and verified and that the overall reliability is high. They also consider that the PPPs and real expenditure shown here are as reliable as

those of many of the countries participating in the Eurostat-OECD PPP Programme which has been running for many years and so has achieved good standards of accuracy.⁴

Results

Tables 1 to 3 give the results of the bilateral comparison between Georgia and Armenia for 2011. Table 4 gives comparable results from the 2005 round of the ICP as some readers will be interested to see how relative price levels and real expenditures have changed since then. Georgia participated in the ICP 2005 as a member of the CIS regional group and this means that the Georgia-Armenia comparison for 2005 is based on a **multilateral** rather than a **bilateral** comparison. In a multilateral comparison each country's results are influenced to some extent by the data supplied by all the other countries in the group. Strictly speaking, therefore, a two-country comparison taken from a multilateral comparison is not fully comparable with a bilateral comparison restricted to the two countries concerned. If a bilateral comparison between Georgia and Armenia had been made in 2005 the results would not be exactly the same as those given in Table 4, but in practice the differences would usually be small.

Table 1 refers to **actual individual consumption** of households rather than to final **consumption expenditure**. Actual consumption of households consists of what households spend directly on goods and services plus the value of the services they receive on an individual basis from government – mainly education, health and recreation and cultural services.

Looking first at the per capita volume indices in Table 1:

- Georgia's real expenditure on *Food* is less than half of that in Armenia. Here *Food* means raw or prepared food bought in shops and Georgians make up for their lower *Food* expenditures by consuming more restaurant meals. Georgian real expenditures on *Hotels and restaurants* (mainly expenditure on restaurants in Georgia's case) is twice as high as in Armenia.
- Armenian real expenditure on *Beverages* (both alcoholic and non-alcoholic) is substantially higher than in Georgia. For example, with Georgia = 100, Armenia's per capita volume index for *Non-alcoholic beverages* is 182.3. As in the case of *Food*, Georgians consume more *Beverages* of all kinds in restaurants and bars than the Armenians.
- Georgians consume about 80 per cent more *Tobacco* than Armenians: with Armenia = 100, the per capita volume index for Georgia is 183.2. This is despite the 12 per cent higher prices of tobacco products in Georgia.
- Georgians consume substantially more *Household furnishings, equipment and maintenance services, Transport, and Recreation and culture* than Armenians, while Armenians consume more *Clothing and footwear* and *Communications* services than the Georgians.
- Georgian consumption of both *Health* and *Education* services is higher than in Armenia: with Armenia = 100, Georgia's per capita volume indices are 115.1 and 108.8 respectively.

In general, price levels are rather similar in the two countries and the PLIs in Table 1 are mostly within 10 per cent of each other. The main exceptions are:

- As regards consumer goods and services, Armenian price levels are more than 10 per cent lower than in Georgia for *Bread and cereals, Milk, cheese and eggs, Alcoholic beverages, Tobacco, Housing, electricity and fuels, Transport services* and *Education*. In Georgia, price levels are more than 10 per cent lower than in Armenia for *Oils and fats, Fruit and vegetables, Transport equipment* and *Communications* services. The price level difference for

⁴ The Eurostat-OECD PPP Programme covers all member states of the European Union, EU candidate countries, and the United States, Canada, Mexico, Chile, Japan, Korea, Australia, New Zealand, Russia, and Israel. For full details see *Eurostat-OECD Methodological Manual on Purchasing Power Parities, 2012 edition*, Eurostat and OECD, Luxembourg 2012.

Communications was particularly marked: the price level in Armenia was over 50% higher than in Georgia.

- The price levels for investment goods were higher in Armenia than in Georgia. The average prices of machinery and equipment were nearly 20 per cent higher in Armenia and the price level index for building and construction was about 5 per cent higher in Armenia.
- The price level of *Actual collective consumption* is just over 10 per cent higher in Georgia. This consists of government expenditure on general public services, defence, public order and safety, economic affairs, environment protection, and housing and community amenities. The price level is higher in Georgia because government employees in these activities are paid more than their Armenian counterparts.

As noted above, Table 1 shows *Actual Individual consumption* by households. This consists of what households spend directly plus the value of the services – mainly health and education - supplied to them on an individual basis by the government. Table 2 shows *Final consumption expenditures* by households and government – that is what households and governments spend directly. The per capita volume indices for households' final consumption expenditures show that Armenian households spent about 23 per cent more than Georgian households. Government *Individual consumption expenditure* is also higher in Armenia than in Georgia: with Georgia = 100 the per capita volume index for Armenia was 147.2. Another way of putting it is that Georgian households spend less money on goods and services than Armenian households and they also get fewer individual services such as government health, education, recreational and cultural services.

Table 3 compares expenditures in the two countries on **goods** as opposed to **services**. Armenians consume about one third more goods than the Georgians. The difference is particularly large for *Non-durable goods* (e.g. food) and rather smaller for *Semi-durable goods* (e.g. clothing, footwear). On the other hand, Georgians consume more *Durable goods* (e.g. motor cars, refrigerators) and they also consume about one third more consumer services than Armenians (e.g. restaurants, recreation, and transport). Georgians, however, consume substantially fewer *Individual services of government* (e.g. cultural services and education): with Armenia = 100 per capita consumption of individual government services was only 68 in Georgia. As regards price levels, in Armenia *Durable goods* are about 10 per cent more expensive and *Capital goods* (e.g. machinery, equipment, and buildings) are about 7 per cent more expensive. Total services are more expensive in Georgia by around 7 per cent on average, but this is due to the higher price level for Government services. Consumer services (e.g. transport, communications, and personal services) have about the same price level in both countries.

Table 4 shows the main results for 2005⁵ and these can be compared with the corresponding figures for 2011 in Table 1. Some key findings:

- In terms of total GDP Georgia is catching up with Armenia. With Georgia = 100, the per capita volume index for Armenia was 114.3 in 2005 indicating that real GDP per head in Armenia was about 14 per cent above that in Georgia. By 2011, however, Armenia's per capita volume index, with Georgia again = 100, had fallen to 105.3 meaning that by 2011 per capita GDP in Armenia was only about 5 per cent higher than Georgia's.
- Price levels are also converging; with Armenia = 100, Georgia's GDP price level index in 2005 was 104.5 – 4.5 per cent higher than in Armenia, but by 2011 the GDP price level had fallen 101.1 – just 1.1 per cent above the overall price level in Armenia.
- Relative to Armenians, Georgians increased their consumption of *Milk, cheese and eggs, Oils and fats, Non-alcoholic beverages, Household furnishings, equipment and maintenance, and Education* but, compared to Armenians, they consumed less *Health, Transport* and

⁵ Armenian national accounts data and population figures submitted by ARMSTAT for the 2005 round of ICP were later revised and the figures in Table 4 reflect these revisions. As a result the figures in Table 4 differ from the official 2005 results.

Communications services. There was also a big change for *Hotels and restaurants*: in 2005, per capita consumption in Georgia was nine times higher than in Armenia but by 2011 Georgia's per capita volume index was only twice as high as Armenia's. The likely explanation is that more Armenians are using these services and more tourists visited Armenia in 2011.

- Relative to Georgia, between 2005 and 2011 price levels in Armenia fell for *Milk, cheese and eggs, Non-alcoholic beverages, Alcoholic beverages, Education, and Restaurants and hotels*. However, between 2005 and 2011, price levels in Armenia rose compared to Georgia, for *Oils and fats, Tobacco, Communications, and Housing, water, electricity, gas and other fuels*.

TABLE 1: MAIN RESULTS BY PRODUCT GROUPS: 2011

	Nominal expenditures (Million units of national currency)		Nominal expenditures (Per cent of GDP)		GEORGIA (Armenia as base)			ARMENIA (Georgia as base)		
	ARMENIA	GEORGIA	ARMENIA	GEORGIA	PPPs	Price level indices	Per capita volume indices	PPPs	Price level indices	Per capita volume index
					(Armenia = 1.00)	(Armenia = 100)	(Armenia = 100)	(Georgia = 1.00)	(Georgia = 100)	(Georgia = 100)
Gross domestic product	3 777 946	24 344	100,0	100,0	0,004578	101,1	95,0	218,434	98,9	105,3
Actual individual consumption	3 356 372	19 073	88,8	78,3	0,004626	102,2	82,9	216,180	97,8	120,6
Food and non-alcoholic beverages	1 830 675	5 991	48,5	24,6	0,004534	100,2	48,7	220,573	99,8	205,3
Food	1 738 749	5 632	46,0	23,1	0,004518	99,8	48,4	221,342	100,2	206,7
Bread and cereals	342 279	1 109	9,1	4,6	0,005143	113,6	42,5	194,428	88,0	235,4
Meat	307 108	873	8,1	3,6	0,004496	99,3	42,7	222,427	100,7	234,3
Milk, cheese and eggs	327 619	1 393	8,7	5,7	0,005615	124,1	51,1	178,084	80,6	195,7
Oils and fats	113 174	350	3,0	1,4	0,003758	83,0	55,6	266,120	120,5	179,8
Fruits, vegetables and potatoes	502 641	1 245	13,3	5,1	0,003458	76,4	48,3	289,209	130,9	206,9
Non-alcoholic beverages	91 926	359	2,4	1,5	0,004808	106,2	54,9	207,992	94,1	182,3
Alcoholic beverages and, tobacco	151 868	1 004	4,0	4,1	0,005527	122,1	80,7	180,918	81,9	124,0
Alcoholic beverages	123 914	618	3,3	2,5	0,005723	126,4	58,8	174,726	79,1	170,1
Tobacco	27 953	386	0,7	1,6	0,005081	112,2	183,2	196,828	89,1	54,6
Clothing and footwear	116 724	485	3,1	2,0	0,004635	102,4	60,5	215,770	97,7	165,3
Housing, water, electricity, gas and other fuels	270 741	2 117	7,2	8,7	0,005150	113,8	102,5	194,177	87,9	97,6
Household furnishings, equipment and maintenance	46 092	715	1,2	2,9	0,004503	99,5	232,5	222,065	100,5	43,0
Health	205 389	1 757	5,4	7,2	0,005014	110,8	115,1	199,446	90,3	86,8
Transport	173 209	1 746	4,6	7,2	0,004650	102,7	146,3	215,060	97,3	68,4
Transport equipment	42 961	208	1.1	0.9	0.003784	88.6	86.4	264.240	119.6	115.8
Operation of transport equipment	51 066	1 100	1.4	4.5	0.004496	99.3	323.3	222.403	100.7	30.9
Purchased transport services	79 182	438	2.1	1.8	0.005406	119.4	69.0	184.986	83.7	144.8
Communication	178 606	563	4,7	2,3	0,002925	64,6	72,7	341,845	154,7	137,5
Recreation and culture	76 745	1 435	2,0	5,9	0,004313	95,3	292,5	231,876	105,0	34,2
Education	149 624	1 328	4,0	5,5	0,005506	121,7	108,8	181,608	82,2	91,9
Restaurants and hotels	39 709	628	1,1	2,6	0,004561	100,8	234,1	219,252	99,2	42,7
Actual collective consumption	292 997	3 375	7,8	13,9	0,005008	110,7	155,2	199,666	90,4	64,4
Gross fixed capital formation	982 731	5 474	26,0	22,5	0,004216	93,2	89,1	237,174	107,4	112,2
Machinery and equipment	163 530	2 045	4,3	8,4	0,003785	83,6	222,9	264,213	119,6	44,9
Construction	793 312	2 641	21,0	10,8	0,004333	95,7	51,8	230,781	104,5	192,9
Net exports	-891 488	-4 511	-23.6	-18.5	0,004526	100,0	---	220,932	100,0	---

TABLE 2: FINAL CONSUMPTION EXPENDITURE : 2011

	Nominal expenditures (Million units of national currency)		Nominal expenditures (Per cent of GDP)		GEORGIA (Armenia as base)			ARMENIA (Georgia as base)		
					PPPs	Price level indices	Per capita volume indices	PPPs	Price level indices	Per capita volume index
	ARMENIA	GEORGIA	ARMENIA	GEORGIA	(AMD = 1.00)	(Armenia = 100)	(Armenia = 100)	(GEL = 1.00)	(Georgia = 100)	(Georgia = 100)
Final consumption expenditure	3 649 369	22 448	96,6	92,2	0,004666	103,1	89,0	214,325	97,0	112,4
Household final consumption expenditure	3 144 469	17 361	83,2	71,3	0,004574	101,1	81,4	218,615	99,0	122,8
Government final consumption expenditure:	488 400	4 431	12,9	18,2	0,005141	113,6	119,1	194,523	88,0	84,0
Individual consumption expenditure	195 403	1 055	5,2	4,3	0,005362	118,5	68,0	186,505	84,4	147,2
Collective consumption expenditure	292 997	3 375	7,8	13,9	0,005008	110,7	155,2	199,666	90,4	64,4

TABLE 3: GOODS AND SERVICES: 2011

	Nominal expenditures (Million units of national currency)		Nominal expenditures (Per cent of GDP)		GEORGIA (Armenia as base)			ARMENIA (Georgia as base)		
					PPPs	Price level indices	Per capita volume indices	PPPs	Price level indices	Per capita volume index
	ARMENIA	GEORGIA	ARMENIA	GEORGIA	(AMD = 1.00)	(Armenia = 100)	(Armenia = 100)	(GEL = 1.00)	(Georgia = 100)	(Georgia = 100)
Total goods	3 471 886	17 043	91,9	70,0	0,004451	98,3	74,4	224,653	101,7	134,4
Consumer goods:	2 489 155	11 569	65,9	47,5	0,004562	100,8	68,7	219,195	99,2	145,5
Non-durable goods	2 261 366	9 966	59,9	40,9	0,004587	101,4	64,8	217,984	98,7	154,3
Semi-durable goods	141 199	885	3,7	3,6	0,004560	100,8	92,7	219,286	99,3	107,8
Durable goods	86 590	717	2,3	2,9	0,004078	90,1	137,1	245,197	111,0	72,9
Capital goods	982 731	5 474	26,0	22,5	0,004216	93,2	89,1	237,174	107,4	112,2
Total services	1 148 409	10 880	30,4	44,7	0,004834	106,8	132,2	206,868	93,6	75,6
Consumer services	643 510	5 793	17,0	23,8	0,004592	101,5	132,3	217,771	98,6	75,6
Government services:	488 400	4 431	12,9	18,2	0,005141	113,6	119,1	194,523	88,0	84,0
Individual services	195 403	1 055	5,2	4,3	0,005362	118,5	68,0	186,505	84,4	147,2
Collective services	292 997	3 375	7,8	13,9	0,005008	110,7	155,2	199,666	90,4	64,4

TABLE 4: MAIN RESULTS BY PRODUCT GROUPS: 2005

	Nominal expenditures (Million units of national currency)		Nominal expenditures (Per cent of GDP)		GEORGIA (Armenia as base)			ARMENIA (Georgia as base)		
	ARMENIA	GEORGIA	ARMENIA	GEORGIA	PPPs	Price level indices	Per capita volume indices	PPPs	Price level indices	Per capita volume index
					(AMD = 1.00)	(Armenia = 100)	(Armenia = 100)	(GEL = 1.00)	(Georgia = 100)	(Georgia = 100)
Gross domestic product	2 242 881	11 282	100,0	100,0	0,004133	104,5	87,5	241,982	95,7	114,3
Actual individual consumption	1 786 190	8 419	79,6	74,6	0,004074	103,1	83,1	245,451	97,0	120,3
Food and non-alcoholic beverages	1 131 930	2 611	50,5	23,1	0,003729	94,3	44,5	268,194	106,0	224,9
Food	1 067 763	2 557	47,6	22,7	0,003726	94,3	46,2	268,360	106,1	216,6
Bread and cereals	262 841	656	11,7	5,8	0,003842	97,2	46,7	260,288	102,9	214,2
Meat	143 998	333	6,4	3,0	0,003944	99,8	42,1	253,555	100,2	237,4
Milk, cheese and eggs	209 363	539	9,3	4,8	0,004314	109,1	42,9	231,791	91,6	233,0
Oils and fats	80 231	147	3,6	1,3	0,003903	98,7	33,8	256,237	101,3	296,0
Fruits, vegetables and potatoes	294 288	608	13,1	5,4	0,003142	79,5	47,2	318,220	125,8	211,8
Non-alcoholic beverages	64 167	55	2,9	0,5	0,003525	89,2	17,4	283,707	112,2	574,4
Alcoholic beverages and, tobacco	60 019	456	2,7	4,0	0,004233	107,1	128,9	236,237	93,4	77,6
Alcoholic beverages	37 992	118	1,7	1,0	0,003204	81,0	69,7	312,117	123,4	143,6
Tobacco	22 027	338	1,0	3,0	0,005604	141,8	196,5	178,449	70,5	50,9
Clothing and footwear	53 650	217	2,4	1,9	0,003887	98,3	74,9	257,293	101,7	133,5
Housing, water, electricity, gas and other fuels	128 418	1 009	5,7	8,9	0,005596	141,6	100,9	178,693	70,6	99,1
Household furnishings, equipment and maintenance	30 637	242	1,4	2,1	0,003640	92,1	155,7	274,737	108,6	64,2
Health	90 401	937	4,0	8,3	0,004263	107,8	174,8	234,597	92,7	57,2
Transport	85 058	1 057	3,8	9,4	0,004100	103,7	217,9	243,931	96,4	45,9
Communication	19 552	349	0,9	3,1	0,004419	111,8	290,3	226,312	89,5	34,5
Recreation and culture	25 254	430	1,1	3,8	0,004189	106,0	292,3	238,719	94,4	34,2
Education	86 203	345	3,8	3,1	0,004077	103,1	70,6	245,283	97,0	141,7
Restaurants and hotels	11 324	513	0,5	4,5	0,003585	90,7	907,4	278,930	110,3	11,0
Actual collective consumption	143 786	1 035	6,4	9,2	0,005622	142,2	92,0	177,887	70,3	108,7
Gross fixed capital formation	667 323	3 261	29,8	28,9	0,003804	96,2	92,3	262,852	103,9	108,3
Machinery and equipment	84 807	1 394	3,8	12,4	0,003565	90,2	331,2	280,485	110,9	30,2
Construction	576 932	1 763	25,7	15,6	0,003903	98,7	56,3	256,236	101,3	177,7

TECHNICAL ANNEX

Purchasing power parities (PPPs) for primary product groups

Each country's GDP was broken down into 183 primary product groups such as: *Rice, Meat, Clothing, Transport equipment, and Non-residential buildings*. The bilateral list representing these 183 groups included the following number of items:

	Number of items priced in both countries
Consumer Surveys	
Food	321
Clothing and footwear	207
Household products	179
Services	113
Furniture	61
Health	89
Transport equipment	31
Transport, restaurants, hotels	84
Total consumer items	1085
Capital Goods Surveys	
Machinery and equipment	104
Construction materials	44
Total capital items	148
Total consumer and capital items	1233

For example, under the group *Rice* prices were collected for eight different kinds of rice. For each kind of rice, price relatives were calculated by comparing the Georgian price in Lari of a particular kind of rice with the Armenian price in Dram for the same kind of rice. The geometric average of the price relatives for the different kinds of rice was calculated to produce a price relative for the group *Rice* as a whole⁶. These averages of the price relatives for homogeneous products are called "PPPs for primary product groups". Note that there are two forms of the presentation of PPPs for primary groups (each one is just the inverse of the other), i.e:

$$PPP_{Group}^{G/A} = \sqrt[n]{\prod_{i=1}^n \frac{p_i^G}{p_i^A}} \text{ and } PPP_{Group}^{A/G} = \sqrt[n]{\prod_{i=1}^n \frac{p_i^A}{p_i^G}}$$

where *A* and *G* are Armenia and Georgia, *p* is price, and there are *n* items in the primary product group.

PPPs for larger aggregates

The PPP for *Rice* is next combined with the PPPs for other food items to obtain a PPP for *Food*. The *Food* PPP will then be combined with PPPs for other kinds of household expenditure to obtain a PPP for Household Consumption Expenditure and this in turn is combined with PPPs for Government

⁶ In practice, fixed imaginary weights for "more important" and "less important" products were also used in the calculation. However products that were more or less important in the one country were almost always more or less important in the other, so the impact of using these weights was virtually negligible.

Expenditure, for Capital Formation, and the Foreign Trade Balance to produce the PPP for Gross Domestic Product as a whole.

Aggregation of the PPPs for primary product groups is done using expenditure weights which are calculated as the shares of expenditure on each primary product group in total expenditure on the GDP or respective aggregate (with the sum of the shares = 1 or 100). As there are two separate sets of expenditure weights, i.e. Georgia's expenditure shares and Armenia's expenditure shares, the aggregated PPPs are the geometric averages (Fisher's index) of the PPPs weighted using each set of weights (Laspeyres and Paasche indices). For example, the ARM / GEO PPP for *Food* is obtained as follows:

$$PPP_{Food}^{A/G} = \left[\sum_{j=1}^k (PPP_j^{A/G} \times W_j^G) \times \left(1 / \sum_{j=1}^k W_j^A / PPP_j^{A/G} \right) \right]^{\frac{1}{2}}$$

where there are k primary product groups in *Food*, and W are the expenditure weights on these various *Food* product groups as shares in total *Food*.

In other words, the ARM / GEO PPP for *Food* is the geometric average of the ARM / GEO product group PPPs for Food items weighted by Georgian shares (arithmetic mean) and those same PPPs weighted by Armenian shares (harmonic mean). The GEO / ARM PPP for *Food* is obtained in a parallel fashion.