

**INEQUALITY IN ARMENIA AND THE INCOME SOURCES THAT SHAPE IT\***David Joulfaian<sup>†</sup>

**Abstract** – This paper provides estimates for income inequality in Armenia and the income components that may have shaped it. More specifically, it employs household survey data for the years 2004 through 2014 to estimate the Gini coefficient for each year. These are followed by estimates of the Gini coefficients for a variety of income sources which are used in decomposing the overall income Gini coefficient. Wages account for the lion share of the measured inequality, and, depending on the year of interest, contribute to over two-thirds of the overall inequality. Also, a one percent increase in wages is estimated to increase overall inequality by about 0.15 percent which is matched by the offsetting marginal effects of the combined pension income and public transfers despite their smaller shares of total income.

**Keywords:** Income inequality, factor decomposition, Armenia  
**JEL:** D31, D33, E25, I3

## 1. INTRODUCTION

Rising income inequality and the increasing concentration of wealth have garnered much global interest from economists and policymakers. Inequality, and in particular, uneven growth has been a rising concern in Armenia as well. A number of studies have explored the extent of income inequality in the country, but these have not explored its determinants.<sup>1</sup> An interesting exercise is to decompose the measure of inequality and gain a greater understanding of the factors that shape it.

In this paper, we provide estimates of the Gini coefficient to gauge income inequality in Armenia over the recent decade. And then explore how the various income sources

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\*The views expressed are those of the author and do not necessarily represent those of the institutions he is affiliated with.

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<sup>1</sup>As an example, see National Statistical Service of the Republic of Armenia, Statistical Yearbook of Armenia, 2015.

contributed to the overall income inequality. These income sources include wages, self-employment income, farm income, pension income, capital income (sales of assets, dividends, interest, and rent), public transfer (other than pensions), and private transfers (including remittances). For each income source, we measure its distribution as well as its contribution to the overall measure of income inequality and observe how this contribution evolves over a period which reflects both pre and post the Global Recession as well as numerous labor-related policy changes. We also compute the marginal effect of changes in each factor on overall inequality.

The paper is organized as follows. Section 2 describes how income inequality is measured as well as the framework employed in decomposing it into the various income sources to evaluate the impact of each source on overall inequality. It also describes the data sources and construction of variables obtained from household surveys covering the years 2004 through 2014. This period is interesting as the economy grew at double-digit rates at the beginning of this window, then it was struck by the Great Recession and GDP contracted by 15 percent, and then struggled along afterward. Also, minimum wages were increased repeatedly from 5000 Drams in 2003 to 50000 in 2014.<sup>2</sup> Section 3 presents estimates of the Gini coefficient for total monetary income for each year. It also provides measures of the Gini coefficients for seven categories of income and uses this information to gauge the contribution of each income source to the overall measure of inequality. Section 5 provides a summary and concludes with a discussion of the findings.

## 2. DECOMPOSING INCOME INEQUALITY

### 2.1. Framework for Decomposition of income inequality by source.

By definition, total household income represents the sum of a variety of income sources. These include labor earnings, capital income, and transfer income, among others. Each of these income sources may be distributed differently among households. Moreover, and

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<sup>2</sup>The minimum monthly wage rate was set at 13,000 in 2004, and took the values of 13,000 in 2005, 15,000 in 2006, 20,000 in 2007, 25,000 in 2008, 30,000 in 2009, 30,000 in 2010, 32,500 in 2011, 32,500 in 2012, 45,000 effective July 1 of 2013, and 50,000 by 2014.

depending on how these are distributed, they may influence overall inequality reflecting on the share of each factor's share in total income. Several advances have been made in measuring the contribution of various income sources to inequality in total income. In order to gauge the contribution of the various factors of income to overall income inequality, we follow Lerman and Yitzhaki's (1985) in decomposing the Gini coefficient which is an extension of the findings in Shorrocks (1982).

Lerman and Yitzhaki demonstrate that the Gini coefficient for income inequality can be decomposed into the Gini coefficients of each of the separate income factors, reflecting on their share in total income as well as the correlation between each income source and the distribution of total income. With  $K$  income sources, and for each income source  $k$  denoting the Gini coefficient as  $G_k$ , the income share of each factor as  $S_k$ , and the correlation between each income source and the distribution of total income as  $R_k$ , the overall Gini coefficient can be presented as:

$$(1) \quad G = \sum_{k=1}^K S_k G_k R_k$$

Using equation (1), we can gauge the effect of income source  $k$  on total income inequality using the three critical terms as noted in Stark, Taylor, and Yitzhaki (1986). The first is the share of an income source in total income, where a source forming a larger share may have a greater influence. The second is the distribution of the income source and how equally it is distributed. An income source with a Gini coefficient of zero, for instance, will not influence total inequality regardless of the size of the income source. And third, total inequality will be shaped by the size and sign of the correlation between the particular income source and the distribution of total income. A negative correlation suggests that an income source reduces inequality regardless of how it is distributed.

We apply this decomposition method using the different components of household income and calculate the contribution of each of the different components to overall income inequality. The contribution of each source is measured as:

$$(2) \quad C_k = \frac{S_k G_k R_k}{G}$$

The above can be restated to gauge the marginal effects, or the marginal contributions (MC), of the various income sources on overall income inequality. Rather than simply gauging how much of the inequality is explained by the unequal distribution of income from each source, the task here is to explain what happens if income from particular source changes and the marginal effects of this change on over inequality. This marginal effect is stated as:

$$(3) \quad MC_k = \frac{S_k G_k R_k}{G} - S_k$$

Per equation (3), the percent change in the overall Gini coefficient resulting from a (small) percent change in an income source is equal to that sources relative contribution to overall inequality reduced by its share in total income. *MC* in equation (3) also turns out to be a measure of the elasticity of the Gini coefficient with respect to the factor income. Equation (3) along with equations (1) and (2) are estimated following Van Kerm (2009).

## 2.2. Data Sources.

Data from household surveys are employed in estimating the Gini coefficients for total income as well as for income from each source for each year. More specifically, the Integrated Living Conditions Survey (ILCS), which is publicly available for the years 2004 through 2014, is downloaded from the website of the National Statistical Service of Armenia often referred to as Armstat.<sup>3</sup> The sample size varied from year to year and ranged from 5,184 to 7,872 households. As shown in Table 1, the sample size was 6816 in 2004, it declined to under 5,200 in 2005 and 2006, it then increased to 7872 in 2007, and then declined to 5,184 in 2012 through 2014 as shown in Table 1.<sup>4</sup>

<sup>3</sup>The surveys are available on the microdatabases page of <https://www.armstat.am>. For this paper, Excel files were downloaded and converted to Stata data format. The alternative data format is SPSS.

<sup>4</sup>Sample design reflect rejection rates close to 8 percent, and reach a high of close to 19 percent for Yerevan. See "Poverty Assessment Methodologies Used over 1996-2013" in Social Snapshot and Poverty in Armenia, 2014, pages 11-14.

TABLE 1. Descriptive summary statistics: unconditional mean monthly income by source in Drams (standard deviations in parentheses)

Year	Sample	Wages	Self employment	Farm	Capital	Pensions	Transfers	
							Public	Private
2004	6,816	27,725 (45,531)	4,749 (20,826)	5,132 (21,606)	74 (2,383)	5,769 (8,627)	1,550 (4,259)	6,782 (22,288)
2005	5,187	29,330 (43,049)	5,686 (22,962)	5,408 (18,033)	96 (3,342)	6,556 (8,904)	1,647 (4,459)	5,988 (19,900)
2006	5,184	32,657 (48,814)	10,879 (36,153)	5,585 (16,699)	190 (5,974)	7,084 (9,587)	2,435 (6,227)	6,425 (21,962)
2007	7,872	39,995 (58,258)	7,569 (33,187)	8,340 (23,867)	146 (3,666)	9,257 (12,164)	2,650 (6,517)	8,888 (29,767)
2008	7,872	48,541 (70,382)	8,017 (39,075)	8,398 (23,309)	167 (3,193)	15,616 (20,602)	2,887 (7,536)	10,027 (29,175)
2009	7,872	51,256 (72,813)	4,918 (27,495)	8,499 (37,215)	98 (2,910)	18,363 (23,363)	2,901 (7,936)	10,527 (31,788)
2010	7,872	56,243 (78,343)	7,520 (34,447)	6,273 (27,994)	138 (3,093)	19,044 (23,578)	3,124 (8,456)	13,860 (151,740)
2011	7,872	59,262 (85,158)	7,717 (35,086)	7,802 (26,044)	245 (5,749)	20,792 (24,782)	2,496 (7,687)	15,713 (44,706)
2012	5,184	72,294 (107,397)	10,939 (45,215)	8,763 (30,927)	558 (12,307)	22,515 (26,483)	3,238 (8,824)	16,613 (44,678)
2013	5,184	74,262 (106,943)	11,265 (46,029)	9,568 (38,488)	543 (6,546)	23,330 (36,549)	2,878 (8,494)	18,703 (61,633)
2014	5,184	88,027 (133,739)	16,964 (61,945)	10,488 (40,900)	875 (13,296)	25,696 (29,575)	3,291 (9,049)	22,121 (62,660)

Note: Calculated from Armenia's Integrated Living Conditions Survey for the years 2004-2014.

Only monetary or cash equivalent income is considered in these computations.<sup>5</sup> Total income is disaggregated into seven income categories or sources. The first consists of wages and salaries only, the second of self-employment income, and the third of farm income. Capital income represents the fourth category and includes proceeds from the sale of real estate (structures and land), dividends, interest, and rent. Pensions follow this as the fifth source. Public transfers, other than pensions, represent the sixth category and are defined as the sum of family, children, unemployment, and other public benefits

<sup>5</sup> Information is available on non-monetary income which is omitted here.

received. The seventh and last category is private transfers which are defined as the sum of private gifts, humanitarian aid, and remittances, with the latter forming the bulk of this category.

Conceptually, the value of real estate sold should be reduced by the cost of acquisition (basis) and not have the gross value considered in the income definition. The ideal measure is the capital gains representing the difference between the selling price and the purchase cost. Otherwise, the gross value will overstate the monetary value of income received. On the other hand, sales of other assets or property are not considered here at all. These include the sale of personal property such as cars, jewelry, and furniture among others. While these sales may provide liquidity to finance household expenditures, the proceeds do not represent a source of income per se, and should not be included in the total income measure.

The definition of wages also deserves attention. Pension reform enacted in 2010 repealed social security taxes effective 1/1/2013 and mandated employers to increase wages by the amount of the employer share of social security taxes.<sup>6</sup> One approach is to subtract from wages reported in 2013 and 2014 an amount equivalent to the repealed taxes and generate a measure of wages consistent over the years. We have decided not to make this adjustment because of anomalies in the data for 2013.

Descriptive summary statistics are reported for each income source in Table 1. Unconditional monthly wages increased from about an average of 28,000 Drams in 2004 to 88,000 in 2014. Some of this trend is very likely to have been shaped by market dynamics. It may have also been shaped by expanding minimum wage limits. As a consequence of pension reform and the increase in minimum wages, 2013 wages are expected to be larger than those in 2012 other things equal, but they are not.

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<sup>6</sup>In 2012 and for monthly wages up to 20,000 Drams the employer paid a flat amount of 7,000 Drams; for wages between 20,000 and 100,000 Drams the employer paid the 7,000 Drams plus 15% of the amount in excess of 20,000; and for wages greater than 100,000 Drams the employer paid 19,000 Drams, or 7,000 + 0.15(100,000-20,000), plus 5% of the amount in excess of 100,000 Drams. The pension benefit formula is based on the length of service and not linked to the covered wages.

Similarly, self-employment income rose from an average of 4749 in 2004 to 17000 Drams in 2014. Other income sources also experienced an increase over the period, albeit at different growth paths. One noteworthy observation is that reported capital income is minuscule in comparison to all sources of income as well as transfers.

### 3. ESTIMATES OF INCOME INEQUALITY

Using the household surveys, and the measure of monetary income, estimates of the Gini coefficients are produced for the years 2004 through 2014. For each annual survey, each household observation is weighted using population sampling weights to project to the total population and not the total number of households. Tables 2 and 3 provide estimates of the Gini coefficient for each year. The estimated coefficient is 0.4488 in 2004 a measure that declines slightly over the years through 2008 and slightly increases following the onset of the Great Recession with an estimate of 0.4249 in 2014. The reported estimates are generally higher than those reported by others.<sup>7</sup>

In addition to the Gini coefficient for total income, Tables 2 and 3 also provide figures on shares of various income sources that make up total monetary income. The shares are followed by estimates of the Gini coefficient for each income source as well as the correlation coefficient between each income source and the distribution of total income. Using these three measures combined we can produce estimates of the average and marginal contributions of each income source to overall income inequality as described in equations (2) and (3) above.

Beginning with income shares, Tables 2 and 3 provide figures for the shares of the various income sources  $k$  that make up total monetary income. Wages account for 52 to about 60 percent of total income depending on the year of interest. Self-employment income accounts for 6 to 16 percent of income and exhibits greater variability over the

<sup>7</sup>As an example, Armstat reports 0.373 for 2014. See Table 81, Statistical Yearbook of Armenia, 2015. <https://www.armstat.am/file/doc/99493608.pdf>

TABLE 2. Gini coefficient and its decomposition: 2004-2008

Year	Income source	Income share	Gini Coeff.	Corr. Coeff.	% Contribution	Elasticity
2004	Wages	0.5274	0.6859	0.7901	0.6369	0.1095
	Self-employment	0.0943	0.9432	0.6332	0.1255	0.0312
	Farm	0.1362	0.8683	0.4637	0.1222	-0.0140
	Capital	0.0026	0.9990	0.7970	0.0047	0.0020
	Pensions	0.1038	0.6699	0.0766	0.0119	-0.0919
	Public transfers	0.0313	0.8762	-0.1699	-0.0104	-0.0417
	Private transfers	0.1043	0.9138	0.5146	0.1093	0.0050
	Total Income	1	0.4488	1	1	0
2005	Wages	0.5600	0.6571	0.8025	0.6835	0.1235
	Self-employment	0.1024	0.9343	0.6075	0.1345	0.0321
	Farm	0.1168	0.8765	0.4678	0.1108	-0.0060
	Capital	0.0039	0.9988	0.8477	0.0077	0.0038
	Pensions	0.1047	0.6643	0.0292	0.0047	-0.1000
	Public transfers	0.0294	0.8864	-0.1813	-0.0109	-0.0404
	Private transfers	0.0827	0.9205	0.3956	0.0697	-0.0130
	Total Income	1	0.432	1	1	0
2006	Wages	0.5179	0.6579	0.7700	0.6527	0.1349
	Self-employment	0.1611	0.8802	0.5371	0.1894	0.0284
	Farm	0.0977	0.6663	0.2409	0.0390	-0.0587
	Capital	0.0139	0.9982	0.9318	0.0323	0.0183
	Pensions	0.0977	0.6663	0.2409	0.0390	-0.0587
	Public transfers	0.0378	0.8732	-0.2046	-0.0168	-0.0546
	Private transfers	0.0739	0.9256	0.3783	0.0644	-0.0095
	Total Income	1	0.402	1	1	0
2007	Wages	0.5931	0.6205	0.7958	0.7191	0.1261
	Self-employment	0.1139	0.9327	0.6389	0.1667	0.0528
	Farm	0.0785	0.8864	0.2421	0.0414	-0.0371
	Capital	0.0009	0.9989	0.2885	0.0006	-0.0003
	Pensions	0.1003	0.6718	0.0495	0.0082	-0.0921
	Public transfers	0.0304	0.8719	-0.1232	-0.0080	-0.0384
	Private transfers	0.0830	0.918	0.3853	0.0721	-0.0109
	Total Income	1	0.4073	1	1	0
2008	Wages	0.5835	0.6163	0.8138	0.7454	0.1619
	Self-employment	0.0957	0.9441	0.6715	0.1545	0.0588
	Farm	0.0706	0.8873	0.1654	0.0264	-0.0442
	Capital	0.0021	0.9985	0.5056	0.0027	0.0006
	Pensions	0.1411	0.6585	0.1605	0.0380	-0.1031
	Public transfers	0.0299	0.8761	-0.2041	-0.0136	-0.0435
	Private transfers	0.0772	0.9063	0.2616	0.0466	-0.0306
	Total Income	1	0.3926	1	1	0



years when compared to wages, albeit much smaller in value. Its share stood at slightly under 10 percent in 2004 and grew to 16 percent in 2006, only to decline close to the onset of the Great Recession, and accounted for 11 percent of income by 2014. Similarly, farm income shares also vary considerably over the years and account for 4 to 14 percent of total income. Capital income shares are minuscule and in general account for less than one percent of income. Moving on to transfers, pension income accounts for 10 to 17 percent of income. Public transfers, other than pension income, account for two to four percent of income, whereas private transfers account for eight to ten percent.

Tables 2 and 3 also report the values for Gini coefficients for each of the seven income sources. All are unequally distributed with the greatest inequality observed for capital income, self-employment income, and private transfers with estimated Gini coefficients of 0.9 and higher for all years; farm income is also unequally distributed after the Great Recession. Wages and pension income are the least unequally distributed with Gini coefficients estimated in the range of 0.6 to 0.7 for all years.

The third critical variable of interest is the correlation between each income source and the over income distribution which is reported in the third column of Tables 2 and 3. All the estimated correlation coefficients are positive except for public transfers which is negative and ranges between -0.12 and -0.26. The coefficient for wages is relatively stable with a value between 0.77 and 0.83 and consistently larger than those for other income sources. Self-employment income is also highly correlated with the overall income distribution, and so is capital income. On the other extreme, the coefficients for pensions and public transfers are the lowest.

Plugging the above figures for the various income source in equation (1) enables the measuring of the contribution of each source to overall inequality. As reported the fourth column of Tables 2 and 3, wages contribute the most to the observed inequality accounting for about 64 to 76 percent of the overall Gini coefficient. The bulk of the remainder is accounted for by self-employment and farm incomes as well as private transfers (mostly

TABLE 3. Gini coefficient and its decomposition: 2009-2014

Year	Income source	Income share	Gini Coeff.	Corr. Coeff.	% Contribution	Elasticity
2009	Wages	0.5999	0.6193	0.8247	0.7571	0.1572
	Self-employment	0.0638	0.9586	0.6135	0.0927	0.0289
	Farm	0.0641	0.9219	0.312	0.0456	-0.0185
	Capital	0.0015	0.9994	0.8143	0.0031	0.0016
	Pensions	0.1657	0.6449	0.2042	0.0539	-0.1117
	Public transfers	0.0281	0.8888	-0.2003	-0.0124	-0.0405
	Private transfers	0.0768	0.9199	0.3437	0.0600	-0.0168
	Total Income	1	0.4047	1	1	0
2010	Wages	0.5989	0.6163	0.8271	0.7615	0.1626
	Self-employment	0.0804	0.9463	0.6177	0.1173	0.0368
	Farm	0.0402	0.9195	0.1603	0.0148	-0.0254
	Capital	0.0010	0.9986	0.5749	0.0014	0.0004
	Pensions	0.1539	0.6372	0.1412	0.0345	-0.1193
	Public transfers	0.0309	0.8728	-0.2536	-0.0171	-0.0480
	Private transfers	0.0947	0.9115	0.4067	0.0875	-0.0071
	Total Income	1	0.4009	1	1	0
2011	Wages	0.5849	0.6163	0.8159	0.7342	0.1494
	Self-employment	0.0796	0.9399	0.5669	0.1059	0.0263
	Farm	0.0566	0.9171	0.2617	0.0339	-0.0227
	Capital	0.0053	0.9965	0.8200	0.0108	0.0055
	Pensions	0.1601	0.6206	0.1939	0.0481	-0.112
	Public transfers	0.0231	0.8987	-0.2237	-0.0116	-0.0347
	Private transfers	0.0905	0.9059	0.3844	0.0787	-0.0118
	Total Income	1	0.4006	1	1	0
2012	Wages	0.5765	0.6358	0.8224	0.7386	0.1620
	Self-employment	0.0907	0.9323	0.5922	0.1226	0.0320
	Farm	0.0607	0.9008	0.2638	0.0354	-0.0254
	Capital	0.0028	0.9977	0.6441	0.0045	0.0016
	Pensions	0.1503	0.6164	0.0928	0.0211	-0.1292
	Public transfers	0.0267	0.8719	-0.2136	-0.0122	-0.0389
	Private transfers	0.0923	0.9079	0.4390	0.0901	-0.0022
	Total Income	1	0.4081	1	1	0
2013	Wages	0.5769	0.6212	0.8204	0.7274	0.1505
	Self-employment	0.0968	0.9272	0.5988	0.1330	0.0362
	Farm	0.0635	0.8970	0.2782	0.0392	-0.0243
	Capital	0.0053	0.9906	0.8547	0.0110	0.0058
	Pensions	0.1461	0.6164	0.1358	0.0302	-0.1158
	Public transfers	0.0229	0.8888	-0.2573	-0.013	-0.0359
	Private transfers	0.0885	0.9073	0.3630	0.0721	-0.0164
	Total Income	1	0.4042	1	1	0
2014	Wages	0.5624	0.6429	0.8168	0.6951	0.1327
	Self-employment	0.1145	0.9169	0.6148	0.1519	0.0374
	Farm	0.0579	0.9302	0.3618	0.0459	-0.0120
	Capital	0.0036	0.9967	0.7534	0.0063	0.0027
	Pensions	0.1401	0.5981	0.1121	0.0221	-0.1180
	Public transfers	0.0212	0.8784	-0.2345	-0.0103	-0.0315
	Private transfers	0.1004	0.8982	0.4197	0.0891	-0.0113
	Total Income	1	0.4249	1	1	0

remittances); the contribution of farms noticeably declines after 2005. Public transfers, not surprisingly, reduce overall inequality but by less than two percentage points and is the only income source with a negative contribution. Capital income, though perfectly unequally distributed makes negligible contribution reflecting on its small share income.

Moving to the marginal effects which are reported in the last column of Tables 2 and 3, wages continue to play the dominant role in shaping inequality. An increase of ten percent in wages in 2014 increases inequality by 1.3 percent, with estimated effects close to 1.6 percent for the years 2008 through 2013. Wages are followed by pensions in their estimated marginal effects on overall inequality, measured in absolute value. An increase in pensions generally leads to a decrease in inequality by 0.9 to 1.2 percent. However, when combined with a ten percent increase in public transfers, their negative marginal effect more than offsets the effects of wage increases. Perhaps this should not be surprising. Pension income and other public transfers are unequally distributed given their respective Gini coefficients. But because they favor the elderly and poor, they have an equalizing effect on total income. Increases in farm income also have an equalizing effect. Similarly, but not uniformly, private transfers also have similar effects.

#### 4. CONCLUSION

This paper presents estimates of income inequality in Armenia and the income sources that shape it. It provides estimated Gini coefficients for total income as well as for each income source for the years 2004 through 2014. Using the various income sources, it decomposes the Gini coefficient for total income in an attempt to gain insights into the factors that influence inequality.

Wages contribute the lion share to overall inequality. However, notwithstanding this contribution, its marginal effects are smaller and offset by the combined marginal effects of pensions and public transfers. In 2014, for instance, a ten percent increase in wages increases the Gini coefficient by 1.3 percent whereas a ten percent increase in pensions and public transfers reduces inequality by 1.4 percent.

Some caveats are in order when evaluating the findings in this paper. The first reflects concerns over the small value of capital income and the likely absence of information on top wealth holders. Another concern relates to the measurement of wages and the inclusion of employer-paid social security taxes. A case can be made for their inclusion in the definition of income. Moreover, this gains greater importance considering that social security taxes were repealed in 2013 and the employers were required to increase wages by the amount of forgiven social security taxes. Because of anomalies in the data for 2013, in particular, we have chosen to ignore these taxes.

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