Background Paper for Georgia Poverty Assessment on Decreasing Enrollment Rates

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INTRODUCTION

Starting from 2005, Georgia saw a rapid decline in tertiary gross enrollment. In a country where poverty reduction is a key priority and where labor market outcomes have not been particularly strong during the last decade, the decline in higher education enrollment might appear as an additional obstacle to human and economic development.

In this report, we analyze a time series of tertiary gross enrollment in Georgia and compare Georgia to other countries in transition. We use the Integrated Household Survey (IHS) data of the National Georgian Statistics Agency (GeoStat) to analyze the socio-economic profiles of enrolled and not-enrolled students. Further, we identify the key potential factors behind decreased enrollment rates, and discuss the role of institutional changes, wages, returns to education, external and international migration, and employment patterns.

The key concern of this study is the impact of social welfare payments targeting the poorest strata of Georgian population on higher education enrollment. We address this question by compiling and analyzing a unique dataset matching: 1) data on poverty scores and beneficiary status of State Social Assistance Program of Georgia's households from the Social Service Agency (SSA) with 2) data on entry examinations and allocation of scholarship from 2005 to 2013 from the National Examination Center (NAEC). Using these data we, first, identify the role of liquidity constraints in limiting access to higher education for the poorest segment of Georgian population. Second, we employ the regression discontinuity framework to examine the causal impact of unconditional cash transfers on university enrollment.

Given the success of unconditional cash transfers in boosting higher education enrolments and other evidence, our policy recommendations are:

1) to introduce an additional instrument of assistance to the poor in the form of needs-based cash transfers (scholarships) conditioned on enrollment in vocational or higher education programs. Such scholarship could also include a living stipends component (currently not on offer) to induce greater geographic mobility for students from remote rural areas. The additional cost

of such scholarships could be met through better targeting of merit-based government scholarships that are heavily skewed towards children from middle class families that have better access to private schooling and tutoring;

2) to prioritize female students in the allocation of government scholarship to mitigate the existing family bias towards male and, particularly first-born male children.
3) to develop higher quality vocational training systems that could offer a viable alternative for high school graduates seeking technical skills. Ideally, such a system should be developed in close partnership (and joint ownership) with the largest private companies operating in Georgia.

1. TERTIARY EDUCATION ENROLLMENT IN THE LAST DECADE: STYLIZED FACTS

1.1. Levels and Trends in Tertiary Education Enrollment between 2005 and 2014.

According to UNESCO data[1] tertiary gross enrollment in Georgia decreased from the peak of 46.6% in 2005 to about 28% in 2012 (see Figure 1). The trend was similar across gender, with females doing slightly better than males (see Figure 2). Figure 1 and Figure 2 also show that despite the overall fall of enrollment rates, the trend reversed starting from 2009. We will elaborate on the potential reasons behind the rebound in enrollment rates below.

Previous literature highlighted the role of education in economic progress and productivity (Lucas, 1988; Mankiw, Romer, & Weil, 1992, Lichtenberg & Siegel, 1991, Huggins & Cooke, 1997). The links between educational attainment and wage prospects (Baum & Payea, 2005) and other important social outcomes has been also demonstrated (Gregorio & Lee, 2002; Breierova & Duflo, 2004; Barro & Lee, 2013). Therefore, the declining trend in tertiary education might be particularly worrisome for a developing country like Georgia[2] given its potentially negative consequences for the accumulation of human capital and economic growth.

[1] According to the UNESCO Institute for Statistics the data sources are: "School register, school survey or census for data on enrollment by level of education; population census or estimates for school-age population" (http://glossary.uis.unesco.org/glossary/en/term/2048/en).

[2] Georgia belongs into the group of "lower middle income" countries, according to the World Bank's definition (http://data.worldbank.org/country/georgia)

Figure 1.

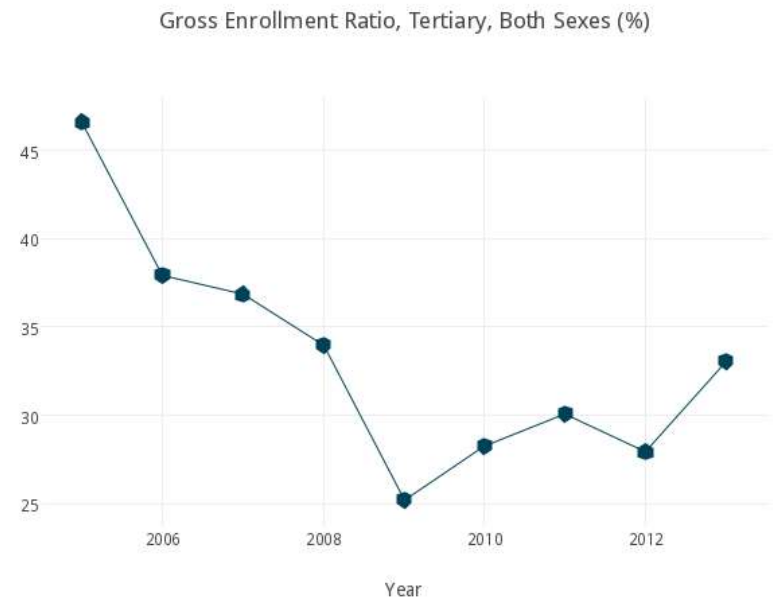
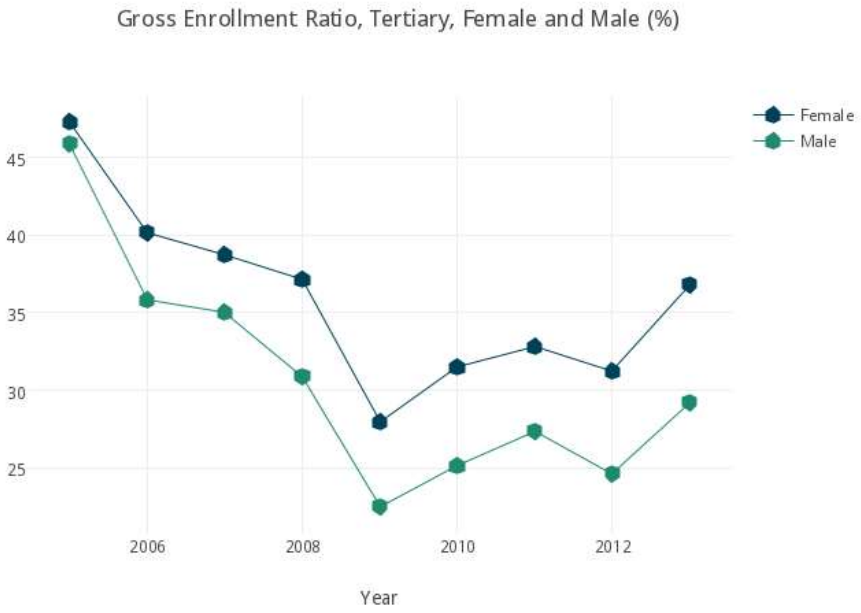


Figure 2.



1.2. Tertiary Education Enrollment in Peer Countries

However, to better understand the issue it would be helpful to put Georgia in a broader context and assess the dynamics of tertiary education enrollment in other transition nations which all went through similar cultural, political and economic changes since the collapse of Soviet Union in 1991.

Table 1 compares higher education enrollment rates in Eastern European, Caucasian and Central Asian countries for 1999, 2005 and 2010[3].

Table 1.

GROSS ENROLLMENT RATIO, TERTIARY, BOTH SEXES (%): 1999-2010								
		1999-2005			2005-2010			1999-2010
	Country	% enrollment In 1999	% enrollment In 2005	**% change**	Country	% enrollment In 2010	**% change**	**% change**
Low enrollment level in 1999 (below 30%)	Romania	21.63	44.90	107.59	Romania	56.77	26.44	162.48
	Kazakhstan	24.93	52.92	112.24	Kazakhstan	39.49	-25.37	58.38
	Czech Rep.	25.56	48.90	91.32	Czech Rep.	63.21	29.24	147.27
	Macedonia	21.77	29.63	36.07	Macedonia	37.07	25.12	70.26
	Mongolia	26.91	44.65	65.93	Mongolia	53.81	20.49	99.95
	Slovakia	25.94	40.39	55.66	Slovakia	55.99	38.61	115.78
	Kyrgyzstan	29.16	42.53	45.82	Kyrgyzstan	42.13	-0.94	44.44
	Tajikistan	17.44	20.96	20.14	Tajikistan	22.69	8.27	30.08
	Armenia	34.62	38.36	10.82	Armenia	50.62	31.94	46.22
	Uzbekistan	12.50	9.85	-20.88	Uzbekistan	9.94*	0.91	-20.48
	Azerbaijan	15.72	14.45	-8.07	Azerbaijan	19.26	33	22
High enrollment level in 1999 (above 30%)	Hungary	32.49	65.10	100.33	Hungary	60.37	-7.26	85.78
	Lithuania	44.01	77.50	76.10	Lithuania	80.75	4.18	83.47
	Slovenia	52.35	79.70	34.31	Slovenia	88.46	10.99	68.97
	Latvia	50.90	78.85	54.90	Latvia	70.55	-10.53	38.59
	Croatia	30.55	44.53	45.74	Croatia	55.83	25.37	82.73
	Ukraine	47.10	68.66	45.78	Ukraine	76.65	11.63	62.74
	Poland	45.43	63.60	39.97	Poland	73.52	15.59	61.80
	Russia	51.44	72.59	41.09	Russia	75.89	4.54	47.53
	Estonia	51.12	68.44	33.89	Estonia	71.65	4.68	40.16
	Georgia	35.70	46.60	30.51	Georgia	28.26	-39.34	-20.84
	Belarus	52.11	66.16	26.96	Belarus	78.99	19.38	51.56

[3] The table is constructed using UNESCO data. The data is available at http://data.uis.unesco.org/?queryid=142

	Moldova	32.69	36.09	10.40	Moldova	38.14	5.67	16.67
	Bulgaria	45.20	44.27	-2.05	Bulgaria	57.99	30.99	28.29

The first observation is that most countries, especially those that had enrollment levels below 30% in 1999, more than doubled student enrollment over an 11-year period. It appears highly likely that this type of abnormal growth in tertiary enrollments, particularly in fields in which these countries had no prior expertise, was achieved by lowering education standards and allowing very weak students to buy diplomas of "higher education" from pseudo universities.

There is considerable anecdotal evidence that in many post-Soviet nations, including Georgia (World Bank, 2012), diplomas could be acquired for a modest price equal to the marginal cost of printing and "normal" profit for "university" owners. Students were not even required to attend lectures or pass exams. As a result, many of these nations now find themselves in an over-education "trap". This is so because not having a college degree in a society that does not provide a reputable vocational training alternative (as in Germany or Switzerland) and where more than 60 or 70% of the population do have college degrees carries a stigma. To avoid it, everyone is trapped into getting a college degree, regardless of its quality and relevance for future occupation.

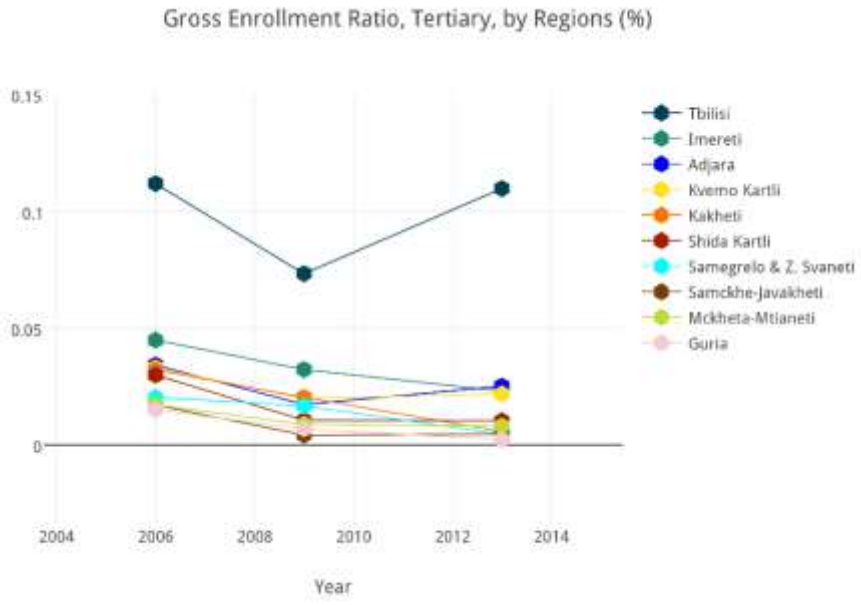
The symptoms of such an over-education trap are present in most transition countries, including Georgia. Thousands of students still go every year into low-quality economics, management, and legal studies that bring them not an inch closer to productive employment. At the same time, according to Rutkowski (2013), 20% of the firms in Georgia consider employee education a major or severe problem. Georgian firms consider education of recent graduates in the labor force to be a more serious challenge in achieving production goals than labor market and business regulations, tax, customs and licensing policies. According to Rutkowski (2013), Georgian workers lack many skills demanded by employers. In particular, 65% of businesses claim that university graduates do not have sufficient knowledge of English. The shares of firms that report lack of leadership and creative thinking on the part of college graduates are 55% and 40%, respectively. According to 30% of firms, recent graduates lack problem solving skills. Thus, as argued by Rutkowski (2013), Georgia's economic growth is constrained by the low *quality* of its formally "over-educated" workforce.

1.3. Socio-demographic Profile of Students

Profile of students and their households who attend tertiary education and those not attending in normative age. Analysis of changes of these profiles over time. The analysis will consider segmentations by region, degree of urbanization, gender and household welfare level. The welfare indicator to be used will be household per adult equivalent consumption (the same used by the Bank to calculate poverty rate). This indicator will be provided by the task team if required.

In this analysis we used Integrated Household Survey (IHS) data from GeoStat for 2006, 2009 and 2013. We define gross enrollment ratio as the share of students enrolled in higher education in the normative age (18-23). Figure 3 plots enrollment patterns across regions.

Figure 3.



As expected, Tbilisi tops the list. Further we analyze enrollment by the degree of urbanization. As shown on Figure 4, urban areas consistently fare better than rural areas.

Figure 4.

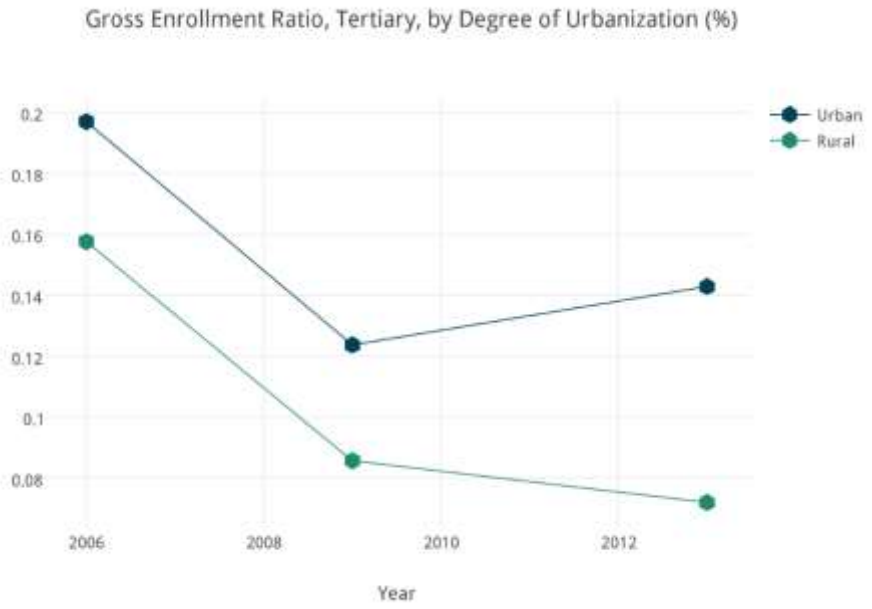
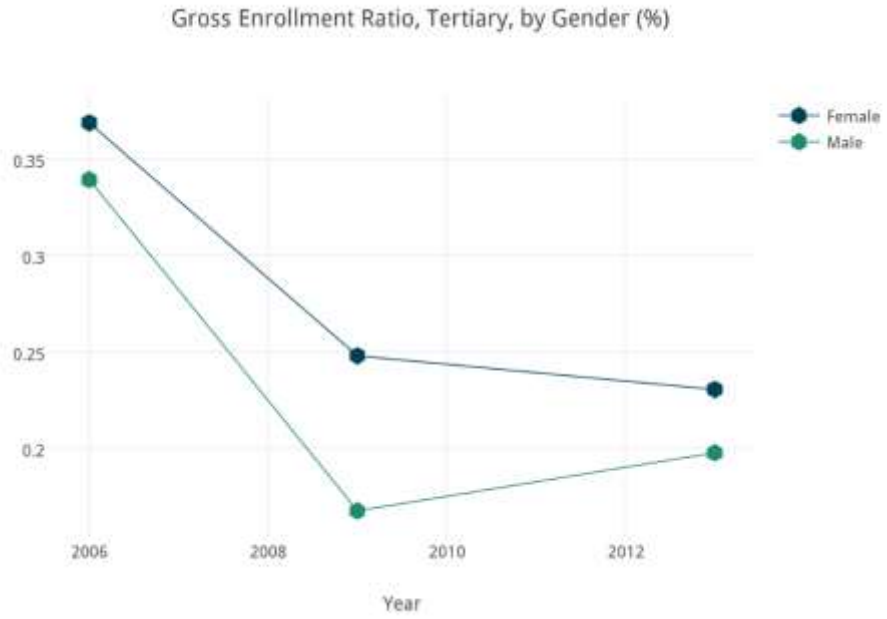


Figure 5 analyzes gross enrollment ratio by gender. Similar to the scenario depicted on Figure 2, we see that females are doing better than males.

Figure 5.



In all of the above instances we see that the time series of the enrollment ratio are U-shaped (declining from 2006 to 2009 and rebounding after 2009), resembling the scenario shown on Figures 1 and 2. Potential reasons behind the U-shape time series of gross enrollment ratio will be discussed below.

Finally, we plot the household welfare indicator weighted by sample weights and adjusted for inflation (we used CPI for adjustments using 2005 as a base year, that is CPI in 2005 was 100) for enrolled and not-enrolled adults. On Figure A1 in Appendix, we see that the welfare indicator was steadily increasing since 2006 for not-enrolled adults. It increased for enrolled as well, but only until 2009 and then sort of leveled out. This may be related to the increased level of living standards in Georgia reported during the same period. According to World Bank data[4], GDP per capita in terms of purchasing power parity (current, in US dollars) increased from 4,695 in 2006 to 5,461 in 2009 and further to 7,176 in 2013.

In contrast, Figure 12 shows that the poverty scores calculated by Social Service Agency (SSA) fell during the same period for enrolled students (i.e. living standards were lower for enrolled students). The apparent conflict between the two sets of figures can be explained by the fact that the IHS data is nationally representative, while SSA data focuses on the poorest segment of the society and thus may not reflect improvements in the overall living standards in the country[5].

Profile:

	Enrolled			Not Enrolled		
	2006	2009	2013	2006	2009	2013
Gender						
Male	54%	62%	56%	51%	50%	52%
Female	46%	38%	44%	49%	50%	48%
	100%	100%	100%	100%	100%	100%
Domain						
Urban	70%	70%	77%	60%	45%	41%
Rural	30%	30%	23%	40%	55%	59%
	100%	100%	100%	100%	100%	100%
Region						

[4] More at http://databank.worldbank.org/data/views/reports/tableview.aspx

[5] Moreover, due to the specificity of the subsequent analysis (that will be discussed in more detail in section 3), the structure of the data used in Figure 12 is such that it does not necessarily reflect the welfare status of a family in a given year. Families enter the data, once their member is of normative age and it can happen that the family poverty score was calculated by SSA in 2007 but its member reached adulthood in 2009, hence family is counted in the data in 2009 and during this timeframe family welfare status could have been increased either by cash transfers from the government or by improvements in the general economic activity in the country. Therefore, the fall in poverty scores for the enrolled students on Figure 31 points to an entirely different phenomenon that will be discussed in section 3 in more detail.

Kakheti	6%	8%	2%	9%	10%	9%
Tbilisi	46%	51%	61%	14%	21%	20%
Shida Kartli	6%	3%	4%	8%	6%	6%
Kvemo Kartli	8%	7%	8%	16%	15%	12%
Samtskhe-Javakheti	3%	1%	1%	8%	6%	4%
Adjara A.R.	8%	4%	10%	10%	12%	9%
Guria	2%	2%	1%	3%	4%	3%
Samegrelo-Zemo Svaneti	6%	7%	2%	12%	10%	13%
Imereti, Racha-Lechkhumi and Kvemo Svaneti	13%	16%	10%	17%	13%	21%
Mtskheta-Mtianeti	2%	1%	1%	3%	3%	3%
	100%	100%	100%	100%	100%	100%
Welfare						
Average Consumption per capita	159	201	207	111	145	197

2. POTENTIAL DRIVERS OF THE TRENDS IN STUDENT ENROLLMENT

2.1. Institutional Changes

After increasing in late 1990s and early 2000s, Georgia's tertiary education enrollment dynamics changed in 2004. In fact, Georgia is unique among all transition countries in that, beginning in 2004-5, it had the political will to combat corruption in higher education and to set a higher quality bar for both students and universities. The new laws on higher and general education (2004 and 2005) aimed at cleaning the system from endemic corruption, and improving access and quality. While quality remains a challenge, the first two aims appear to have been fully achieved in a very short timeframe. For instance, the independent National Centre of Education Accreditation, created in 2005, conducted a "quick and dirty" institutional accreditation process, reducing the number of higher education institutions from more than 240 to 43[6]. Many of the institutions thus shut down were in fact village-based diploma mills, "orghobis universitetebi", as they were called in Georgian[7].

To eliminate corruption in the university admissions system, the government implemented a rapid admissions reform process in 2005 (see the recent book from the World Bank (2012) chronicling Georgia's reforms for more details). The key element of this reform was the establishment of the

[6] Following a botched attempt to reform the system, the number of higher education institutions skyrocketed in 2002, rising from 26 public institutions (plus 18 branches) to 235. 209 new licenses for private universities were granted in 2002 alone! (World Bank 2012). It is therefore not surprising that enrollment rates peaked during the same period.

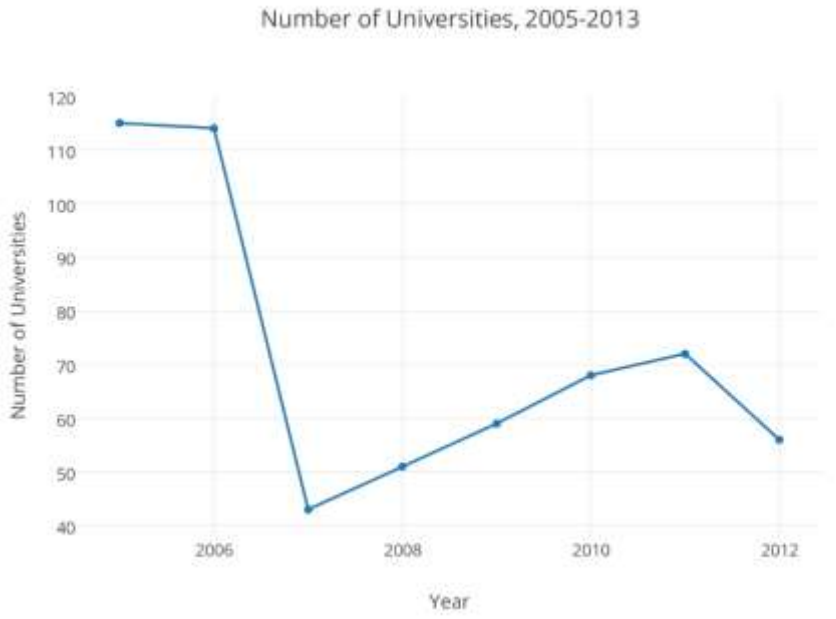
[7] World Bank, 2012

National Accreditation and Examination Center (NAEC) to be placed in charge of conducting a single, centralized, secure and transparent entrance examination. In 2009, NAEC was authorized to conduct a similar entrance exam for Master's-level studies.

As a direct consequence of its education policies, Georgia is the only country in the "high initial enrollment" group (above 30% in 1999) that managed to bring higher education enrollment from the peak of almost 47% in 2004 down to below the 1999 level of 35% (see Table 1). Eliminating low quality universities, solves part of the problem only. Georgia has yet to develop high quality vocational training programs that will help Georgian graduates find productive jobs.

As mentioned above, we see that Georgia's tertiary enrollment trend rebounds in 2009. This can be explained by the fact that, starting from 2007, some of the universities and programs that had their accreditation revoked in 2004-6, were able to regain accreditation. Indeed, the number of accredited universities starts increasing from 2007 onward (Figure 7), partially explaining the rebound in enrollment rates.

Figure 7.



An excellent case in point is Georgian Technical University (GTU), the second largest university in Georgia in terms of cohort size after the Tbilisi State University. In 2005 and 2006, GTU enrolled 3200 and 3400 students, respectively. However, its accreditation was revoked in 2007, contributing to the large slump in enrollment in 2007. In 2008, GTU regained accreditation and enrolled 2150

students. Subsequently, in 2009 and 2010, GTU enrolled 3600 and 4400 students, respectively, contributing to the upward trend in enrollment[8].

2.2. Changes in Incentives to Enrollment (e.g. scholarships)

Allocation of Scholarships in GEL:

	2006	2009	2013
Grants			
100% (2250 GEL)	2209500	2256750	2247750
70%	2332575	2179800	2266425
50%	2265750	2363625	4945500
30%	2560950	2355075	NA
Total	**9368775**	**9155250**	**9459675**

The next question we address is whether or not the dynamics of tertiary enrollment could be driven by changes in government scholarship policy. Following the unified entry examinations starting in 2005, the Georgian government introduced government grants for successful applicants based on merit. Depending the performance, each student was awarded a grant score that determined the percentage of tuition that government would cover. There were four levels of government grants: 100%, 70%, 50% and 30%. 100% government grant means that government is going to cover 2250 GEL of tuition costs. 70% grant equals 2250*0.7 that is 1575 GEL, etc. The grant amounts were constant over time. And if we look the table[9] above, we see that within each level of government grants the grant amount as well as total amount fairly constant over time. In 2013, the government scrapped 30% grants and instead allocated money to 50% grants. That is why we see that in 2013 the amount of 50% grants about doubled. From this picture we see that government scholarship policy was virtually unchanged and therefore it is unlikely that it may have affected enrollment decisions.

What did change though was the prioritization of scholarships starting in 2011 (The allocation of scholarships was not prioretisized until 2011). From 2011-2012 academic year, for several disciplines (law, healthcare, business administration, communications, journalism, international relations and public administration) the government offered funding only to those who qualified for 100% grant[10].

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[8] Data from NAEC is used in these calculations.

[9] Analysis uses NAEC data.

[10] Source: Ministry of Education and Science of Georgia. http://www.mes.gov.ge/content.php?id=1926&lang=eng

Others had to cover full tuition themselves. The aim was to incentivize students to study more technical disciplines. However, the major decline and later rebound in enrollment rates happened prior 2011 and this change in the scholarship allocation rules could not have been responsible to U shaped enrollment time series. Moreover, this change did not affect the total amount of government scholarships as it remained constant in following years as well.

Connection to the Labor Market

Next, we address the question of whether or not tertiary enrollment dynamics are somehow related to structural changes in the economy and/or changes in the returns to education.

2.2.1. Changes in returns to education

In this analysis we follow an approach by Montenegro and Patrinos (2014) to calculate earnings to education. This method allows for estimation of returns at different schooling levels. To this end we create dummy variables Ds (equals one if person completed a secondary education and zero otherwise) and Dt (equals one if person completed a tertiary education and zero otherwise). The omitted group is people with lower secondary education[11]. Table below provides the summary statistics of the sample[12].

Summary Statistics:

	Year		
	2006	2009	2013
Education			
No Education	0%	0.004 %	0.008%
Primary	0.3%	0.1%	0.3%
Lower Secondary	2.12%	2.34%	1.28%
Upper Secondary	19.64%	26.25%	22.44%
Vocational	8.87%	4.08%	3.08%
Secondary or Higher Professional	17.41%	15.32%	17.76%
Tertiaty	51.61%	51.82%	54.68%
	100%	100%	100%
# of Observations	1363	2716	1422

[11] In the original Montenegro and Patrinos (2014) study, the omitted category is the people with no education. In our data the number of working people with no schooling was zero in 2006 and 2 in 2009 and 2013. Therefore we decided for including people with primary education as an omitted category.

[12] All the variables un this analysis was weighted using sample weights.

Real Wage (CPI adjusted, base year is 2005)			
Average	153	238	448
SD	5.84	7.01	12.29
# of Observations	1363	2716	1523

We estimate the following equation:

$$\ln(wage) = \beta_0 + \beta_s Ds + \beta_t Dt + \beta_1 x + \beta_2 x^2 + \varepsilon \qquad (1)$$

Where x is potential labor market experience and is defined as: $x = age - S - 6$, where S is years of schooling.

After estimating equation (1) we can calculate the rate of return to each level of education. As our focus is a tertiary education, the rate of return to tertiary education can be derived as:

$$r_t = (\beta_t - \beta_s)/(S_t - S_S) \quad (2)$$

We estimate equation (1) for the total sample and for females and males separately for 2006, 2009 and 2013. The estimation results and corresponding rates to tertiary education are presented in Tables A1-A3 in Appendix. The estimated rate of returns are comparable to the estimates by Montenegro and Patrinos (2014) for 2010. In general, we see a clear improvement in the rates of return to tertiary education from 2006 to 2009 and 2013. Thus, the drop in tertiary enrollment rates between 2006 and 2009 cannot be explained by a reduction in the returns to education and a corresponding shift (to the left) of the demand curve. If anything, the demand curve should have shifted to the right with the increase in the returns to education.

On the one hand, one can hypothesize that students are not fully informed about increasing returns to education, as reported by (Hastings, Neilson, & Zimmerman, 2014). A more realistic explanation, however, would relate the observed drop in equilibrium tertiary enrollment rates to the institutional reforms that Georgia implemented in 2005 (as discussed above) which caused a shift (to the left) in the *supply* of tertiary education. Given that supply of education by Georgia's public[13] universities is almost perfectly inelastic (both prices and student quotas are capped by the National Centre of Education Accreditation), changes in supply dominate any changes in demand.

[13] While private Georgian universities are free to set their own tuition policies, the number of students they are allowed to enroll is also capped by National Centre of Education Accreditation.

2.2.2. Changes in wages/earnings in the economy

Another hypothesis to be tested is whether or not tertiary enrollment ratios could have been affected by changes in the short-term opportunity cost of acquiring education (i.e. current wages). Previous research, indeed, suggests that labor supply can significantly increase at the extensive margin in response to higher wages (Moffitt, 2012; Keane & Rogerson, 2012). Increased wages have also been shown to cause a decrease in school enrollment (Gustman & Steinmeier, 1981; Black, McKinnish, & Sanders, 2005) and in university enrollment (Morissette, Chan, & Lu, 2014).

We collected the data from the National Statistics Office of Georgia (GeoStat) on average monthly real wages by types of employment from 2005 to 2013[14]. The first observation is that the labor market conditions clearly improved in all sectors as demonstrated by rising wages (that were adjusted for inflation using 2005 as a base year) (see Figure A3 in Appendix). The observed decline in tertiary education enrollment rate in 2006-2009 may thus be partially explained by better wage prospects for Georgia's youth on the Georgian labor market. We further disaggregate the data by gender and see the same increasing trend in wages for both sexes (see Figures A4 and A5 in Appendix). For females, the top earning opportunities are in finance and governance followed by energy, transport and communications, and real estate sectors (Figure A4 in Appendix). For males finance and governance are also the top earning sectors followed by transport and communications, energy and mining.

Figure A6 in Appendix plots the size of employment sectors as measured by the number of workers employed in each sector[15]. The largest employment sectors are manufacturing and trade of automobiles, appliances and repair, followed by construction, transport and communications, and healthcare. Share of workers in the healthcare sector declined after 2010. These data do not include the share of workers in finance and governance sectors. However, we can have an idea of the size of these sectors by looking at their share in Georgian GDP[16]. The share of the financial segment never exceeded 3% of Georgian GDP between 2006 and 2013. The share of the governance sector was much larger. From 2006 to 2013, the contribution of the public administration sector to Georgia's GDP was about 12%.

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[14] Source: IHS

[15] Source: IHS

[16] The data was collected from GeoStat.

We also collected the data from GeoStat on enrollment in public and private universities by fields of study from 2007 to 2013[17] to check whether the labor market prospects are reflected in students' educational choices. Figure A7 in Appendix plots the percentage of students enrolled in various fields of study over years. While the social sciences, business and law tops the list of departments possibly reflecting the best wage prospects in financial and government sector, the popularity of arts and humanities and healthcare departments is somewhat odd given that the healthcare sector is not very large and it is at the bottom of the earnings distribution (Figure A3 in Appendix) while there is virtually no market for arts and humanities graduates in Georgia.

Arts and humanities, and healthcare departments are particularly popular for females (see Figure A8 in Appendix). Males seem to be relatively well aware of labor market situation as the top two destination for male students are social sciences, business and law, and engineering departments, though significant share of male student population is still enrolled in arts and humanities and healthcare departments (see Figure A9 in Appendix). We also collected data from GeoStat on enrollment in public and private vocational education programs. The pattern is similar. We see that a decent number of students prefer to study arts and humanities, and medicine, and that is especially true for females (Figures A10, A11, A12 in Appendix).

It should also be noted that the share of students enrolling in vocational programs in 2007 was very low (10%) and declined to almost 0 in 2013 (Figure A13 in Appendix). The fact that so many Georgian students are enrolled in fields that may not be helpful for earning decent wages later, can be explained by the value Georgians traditionally attach to medical and artistic professions. There is also the supply side factor. The allocation of students to faculties and departments is not based on students' motivation only. The government sets rigid quotas for the number of students per each university. These quotas are then subdivided among different departments according to formal criteria such as space, number of doctors of science, etc. without acknowledging the demand from students and the labor market prospects of the profession acquired in those departments. These facts may be echoing recent findings from Chile where it is found that the majority of students and even colleges are myopic about labor market prospects (Hastings, Neilson, & Zimmerman, 2014).

[17] The data for 2010 is not available and we had observations from 2007, 2008, 2009, 2011, 2012 and 2013 in our data.

2.2.3. Changes in the patterns of employment after high school

To track the change in employment patterns, we use IHS data[18] about employment category for people between 25 and 35. Figure A14 in Appendix plots the evolution of employment patterns from 2006 to 2009 and 2013[19]. This figure is roughly similar to the picture we have from GeoStat data (Figure A6 in Appendix) where trade, manufacturing and transport and communications (as well as governance) are shown to be the largest employment sectors. One exceptional employment category on Figure A14 in Appendix is education that stands out as the second largest in terms of the share of employees. This could be caused by the fact that we limit our analysis to a specific age group and thus do not analyze a representative sample of employees. In general, we do not see any dramatic changes in the patterns of employment that could have contributed to the initial decline and subsequent rebound in enrollment rates.

2.3. Migration

Migration is another channel of influence to be examined as it can significantly affect enrollment rates. If a large number of families migrate out of the country the pool of prospective students will shrink, reducing enrollment rates. Similarly, if a large number of students decide to study abroad that will have a significant negative impact on tertiary enrollment in Georgia's universities.

We use IHS data to analyze migration patterns within and out of the country. Figure A15 in Appendix shows the number of permanent migrants over time. The apparent increase in the *number* of permanent migrants within Georgia in 2009 is due to the fact that in 2009, there were twice as many observations as in 2006; *percentage-wise* there was no dramatic change in the share of permanent migrants (which was less than 1% in all years). Figure A16 in Appendix shows the number of temporary migrants in Georgia and abroad. Finally, on Figure A17 in Appendix we report the number of temporarily migrated people by types of migration[20]. As we see, most people move abroad for work, while internal migration is relatively balanced among workers and students.

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[18] The variables in this analysis are weighted by sample weights.

[19] Agriculture was not included in these categories because it stands out with relatively very large number of people reported employment in this sector than in other sectors and thus may blur the differences in employment patterns across other sectors.

[20] In analysis we exclude people that describe their migration type as 'Other'.

As we see the share of migrants in general population is very low. Similarly the share of migrants who go abroad to study is minuscule. Therefore migration seems to be an unlikely factor that can explain the U-shaped dynamics of enrollment rates.

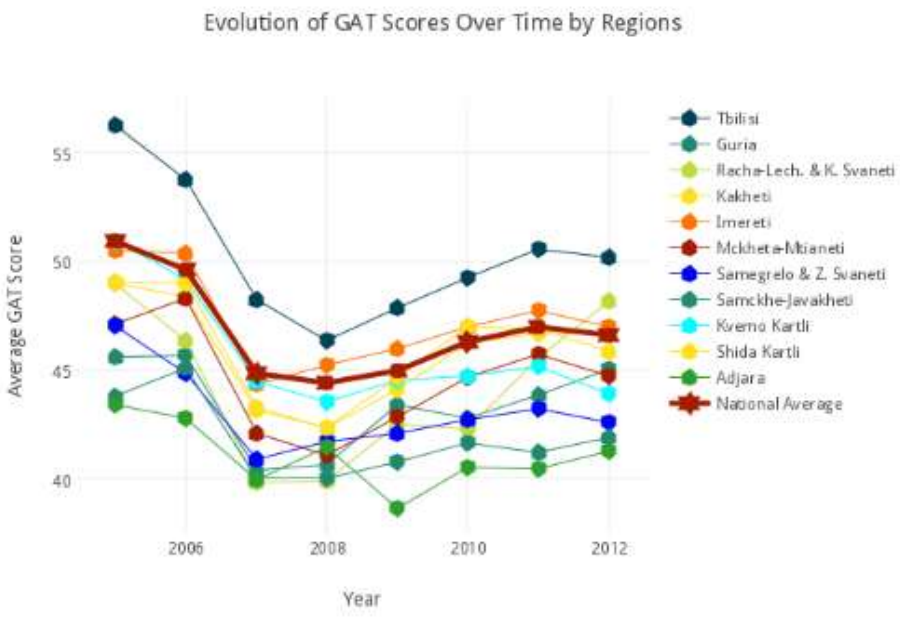
3. THE CAUSAL RELATIONSHIP BETWEEN STATE SOCIAL ASSISTANCE (TSA) AND TERTIARY ENROLLMENT

Combine the data on poverty scores and TSA beneficiary status of Georgia's households from 2005 to 2010 (with over 1.8 million observations that is roughly 500 000 families – over 40% of Georgian population) from the Social Service Agency (SSA) – an affiliated organization of the Ministry of Labor, Health and Social Assistance (MoLHSA) with the data on entry examinations, and scholarship allocations from 2005 to 2013 from the National Examination Center (NAEC). Analyze the average scores for households with enrolled students and how these have changed in time after TSA introduction.

Using the combined dataset study how being recipient of TSA affects students' chances of university enrollment, detailing the transmission mechanism of this impact. Check whether the effect is gender specific and how it varies with birth order and geographical location.

There is one aspect of the Georgian education system, however, that is fundamentally problematic and may be call for a policy intervention: accessibility of high quality education. To further illustrate this point, Figure 8 plots performance in the national General Ability Test (GAT) of university applicants by regions from 2005 to 2012 using the data from NAEC.

Figure 8.



While applicants from Tbilisi have been top performers, students from Imereti, the western region of Georgia that is the second largest source of Georgian student population after Tbilisi, have consistently come on the second place (see Figure A18 in Appendix), well above the national average. They have been bested by Rachvelis in only one year, 2012 (see Figure A19 in Appendix). Yet, according to the same data, not as many Imeretians as one would expect end up in the best Georgian universities (see Figures 9 and 10), which, judging by the average GAT performance of admitted students, are located in Tbilisi (Chanqseliani, 2012). In fact, according to Figures 9 and 10, Imeretians constitute one of the lowest shares of student population in Tbilisi-based universities.

Figure 9.

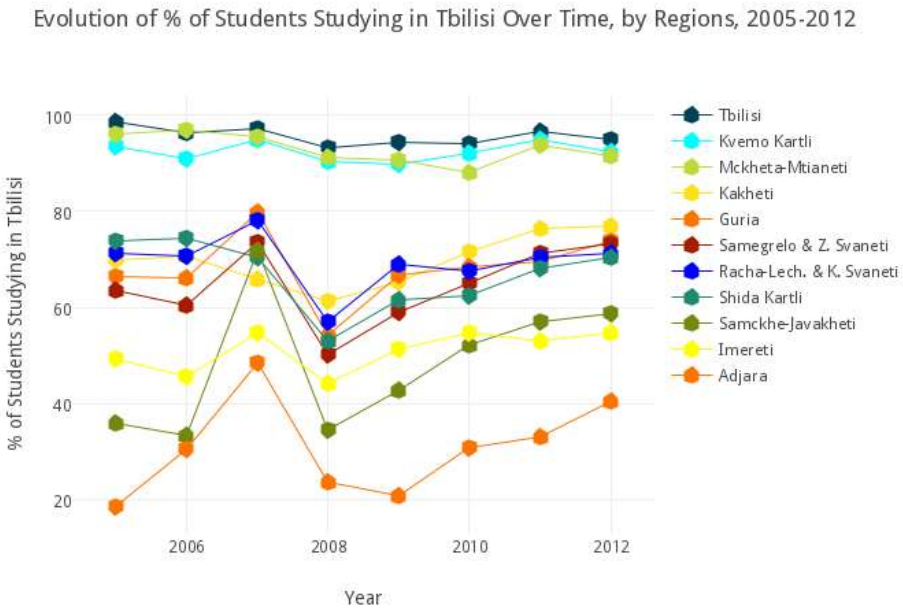
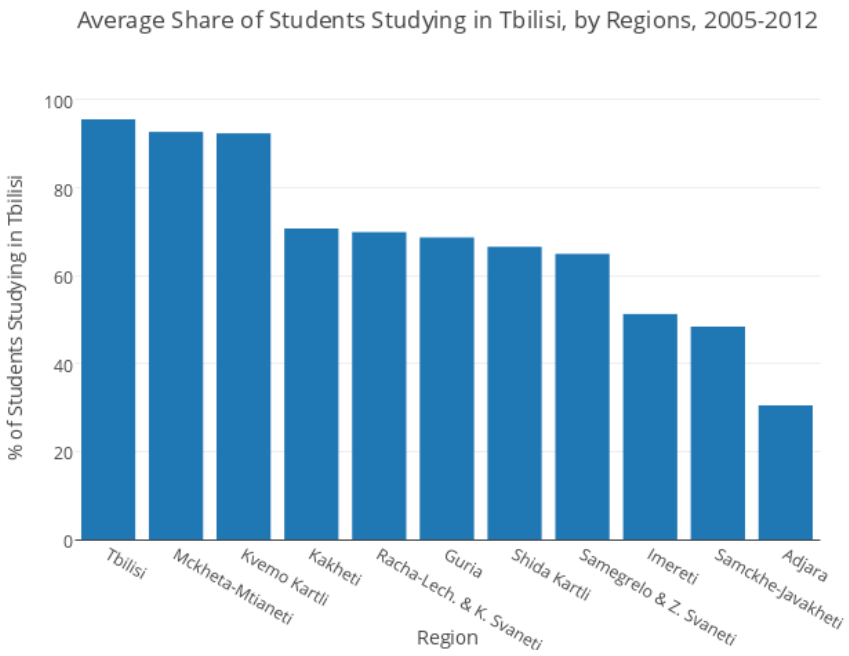


Figure 10.



Likewise, according to Figure A20, when Rachvelis outperformed Imereteians in 2012, they came seventh out of eleven regions in terms of students admitted to Tbilisi-based universities. Conversely, disproportionately many Rachvelis chose to study closer to home, e.g. in Akaki Tsereteli Kutaisi State University – 43rd on Chanqseliani's ranking of Georgian higher education institutions!

The conclusion is that the allocation of regional talent across universities is biased towards second-tier provincial universities[21]. One factor distorting educational choices is distance (James, Baldwin, & McInnis, 1999; Griffith & Rothstein, 2009). In particular, applicants that are most likely to be deterred by the distance factor from applying to high ranking universities, are low income (Turley, 2009) and live in rural areas (OECD & World Bank, 2009; Chanqseliani, 2012). The distance factor is reinforced by the fact that Georgian universities do not offer student accommodation or living stipends, and the annual cost of living in Tbilisi would cost three years of income for an average rural adult (Chanqseliani, 2012).

Previous literature is rife with examples when the sorting of students and universities according to prestige considerations has a very significant effect on educational outcomes, occupations, earnings

[21] According to Chanqseliani (2012), the ranking of the universities is based on the average United National Examination scores of the student cohort. According to this measure of university quality, 100% of the highest, 100% of the second highest and 100% of the medium quality universities are located in Tbilisi. While 65% of the least quality universities are located outside of Tbilisi.

and, consequently, social mobility (Behrman, Rosenzweig, & Taubman, 1996; Daniel, Black, & Smith, 1997; Brewer, Eide, & Ehrenberg, 1999; Carnevale & Rose, 2003; Li, Meng, Shi, & Wu, 2012). To the extent to which this sorting is affected by the distance and cost factors, it reinforces existing regional disparities while generating welfare losses for the individuals involved and the economy as whole. This very much holds for Georgia where, despite early reform successes in eradicating corruption and establishing a transparent system of university admissions, the system has been much more resilient to change as far as the quality[22] and labor market relevance[23] of teaching is concerned. While quality and relevance problems are plaguing the entire education system, they are particularly acute in the periphery. To reduce welfare losses resulting from imperfect sorting, welfare assistance and scholarship policies may be differentiated to encourage the brightest provincial students to study in the better educational environment offered by the more prestigious Tbilisi-based universities.

The second problem that could be addressed through targeted policy interventions is ensuring access to higher and professional education for the poorest strata of the population. Being liquidity constrained, the poorest rural households are unable to finance private tutoring that is considered essential for students' success in the nationally General Ability Test administered by NAEC. And, given that success in GAT determines the allocation of scholarships, students' from vulnerable households lose motivation to even complete high school education, let alone enroll in vocational or higher education programs. The phenomenon of rural students dropping out of high schools and early teen marriages, particularly prevalent for girls, has been documented for individual Georgian villages (see Livny (2014)).

Some evidence for the significance of liquidity constraints for education choices is offered by our analysis of how university enrollment is affected by Georgian unconditional cash transfer policies, designed to help households living below the subsistence level.

In 2005, the Georgian government introduced the State Social Assistance Program (SSA). Any household could apply for the assistance. Government agents visited applicant families and collected information on demographics, family income, living conditions and wealth. Each family was warned that in case of false declaration the application would be cancelled and their right to apply would be forfeited for three years. Based on the declared characteristics each family was assigned a ranking

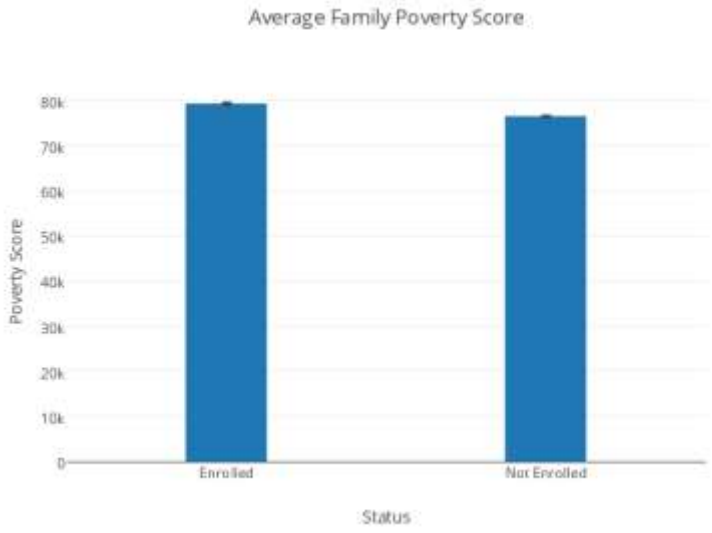
[22] World Bank, 2012.

[23] World Economic Forum's Executive Opinion Survey, 2012.

score with lower scores corresponding to higher level of poverty. Each and every family below the score of 57,000 was eligible to receive government assistance. The cutoff point corresponded to the minimum subsistence level. There were 500,000 applications in total and among these about 160,000 households were treated. The amount of cash transferred monthly to an average household (composed of four members), is comparable to the average household's subsistence level and total income values (per month) PPP-adjusted and calculated in USD (see Table A4 in Appendix). As we see, financial aid covers at least 40 percent of subsistence level consumption needs.

We combine data on program recipients' poverty score from the Social Service Agency of Georgia (SSA) and on university admissions from the National Examination Center (NAEC) to form a single dataset linking poverty scores with enrollment from 2007 to 2013. Several interesting facts are emerging from the initial inspection of the data. First, we see that overall, enrolled students come from wealthier families (see Figure 11)[24] and the difference is statistically significant ($P < 0.001$).

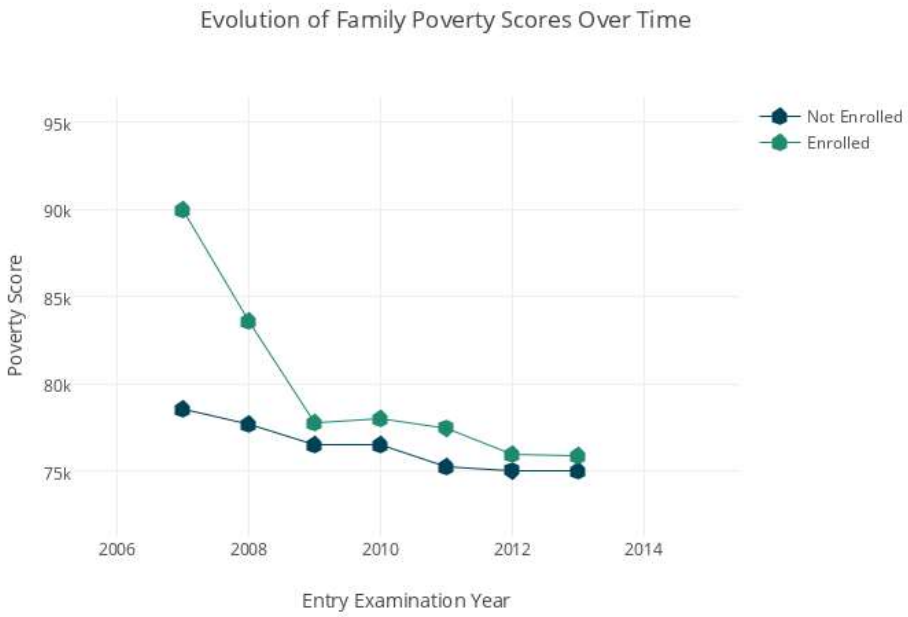
Figure 11.



However, when we plot the evolution of poverty scores over time for families with and without enrolled students, we see that the income gap gets much narrower by 2009, continuing to decline through 2013 (see Figure 12).

[24] Higher the poverty score, the wealthier the household is.

Figure 12.



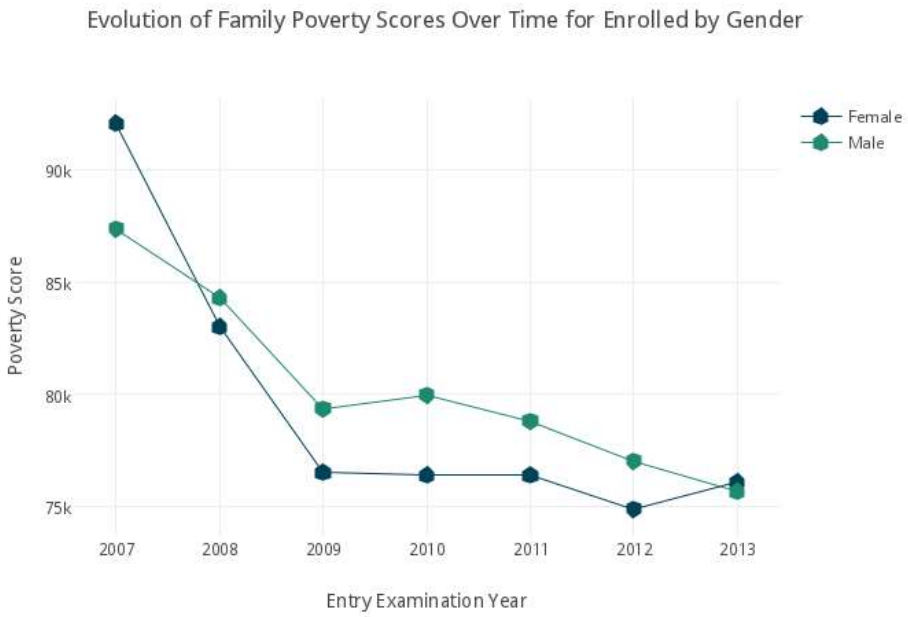
This suggests that applicants from poorer families are increasingly able to enroll in universities. This very positive outcome may result from two parallel policy developments.

- First, within four years since its introduction, the SSA made higher education more affordable for students from the poorest, liquidity-constrained households. This result can also explain the upward trend in enrollment since 2009.
- Second, the introduction of a merit-based and corruption-free university admissions system in 2005 reduced the gap between the "haves and have-nots" in terms of university enrollment. The initial drop in enrollment, which we observe in 2005-2009, can thus be partially attributed to the wealthier families losing their ability to bribe their children's way through the education system. While private schooling and private tutoring continue to limit upward social mobility in the Georgian society, the university admissions reform has been a huge step forward in terms of creating a more level playing field in university admissions.

The evolution of household poverty scores over time for *enrolled* students across regions (Figure A21 in Appendix) reveals a clear downward trend in average poverty scores, especially during the early years of program introduction. Poverty scores time series for *not enrolled* students remain flat (see Figure A22 in Appendix). These results indicate that the impact of cash transfers was uniform across regions.

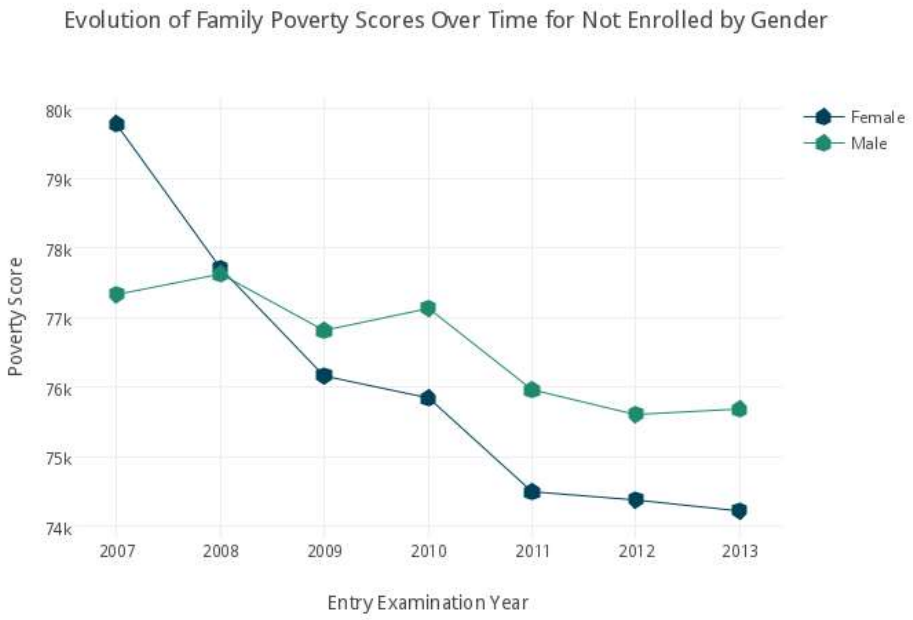
We also disaggregate poverty score time series by gender and enrollment status. Figure 34 shows that there was a large initial decline in average household poverty scores for enrolled *females*, which leveled up later. The declining trend in household poverty scores for enrolled *males* has been steady.

Figure 34.



Interestingly, according to Figure 35, the decline in average household poverty scores for *not enrolled females* was quite dramatic, while the decrease in household poverty scores for *not enrolled males* was less significant.

Figure 35.



Finally, Figure A23 demonstrated that enrolled students come from smaller families — an indication that family composition may also play a role in university enrollment.

All these findings call for further research into the causal impact of SSA on students' chances of university enrollment using a regression discontinuity methodology.

For assessing the causal inference of the social assistance program on university enrollment we chose a parametric Regression Discontinuity Design (RDD). As the initial poverty threshold of 52,000 points (according to a measure of poverty applied by SSA) changed and was raised to 57,000 points in March 2008, two datasets are considered to ensure that the treatment and control groups are well defined. Dataset 1 contains information on university candidate applicants who come from families assessed after March 2008. We include into the treatment group only families with a treatment period of more than one year. On the other hand, dataset 2 combines applicants from such families who were assessed before March 2008.

To carry out RDD analysis with our datasets, we first go through a visual inspection of covariates around the cut-off point. Covariates such as gender, age and number of siblings are statistically indistinguishable in the 5000 points and 1000 points bandwidths around the thresholds for Dataset 1 and Dataset 2, respectively (Figures A24 and A25 in Appendix). Table A5 in Appendix demonstrates the quantitative distribution of candidate applicants (ready for higher education) from SSA families,

where bold numbers refer to those candidates whose families were assessed before the entry examination year. Put differently, the remaining numbers refer to Placebo candidates, those who took the university entry examination before the SSA assessed the families and assigned the scores.

The general form of the polynomial equation used for our estimation is

$$e_i = \alpha + \beta p_i + \gamma P^{(n)}(s_i - T) + \delta P^{(n)}(s_i - T)p_i + \theta X_i + \epsilon_i, \qquad (1)$$

where the binary outcome variable ei stands for enrollment to university, while the dummy variable p_i is one if the family is a program recipient and zero otherwise. Other explanatory parts are n th order polynomials of the distance between the poverty score s_i and the threshold T, reflected in the gamma coefficient. Xi refers to relevant covariates, reflected with the theta coefficient.

In order to specify the model or degree of the polynomial terms correctly, in this case using a parametric model, we go through a three-step procedure separately for both datasets (thresholds: 57000 and 52000). The first step is a visual inspection of the average outcome values over the rating variable and a formal test of the selection of an appropriate bin width. After choosing the optimal bin sizes, the second step is to identify the polynomials' degree. We use the methodology of Lee and Lemieux (2010) for the model selection criterion.

Table 2.

The Impact of the Social Assistance Program on University Enrollment: First–degree, polynomial regressions: Dataset 1

Enrolled to university (0/1)	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	*Males only*	*Oldest*	*Oldest Male*	*City*	*City, Males*
Program recipient (0/1)	.008**	.017***	.0073	.015*	.011	.024
	(.004)	(.006)	(.006)	(.008)	(.016)	(.021)
Cohort FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Entry year into the program FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Covariates (HH size, gender)	*Yes*	---	*Yes*	---	*Yes*	*Yes*
Mean of dependent variable	.127	.115	.126	.115	.125	.129
Observations	61150	31183	38217	19393	6924	3574
R^2	0.0021	0.0008	0.0017	0.0010	0.0052	0.0025

Notes: Coefficients in all columns are OLS regression estimates, robust standard errors are in parentheses; ***, **, and * indicate significance at 5%, 10% and 1% level, respectively. Sample 1, 2 and 3 are households (candidate applicants) with the entry examination at least one year later than family assessment period, additionally second sample narrows down on big size families (more than 3 members) and third subsample considers only the capital city of Georgia.

Our main findings, shown in Table 2, clearly suggest that being a member of a beneficiary family significantly increases the chance of enrollment in university by up to 0.8 percentage points (with the sample mean of university enrollment being 12.7%). Furthermore, we show that the effect is stronger for males (possibly reflecting gender-specific preferences – a bias towards males – by parents in the South Caucasian countries) and oldest male-children by 1.7 (13.38%) and 1.5 (11.81%) percentage points, respectively. The latter finding provides support for the quantity-quality tradeoff paradigm formulated by Becker and Lewis (1974).

We perform similar analysis for dataset 2, where the optimal model specification included second–degree polynomial terms with interactions and covariates. Table 3 illustrates the results. We see that the average effect of treatment is 1.4 percent and estimates are stronger for males (2.3 %) and oldest male children in a family (2.2 %).

Table 3.

The Impact of the Social Assistance Program on University Enrollment: Second–degree polynomial regressions: Dataset 2

Enrolled to university (0/1)	(1)	(2)	(3)	(4)	(5)	(6)
	Full sample	*Males only*	*Oldest*	*Oldest Male*	*City*	*City, Males*
Program recipient (0/1)	.014*	.023*	.021**	.022*	-.017	-.012
	(.007)	(.011)	(.009)	(.012)	(.021)	(.029)
Cohort FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Entry year into the program FE	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Covariates (HH Size, gender)	*Yes*	---	*Yes*	---	*Yes*	*Yes*
Mean of dependent variable	.117	.127	.115	.106	.141	.136
Observations	71132	34378	50129	25960	11286	5802
R^2	0.0025	0.0027	0.0027	0.0057	0.0049	0.0077

Notes: Coefficients in all columns are OLS regression estimates, robust standard errors are in parentheses; **, and * indicate significance at 5%, and 10% level, respectively. Samples definitions are the same as in the previous table.Sample 1, 2 and 3 are households (candidate applicants) with the entry examination at least one year later than family assessment period, additionally second sample narrows down on big size families (more than 3 members) and third subsample considers only the capital city of Georgia.

Finally, we check whether the effect differs across the geographical locations of the program's recipients. One might argue that the program can only increase the chance of enrollment for those students who live in the capital city of Tbilisi and has no impact on university enrollees in the regions. As columns 5-6 in the regression tables above show, the coefficient of the interaction term is not significant, either for all students, or males only. The latter result suggests that the effect of cash transfer programs was uniform across all geographic locations.

Our study provides support for the effectiveness of the SSAP program in reducing poverty, as we find a statistically significant and positive impact of unconditional cash transfers on university enrollment rates. While a 0.8 percentage point increase does not sound like a lot, it is quite significant considering that only 12.7% of children from poor households make it to universities. In essence, we find that SSAP increases university enrollment for the poor by anywhere between 6.3% (0.8/12.7) and 18.1% (2.3/12.7).

A study that has been just published in American Economic Journal (Fack & Grenet, 2015) reports up to 7% increase in university enrollment as a result of 1,500 euros need-based scholarships allocated to potential students in France. Given this result, the large effects of Georgian cash assistance program are particularly notable. First of all, unlike in France, cash transfers in Georgia were unconditional. Second, the size of Georgian cash transfers, which never exceeded 100 US dollars for an average family, was minuscule relative to need-based scholarships in France.

4. POLICY RECOMMENDATIONS

4.1. Greater Focus on Human Capital Accumulation by the Poor

If unconditional transfers have such a strong impact on university enrollment of the poor, the government may consider other, complementary approaches to nudge the poor to invest in skills and education. In particular, one might go for *conditional* transfer programs, such as need-based university scholarships that would encourage students from poor family backgrounds to continue their education. Such measures would reduce the pressure to leave the educational system and start working early with low education and correspondingly low productivity and income levels.

A recent policy experiment conducted in the village of Dzevri (Livny (2014)) demonstrates that the promise of university scholarships (by a private donor) has had a tremendous impact on children's motivation to attend classes, study hard, graduate and enroll in universities and professional colleges.

In the absence of scholarships, the norm for Dzevri children (girls in particular) was to drop out, marry early, and spend their lives in a small village. All of this changed with the arrival of a private donor, bringing school completion and college enrollment rates from 0 to 100% in just 3 years.

4.2. Need to Develop High Quality Vocational Training Systems

On a more general note, one has to emphasize the development of high quality vocational training systems. Vocational training programs have been traditionally linked with *individual* benefits (such as increased earnings, lower probability of unemployment, and increased life satisfaction), *industry-level* benefits (including increased productivity and cost effectiveness), and *societal* benefits (such as lower crime rates, decreased levels of social and unemployment benefits and externalities from productivity gains) (Hoeckel, 2008; CEDEFOP 2011).

The impacts of vocational training programs have been shown to be particularly large in developing countries (Betcherman, Dar, & Olivas, 2004; Attanasio, Kugler, & Meghir, 2011; Reis, 2015). As we discussed above, the share of students enrolled in vocational training program in Georgia is very low (Figure 19) and the quality and relevance of higher education remains problematic, resulting in skills mismatch in the Georgian labor market. Given the reported evidence on the benefits of vocational education, one may recommend that Georgia coordinate the investment of public and private resources in the re-creation of an effective, high quality system of vocational education, helping Georgia's youth acquire much demanded skills and ultimately secure employment and decent earnings.

5. CONCLUSIONS

Starting from 2005, Georgia saw a dramatic decline in enrollment in higher education. This decline in enrollment may, however, reflect Georgia's success in reforming its educational system, at least as far as the phenomenon of diploma mills and corruption are concerned. In 2005, the Georgian government introduced Unified Entry Examinations that cleaned the system of deep-rooted corruption, ensuring transparency and merit-based admissions to the universities.

Moreover, following this reform, money could no longer buy universities degrees, and gifted youth were able to acquire university education regardless of their social background, thus inducing upward social mobility. It is true that those who can afford private schools and private tutoring continue to hold a significant advantage. Still, the system became fairer — and as we show above — more students from poorer households were able to enroll in universities after 2005.

We see a rebound in enrollment rates starting from 2009. For one, this may reflect a lack of viable alternatives such as high quality vocational training systems. Moreover, the growth in enrollments was mostly driven by growth in the number of accredited programs and universities (supply side factors) with the quality of education and the resulting lack of adequate labor market skills remaining major challenges.

In general, as we see in the analysis above, liquidity constraints remain major obstacles for access to higher education. This is reflected in low enrollment rates among the poorest strata of the population and in the distance factor distorting the sorting of gifted students to the most prestigious universities.

We find that being a beneficiary of the state social assistance (TSA) program significantly increases a student's likelihood of university enrollment by 6.3%. For comparison, Fack and Grenet (2015) report up to 7% increase in university enrollment as a result of 1500 euros need-based scholarships allocated to potential students in France. Where *unconditional* cash transfers seem to have decent size effect on enrollment of the poor, *conditional* transfers (university scholarships, living stipends), tailored to Georgia's poorest and at the same time brightest students, may go a long way in further motivating rural population to finish school, delay marriages, enroll in prestigious universities or vocational training centers, acquire high quality education and labor market skills, and ultimately secure productive employment.

We also find a very strong gender specific effect. While cash transfers increase overall tertiary enrollment rates in Georgia, the effect for males is much stronger (13.38%). One cautionary note about using cash transfers is that, while cash transfers increase overall enrollment rates, they may also be responsible for creating a gender gap in education. Therefore, it may be recommended to prioritize female students in the allocation of government scholarship to mitigate the existing family bias towards male and, particularly first-born male children.

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APPENDIX

Figure A1[25].

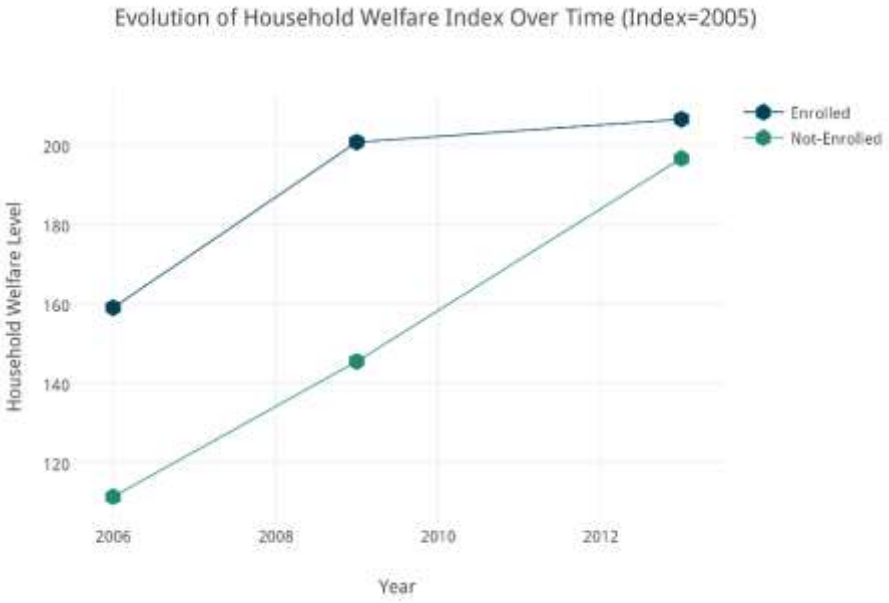
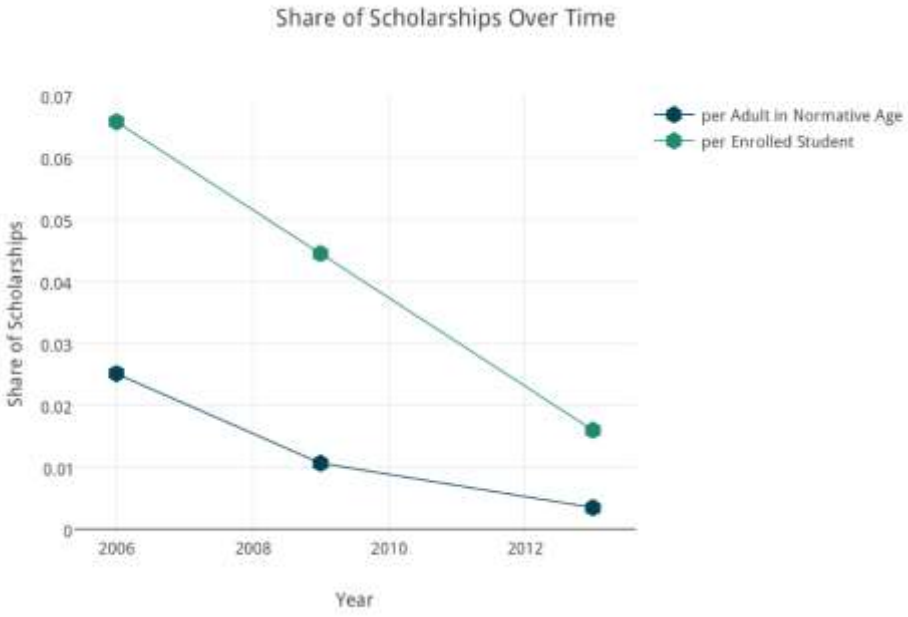


Figure A2.



[25] We used CPI for adjustments using 2005 as an index or base year. That is CPI in 2005 was 100.

Figure A3.

Figure A4.

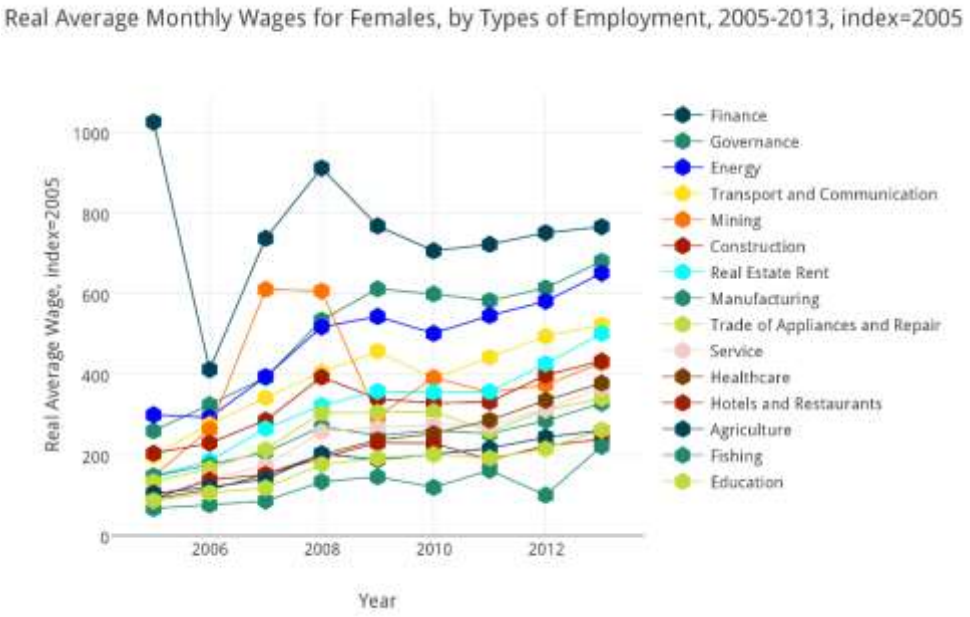


Figure A5.

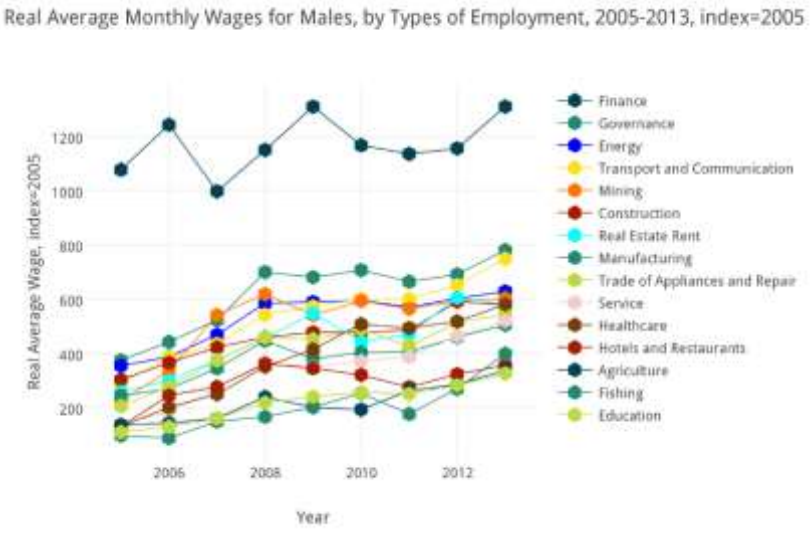


Figure A6.

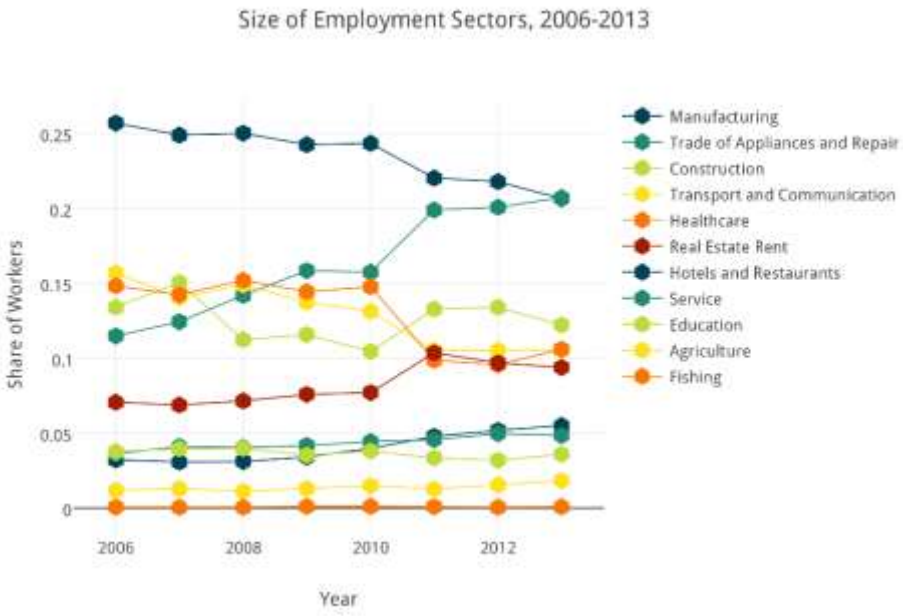


Figure A7.

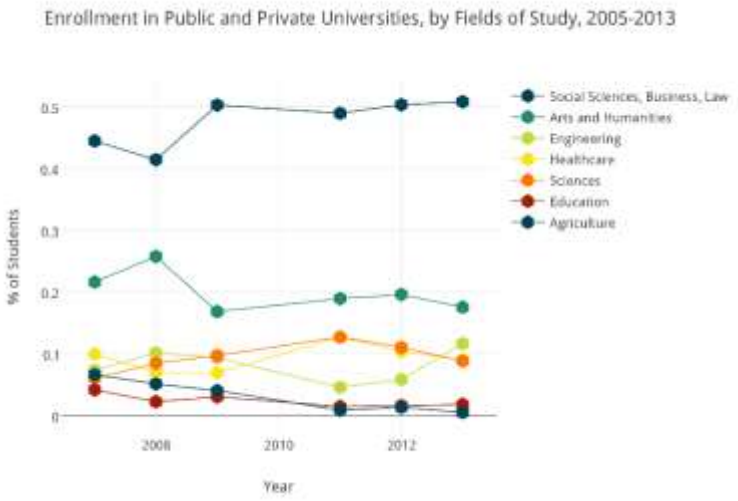


Figure A8.

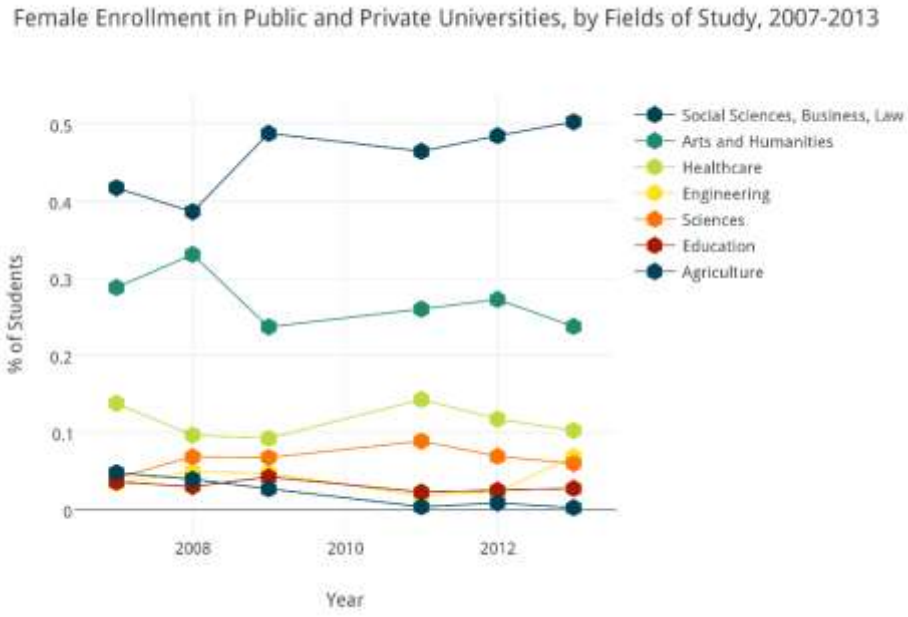


Figure A9.

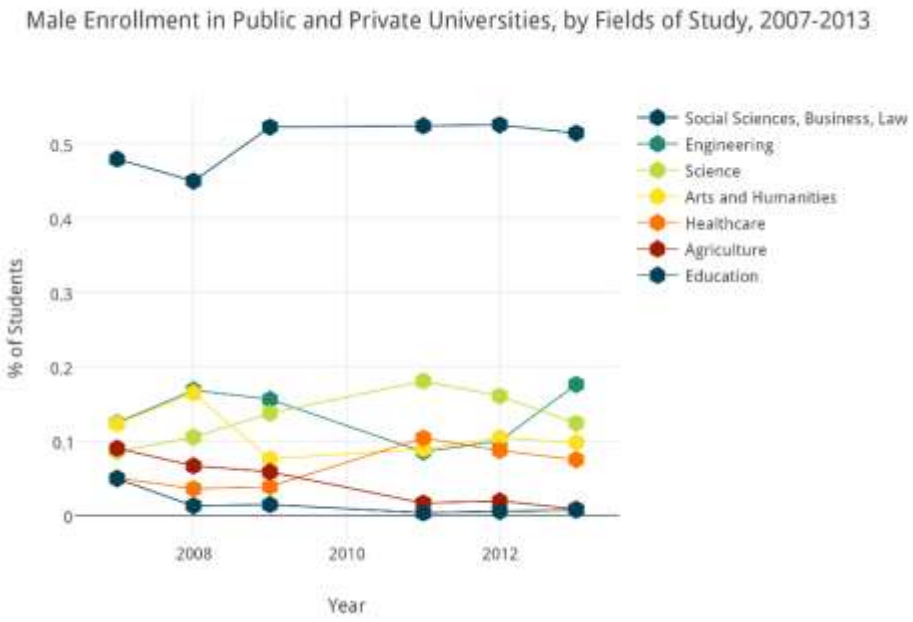


Figure A10.

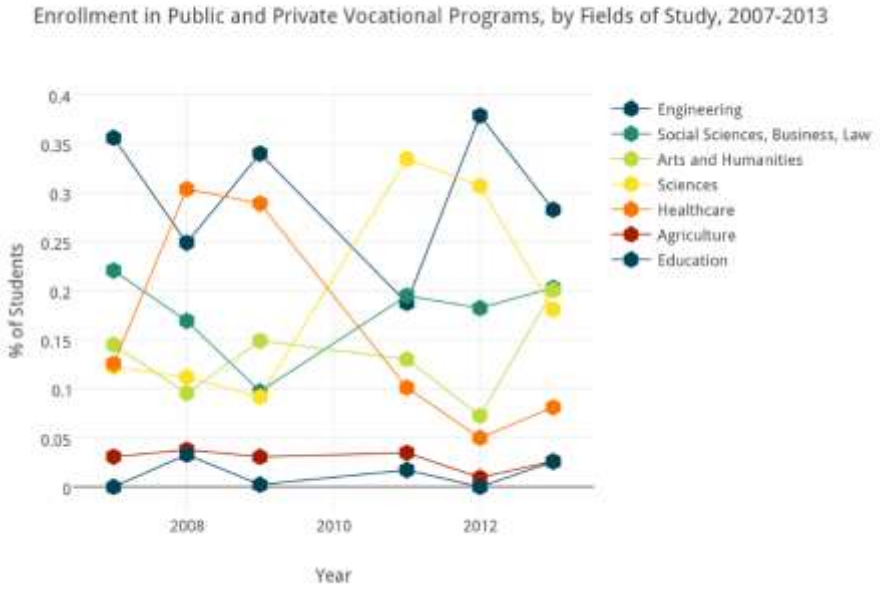


Figure A11.

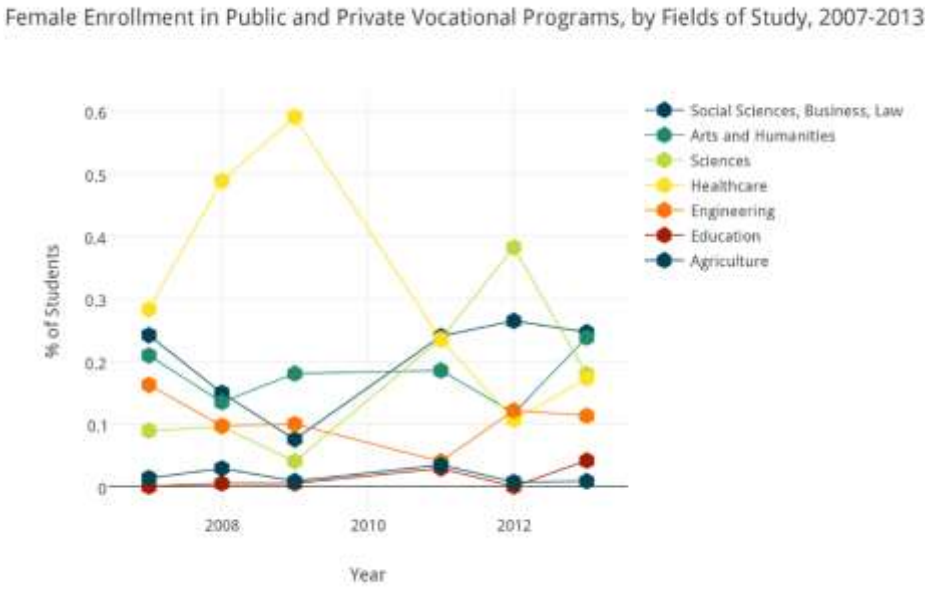


Figure A12.

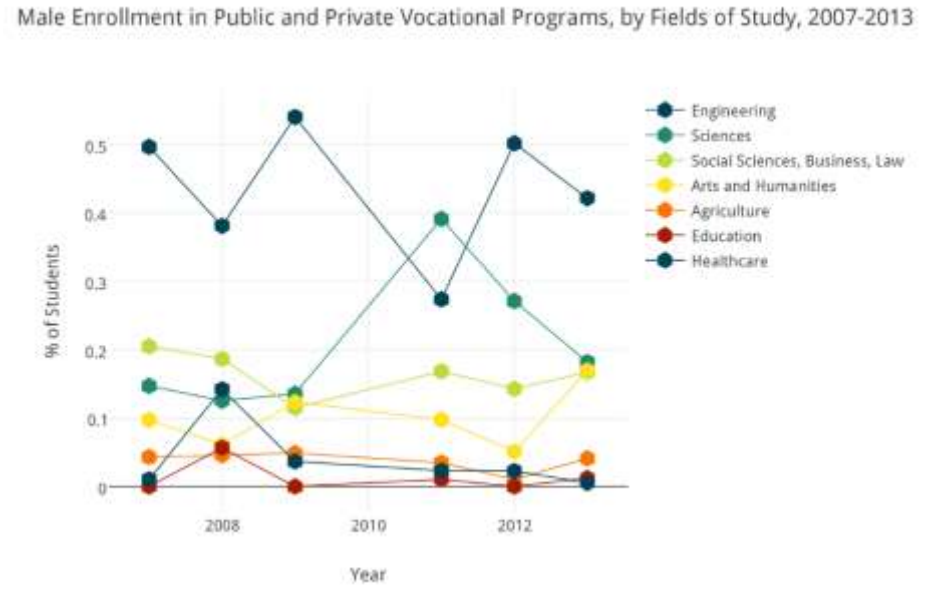


Figure A13.

Figure A14.

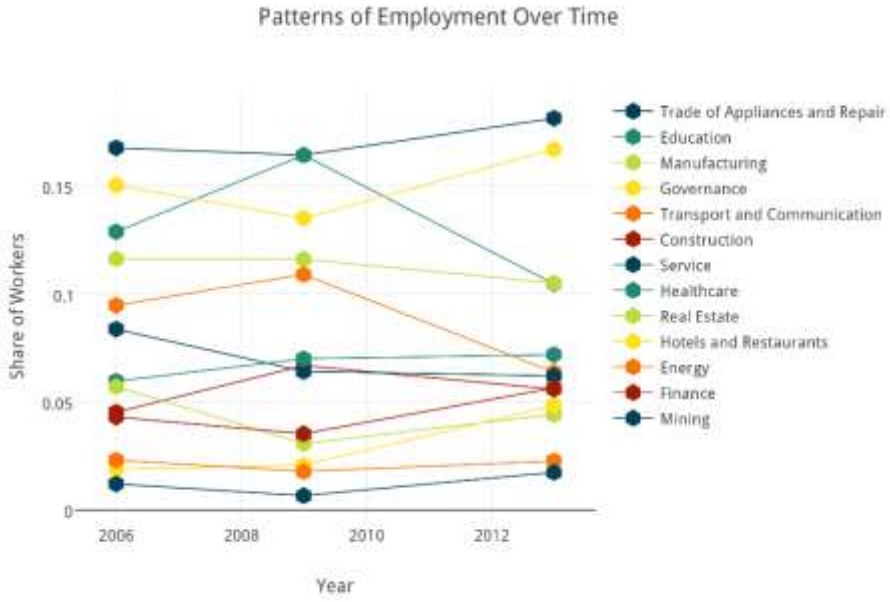


Figure A15.

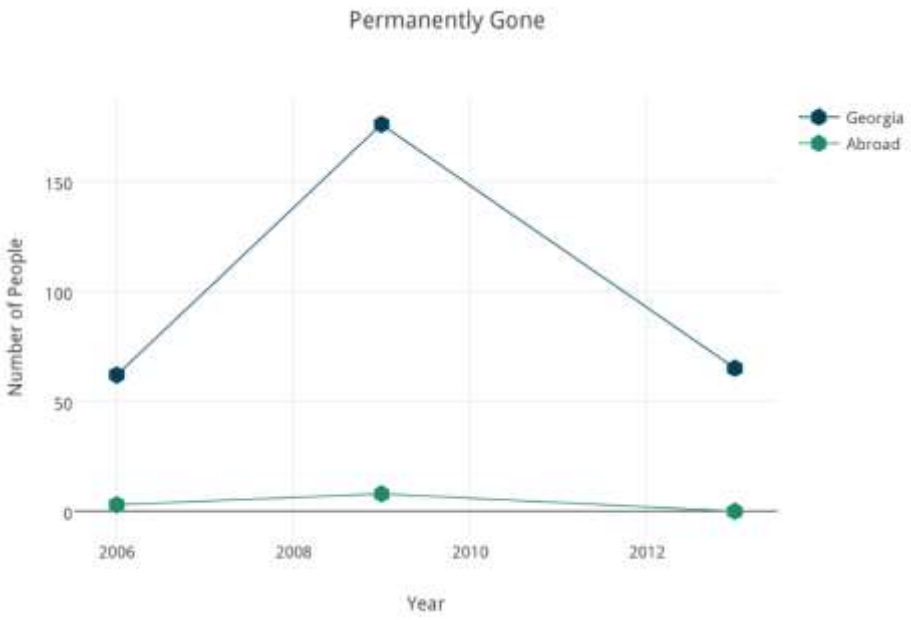


Figure A16.

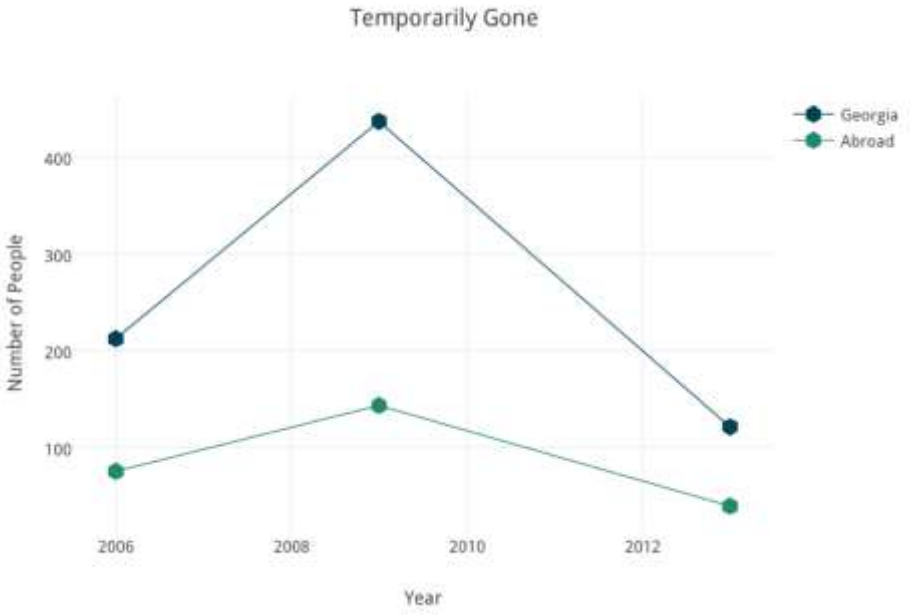


Figure A17.

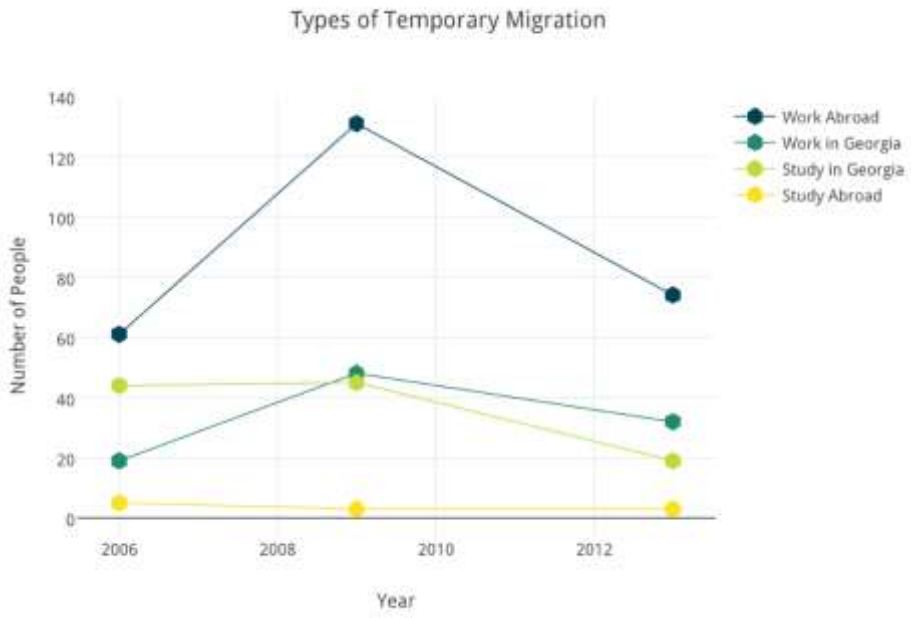


Figure A18.

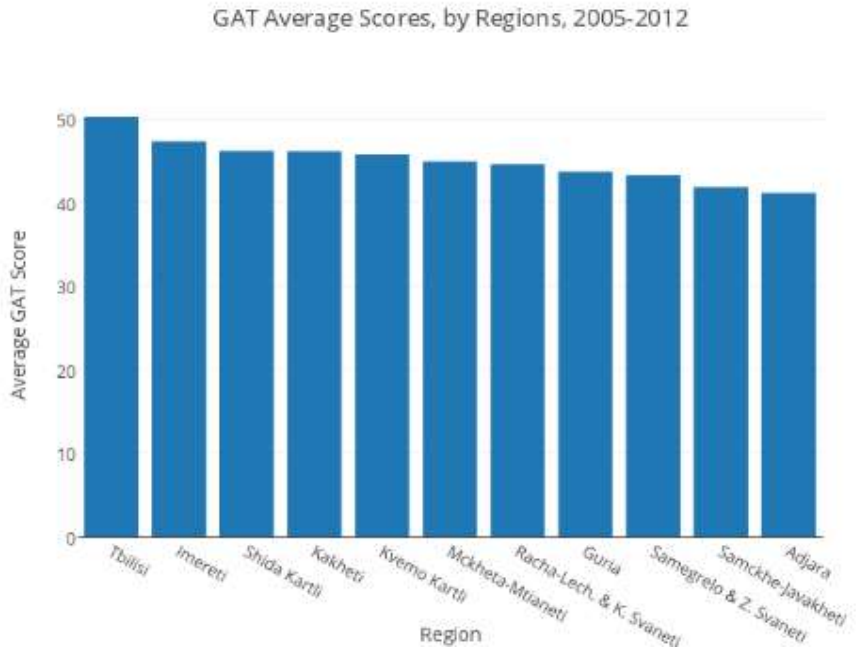


Figure A19.

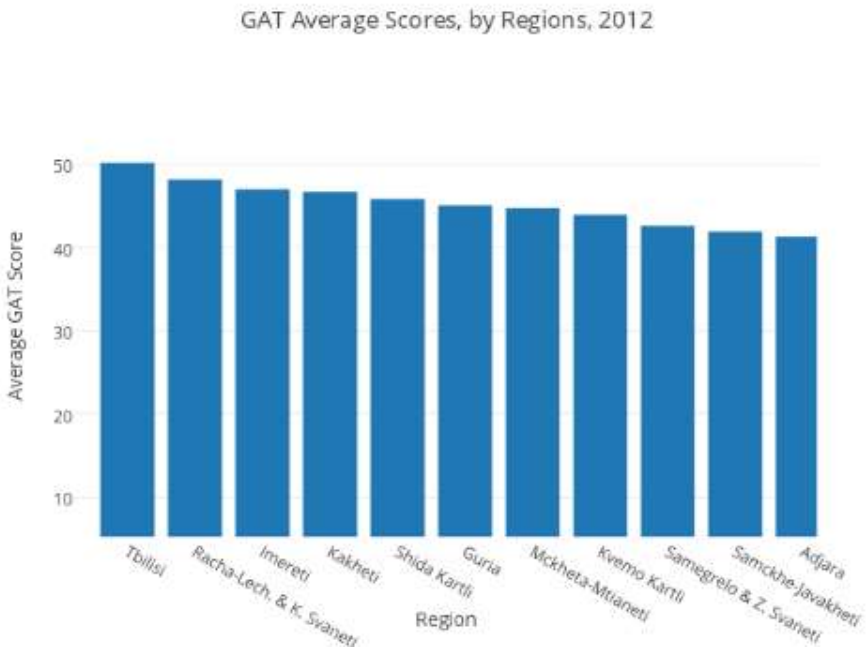


Figure A20.

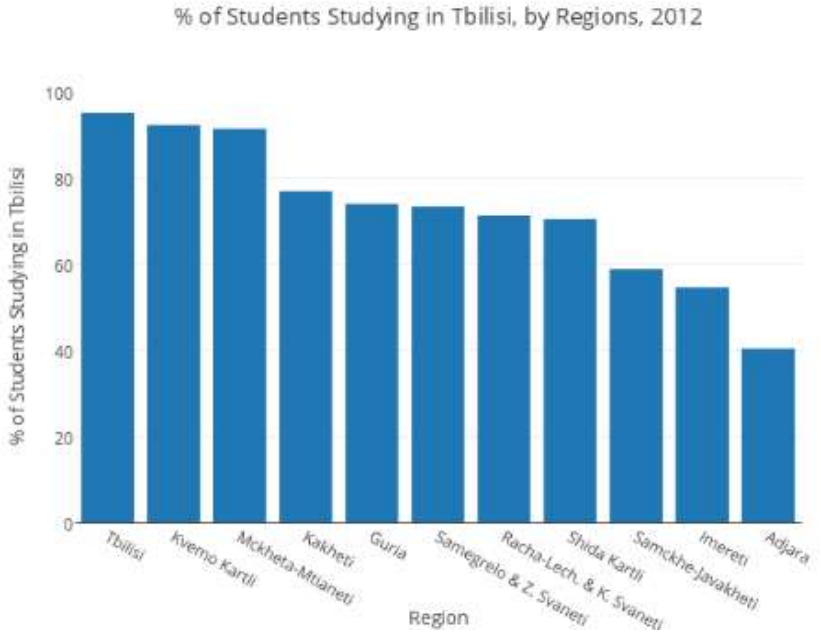


Figure A21.

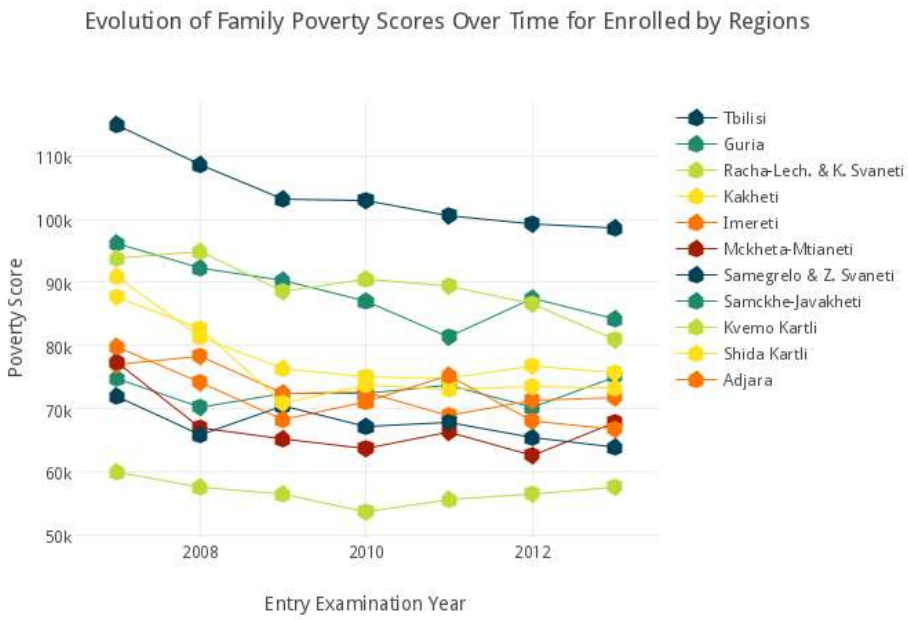


Figure A22.

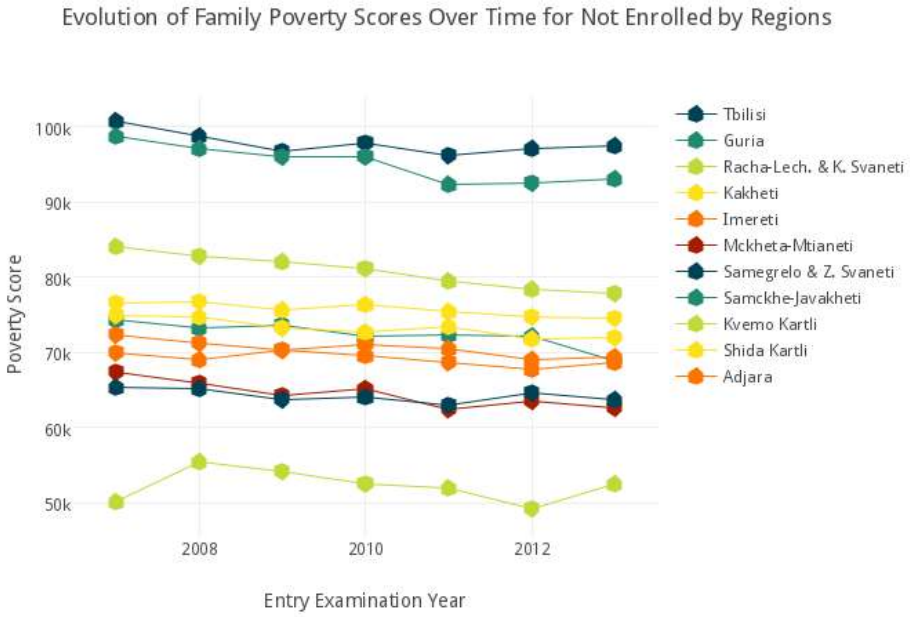


Figure A23.

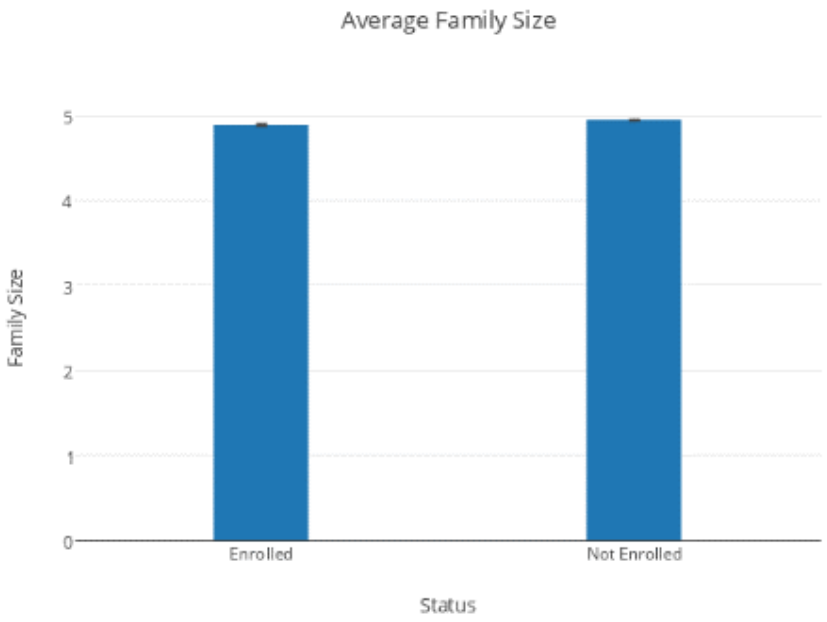


Figure A24 : (Dataset 1) – Distribution of the covariates (Family size, age, number of siblings, gender).

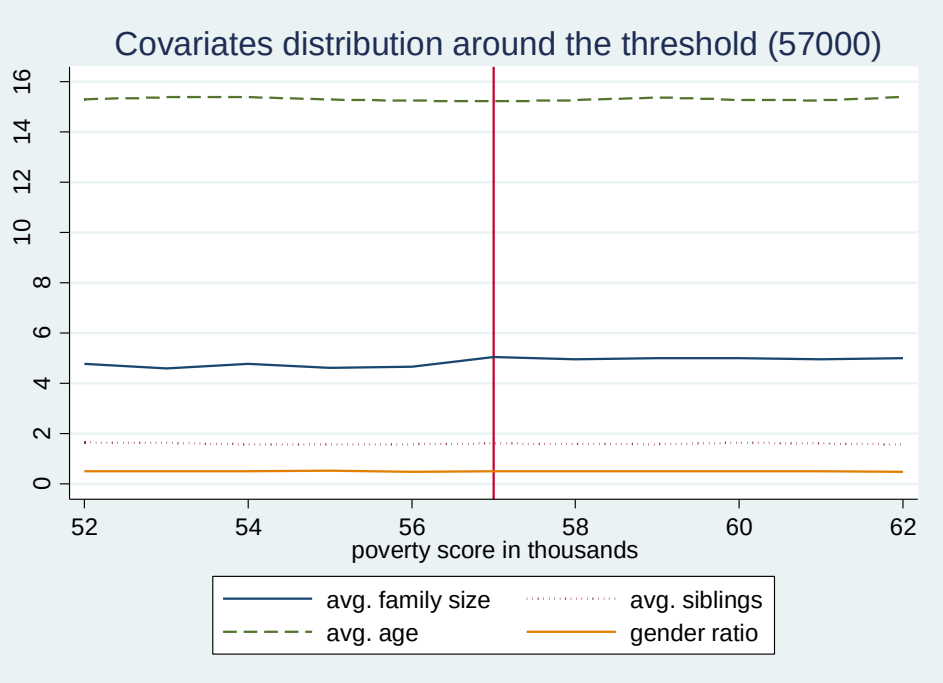


Figure A25: (Data set 2) – Distribution of the covariates (Family size, age, number of siblings, gender).

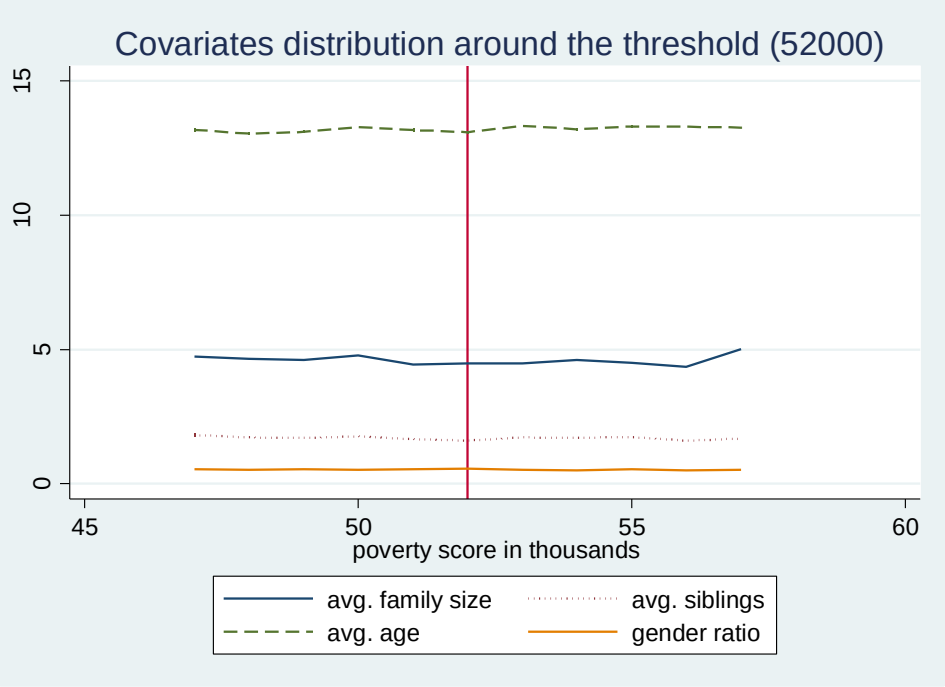


Table A1.

Returns to Education

	Ln($wage$) Year=2006	Ln($wage$) Year=2009	Ln($wage$) Year=2013
Dependent Variable	(1)	(2)	(3)
Secondary Eduction	-0.161	0.538	-0.476
	(0.236)	(0.798)	(0.189)
Tertiary Education	0.153	0.952	0.029
	(0.237)	(0.797)	(0.186)
Experience	0.010	0.006	0.004
	(0.007)	(0.007)	(0.006)
Experience^2	-0.0004***	-0.0003**	-0.0003**
	(0.0001)	(0.0001)	(0.0001)
Constant	4.741***	4.499***	6.104***
	(0.322)	(0.799)	(0.187)
Observations	941	2387	1142
R^2	0.074	0.098	0.126
Rate of Return to Tertiary Education (%)	6.28	8.28	10.1

Table A2.

Returns to Education, Females

	Ln($wage$) Year=2006	Ln($wage$) Year=2009	Ln($wage$) Year=2013
Dependent Variable	(1)	(2)	(3)
Secondary Eduction	-0.595*	0.154*	-0.418
	(0.454)	(0.085)	(0.176)
Tertiary Education	-0.057	0.576***	0.017
	(0.338)	(0.069)	(0.174)
Experience	0.008	-0.003	-0.001
	(0.011)	(0.008)	(0.007)
Experience^2	-0.0004**	-0.0001	-0.0002
	(0.0002)	(0.0001)	(0.0001)
Constant	4.706***	4.628***	6.168***
	(0.313)	(0.119)	(0.179)
Observations	437	1105	844
R^2	0.132	0.102	0.107
Rate of Return to Tertiary Education (%)	10.76	8.44	8.7

Table A3.

Returns to Education, Males

	Ln($wage$) Year=2006	Ln($wage$) Year=2009	Ln($wage$) Year=2013
Dependent Variable	(1)	(2)	(3)
Secondary Education	-0.093	0.614	-1.080
	(0.306)	(1.285)	(0.287)
Tertiary Education	0.322	1.256	-0.375
	(0.307)	(1.285)	(0.272)
Experience	0.024	0.018*	0.025**
	(0.009)	(0.010)	(0.010)
Experience^2	-0.0006***	-0.0005**	-0.0008***
	(0.0001)	(0.0002)	(0.0002)
Constant	4.708***	4.441***	6.339***
	(0.307)	(1.281)	(0.272)
Observations	504	1282	298
R^2	0.104	0.186	0.207
Rate of Return to Tertiary Education (%)	8.3	12.84	14.1

Table A4. Amount of cash transferred monthly to the average household in PPP adjusted USD. All other values are calculated per month.

Year	Fixed payment	Marginal payment	4-member family cash transfer	4-member family total income	Average family's subsistence level
2005	16.5	6.6	36.4	501.8	88.7
2006	16.9	6.8	37.1	774.6	100.6
2007	18	7.2	39.5	960.6	119.1
2008	20.1	8.1	44.3	973.7	144
2009	18	14.4	61.1	818.4	129.3
2010	16.8	13.5	57.2	874.3	126.4
2011	17.8	14.2	60.5	1076.9	156.9
2012	18.2	14.5	61.8	1174.5	153.5

Table A5. Quantitative distribution of candidate applicants (ready for higher education) from SSA families, where numbers in bold refer to those candidates whose families were assessed before the entry examination year

	Family assessment year (by SSA)	University entry Examination Year							
Threshold		2007	2008	2009	2010	2011	2012	2013	Total
T=52k	2005	**842**	**943**	**746**	**658**	**584**	**527**	**531**	4831
	2006	**5582**	**6051**	**5,599**	**4904**	**4564**	**4579**	**4476**	35755
	2007	4036	**4418**	**4425**	**4105**	**3865**	**3924**	**3875**	28648
T=57k	2008	6803	6460	**5863**	**5735**	**5727**	**6024**	**5771**	42383
	2009	10497	11081	9668	**8778**	**9259**	**9346**	**9530**	68159
	2010	718	753	703	644	**602**	**608**	**565**	4593
	Total	28478	29706	27004	24824	24601	25008	24748	184369
	Enrollment								
	no	25165	26913	23687	22109	21564	21708	21318	162464
	yes	3313	2793	3317	2715	3037	3300	3430	21905
	% enrollment	12%	9%	12%	11%	12%	13%	14%	12%
	NAEC	15599	14159	25153	19749	23204	24495	27097	149456
	% share in NAEC	21%	20%	13%	14%	13%	13%	13%	15%