

The internal migration choices of Ghanaian youths

Anne Duplantier*, Christopher Ksoll†, Kim Lehrer‡ and William Seitz§

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*GREDI - Economics Department - Administration Faculty - University of Sherbrooke

†Mathematica Policy Research - Oakland

‡GREDI - Economics Department - Administration Faculty - University of Sherbrooke

§World Bank

Abstract

Though international migration has garnered much attention over the past few years, internal migration has typically not. Yet, internal migration is the most common type of migration in developing countries. For many in Sub-Saharan Africa, international migration is not feasible. However, educated youth often migrate within their home country in search of employment opportunities. This article presents the internal migration patterns of educated youth in Ghana and analyses the relationship between migration decisions and wage differentials between Ghanaian regions. We use individual survey data of former students from 136 randomly selected secondary schools in Ghana collected by the authors in both 2011 and 2012. These surveys include information on education outcomes, migration histories, employment expectations and outcomes, as well as other socio-demographic characteristics. In our sample, 37% of respondents are living in a region other than their region of birth. Moreover, 56% are living in a region other than the region where they completed secondary school. In addition, we use the two most recent rounds (2006 and 2013) of the Ghana Living Standards Survey (GLSS), a large nationally representative household survey. We use the GLSS data to calculate mean income and employment statistics by region and by population sub-samples including young educated youth. We posit that when choosing whether to migrate within Ghana, and if so, where, individuals searching for employment base this decision, at least in part, on their expected probability of employment and expected salary. We use the statistics from the GLSS data and our respondents' migration outcomes to test whether this is the case.

Introduction

According to [De Vreyer et al. \(2009\)](#), internal migration within West African countries is an ongoing and highly developed phenomenon. This type of migration is generally recognized as a less expensive alternative to international migration for individuals seeking to escape poverty. Thus, globally, in 2005 there were approximately 763 million people who remained in their home country but had moved from their region of birth (a little over 11% of the population). In Africa, slightly more than 113.5 million individuals are considered internal migrants—12.5% of the population of Africa.

Intranational relocation is also the option chosen by individuals who have acquired a certain level of education and are looking for expanded opportunities. In Ghana, specifically, educated youths are very mobile. According to our data, 31.5% of them lived outside of their birth region in 2011 and 2012. In this article we will shed some light on the internal migration of young Ghanaians with a secondary education. We will then explore the relationship between this pattern of migration and regional income disparities within Ghana in order to determine whether educated young Ghanaians are pursuing better labour-market prospects. We seek to identify the role played by economic opportunities in the decision to migrate, and whether the determining factor for migration is expected future earnings or actual past earnings. Individuals do not have perfect information on prevailing incomes in each region, and we do not know on what information they base their decision to migrate. Are they accounting for past information or projecting estimates of future incomes?

To answer this question we draw on two rounds of the Ghana Statistical Service's Ghana Living Standards Survey (GLSS). This gives us information on Ghanaians' incomes in two different periods. The first survey round was conducted in 2005–06 and provides data on the past incomes of our respondents interviewed in 2011 and 2012, while the second GLSS survey round, in 2012–13, yields future incomes. We also use survey data that the authors collected in 2011 and 2012 from students who graduated from, or dropped out of, 136 randomly selected secondary schools in Ghana between 2008 and 2012. These surveys contribute information on the respondents' educational backgrounds, moves since birth, and career prospects. The methodology we apply in this study is McFadden's model of choice behaviour. Based on a conditional logit regression,

this method was developed by [McFadden \(1973\)](#) to facilitate the analysis of individuals' choice of area of residence. We adapt it to help us understand young Ghanaians' decision making process regarding their region of residence at the time of the survey.

Our primary contribution is to demonstrate a correlation between internal migration and income disparities between the various regions of Ghana. In addition, the McFadden choice model has rarely been used to study internal migration, so this will be a novel approach. Our main results are that post-secondary migration is less common among youths born in Ghana's rural zones and that it is positively correlated with the mother's education level and the respondent's IQ score. Moreover, higher incomes in neighbouring regions appear to attract youths with a high school education.

We begin with a review of the literature relevant to the subject of our article. Next, we briefly explain the data and the methodology used before proceeding with the analysis and, finally, concluding.

Review of the literature

While many articles have examined the issue of international migration ([Adams & Page \(2005\)](#), [Bertoli & Marchetta \(2014\)](#), [McKenzie & Sasin \(2007\)](#) and [Mayda \(2010\)](#)), far fewer have addressed internal migration. Nonetheless, these issues are of no less importance and central to development problems. In fact, while leaving one's country to start a new life abroad is a very costly investment, internal migration appears much more accessible. Indeed, a seminal article by Lewis ([Lewis \(1954\)](#)) explores how population shifts between rural and urban regions of a single country optimize the allocation of labour between the agricultural and industrial sectors. [Deshingkar & Grimm \(2005\)](#) emphasize that internal migration is increasingly common in developing countries. It could play a non-negligible role in fighting poverty and contributing to economic development, because it is not only a response to shocks but also a key survival strategy for the poorest populations. However, migration is also desired by, and accessible to, a less poor and more educated segment of society seeking a better return to its investment in education. Thus, there is some interest in identifying the individual characteristics that motivate internal migration.

There does not appear to be any consensus in the literature with regard to the connection

between education and internal migration. In fact, while [Miguel & Hamory \(2009\)](#) (Kenya) and [Du et al. \(2005\)](#) (China) find that higher education and skill levels increase the probability of migration within these countries, [Hare \(1999\)](#) concludes in his analysis of rural China that the number of years of schooling have no impact on the probability of migration. As a rule, single young men with no dependants appear most likely to migrate, although [Deshingkar & Grimm \(2005\)](#) have observed a pronounced feminization of migration in recent years, especially in South America and Southeast Asia. Also, shrinking opportunities in farming, high population densities, and an unequal distribution of agricultural land are all incentives to leave rural zones ([Deshingkar & Grimm, 2005](#)).

Before moving from one region to another, individuals—who are assumed rational—compare the expected benefits and costs of migration. [Lall et al. \(2009\)](#) and [Zhang & Shunfeng \(2003\)](#) find that wage differentials between rural and urban regions create an incentive for migrants to leave the countryside. This is consistent with the traditional theory of [Harris & Todaro \(1970\)](#) and [Lewis \(1954\)](#).

According to [Fafchamps & Shilpi \(2013\)](#), inter-regional mean wage differentials do not affect migration in Nepal. However, their work suggests that differences in spending and consumption levels between the regions play a role in migrants' choice of destination. They examine subjective satisfaction derived from the consumption of food, clothing, housing, healthcare, and education. In all of these areas, the destination region posts a greater level of subjective satisfaction than the region of origin and other potential destinations. The network of migrants at the destination appears to be a second factor that provides strong support for migration ([Mora & Taylor, 2006](#)). [Fafchamps & Shilpi \(2013\)](#) further find that Nepalese migrants tend to limit their moves to zones within which they share the language and ethnicity. Finally, [Dudwick \(2011\)](#) shows that migrants are prepared to accept lower wages to have access to better government services.

[Lu & Shunfeng \(2006\)](#) compare the jobs of rural migrants with those of urbanites in China. The yield to education appears higher for urban workers than for migrants, reflecting the poor quality of education in rural zones and suggesting that a few more years of schooling in these areas does not really impart more education. It could also indicate discrimination against migrants. Moreover, in China the relaxation of controls on internal migration has played a key role in the increase

in population shifts. [Awumbila et al. \(2008\)](#) remind us that migration in West Africa is usually informal and little studied, partly because of a lack of data. Thus, investigating the consequences of migration remains relevant for obtaining a better understanding of what's at stake, particularly in West Africa. Examining the issues surrounding migration within Ghana will certainly allow us to identify economic policy recommendations for one of the most active countries in West Africa, and even for the entire region.

There is no consensus on the impact of migration: It can be positive or negative, depending on the aspect considered, the country or region, the economic background, and its temporary or permanent nature. [Lall et al. \(2006\)](#) remind us that the ramifications of these internal population shifts can be both positive (transfers, contribution to the development of rural zones, poverty reduction) and negative (pressure on the cities, increased inequality between cities and the countryside). In addition, migrants often face difficult living conditions, in terms of a high cost of living in their destination. This can undermine the poverty-reduction benefits of migration. Finally, temporary migration has a long-term impact on the structure of families and society, which may be positive (increased autonomy and empowerment of women) or negative (loss of paternal influence for the children, migrant men returning with sexually transmitted diseases or AIDS), and which are often overlooked ([Deshingkar & Grimm, 2005](#)). However, our sample is young, just out of secondary school, and so most of them have neither a spouse (98%) nor children (97.05%) and so for them these points are largely moot.

[Anarfi et al. \(2003\)](#) discuss the determinants of rural-urban migration within Ghana. They maintain that the high population growth rate over the past thirty years has increased the labour supply and put pressure on arable land, thus encouraging migration from the countryside into the city. In addition, these same authors suggest that great differences between the poverty levels in the south and the north of Ghana are fuelling this internal migration. The coastal zone (dominated by Accra-Tema and Sekondi-Takoradi) is the most industrialized and urbanized, attracting the lion's share of internal migration. The centre, the capital of which is Kumasi, is strong in agriculture, forestry, and mining. This region received most of the migration from the north in the 1990s. We see that Ghana is a country of particular interest for studying internal migration between regions because of the great diversity in poverty levels. It is of some interest to study the movement of

educated youths in Ghana in order to better understand their choice of region of residence and whether it is related to wages offered in the different regions of Ghana.

The Data

The data we use in this study are from two different sources. The first and primary source is the GOT survey (Ghana Opportunities for Transitioning Senior High School Students) conducted by the authors in several successive rounds. The goal of this survey is to follow senior high school (SHS) students for several years after graduation in order to observe their post-secondary education and their labour market integration. The first survey was conducted in 2010 in 136 public high schools selected at random from among all public high schools in Ghana. Within each of these schools one class was chosen at random from each grade level (for a total of four levels), then eight students were chosen at random from each of the selected classes. Two classes of students having graduated in 2008 and 2009 were also selected at random in order to have two cohorts of students with diplomas. Subsequently, three rounds of surveys, conducted in 2011, 2012, and 2014, continued to follow and interview the students chosen in 2010. It should be noted, however, that during the 2011 round an additional cohort of students in the first year of high school was added at random in each surveyed school. The same number of students was drawn in each school, but we added weights to reflect the size of the school's student population to improve representativeness. Thus, this sample is representative of public high school students in each region of Ghana.

The questionnaires used in this survey cover different areas, depending on whether the respondent is currently in high school. For students attending SHS, the questions address their educational antecedents and family background. For those having finished high school, the questions are more focused on their success with the West African Senior School Certificate Examination (WASSCE), their post-secondary education if applicable, their post-high-school career paths, and their moves within Ghana since birth. We consider internal migration to be a change in residence between the regions of Ghana.

Individuals attending university or a post-secondary institution at the time of the survey, 29% of the sampled population, are eliminated from the sample (which initially comprised 3275 individuals). Also, 0.68% of the interviewed individuals were still attending SHS at the time of the



Figure 1: Map of the regions of Ghana

survey and were removed. Our final sample consists of 2311 Ghanaians who were not attending post-secondary or secondary school at the time of the survey. Of that group, 97.11% had obtained their high-school diploma.

Our target population is individuals who had attended secondary school but no longer were (whether they graduated or not) and who were, or wanted to be, on the labour market. Thus, we do not account for moves motivated by education. This sample is representative of the individuals who completed high school in Ghana between 2007 and 2009 and in 2011 and 2012. In fact, owing to a reform of the school system no one graduated in 2010, but two cohorts graduated in 2011. This is a panel survey with several successive rounds (2011 and 2012). However, we do not use panel data, but retain the most recent information for each individual. Thus, we only interviewed 106 individuals in 2011, but have data on 2205 from 2012.

As we see in Table 1, the average age of our sample was 21.93 at the time of the survey and 61.67% of the survey participants were male. According to the Ghana Statistical Service's 2010 census, men make up 48.76% of the nation's population. Thus, we can conclude that in Ghana men still have greater access to secondary education than women. In 2010, 55.06% of individuals whose highest level of education was SHS were men. So we see that men are slightly overrepresented in our sample relative to the population at large. As previously explained, several cohorts were interviewed. On average the time elapsed between high school graduation and participation in the survey was one-and-a-half years; the maximum being four years and the minimum zero.

Table 1: Individual characteristics of the sample

Variables	Interviewed in 2011	Interviewed in 2012	Total
Male (%)	63.21	61.60	61.67
Average age (years)	21.73	21.94	21.93
	[2.15]	[2.25]	[2.25]
Migration birth-today (%)	31.13	31.61	31.59
Migration SHS-today (%)	34.91	32.38	32.50
One-way migration(%)	22.64	21.68	21.72
Born in rural zone (%)	-	59.57	59.57
Network: migrants per school (%)	21.77	21.67	21.67
Average time since diploma (years)	1.58	1.43	1.44
	[1.29]	[1.48]	[1.47]
Average distance SHS-Accra (km)	315.58	216.53	221.08
	[196.05]	[147.61]	[151.54]
Internal to SHS (%)	52.83	52.06	52.10
Cognitive abilities (%)	39.94	40.02	40.02
Current region (%)			
<i>Ashanti</i>	26.92	19.15	19.50
<i>Brong Ahafo</i>	11.54	10.17	10.23
<i>Central</i>	3.85	7.88	7.70
<i>Eastern</i>	8.65	6.18	6.30
<i>Greater Accra</i>	13.46	26.84	26.24
<i>Northern</i>	2.88	7.28	7.08
<i>Upper East</i>	7.69	1.74	2.01
<i>Upper West</i>	11.54	2.11	2.54
<i>Volta</i>	6.73	10.86	10.67
<i>Western</i>	6.73	7.79	7.74
Father's education (%)			
<i>None</i>	40.22	18.66	19.63
<i>Primary</i>	2.17	4.51	4.41
<i>JHS</i>	32.61	41.11	40.72
<i>SHS</i>	11.96	17.27	17.03
<i>Post-secondary</i>	13.04	18.45	18.21
Mother's education (%)			
<i>None</i>	54.9	30.82	31.98
<i>Primary</i>	4.90	9.460	9.25
<i>JHS</i>	27.45	43.41	42.64
<i>SHS</i>	7.84	10.85	10.71
<i>Post-secondary</i>	4.90	5.45	5.42
Year SHS started (%)			
<i>2005</i>	33.96	14.65	15.53
<i>2006</i>	28.3	17.82	18.3
<i>2007</i>	37.74	31.6	31.89
<i>2008</i>	-	35.92	34.27
Observations	106	2205	2311

Standard deviations in parentheses

Furthermore, 59.57% of the individuals in our sample were born in a rural zone, while the 2010 census finds that 49.1% of the population is rural. Thus, we oversample individuals living in rural zones. One possible explanation for this discrepancy is that our definition of rural is not the same as that used by the census. Indeed, the 2010 census considers a zone to be rural if the population is below 5000 inhabitants. Our survey, on the other hand, draws on a subjective conception of rural in that we simply ask the participant whether they live in a rural or urban zone without providing any definitions. Thus, it is possible that our survey participants consider themselves to live in a rural zone even though, according to the census definition, this is not the case. As a proxy for migration networks we use a variable for the percentage of students in each school who have migrated. Thus, the mean of migrants per SHS is 21.67% and the standard deviation 13.69. The schools are an average of 214.76 km from Accra; the one furthest from the national capital is 628 km away.

We note that a little over half of our sample (52.10%) lived in residence while at school. Cognitive abilities is measured as the percentage of correct answers obtained on the 18 questions of the Klein test, which is similar to Raven's Progressive Matrices test. This test belongs to the family of nonverbal tests in which the individual's ability to think, solve problems, and learn is measured. In our sample individuals answered an average of 40% of the questions correctly.

It is now recognized that the parents' education level can have a significant impact on the children. In our sample, approximately 41% of the participants had at least one parent with a junior high school (JHS) level education. However, 31.98% of them had a mother with no formal education while only 19.63% had a father with none. Similarly, the fathers of 18.21% of our participants had a post-secondary education, but only 5.42% of the mothers did.

Recall that we interviewed four cohorts that officially started school between 2005 and 2008. The largest cohorts were the last two, representing 34.27% and 31.89% of the sample, respectively, while only 15.53% of the individuals were in the first cohort from 2005. This is quite reasonable, since our sampling frame was SHS students. In 2012 it would be easier to find students who had just finished their education than those having left school several years ago, who could be difficult to track down.

We also observe that not all regions are represented equally in this survey. For instance, at that

time 26.24% of our sample lived in the Greater Accra region, and only 2.01% in the Upper East region. However, according to the census conducted by the Ghana Statistical Service, the Ashanti region had the largest population in 2010. Consequently, our sample is clearly not representative of the Ghanaian population.

We observe at first blush that the individuals in our sample are very mobile within Ghana at different stages of their lives. In fact, at the time of the survey, 31.59% of them lived in a region other than their region of birth. Moreover, 21.72% lived in a region that was neither where they were born nor where they went to school. We can infer from this that these individuals did not return home after high school, probably going to another region to look for work.

In this database we have three different types of migration. “Birth-today” migration covers all individuals who were living in a region other than their birth region at the time of the survey. “SHS-today” migration covers individuals who lived in a different region at the time of the survey than the one in which they attended SHS. Finally, “one-way” migration covers individuals who were living in neither their birth nor schooling region at the time of the survey. This final category appears to us to be the most complete and interesting for studying the link with the labour market, since it excludes individuals who returned home after completing SHS—presumably for non-economic reasons. This is the type of internal migration we examine in this paper. We use the two other definitions to test for robustness. First let us take a closer look at the survey participants’ history of moves.

Table 2: Location of individuals in each phase

Regions	Birth	SHS	Post-SHS	2010 Census
Ashanti	17.24	17.57	19.50	19.4
Brong Ahafo	11.82	11.99	10.23	9.4
Central	8.78	10.17	7.70	8.9
Eastern	10.64	13.67	6.30	10.7
Greater Accra	13.19	7.96	26.24	16.3
Northern	7.64	7.27	7.08	10.1
Upper East	3.37	3.72	2.01	4.2
Upper West	2.73	3.55	2.54	2.8
Volta	15.64	16.40	10.67	8.6
Western	8.23	7.70	7.74	9.6
Outside of Ghana	0.73	-	-	-
Total (%)	100	100	100	100
Total (#)	2 199	2 311	2 287	24 658 823

Table 2 presents the regions in which the participants lived during each of these three phases of their lives: birth, SHS, and the time of the survey. Thus, we see that some regions attract individuals while others are avoided. The capital, Accra, exerts a strong attraction, since 26.24% of our sample lived there at the time of the survey while only 7.96% obtained their SHS diploma, and 13.19% were born, there. Conversely, since 16.40% and 13.67% of the sample went to high school in the Volta and Eastern regions, respectively, but only 10.67% and 6.30% lived in them at the time of the survey, they appear less attractive.

Table 3: Residential location before SHS

Région du SHS	Region of birth										
	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western	Outside
Ashanti	77.04	7.66	7.77	2.56	4.14	1.79	4.05	1.67	0.58	11.05	6.25
Brong Ahafo	5.54	78.46	1.04	2.14	1.38	7.14	5.41	1.67	0.87	4.42	12.5
Central	3.69	1.15	80.31	4.7	9.31	0	1.35	1.67	1.16	6.63	6.25
Eastern	3.17	1.15	3.63	74.796	28.28	2.98	1.35	3.33	3.20	2.21	25
Greater Accra	3.43	0	2.59	7.69	43.45	0	0	1.67	4.07	0	12.5
Northern	0.79	4.62	0	0.43	0.34	73.21	10.81	8.33	0.58	0.55	6.25
Upper East	2.37	1.15	0	0.85	1.72	5.95	70.27	0	0.29	0	0
Upper West	1.85	3.08	0	0	0.69	3.57	5.41	80	0	2.21	0
Volta	0.53	1.92	0	4.27	8.28	4.76	0	0	87.79	1.10	25
Western	1.58	0.77	4.66	2.56	2.41	0.6	1.35	1.67	1.45	71.82	6.25
Total (%)	100	100	100	100	100	100	100	100	100	100	100
Total (#)	379	260	193	234	290	168	74	60	344	181	16

Table 3 allows us to follow individuals born in each region in order to determine where they attended SHS. Thus, only 43.45% of those born in the Greater Accra region remained in that same region to complete their SHS, while 28.28% moved to the Eastern region. On the other hand, 87.79% of individuals born in Volta stayed there to attend SHS. We see that survey participants who were born in the capital region are more prone to move for their high school education than those born elsewhere.

Table 4 indicates where individuals were living at the time of the survey as a function of where they attended school. This allows us to examine post-SHS moves within Ghana. Some regions, such as Eastern, Western, Volta, Upper East, and Upper West attract very few individuals who received their education elsewhere. These same regions have a very low retention rate for students who completed their education there (between 41.18% and 75.14%). It appears that individuals are not attracted to these regions, even if that is where they attended high school. Conversely, the Ashanti, Brong Ahafo, Central, Greater Accra, and Northern regions not only appear to retain students who completed their SHS there, but also to attract students educated elsewhere.

Table 4: Location after SHS

Current region	SHS region									
	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Ashanti	80.94	15.04	8.15	3.51	2.17	2.99	17.65	9.76	2.13	5.08
Brong Ahafo	4.21	72.56	0.43	0.64	0	4.79	2.35	12.2	0	0.56
Central	3.22	0.75	55.79	3.19	2.17	0	2.35	0	2.39	3.39
Eastern	0.5	0	0.86	42.17	0.54	0	2.35	1.22	0.53	1.13
Greater Accra	7.92	6.02	27.47	47.6	92.39	6.59	21.18	4.88	29.79	13.56
Northern	0.25	1.88	0	0.96	0.54	80.84	10.59	6.1	0.80	0
Upper East	0	0	0	0.32	0.54	1.8	41.18	3.66	0.53	0.56
Upper West	0.25	0	0.86	0.32	0	2.4	1.18	56.1	0.53	0.56
Volta	0.25	0.75	0.43	0.32	1.09	0.6	0	1.22	62.50	0
Western	2.48	3.01	6.01	0.96	0.54	0	1.18	4.88	0.80	75.14
Total (%)	100	100	100	100	100	100	100	100	100	100
Total (#)	404	266	233	313	184	167	85	82	376	177

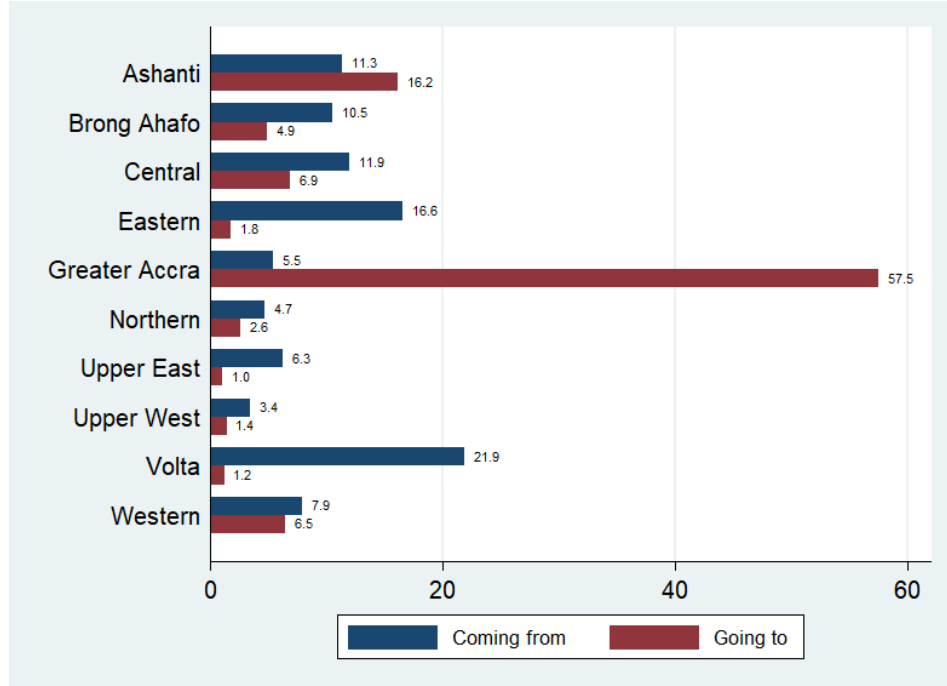


Figure 2: Migrants' origin and destination regions

Figure 2 shows us from which regions educated young migrants originate in Ghana and where they choose to settle. We see that the two regions that attract the largest number of educated youths are Greater Accra and Ashanti, and that Volta and Eastern generate the most migrants. Some regions attract very few educated youths: Upper East, Volta, Upper West, and Eastern each receive fewer than 2% of migrants.

Finally, to complete this overview of migratory trends in Ghana, Table 4A (in the appendix) presents individuals' choices of residential location as a function of where they attended SHS when return migration (i.e. individuals who moved to attend school but then returned home) is excluded. Our interest is in the movements of high school graduates seeking work. Individuals who return to their region of birth are not necessarily looking for work, they may just be going home to their families after graduating. In order to eliminate this going-home effect, the table presents statistics on the post-SHS location of individuals with that group omitted. The previously observed trend persists and the national capital region is the indisputable leader in attracting SHS graduates from all regions, but especially from the Central, Eastern, Upper East, and Volta regions (between 20% and 30% of those having gone to school in these regions lived in the capital region at the time of the survey). Furthermore, we observe that nearly 95% of individuals who completed their SHS in the Greater Accra region remain in that region afterwards, while the corresponding statistic for the Upper East region is barely 50%, indicating that this region struggles to retain its high school graduates.

The second source of data for our study is the Living Standards Measurement Survey, collected by the Ghana Statistical Service with support from the World Bank, of which we especially drew on the fifth (2005–2006) and sixth (2012–2013) rounds (GLSS, Ghana Living Standards Survey). This sample, representing all regions of Ghana, comprises 8700 households from both rural and urban zones. We extract information on unemployment and incomes from the variable *individual's total real monthly income in Ghanaian cedi (GHS)*. Our income variable is based on the one created by Francis Teal with several changes. First, we convert incomes into the current Ghanaian currency (GHS), because his was expressed in terms of the former currency (GHC). Next, we use the consumer price index from the World Bank's World Development Indicators (WDI) database to deflate 2012 prices in order to correct for inflation between 2006 (the year in which GLSS income

data was collected) and 2012 (the year of the GOT survey). Finally, we account for standard of living differences within the country by dividing incomes by the regional price index from the GLSS5 database. We then normalize these results around the 2005 Accra price index, which we set at one (1). This allows us to compare mean incomes in each region after eliminating price differences. This income measure accounts for any remuneration to work (employment, agricultural labour, self-employment, etc.) as well as the value of goods and services provided as in-kind benefits. The GLSS5 database does not include a variable for the number of hours worked. Thus, we must make the assumption that all individuals work full time. This is the real income variable with which we subsequently construct the ratio of origin-region to destination-region incomes for each individual. We will take a closer look at the construction of this variable in the next section.

Table 5: Migration and mean income in each region

Region	Age	Migration to (%)	Migration from (%)	Income	Income SHS	Income youth	Income SHS youth	Youth incomes SHS male	Youth incomes SHS female	Unemployment (%)
Ashanti	21.64 (2.25)	16.14	11.16	184.28 (266.60)	252.90 (313.93)	138.91 (184.19)	174.85 (199.10)	158.05 (159.61)	226.91 (295.43)	4.74
Brong Ahafo	22.3 (2.09)	4.78	10.36	181.90 (281.75)	253.54 (245.27)	158.23 (247.01)	151.97 (166.40)	109.39 ⁺ (56.86)	188.47 ⁺ (222.07)	2.07
Central	21.65 (2.1)	6.97	11.74	157.33 (216.41)	300.76 (452.57)	125.96 (177.65)	196.01 (223.96)	211.96 ⁺ (264.05)	164.11 [#] (138.51)	6.04
Eastern	22 (2.02)	1.79	16.53	157.55 (240.51)	223.64 (207.53)	133.96 (198.10)	170.43 (116.63)	166.50 ⁺ (141.45)	173.18 (104.04)	3.32
Greater Accra	21.45 (2.1)	57.77	5.38	207.89 (250.40)	214.07 (183.93)	157.55 (192.28)	192.65 (236.39)	189.23 (160.71)	196.19 (298.48)	7.89
Northern	22.72 (2.25)	2.59	4.58	143.93 (244.19)	132.34 (112.79)	124.06 (241.17)	77.75 (61.43)	86.68 (61.50)	53.96 ⁺ (59.74)	0.92
Upper East	22.63 (2.29)	1	6.18	97.25 (207.22)	114.75 (104.54)	57.16 (90.85)	74.28 (94.43)	85.76 ⁺ (113.38)	48.43 [#] (10.13)	8.38
Upper West	22.66 (2.08)	1.39	3.39	126.21 (186.06)	152.51 ⁺ (238.96)	133.14 (181.59)	76.99 ⁺ (78.13)	86.02 [#] (87.15)	40.85 [#]	16.06
Volta	22.67 (2.72)	1.0	21.51	118.11 (154.41)	145.90 (215.54)	100.45 (119.90)	103.19 (98.12)	96.55 (102.08)	120.89 ⁺ (93.05)	2.15
Western	21.88 (1.9)	6.37	6.37	168.71 (231.62)	185.72 (155.00)	177.31 (260.59)	125.03 (81.95)	110.65 (62.38)	326.36 [#]	3.87
Ghana	21.93 (2.24)			164.51 (241.34)	209.40 (238.07)	135.48 (201.11)	150.15 (176.89)	139.30 (140.89)	169.87 (228.06)	4.73
Total #	2 284	502	502	8 893	580	2 036	217	140	77	9 335

⁺ Fewer than 10 observations used to compute mean; [#] Fewer than 5 observations used to compute mean
The variables *Age*, *Migration to* and *Migration from* are from the authors' GOT database; the other variables are from the World Bank's GLSS5 database. Standard deviations in parentheses

Table 5 presents the mean age by region, the percentage of individuals from each region, and the percentage of individuals moving into each region from the GOT database. In addition, we have an overview of mean incomes in each region of Ghana during the 2005–2006 period by assorted individual characteristics, and the unemployment rate, from the GLSS5 database. We note that the regions exercising the greatest attraction are the capital region with nearly 58% and the Ashanti region with 16% of migrants. These are the regions with the highest mean incomes, 208 and 184 GHS, respectively. Conversely, there are more migrants from Volta and Eastern than from any other region (21.5% and 16.5%, respectively). Incomes in these regions are 118 and 157 GHS,

respectively, and thus below the national average of 164 GHS. However, these are not the regions with the lowest mean incomes (Upper East and Volta), indicating that it is harder, or less necessary, for youths having graduated from SHS in poor regions to migrate.

Since our sample consists of individuals who graduated from SHS and are aged between 18 and 28, we also present this sampling sub-demographic's mean income for each region. Thus, we observe in all regions that the incomes of individuals with an SHS diploma are significantly above average. On the other hand, mean incomes of individuals between 18 and 28 years of age are below average in every region. As a reminder, our measure of individual monthly income accounts for price differences between the regions and for inflation between 2005–2006 (time of income data collection) and 2011–2012 (time of migration data collection) in order to normalize incomes in 2005–2006 GHC.

Finally, the last column of this table gives us an overview of the unemployment rate in each region. Indeed, if youths are attracted by high incomes, rational individuals will also consider the unemployment rate, which may create a disincentive to migration. We observe that four regions post unemployment rates higher than the national average of 4.73%: Upper West with 16%, Upper East and Greater Accra with approximately 8%, and Central with 6%. In fact, because of their poverty the Upper West and Upper East regions attract very few migrants. We observe that, even though the unemployment rate in Accra is high, it still attracts a lot of migrants who nonetheless expect to find the greatest array of professional opportunities.

Table 6: Unemployment rate in each region

Region	Unemployment	Unemployment SHS	Unemployment youth	Youth unemp SHS	Youth unemp SHS male	Youth unemp SHS female
Ashanti	4.74	14.6	10.89	26.79	26.19	28.57
Brong Ahafo	2.07	5.56	6.82	13.33	14.29 ⁺	12.5 ⁺
Central	6.04	12.12	15.34	20	11.11 ⁺	33.33 ⁺
Eastern	3.32	7.32	8.99	10.53	12.5 ⁺	9.09
Greater Accra	7.89	14.29	17.25	22.97	23.68	22.22
Northern	0.92	2	2.52	4.35	5.88	0 ⁺
Upper East	8.38	12.5	18.49	23.53	25	20 ⁺
Upper West	16.06	0 ⁺	20.37	0 ⁺	0 [#]	0 [#]
Volta	2.15	6.38	7.73	12	5.88	25 ⁺
Western	3.87	9.09	7.77	11.76	0	66.67 [#]
Ghana	4.73	11.18	11.05	18.42	16.67	21.43
Total #	9335	653	2289	266	168	98

⁺ Number of observations fewer than 10; [#] Number of observations fewer than 5
Variables from the World Bank's GLSS5 database.

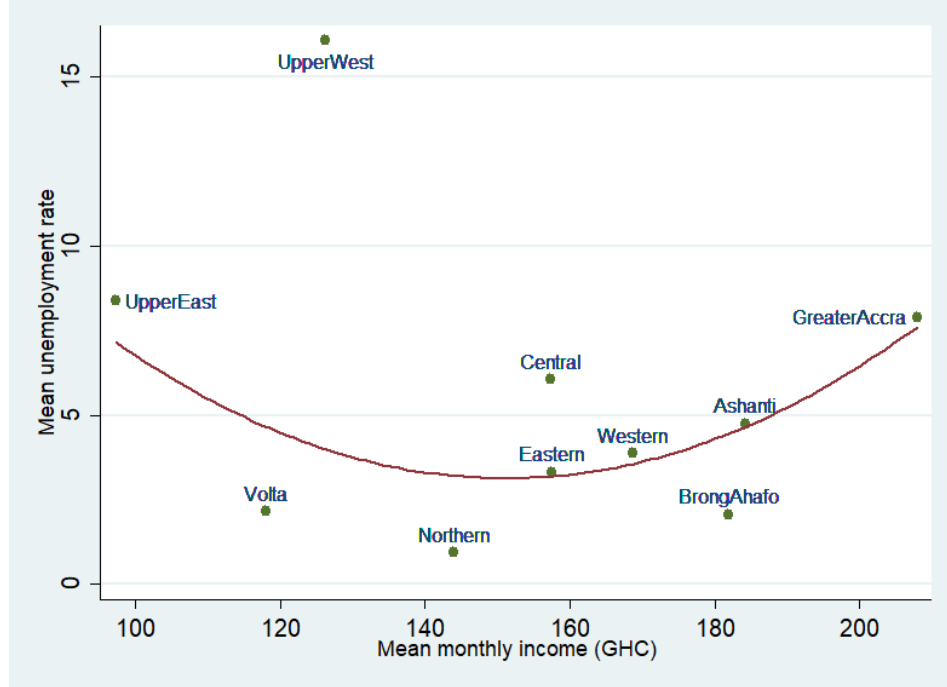


Figure 3: Relationship between mean income and the unemployment rate in each region

Table 6 presents the unemployment rate in each region of Ghana by sub-group of the population. Thus, we observe that the youth unemployment rate exceeds that of the population as a whole, and that possession of a high school diploma does not always improve the probability of having a job. Only in the Ashanti and Western regions is the unemployment rate of SHS graduates lower than the youth unemployment rate. In addition, while the mean national unemployment rate is 4.73% for all individuals, it is 18.42% for youths having attended SHS (this rate is slightly lower for men and slightly higher for women).

In Figure 3 we see the relationship between mean income and the unemployment rate in each region. If the decision to migrate depends on expectations with regard to potential earnings, then it is a function of the mean income, but also of the unemployment rate and the probability of obtaining a job, in the destination region. Therefore, it is important to understand the relationship between mean income and the unemployment rate in each region. We observe a convex relationship between mean income and the unemployment rate, but this relationship is quite weak.

In Figure 4 we observe a strong and positive correlation between mean income in each region and the rate of migration to that region. The higher a region's mean income, the more it is preferred as a destination for migrants. Thus, *a priori*, there appears to be a link between mean income and

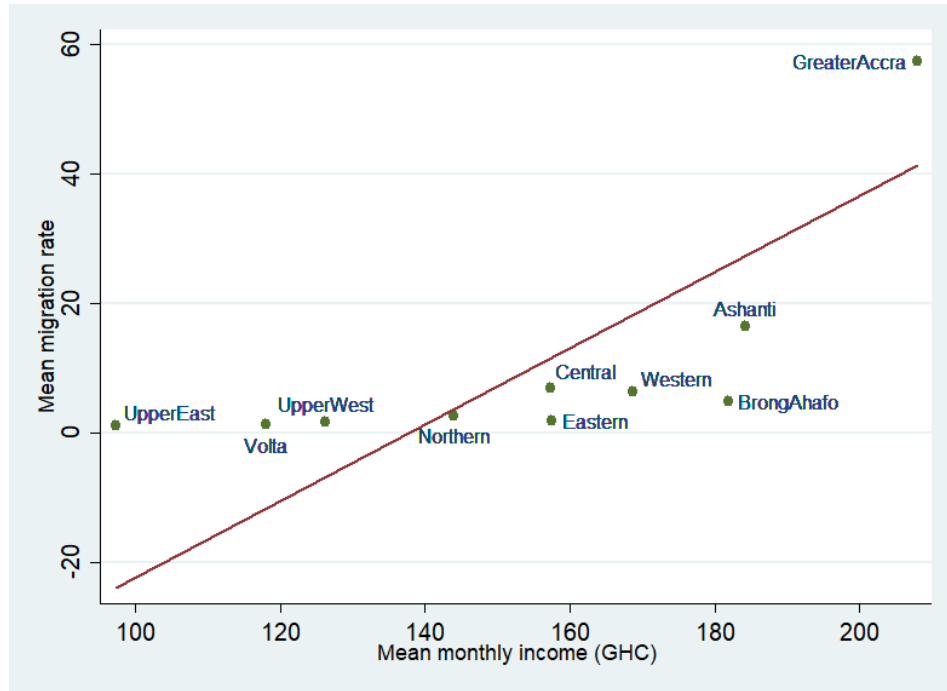


Figure 4: Relationship between mean income and the rate of migration into each region

inter-regional migration in Ghana.

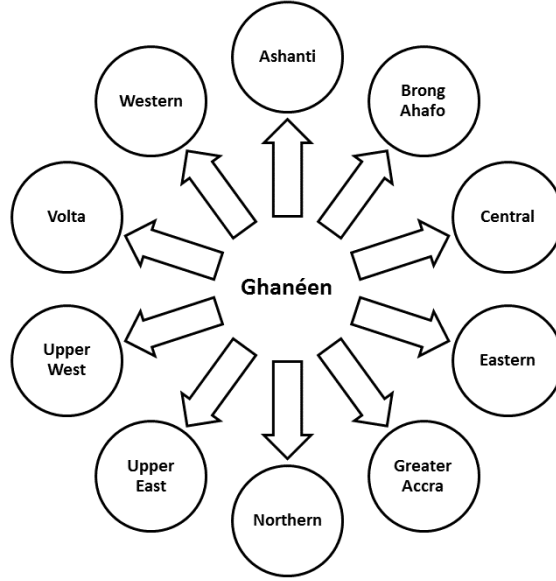


Figure 5: Ghanaians' choice of region of residence

Methodology

First, we examine how the characteristics of individuals and schools affect the decision of individual i from school s to migrate within Ghana. We accomplish this by estimating the following equation with ordinary least squares (OLS):

$$migration_i = X_i + Z_s + \epsilon_{is} \tag{1}$$

where X_i is the vector of individual characteristics: age, abilities, having lived in residence, being born in a rural zone, sex, number of years since diploma obtained, education of father and mother; Z_s is the vector of the school's characteristics: percentage of migrants per school (representing migration networks) and distance from Accra; and ϵ_{is} is the error term.

Second, we ask how young Ghanaians come to the decision to migrate between the different regions of the country. As is reflected in Figure 5, any young Ghanaian can choose to live in any of the 10 regions of Ghana.

Our objective is to understand different choices of residential location within Ghana as a function of individuals' characteristics and the attributes of the different regions. The method we will

apply is McFadden’s model of choice of residential location, which explains how individuals make behavioural choices. [McFadden \(1973\)](#) formulates econometric behavioural choice models on the basis of the distribution of individual decision rules. The key underlying assumption is that rational individuals consider the characteristics of each option and then choose the one that maximizes their utility. The multinomial logit model is a discrete choice model including variables specific to each individual but in which the attributes of the alternatives remain constant. This is the method used by [De Vreyer et al. \(2009\)](#) to analyze migration between the countries of the West African Economic and Monetary Union (WAEMU). When the variables are specific to the alternatives, on the other hand, the conditional logit model is appropriate. These two situations can be combined in the mixed logit model, which accommodates variables specific to both individuals and the choices.

In the McFadden model, the expected utility of a choice may depend on the characteristics of both the alternatives and of the individuals making the choice, as well as on cross variables specific to the combination of person and alternative. This is why the mixed logit is suitable for our estimation. Moreover, the assumption of the independence of irrelevant alternatives (IIA), which we find in multinomial logit models, is relaxed to allow for the existence of perceived similarities between the various alternatives. Thus, with a mixed logit model a change in one alternative will not have a proportional impact on the probability of choosing the other alternatives (the ratios of probabilities are affected). This is not the case with multinomial logit models, where the probability ratios are constant.

Following [Wooldridge \(2002\)](#), let the utility of individual i from choosing alternative j from among the set of alternatives J be:

$$U_{ij}^* = \beta_i x_{ij} + a_i + e_{ij} \tag{2}$$

where x_{ij} is a vector of observed non-stochastic variables, including the socio-economic characteristics of individual i and the attributes of alternative j . This vector varies with the alternatives and possibly across individuals, but it cannot contain elements that only vary with i and not with j .

a_i is a vector of individual fixed effects, normally distributed with respect to individuals; and e_{ij} is the extreme value distribution error term, independently and identically distributed over the

individuals and alternatives and including unobservable traits that affect preferences.

Let U_i be the choice of individual i maximizing utility:

$$U_i = \operatorname{argmax}(U_{i0}^*, U_{i2}^*, \dots, U_{iJ}^*). \quad (3)$$

The mixed logit response probabilities are:

$$P(U_i = j | x_i) = \frac{\exp(x_{ij}\beta + a_i\alpha_j)}{\sum_{h=0}^J \exp(x_{ih}\beta + a_i\alpha_h)}, \quad (4)$$

where x_i is a vector containing x_{ij} for all values of j , i.e. $j = 1, \dots, J$; and

x_{ih} is the vector of observed non-stochastic variables for individual i and alternative h .

The impact of a change in x_{ij} is

$$\frac{\partial P_{ij}}{\partial x_{ij}} = \begin{cases} P_{ij}(1 - P_{ij})\beta & \text{if } j = k \\ -P_{ij}P_{ik}\beta & \text{if } j \neq k \end{cases} \quad (5)$$

If $\beta > 0$ the direct effect is positive since $P_{ij}(1 - P_{ij})\beta > 0$ and the cross effect is negative because $-P_{ij}P_{ik}\beta < 0$. A positive coefficient indicates that, if variable x_{ij} (for an alternative j) increases, there is a greater probability of this alternative being chosen (direct effect) and a lower probability of the others being chosen (cross effect).

We adapted this mixed logit model to the choice of region of residence made by educated youths in Ghana. Thus, each young Ghanaian i chooses his or her region of residence j from among the ten regions of Ghana presented in Figure 5. The estimated model is specified as follows:

$$U_{ij}^* = \beta_{0j} + \beta_{ratio}Ratio_{ij} + \beta_{1j}Resid_i + \beta_{2j}Ability_i + \beta_{3j}Age_i + \beta_{4j}AgeSquare_i + \beta_{5j}Rural_i \\ + \beta_{6j}Male_i + \beta_{6j}TimeDiploma_i + \beta_{7j}Network_i + \beta_{8j}DistanceAccra_i + a_i + e_{ij} \quad (6)$$

where β_{0j} is the alternative specific constant (ASC) for region j ;

β_{ratio} is the income-ratio sensitivity parameter;

$Ratio_{ij}$ is the ratio of origin-region to destination-region incomes for individual i living in region j ;

$Resid_i$, $Ability_i$, Age_i , $AgeSquare_i$, $Rural_i$, $Male_i$, $TimeDiploma_i$, $Network_i$, and $DistanceAccra_i$ are the socio-economic variables described in Table 1;

a_i is a normally distributed individual-specific error term; and

e_{ij} is an independently and identically distributed error term for individuals and alternatives.

In order to perform the analysis with the mixed logit model, the database has to be converted into long format. This means that it contains one observation on each possible alternative for every individual. In our case, that means that there are ten observations for every individual, representing each of the ten potential destination regions in Ghana. Thus, the variable for income ratio corresponds to the ratio between the income in the SHS or birth region (region of origin) and the income in each of the ten regions of Ghana—the potential destination regions. This is why the variable $Ratio_{ij}$ varies across individuals and alternatives (regions in our case). Recall that the incomes from which we create these ratios are individuals' total real monthly income in GHS.

In keeping with the theory of [Harris & Todaro \(1970\)](#) and [Lewis \(1954\)](#), which shows that individuals are attracted by income differentials between rural and urban zones, we expect the coefficient of β_{ratio} to be negative. Thus, *ceteris paribus*, when the income in a destination region increases, the probability of migrating to that region also increases. Similarly, if the income in a region of origin increases, the likelihood of leaving that region decreases.

With regard to the coefficients of the variables specific to the case β_{gj} with $g = 1, \dots, 8$ representing the different regressors included in the model, they are to be interpreted as the parameters of a binary logit with respect to the baseline category. If β_{gj} is negative an increase in the value of explanatory variable g diminishes the probability of alternative j being chose over alternative h .

Results

Here we present the empirical results of our analysis of the relationship between the decision to migrate within Ghana and individual characteristics. Recall that we consider a migrant to be an individual who was living in a region other than the birth- or SHS-region at the time of the survey.

We note in Table 7 that migration networks play a key role here, because the probability of migrating is greater in schools from which more students have migrated, which is consistent with the literature on the subject. Thus, a 1% rise in the number of migrants in the SHS increases the probability of migrating by 100%. Furthermore, there is a negative and strong correlation between the father's level of education and the probability of migrating, but no significant relationship

between the mother’s education and the migration of young Ghanaian SHS graduates. A Ghanaian youth whose father is not educated is more likely to change region of residence after SHS than one whose father has an education level above primary school.

Finally, an individual who has just completed SHS is less likely to migrate than one who has been out of school for several years. Indeed, an individual who graduated 1.44 years (the mean value in our sample) earlier than another has a 2.16% ($1.44 \cdot 0.014$) greater probability of migrating. However, few individual characteristics are correlated with the probability of migrating. For example, the measure of cognitive abilities appears connected with the probability of inter-regional migration in Ghana among students having attended SHS. We observe that these results remain unchanged regardless of the specification chosen, both in terms of the value and the significance of the coefficients.

In Table 8 we repeat these regressions but with three types of fixed effects: SHS fixed effects, cohort fixed effects, and SHS-region fixed effects. We observe that the results remain virtually unchanged, except that cohort plays a role. Thus, belonging to the 2008 cohort significantly increases the probability of migrating—by 36.5% over its value for an individual from the 2005 cohort. This result is somewhat surprising, as it appears to contradict the positive result we obtained for number of years since graduation.

In the second part of this study we apply the McFadden choice model described in the previous section to examining how young Ghanaians choose their region of residence. Table 9 (which covers several pages) presents results from estimating the McFadden model on the ratio of birth-region to destination-region mean incomes using a mixed logit model that is specific to the alternatives. We present the coefficients β .

The first four estimates are of the coefficients $\hat{\beta}_{ratio}$ of the alternative-specific regressors (the 10 regions of Ghana), i.e. the ratios of the two regions’ incomes. Ratio 1 corresponds to the ratio of birth-region to destination-region incomes and ratio 2 the ratio SHS-region to destination-region incomes. The two other ratios (3 and 4) correspond to ratios 1 and 2, respectively, but for a subsample of young and educated youths (from the GLSS5). The nine other parts of the table are estimates $\hat{\beta}_{zj}$ of individual-specific variables $z = 1, \dots, 9$. Recall that these results are comparisons with the Central region. The coefficients of the constant correspond to $\hat{\beta}_{0j}$ in the equation.

Table 7: Individual characteristics and migration

	(1)	(2)	(3)	(4)	(5)	(6)
	(Reference)	(Reference 2)	(Male)	(Female)	(Rural)	(Urban)
Cognitive abilities	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
Age	0.000 (0.005)	-0.002 (0.005)	0.001 (0.006)	-0.011 (0.008)	-0.010 (0.006)	0.016 (0.010)
Residence	0.009 (0.020)	0.010 (0.021)	0.011 (0.026)	0.009 (0.038)	0.058** (0.027)	-0.056 (0.035)
Born rural region	0.029 (0.022)	0.022 (0.022)	0.018 (0.030)	0.034 (0.034)		
Male	0.022 (0.018)	0.020 (0.018)			0.024 (0.030)	0.014 (0.025)
Years since diploma	0.014* (0.008)	0.015* (0.008)	0.014 (0.011)	0.021 (0.014)	0.033*** (0.011)	-0.015 (0.012)
Migrants per school	1.012*** (0.044)	1.023*** (0.044)	1.035*** (0.061)	0.986*** (0.085)	1.024*** (0.075)	1.052*** (0.093)
Distance SHS-Accra (log)	-0.008 (0.007)	-0.015* (0.008)	-0.019* (0.012)	-0.009 (0.012)	-0.036* (0.018)	-0.006 (0.011)
Father primary educ.		-0.022 (0.066)	-0.042 (0.079)	0.017 (0.109)	0.024 (0.077)	-0.171 (0.104)
Father JHS		-0.079** (0.039)	-0.088* (0.046)	-0.066 (0.071)	-0.091** (0.043)	-0.080 (0.073)
Father SHS		-0.088** (0.043)	-0.089* (0.053)	-0.092 (0.076)	-0.046 (0.053)	-0.143** (0.068)
Father post-sec. educ.		-0.076* (0.044)	-0.055 (0.056)	-0.105 (0.079)	-0.112** (0.052)	-0.052 (0.074)
Mother primary educ.		0.009 (0.038)	0.021 (0.050)	-0.014 (0.060)	0.018 (0.052)	-0.024 (0.062)
Mother JHS		0.002 (0.028)	0.009 (0.037)	-0.013 (0.039)	0.009 (0.035)	-0.030 (0.043)
Mother SHS		0.021 (0.038)	0.028 (0.050)	0.002 (0.053)	0.002 (0.065)	0.026 (0.050)
Mother post-sec. educ.		0.012 (0.053)	0.053 (0.079)	-0.036 (0.073)	0.021 (0.094)	-0.009 (0.066)
Constant	-0.012 (0.092)	0.133 (0.108)	0.102 (0.149)	0.287* (0.172)	0.393** (0.179)	-0.203 (0.214)
Observations	1579	1579	990	589	951	628
R-square	0.121	0.126	0.129	0.127	0.120	0.169

OLS model; SHS-level cluster; standard deviations in parentheses; *** p<0.01, ** p<0.05, * p<0.1
The baseline category for parents' education is "No education."

Table 8: Individual characteristics and migration – fixed effects

	(1)	(2)	(3)
Cognitive abilities	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Age	-0.001 (0.005)	-0.002 (0.005)	-0.002 (0.005)
Residence	0.033 (0.029)	0.010 (0.020)	0.012 (0.021)
Born rural region	0.027 (0.026)	0.023 (0.022)	0.020 (0.022)
Male	0.024 (0.025)	0.018 (0.018)	0.017 (0.018)
Years since diploma	0.017* (0.009)		0.015* (0.009)
Migrants per school	1.036*** (0.056)	1.019*** (0.044)	0.988*** (0.062)
Distance SHS-Accra (log)	0.025*** (0.006)	-0.015* (0.008)	
Father primary educ.	-0.027 (0.075)	-0.023 (0.066)	-0.025 (0.067)
Father JHS	-0.084* (0.046)	-0.079** (0.039)	-0.082** (0.041)
Father SHS	-0.092* (0.050)	-0.087** (0.043)	-0.091** (0.044)
Father post-sec. educ.	-0.076 (0.051)	-0.076* (0.044)	-0.079* (0.045)
Mother primary educ.	0.011 (0.044)	0.009 (0.038)	0.007 (0.039)
Mother JHS	-0.007 (0.032)	0.003 (0.028)	0.002 (0.029)
Mother SHS	0.021 (0.043)	0.021 (0.038)	0.020 (0.039)
Mother post-sec. educ.	0.002 (0.062)	0.012 (0.053)	0.011 (0.055)
Cohort 2006		-0.041 (0.041)	
Cohort 2007		-0.071* (0.038)	
Cohort 2008		-0.066* (0.039)	
Constant	-0.058 (0.117)	0.196 (0.129)	0.076 (0.114)
Observations	1579	1579	1579
R-square	0.155	0.126	0.127

SHS-level cluster; (1) school-level fixed effects; (2) cohort-level fixed effects; (3) SHS-region level fixed effects; Omitted categories: cohort = “2005,” parents’ education = “No education.”

Table 9: Income ratio and inter-regional migration

	(1)	(2)	(3)	(4)
Alternative-specific variables				
Birth and destination region	-18.732*** (2.037)			
SHS and destination region		-23.065*** (2.255)		
Indi educated youths, birth-destination			-4.962*** (1.344)	
Indi educated youths, SHS-destination				-7.770*** (1.364)
Individual-specific variables				
CENTRAL (baseline region)				
ASHANTI				
Residence	0.075 (0.267)	0.194 (0.270)	0.196 (0.260)	0.249 (0.258)
Cognitive abilities	0.001 (0.005)	0.001 (0.006)	0.001 (0.005)	-0.000 (0.006)
Age	-0.340 (0.361)	-0.399 (0.381)	-0.236 (0.368)	-0.175 (0.336)
Age squared	0.008 (0.008)	0.009 (0.008)	0.005 (0.008)	0.004 (0.007)
Born rural region	-0.691*** (0.247)	-0.876*** (0.248)	-0.857*** (0.245)	-0.760*** (0.252)
Male	0.383 (0.298)	0.450 (0.286)	3.171*** (0.819)	4.764*** (0.857)
Number of years since diploma	-0.037 (0.084)	0.014 (0.081)	-0.008 (0.083)	0.015 (0.083)
Percentage migrants per SHS	-7.767*** (1.746)	-6.277*** (1.726)	-8.635*** (1.717)	-8.138*** (1.616)
Distance SHS-Accra (log)	1.945*** (0.286)	2.059*** (0.301)	1.877*** (0.294)	1.852*** (0.301)
Constant	-6.874 (4.653)	-7.663 (4.977)	-5.993 (4.863)	-7.547 (4.606)
BRONGAHAFO				
Residence	-0.477 (0.358)	-0.317 (0.351)	-0.300 (0.356)	-0.265 (0.353)
Cognitive abilities	-0.005 (0.006)	-0.004 (0.006)	-0.004 (0.007)	-0.005 (0.007)
Age	0.665 (0.491)	0.545 (0.479)	0.819* (0.494)	0.914* (0.484)
Age squared	-0.012 (0.010)	-0.010 (0.010)	-0.016 (0.010)	-0.018* (0.010)
Born rural region	-0.089 (0.294)	-0.261 (0.296)	-0.322 (0.300)	-0.191 (0.301)
Male	-0.097 (0.403)	-0.039 (0.383)	3.448*** (1.097)	5.358*** (1.141)
Number of years since diploma	-0.101 (0.099)	-0.055 (0.096)	-0.062 (0.099)	-0.050 (0.099)
Percentage migrants per SHS	-5.566** (2.419)	-3.971* (2.327)	-7.002*** (2.428)	-7.247*** (2.375)
Distance SHS-Accra (log)	3.976*** (0.533)	4.205*** (0.587)	3.571*** (0.515)	3.300*** (0.498)
Constant	-30.506*** (6.706)	-31.242*** (6.773)	-27.460*** (6.633)	-27.341*** (6.432)
EASTERN				
Residence	0.145 (0.352)	0.154 (0.352)	0.166 (0.348)	0.165 (0.348)
Cognitive abilities	0.003 (0.006)	0.002 (0.006)	0.002 (0.006)	0.001 (0.007)
Age	1.662** (0.683)	1.795** (0.730)	1.787*** (0.690)	1.820*** (0.675)
Age squared	-0.034** (0.015)	-0.038** (0.016)	-0.037** (0.015)	-0.038** (0.015)
Born rural region	0.422 (0.269)	0.492* (0.269)	0.453* (0.270)	0.531** (0.270)
Male	0.215 (0.301)	0.229 (0.301)	1.489*** (0.477)	2.261*** (0.498)
Number of years since diploma	0.052 (0.080)	0.074 (0.084)	0.055 (0.081)	0.072 (0.085)
Percentage migrants per SHS	2.636 (1.699)	2.634 (1.733)	2.664 (1.672)	2.689* (1.599)
Distance SHS-Accra (log)	-0.562** (0.243)	-0.577** (0.249)	-0.629*** (0.240)	-0.677*** (0.243)
Constant	-18.783** (8.071)	-20.215** (8.566)	-20.120** (8.083)	-20.432** (7.937)
Number of observations	18 600	18 780	18 600	18 780
Number of individuals	1 860	1 878	1 860	1 878

ASC logit model; Coefficients (standard deviations in parentheses); baseline region is CENTRAL.

Table 9 - Income ratio and inter-regional migration (cont.)

	(1)	(2)	(3)	(4)
Alternative-specific variables				
Birth and destination region	-18.732*** (2.037)			
SHS and destination region		-23.065*** (2.255)		
Indi educated youths, birth-destination			-4.962*** (1.344)	
Indi educated youths, SHS-destination				-7.770*** (1.364)
Individual-specific variables				
CENTRAL (baseline region)				
GREATERACCRA				
Residence	-0.112 (0.295)	0.081 (0.302)	0.124 (0.275)	0.132 (0.276)
Cognitive abilities	0.002 (0.005)	0.002 (0.006)	0.002 (0.005)	0.001 (0.006)
Age	-0.410 (0.442)	-0.432 (0.437)	-0.259 (0.427)	-0.251 (0.395)
Age squared	0.009 (0.009)	0.010 (0.009)	0.005 (0.009)	0.005 (0.008)
Born rural region	-0.422* (0.223)	-0.726*** (0.223)	-0.735*** (0.214)	-0.664*** (0.216)
Male	0.213 (0.272)	0.287 (0.271)	1.511*** (0.436)	2.253*** (0.454)
Number of years since diploma	0.058 (0.077)	0.105 (0.077)	0.096 (0.071)	0.114 (0.073)
Percentage migrants per SHS	0.959 (1.603)	2.786* (1.539)	-0.261 (1.407)	-0.134 (1.349)
Distance SHS-Accra (log)	-0.367* (0.203)	-0.214 (0.201)	-0.526*** (0.197)	-0.549*** (0.201)
Constant	2.251 (5.324)	0.345 (5.304)	5.957 (5.115)	5.495 (4.750)
NORTHERN				
Residence	-0.215 (0.370)	-0.248 (0.376)	-0.034 (0.385)	-0.247 (0.396)
Cognitive abilities	0.004 (0.007)	0.004 (0.007)	0.003 (0.007)	0.002 (0.007)
Age	0.547 (0.607)	0.348 (0.668)	0.826 (0.608)	0.694 (0.616)
Age squared	-0.008 (0.012)	-0.005 (0.014)	-0.014 (0.013)	-0.012 (0.013)
Born rural region	-0.469 (0.339)	-0.415 (0.344)	-0.747** (0.363)	-0.209 (0.348)
Male	0.680 (0.443)	0.675 (0.442)	-0.102 (0.799)	0.550 (0.864)
Number of years since diploma	-0.103 (0.108)	-0.058 (0.106)	-0.078 (0.115)	-0.069 (0.113)
Percentage migrants per SHS	-15.376*** (3.113)	-15.814*** (2.931)	-15.304*** (3.132)	-16.487*** (2.735)
Distance SHS-Accra (log)	6.271*** (0.771)	5.921*** (0.769)	5.309*** (0.809)	4.227*** (0.698)
Constant	-38.363*** (8.393)	-33.485*** (9.048)	-32.630*** (8.579)	-23.094*** (8.174)
UPPEREAST				
Residence	0.947 (0.778)	0.322 (0.519)	0.405 (0.735)	0.200 (0.660)
Cognitive abilities	0.013 (0.011)	0.008 (0.010)	0.009 (0.010)	0.008 (0.010)
Age	-0.035 (0.737)	-0.198 (0.873)	0.592 (0.903)	0.385 (0.860)
Age squared	0.002 (0.017)	0.004 (0.019)	-0.012 (0.020)	-0.008 (0.018)
Born rural region	-0.289 (0.745)	0.144 (0.533)	-0.319 (0.603)	0.278 (0.511)
Male	0.922* (0.560)	0.544 (0.566)	-0.771 (1.053)	-0.181 (1.386)
Number of years since diploma	0.036 (0.196)	0.041 (0.175)	0.080 (0.197)	0.050 (0.163)
Percentage migrants per SHS	-3.777 (2.318)	-7.864*** (2.870)	-0.013 (2.509)	-1.649 (2.477)
Distance SHS-Accra (log)	4.031*** (1.403)	3.490*** (1.287)	3.826** (1.578)	2.973* (1.621)
Constant	-14.617** (7.202)	-5.745 (8.236)	-24.896** (9.687)	-15.822 (9.935)
Number of observations	18 600	18 780	18 600	18 780
Number of individuals	1 860	1 878	1 860	1 878

ASC logit model; Coefficients (standard deviations in parentheses); baseline region is CENTRAL.

Table 9 - Income ratio and inter-regional migration (cont.)

	(1)	(2)	(3)	(4)
Alternative-specific variables				
Birth and destination region	-18.732*** (2.037)			
SHS and destination region		-23.065*** (2.255)		
Indi educated youths, birth-destination			-4.962*** (1.344)	
Indi educated youths, SHS-destination				-7.770*** (1.364)
Individual-specific variables				
CENTRAL (baseline region)				
UPPERWEST				
Residence	1.239* (0.709)	0.870 (0.681)	1.109* (0.611)	0.875 (0.615)
Cognitive abilities	-0.001 (0.012)	-0.001 (0.013)	-0.003 (0.012)	-0.003 (0.012)
Age	1.298 (0.913)	1.133 (0.984)	1.688* (0.876)	1.629* (0.918)
Age squared	-0.022 (0.020)	-0.020 (0.022)	-0.031 (0.019)	-0.030 (0.020)
Born rural region	-1.029* (0.571)	-0.686 (0.499)	-1.211** (0.560)	-0.551 (0.503)
Male	0.592 (0.980)	0.367 (0.953)	-1.730* (1.044)	-1.587 (1.084)
Number of years since diploma	-0.132 (0.167)	-0.097 (0.158)	-0.104 (0.173)	-0.084 (0.169)
Percentage migrants per SHS	-6.461 (4.241)	-8.897** (4.232)	-5.247 (4.317)	-6.781* (3.921)
Distance SHS-Accra (log)	5.918*** (1.551)	5.266*** (1.481)	5.093*** (1.534)	4.035*** (1.401)
Constant	-46.745*** (12.248)	-39.080*** (12.345)	-44.098*** (12.124)	-35.003*** (12.402)
VOLTA				
Residence	-0.494 (0.309)	-0.481 (0.311)	-0.553* (0.331)	-0.533* (0.321)
Cognitive abilities	-0.005 (0.005)	-0.007 (0.005)	-0.005 (0.005)	-0.007 (0.006)
Age	-0.127 (0.407)	-0.292 (0.390)	0.140 (0.427)	0.150 (0.408)
Age squared	0.004 (0.008)	0.008 (0.008)	-0.001 (0.009)	-0.001 (0.008)
Born rural region	0.289 (0.240)	0.510** (0.238)	0.232 (0.239)	0.485* (0.252)
Male	0.134 (0.312)	0.074 (0.288)	2.227*** (0.666)	3.427*** (0.668)
Number of years since diploma	-0.035 (0.085)	-0.033 (0.078)	-0.039 (0.084)	-0.058 (0.084)
Percentage migrants per SHS	-2.684* (1.454)	-4.434*** (1.632)	-1.340 (1.467)	-2.379* (1.357)
Distance SHS-Accra (log)	0.816** (0.320)	0.559 (0.387)	0.437 (0.272)	0.084 (0.276)
Constant	3.369 (5.360)	8.298 (5.341)	-2.188 (5.435)	0.641 (5.251)
WESTERN				
Residence	-0.411 (0.335)	-0.350 (0.333)	-0.252 (0.315)	-0.204 (0.310)
Cognitive abilities	0.002 (0.006)	0.002 (0.006)	0.002 (0.006)	-0.001 (0.006)
Age	0.736 (0.520)	0.680 (0.517)	0.990** (0.495)	1.119** (0.471)
Age squared	-0.017 (0.012)	-0.016 (0.012)	-0.023** (0.011)	-0.026** (0.011)
Born rural region	0.023 (0.250)	-0.045 (0.249)	-0.147 (0.242)	0.108 (0.251)
Male	0.862*** (0.324)	0.912*** (0.316)	6.839*** (1.680)	10.294*** (1.722)
Number of years since diploma	0.039 (0.093)	0.075 (0.090)	0.065 (0.095)	0.072 (0.096)
Percentage migrants per SHS	-5.000** (2.173)	-4.151* (2.133)	-5.480*** (2.036)	-5.519*** (1.948)
Distance SHS-Accra (log)	1.544*** (0.302)	1.593*** (0.316)	1.179*** (0.304)	0.801*** (0.295)
Constant	-16.650*** (6.023)	-16.641*** (6.023)	-18.951*** (5.935)	-20.136*** (5.649)
Number of observations	18 600	18 780	18 600	18 780
Number of individuals	1 860	1 878	1 860	1 878

ASC logit model; Coefficients (standard deviations in parentheses); baseline region is CENTRAL.

We observe that all the $\hat{\beta}_{ratio}$ -s are negative, indicating that when incomes rise in the region of origin (whether the birth or SHS region), the probability of migrating (i.e. leaving this region) falls. However, comparing them individually reveals that the ratio of SHS-region to destination-region incomes appears to have more of an impact than the ratio birth-region to destination-region incomes. Furthermore, we see that individuals born in a rural zone are less likely to choose the Ashanti and Greater Accra regions than the Central region, but are more likely to choose to migrate into the Eastern region than the Central region. We also observe that men are more likely to migrate into the Ashanti, Brong Ahafo, Eastern, Greater Accra, Volta and Western regions than the Central region.

In terms of the characteristics of the individual's educational institution, the distance between the school and the capital of Ghana affects the choice of destination region. Thus, the greater the distance between the SHS and Accra, the more the migrants will tend to choose the Ashanti, Brong Ahafo, Northern, Upper East, Upper West and Western regions over the Central region. The Central region is one of the regions that borders on Greater Accra. If the SHS is far from Accra, the capital of Ghana where economic opportunities are concentrated, individuals will tend to move into regions that are closer to home rather than the Central region. However, increased distance from Accra reduces the probability of choosing to move to Greater Accra and Eastern relative to Central. Therefore, very reasonably, individuals who are far from Accra are less prone to choose to migrate to Greater Accra and Eastern, a neighbouring region, than to Central, which is closer to the other regions.

In Table 10 we once again present results of estimating the McFadden model, but this time on both the ratio of origin-region to destination-region mean incomes and the ratio of origin-region to destination-region unemployment rates. These results are very similar to those in Table 9, but they allow us to compare the impact of income ratios with that of unemployment-rate ratios on the probability of choosing a specific destination region. We observe that for both types of ratio (income and unemployment) an increase in the origin-region X to destination-region Y ratio significantly reduces the probability of migrating to region Y . However, we also note that the income ratio has a much greater incidence on the probability of migrating than the unemployment ratio. This suggests that individuals pay much more attention to inter-regional income differentials

Table 10: Income and unemployment ratios - birth/destination

Alternative-specific variables									
Ratio birth-region to	-15.703***								
dest-region incomes	(1.911)								
Ratio birth-region to	-1.084***								
dest-region unemployment	(0.260)								
Individual-specific variables									
Baseline region :		Brong		Greater		Upper	Upper		
Central	Ashanti	Ahafo	Eastern	Accra	Northern	East	West	Volta	Western
Boarding	0.116	-0.451	0.181	-0.091	-0.323	1.118	1.609**	-0.480*	-0.364
	(0.260)	(0.346)	(0.346)	(0.294)	(0.417)	(0.770)	(0.663)	(0.286)	(0.328)
Cognitive abilities	0.001	-0.004	0.003	0.002	-0.000	0.015	0.010	-0.004	0.003
	(0.005)	(0.006)	(0.006)	(0.005)	(0.007)	(0.011)	(0.015)	(0.005)	(0.006)
Age	-0.342	0.785	1.653**	-0.379	1.179	0.043	1.113	-0.011	0.726
	(0.353)	(0.491)	(0.658)	(0.439)	(0.734)	(0.779)	(0.978)	(0.387)	(0.500)
Age squared	0.008	-0.015	-0.035**	0.009	-0.022	-0.000	-0.019	0.002	-0.016
	(0.008)	(0.010)	(0.015)	(0.009)	(0.015)	(0.017)	(0.022)	(0.008)	(0.011)
Born rural region	-0.736***	-0.333	0.305	-0.416*	-0.842*	-0.322	-1.063	0.201	-0.047
	(0.245)	(0.292)	(0.266)	(0.226)	(0.454)	(0.771)	(0.744)	(0.238)	(0.248)
Male	0.371	-0.133	0.193	0.207	0.268	1.019*	1.064	0.088	0.843***
	(0.292)	(0.379)	(0.296)	(0.271)	(0.491)	(0.619)	(0.781)	(0.295)	(0.318)
Years since diploma	-0.028	-0.107	0.059	0.053	-0.157	0.082	-0.081	-0.047	0.043
	(0.082)	(0.100)	(0.081)	(0.076)	(0.134)	(0.225)	(0.220)	(0.085)	(0.093)
Percentage migrants	-8.072***	-6.249***	2.429	0.811	-11.235***	-2.353	-5.768	-3.042**	-5.306**
per SHS	(1.678)	(2.179)	(1.610)	(1.575)	(2.720)	(1.962)	(3.952)	(1.321)	(2.119)
Distance SHS-Accra	1.904***	4.048***	-0.596***	-0.333*	6.416***	2.348*	3.377***	0.869***	1.486***
(log)	(0.263)	(0.509)	(0.227)	(0.195)	(0.979)	(1.232)	(1.122)	(0.264)	(0.289)
Constant	-5.811	-30.085***	-17.664**	2.351	-43.726***	-8.675	-32.473***	2.253	-15.466***
	(4.516)	(6.325)	(7.766)	(5.315)	(10.872)	(7.589)	(11.512)	(5.007)	(5.817)
Observations				18 600					
Individus				1 860					

ASC logit model; Coefficients (standard deviations in parentheses); baseline region is CENTRAL.

*** p<0.01, ** p<0.05, * p<0.1

Table 11: Income and unemployment ratios - shs/destination

Alternative-specific variables									
Ratio of shs-region to dest-region incomes	-21.176*** (2.221)								
Ratio of shs-region to dest-region unemployment	-0.975*** (0.235)								
Individual-specific variables									
Baseline region :		Brong		Greater		Upper	Upper		
Central	Ashanti	Ahafo	Eastern	Accra	Northern	East	West	Volta	Western
Boarding	0.223 (0.267)	-0.252 (0.340)	0.169 (0.339)	0.114 (0.305)	-0.064 (0.404)	0.132 (0.566)	0.627 (0.691)	-0.446 (0.289)	-0.317 (0.327)
Cognitive abilities	0.002 (0.006)	-0.003 (0.006)	0.002 (0.006)	0.002 (0.006)	-0.001 (0.008)	0.008 (0.009)	0.003 (0.013)	-0.007 (0.005)	0.002 (0.006)
Age	-0.394 (0.368)	0.642 (0.473)	1.804** (0.703)	-0.411 (0.431)	1.097 (0.926)	0.274 (0.827)	0.658 (0.838)	-0.235 (0.367)	0.670 (0.496)
Age squared	0.009 (0.008)	-0.012 (0.010)	-0.038** (0.016)	0.009 (0.009)	-0.022 (0.020)	-0.006 (0.018)	-0.010 (0.019)	0.006 (0.008)	-0.016 (0.011)
Born rural region	-0.869*** (0.244)	-0.345 (0.290)	0.495* (0.260)	-0.736*** (0.223)	-0.496 (0.408)	0.183 (0.463)	-0.707* (0.399)	0.527** (0.236)	-0.044 (0.244)
Male	0.443 (0.281)	0.008 (0.357)	0.214 (0.290)	0.269 (0.271)	0.275 (0.504)	0.389 (0.511)	0.431 (0.604)	0.041 (0.266)	0.900*** (0.310)
Years since diploma	-0.022 (0.080)	-0.094 (0.096)	0.071 (0.083)	0.104 (0.077)	-0.214 (0.137)	0.083 (0.164)	0.046 (0.143)	-0.046 (0.077)	0.074 (0.093)
Percentage migrants per SHS	-6.889*** (1.666)	-4.818** (2.027)	2.208 (1.638)	2.723* (1.539)	-5.984*** (2.744)	-5.648** (2.312)	-4.784** (3.942)	-3.042** (1.407)	-4.672** (2.095)
Distance SHS-Accra (log)	2.004*** (0.261)	4.822*** (0.545)	-0.636*** (0.231)	-0.162 (0.189)	7.962*** (1.367)	1.767* (1.031)	2.516*** (0.906)	0.737** (0.291)	1.539*** (0.289)
Constant	-6.789 (4.715)	-33.961*** (6.085)	-19.261** (8.241)	0.182 (5.248)	-51.862*** (12.062)	3.089 (7.564)	-19.372** (9.086)	7.344 (4.816)	-15.595*** (5.750)
Observations	18 780								
Individuals	1 878								

ASC logit model; Coefficients (standard deviations in parentheses); baseline region is CENTRAL.
 *** p<0.01, ** p<0.05, * p<0.1

than unemployment rate differentials when migrating.

Table 11 shows the same results but for ratios between shs region and destination region. The difference of scale between incomes-ratio and unemployment-ratio is larger when we compare SHS region and destination region (tableau 11) than birth region and destination region (tableau 10).

Now let us estimate the predicted probabilities for each observation representing the individual's alternatives (the regions). In Table 11 we can see which regions exercise the greatest attraction. Unsurprisingly, we notice that, at 27.16% and 18.42% respectively, Greater Accra and Ashanti are the most chosen. The two regions least often chosen are Upper East and Upper West, with less than a 2% chance each of being selected as the destination region.

Table 12: Predicted probabilities of choice of region

Regions	Sample	Prediction
Ashanti	19.35	18.42
Brong Ahafo	10.15	9.80
Central	7.63	8.31
Eastern	6.23	6.34
Greater Accra	25.80	27.16
Northern	7.02	7.14
Upper East	2.01	1.54
Upper West	2.53	1.97
Volta	10.59	11.55
Western	7.71	7.77

Finally, we can estimate the marginal effects at the means in order to understand the impact of an increase in the origin-region to destination-region ratios (income and unemployment) on the probability of choosing a different region from that initially chosen while holding the characteristics of the individual and the school at their mean values.

First let us look at the marginal effects of the birth-region to destination-region income ratios. The underlying idea is to fix the choice of one alternative, and then observe how the probability of choosing another region changes as we increase the ratio by one standard deviation. Recall that the income ratio equals the mean income in the individual's birth region over the mean income in the destination region. An increase in the income ratio of 0.32 (i.e. one standard deviation) significantly reduces the probability of choosing the Ashanti region (by 3.28) when this region was the first choice of destination and all other variables are fixed at their mean sample values. In

addition, if the destination region was Ashanti, then a 0.32 increase in the ratio would significantly increase (by 1.31) the probability of moving to Greater Accra. We also observe that this change in the income ratio does not have a significant impact on the probability of migrating to the Northern, Upper East, or Upper West regions, the three poorest regions of the country with the least power of attraction. The remaining probabilities (3.28 – 1.31) are distributed among the other regions of Ghana.

Now let us look marginal effects of the birth-region to destination-region income ratios. Recall that the unemployment-rate ratio equals the unemployment rate in the individual’s birth region over the unemployment rate in the destination region. An increase in the unemployment ratio of 1.81 (i.e. one standard deviation) significantly reduces the probability of choosing the Ashanti region (by 0.19) when this region was the first choice of destination and all other variables are fixed at their mean sample values. In addition, if the destination region was Ashanti, this same increase in the ratio significantly increases (by 0.08) the probability of moving to Greater Accra. Thus, we observe that the impact of the unemployment-rate ratio on the probability of choosing one region or the other as the destination is much less pronounced than that of the income ratio.

Table 13: Marginal effects of income ratio - birth/destination

Destination region	Chosen region									
	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Ashanti	-2.807*** (0.435)	0.155*** (0.050)	0.500*** (0.148)	0.241*** (0.076)	1.160*** (0.172)	0.002 (0.002)	0.005 (0.005)	0.009 (0.008)	0.279*** (0.057)	0.452*** (0.118)
Brong Ahafo	0.155*** (0.050)	-0.639*** (0.180)	0.091*** (0.033)	0.044* (0.018)	0.211*** (0.060)	4.629E-4 (5.12E-4)	9.74E-4 (0.001)	0.001 (0.001)	0.050*** (0.016)	0.082*** (0.028)
Central	0.500*** (0.148)	0.091*** (0.033)	-1.853*** (0.462)	0.141*** (0.051)	0.680*** (0.164)	0.001 (0.001)	0.003 (0.003)	0.005 (0.005)	0.163*** (0.045)	0.265*** (0.090)
Eastern	0.241*** (0.076)	0.044** (0.018)	0.141*** (0.051)	-0.967*** (0.272)	0.328*** (0.095)	7.18E-4 (7.79E-4)	0.001 (0.001)	0.002 (0.002)	0.079*** (0.023)	0.127*** (0.044)
Greater Accra	1.160*** (0.172)	0.211*** (0.060)	0.680*** (0.164)	0.328*** (0.095)	-3.400*** (0.375)	0.003 (0.003)	0.007 (0.007)	0.012 (0.010)	0.379*** (0.081)	0.615*** (0.139)
Northern	0.002 (0.002)	4.62E-4 (5.12E-4)	0.001 (0.001)	7.18E-4 (7.79E-4)	0.003 (0.003)	-0.011 (0.010)	1.59E-5 (2.19E-5)	2.8E-5 (3.4E-5)	8.30E-4 (8.7E-4)	0.001 (0.001)
Upper East	0.005 (0.0057)	9.74E-4 (0.001)	0.003 (0.003)	0.001 (0.001)	0.007 (0.007)	1.59E-5 (2.19E-5)	-0.022 (0.024)	5.8E-5 (8.39E-5)	0.001 (0.001)	0.002 (0.003)
Upper West	0.009 (0.008)	0.001 (0.001)	0.005 (0.005)	0.002 (0.002)	0.012 (0.010)	2.8E-5 (3.4E-5)	5.8E-5 (8.39E-5)	-0.039 (0.034)	0.003 (0.002)	0.004 (0.004)
Volta	0.279*** (0.057)	0.051*** (0.016)	0.163*** (0.045)	0.079*** (0.023)	0.379*** (0.081)	8.3E-4 (8.7E-4)	0.001 (0.001)	0.003 (0.002)	-1.106*** (0.190)	0.147*** (0.0362)
Western	0.452*** (0.118)	0.082*** (0.028)	0.265*** (0.090)	0.127*** (0.044)	0.615*** (0.139)	0.001 (0.001)	0.002 (0.003)	0.004 (0.004)	0.147*** (0.036)	-1.700*** (0.381)

Marginal effects of ASC logit estimation of birth and destination region incomes ratio ;
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Marginal effects of unemployment ratio - shs/destination

Destination region	Chosen region									
	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Ashanti	-0.193*** (0.05)	0.011*** (0.003)	0.034*** (0.013)	0.016*** (0.005)	0.08*** (0.022)	1.75E-4 (1.51E-4)	3.69E-4 (4.36E-4)	6.43E-4 (6.29E-4)	6.43E-4*** (6.29E-4)	0.031*** (0.01)
Brong Ahafo	0.01*** (0.003)	-0.044*** (0.012)	0.006*** (0.002)	0.003** (0.001)	0.014*** (0.004)	3.19E-5 (3.0E-5)	6.70E-5 (8.0E-5)	1.17E-4 (1.13E-4)	1.17E-4*** (1.13E-4)	0.005*** (0.001)
Central	0.034*** (0.012)	0.006*** (0.002)	-0.127*** (0.042)	0.009** (0.003)	0.046*** (0.015)	1.03E-4 (8.89E-5)	2.15E-4 (2.57E-4)	3.77E-4 (3.84E-4)	3.77E-4*** (3.84E-4)	0.018** (0.007)
Eastern	0.016*** (0.005)	0.003** (0.001)	0.009** (0.003)	-0.066*** (0.021)	0.022*** (0.007)	5.00E-5 (4.6E-5)	1.03E-4 (1.26E-4)	1.82E-4 (1.78E-4)	1.82E-4*** (1.78E-4)	0.008*** (0.003)
Greater Accra	0.08*** (0.021)	0.014*** (0.004)	0.046*** (0.015)	0.022*** (0.007)	-0.234*** (0.057)	2.38E-4 (2.05E-4)	5.01E-4 (5.94E-4)	8.73E-4 (8.37E-4)	8.73E-4*** (8.37E-4)	0.042*** (0.013)
Northern	1.75E-4 (1.51E-4)	3.19E-5 (3.01E-5)	1.03E-4 (8.89E-5)	5.00E-5 (4.6E-5)	2.38E-4 (2.05E-4)	-7.51E-4 (6.44E-4)	1.10E-6 (1.5E-6)	1.9E-6 (2.21E-6)	1.9E-6 (2.21E-6)	9.29E-5 (8.07E-5)
Upper East	3.69E-4 (4.36E-4)	6.72E-5 (8.07E-5)	2.15E-4 (2.57E-4)	1.03E-4 (1.26E-4)	5.01E-4 (5.94E-4)	1.10E-6 (1.5E-6)	-0.001 (0.001)	3.99E-6 (6.39E-6)	3.99E-6 (6.39E-6)	1.95E-4 (2.33E-4)
Upper West	6.43E-4 (6.29E-4)	1.17E-4 (1.13E-4)	3.77E-4 (3.84E-4)	1.82E-4 (1.78E-4)	8.73E-4 (8.37E-4)	1.9E-6 (2.21E-6)	3.99E-6 (6.39E-6)	-0.002 (0.002)	-0.002 (0.002)	3.40E-4 (3.46E-4)
Volta	0.019*** (0.005)	0.003*** (0.001)	0.011*** (0.003)	0.005*** (0.001)	0.026*** (0.007)	5.73E-5 (5.1E-5)	1.21E-4 (1.43E-4)	2.11E-4 (2.03E-4)	2.11E-4*** (2.03E-4)	0.010*** (0.003)
Western	0.031*** (0.010)	0.005*** (0.001)	0.018** (0.007)	0.008*** (0.003)	0.042*** (0.013)	9.29E-5 (8.07E-5)	1.95E-4 (2.33E-4)	3.49E-4 (3.46E-4)	3.49E-4*** (3.46E-4)	-0.117*** (0.035)

Marginal effects of ASC logit estimation of birth and destination region incomes ratio ;

*** p<0.01, ** p<0.05, * p<0.1

Conclusion

This study has allowed us to sketch a portrait of the internal migration of educated youths in Ghana. It appears that young Ghanaians are more likely to move to another region if their mother is educated and their IQ score is high. Moreover, mobility is positively correlated with incomes in neighbouring regions. The second part of this study has allowed us to understand how income and unemployment rate differentials between the regions of origin and destination affect the probability of migrating to any of the regions in Ghana. We note the income- and unemployment-rate ratios have a significant impact on the probability of migrating, but that individuals assign considerably more weight to income differentials than to unemployment differentials.

Our results could be of great relevance to political decision-makers since they provide valuable information on how to attract educated youths. Also, it is of some interest to more thoroughly understand domestic population movements in order to better allocate resources and use policy tools to provide support and incentives or disincentives to migration. Finally, it is particularly relevant to recognize the yield to secondary education in Ghana and the opportunities open to young high school graduates. This gives the government of Ghana an indication of the effectiveness and relevance of its education system.

Appendices

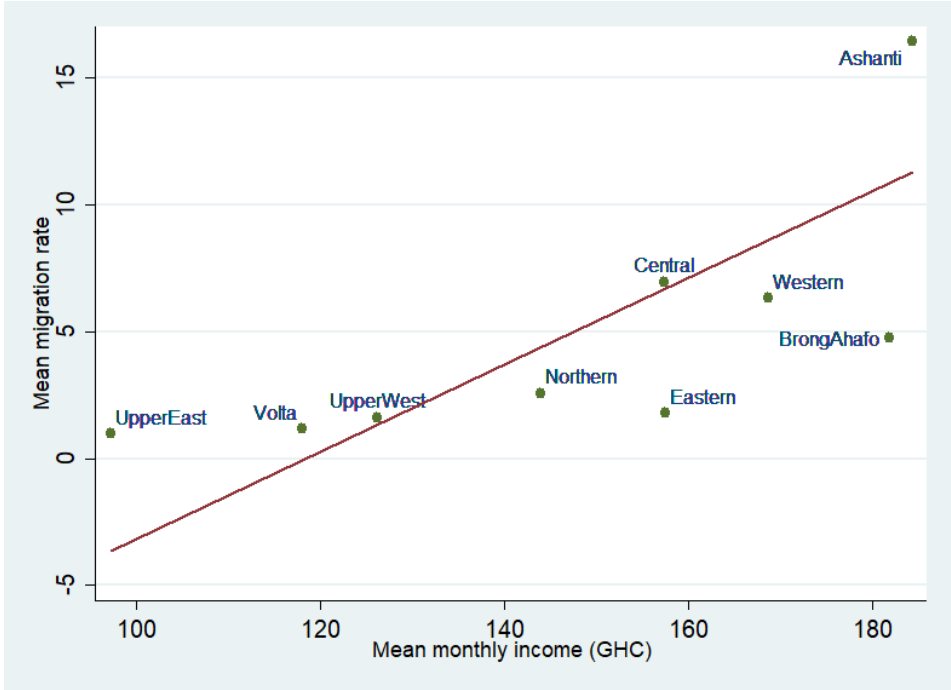


Figure 6: Relationship between mean income and the migration rate in each region excluding Greater Accra

Table 15: Individual characteristics of the sample with missing observations omitted

Variables	Total
Male (%)	62.7
Average age (years)	21.87
	[2.29]
Post-birth migration (%)	32.17
Post-SHS migration (%)	31.41
One-way migration (%)	21.85
Born in rural zone (%)	60.23
Migrants per school (%)	21.8
Time since diploma (years)	1.32
	[1.47]
Average distance to Accra (km)	216.81
	[148.29]
Internal to SHS (%)	50.73
Cognitive abilities (%)	39.73
Current region (%)	
<i>Ashanti</i>	18.71
<i>Brong Ahafo</i>	9.20
<i>Central</i>	8.49
<i>Eastern</i>	5.94
<i>Greater Accra</i>	26.25
<i>Northern</i>	7.6
<i>Upper East</i>	1.79
<i>Upper West</i>	2.17
<i>Volta</i>	11.37
<i>Western</i>	8.49
Father's education (%)	
<i>None</i>	18.24
<i>Primary</i>	4.69
<i>JHS</i>	40.15
<i>SHS</i>	18.43
<i>Post-secondary</i>	18.49
Mother's education (%)	
<i>None</i>	30.4
<i>Primary</i>	10.26
<i>JHS</i>	43.19
<i>SHS</i>	10.89
<i>Post-secondary</i>	5.26
Year SHS started (%)	
<i>2005</i>	13.43
<i>2006</i>	16.59
<i>2007</i>	28.63
<i>2008</i>	41.36
Observations	1579

Standard deviations in parentheses

Table 16: Residential location after SHS excluding return migration

Current region	SHS region									
	Ashanti	Brong Ahafo	Central	Eastern	Greater Accra	Northern	Upper East	Upper West	Volta	Western
Ashanti	85.83	10.93	6.8	3.75	0.56	3.21	14.49	7.46	2.24	3.61
Brong Ahafo	3.15	78.14	0.49	0.83	0	3.21	2.90	7.46	0	0.60
Central	1.84	0.81	63.11	3.75	1.68	0	2.90	0	2.52	2.41
Eastern	0.52	0	0.97	55	0.56	0	1.45	1.49	0.56	0.60
Greater Accra	6.82	6.48	21.84	33.33	94.97	6.41	20.29	4.48	26.33	12.05
Northern	0.26	0.40	0	0.83	0.56	86.54	4.35	4.48	0.56	0
Upper East	0	0	0	0.42	0.56	0.64	50.72	1.49	0.56	0
Upper West	0.26	0	0.49	0.42	0	0	1.45	68.66	0.56	0.60
Volta	0.26	0.40	0.49	0.42	0.56	0	0	1.49	65.83	0
Western	1.05	2.83	5.83	1.25	0.56	0	1.45	2.99	0.84	80.12
Total (%)	100	100	100	100	100	100	100	100	100	100
Total (#)	381	247	206	240	179	156	69	67	357	166

Table 17: Migration and mean income in each region without accounting for price differences

Region	Age	Migration to (%)	Migration from (%)	Income	Income SHS	Income youth	Income SHS youth	Youth incomes SHS male	Youth incomes SHS female	Unemployment (%)	Prix
Ashanti	21.64 [2.25]	16.14	11.16	146.17 [206.21]	196.06 [238.16]	111.15 [143.89]	135.04 [150.11]	122.04 [117.80]	175.35 [226.94]	4.74	0.81 [0.05]
Brong Ahafo	22.30 [2.09]	4.78	10.36	143.31 [221.59]	197.58 [188.98]	123.31 [190.96]	120.08 [137.54]	85.59 ⁺ [44.01]	149.64 ⁺ [184.42]	2.07	0.79 [0.04]
Central	21.65 [2.10]	6.97	11.74	127.11 [174.43]	237.37 [354.44]	103.30 [147.96]	153.35 [170.96]	168.11 ⁺ [201.97]	123.83 [#] [101.21]	6.04	0.82 [0.05]
Eastern	22.00 [2.02]	1.79	16.33	126.52 [190.52]	178.56 [170.70]	108.15 [160.21]	132.64 [92.12]	136.42 ⁺ [117.21]	130.00 [76.87]	3.32	0.82 [0.05]
Greater Accra	21.45 [2.10]	57.77	5.38	214.22 [260.57]	222.73 [193.13]	161.01 [196.94]	196.27 [247.21]	193.41 [156.40]	199.23 [318.39]	7.89	1.03 [0.08]
Northern	22.72 [2.26]	2.59	4.58	112.68 [191.02]	101.76 [86.15]	97.36 [189.88]	59.60 [46.80]	65.96 [45.85]	42.65 ⁺ [49.17]	0.92	0.79 [0.03]
Upper East	22.63 [2.29]	1	6.18	77.39 [166.72]	90.82 [83.93]	45.68 [72.79]	60.07 [78.61]	69.99 [94.27]	37.74 [#] [7.80]	8.38	0.80 [0.03]
Upper West	22.66 [2.08]	1.39	3.39	96.99 [140.47]	115.33 ⁺ [177.16]	101.28 [136.50]	59.10 ⁺ [60.34]	66.30 [#] [67.15]	30.33 [#] [0]	16.06	0.79 [0.03]
Volta	22.67 [2.72]	1.20	21.51	95.23 [123.34]	114.80 [162.54]	80.97 [96.03]	82.38 [79.02]	78.48 [84.00]	92.78 ⁺ [69.86]	2.15	0.81 [0.05]
Western	21.88 [1.90]	6.37	7.77	139.10 [194.43]	149.49 [117.37]	149.09 [228.93]	98.96 [64.00]	87.26 [46.88]	262.83 [#] [0]	3.87	0.83 [0.06]
Ghana	21.93 [2.24]			139.13 [204.79]	182.22 [200.25]	114.12 [170.25]	129.33 [164.61]	118.81 [121.04]	148.46 [222.79]	4.73	0.84 [0.09]
Observations	2 284	502	502	8 893	580	2 036	217	140	77	9 335	20 253

⁺ Nombre d'observations inférieur à 10 pour calculer la moyenne ; [#] Nombre d'observations inférieur à 5 pour calculer la moyenne.
The variables *Age*, *Migration to* and *Migration from* are from the authors' GOT database; the other variables are from the World Bank's GLSS5 database.
For prices, the value 1 corresponds to the Accra index in 2005

Table 18: Individual characteristics and migration – fixed effects

	(1)	(2)	(3)	(4)	(5)	(6)
	(Reference)	(Éducation)	(Male)	(Female)	(Rural)	(Urban)
Cognitive abilities	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
Age	0.001 (0.005)	-0.002 (0.005)	0.001 (0.006)	-0.011 (0.008)	-0.010 (0.006)	0.016 (0.010)
Residence	0.015 (0.019)	0.010 (0.021)	0.011 (0.026)	0.009 (0.038)	0.058** (0.027)	-0.056 (0.035)
Born rural region	0.022 (0.020)	0.022 (0.022)	0.018 (0.030)	0.034 (0.034)		
Male	0.018 (0.016)	0.020 (0.018)			0.024 (0.030)	0.014 (0.025)
Years since diploma	0.014* (0.008)	0.015* (0.008)	0.014 (0.011)	0.021 (0.014)	0.033*** (0.011)	-0.015 (0.012)
Migrants per school	1.011*** (0.028)	1.023*** (0.044)	1.035*** (0.061)	0.986*** (0.085)	1.024*** (0.075)	1.052*** (0.093)
Distance SHS-Accra (log)	-0.005 (0.006)	-0.015* (0.008)	-0.019* (0.012)	-0.009 (0.012)	-0.036* (0.018)	-0.006 (0.011)
Father primary educ.		-0.022 (0.066)	-0.042 (0.079)	0.017 (0.109)	0.024 (0.077)	-0.171 (0.104)
Father JHS		-0.079** (0.039)	-0.088* (0.046)	-0.066 (0.071)	-0.091** (0.043)	-0.080 (0.073)
Father SHS		-0.088** (0.043)	-0.089* (0.053)	-0.092 (0.076)	-0.046 (0.053)	-0.143** (0.068)
Father post-sec. educ.		-0.076* (0.044)	-0.055 (0.056)	-0.105 (0.079)	-0.112** (0.052)	-0.052 (0.074)
Mother primary educ.		0.009 (0.038)	0.021 (0.050)	-0.014 (0.060)	0.018 (0.052)	-0.024 (0.062)
Mother JHS		0.002 (0.028)	0.009 (0.037)	-0.013 (0.039)	0.009 (0.035)	-0.030 (0.043)
Mother SHS		0.021 (0.038)	0.028 (0.050)	0.002 (0.053)	0.002 (0.065)	0.026 (0.050)
Mother post-sec. educ.		0.012 (0.053)	0.053 (0.079)	-0.036 (0.073)	0.021 (0.094)	-0.009 (0.066)
Constant	-0.048 (0.092)	0.133 (0.108)	0.102 (0.149)	0.287* (0.172)	0.393** (0.179)	-0.203 (0.214)
Observations	1902	1579	990	589	951	628
R-square	0.119	0.126	0.129	0.127	0.120	0.169

OLS model; SHS-level cluster; standard deviations in parentheses; *** p<0.01, ** p<0.05, * p<0.1
The baseline category for parents' education is "No education."

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