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Effects of an education reform on household poverty and inequality

A microsimulation analysis on the free Senior High School policy in Ghana

Kwabena Adu-Ababio[1] and Robert Darko Osei[2]

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Abstract: The level of income can be directly inferred from the level of education, making education an important variable as a key determinant of better livelihoods and poverty alleviation. However, in most developing countries education is not accessible to all. In Ghana—although basic education is largely free—for secondary education this was not the case until recently. Hence, the high tuition fees and other scholarly expenses continue to be a burden on parents and guardians. The problem was further compounded when government subsidies to upper secondary institutions were delayed. It is not surprising that the government has decided to provide this service as a public good to the benefit of all. In the 2017/2018 academic year the government began an educational reform policy to fully absorb the cost of Senior High School and vocational education for any student who qualifies. Seeing this as a form of benefit to households, this study provides an analysis of the effect of the reform on household poverty and inequality. Analysis is based on the Ghana Microsimulation Model which has the Ghana Living Standards Survey - Round 6 as its base input data. Results provide policy makers with some good ex-ante evidence on the extent to which the reform is contributing to lessening the burden of vulnerable households.

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[1] Institute of Statistical, Social and Economic Research (ISSER), University of Ghana, Accra, Ghana, corresponding author: kobbyaduababio@yahoo.com; [2] ISSER, University of Ghana, Accra, Ghana.

1   Introduction

The stock of human capital can be directly linked to the level of earnings or income of an individual. This is attributed to the fact that an employee is rewarded to the extent where the additional return on investment is positive. Thus, if the value of human capital employed—wages paid—is higher than the return brought in, the employer has an incentive to reduce wages or to reduce the human capital employed. The importance of the quality of human capital and its impact on earnings is demonstrated by the extent to which individual livelihoods can be sustained in the bid to reduce poverty and vulnerability. This quality cannot be overemphasized without the acquisition of skills which brings to bear the completion of some form of training or education in the workforce if earnings is used as a yardstick for the value of human capital.

It is the belief that, with some level of education, a better life is assured. This assertion has been confirmed empirically in two ways. First, by people's personal experience and second, through respondents' statements concerning their life quality perception and expectations along with their level of education (Dziechciarz-Duda & Król, 2013). Apart from its inherent worth as an important developmental goal, education is also central to one's ability to respond to the opportunities that development presents (Ahmed & Del Ninno, 2002). These points largely reflect the long-term impacts of human capital on general welfare. However, for many households, investing in human capital presents immediate costs for which the returns are long-term. In reality, many poor households find it difficult to bear these short-term costs. In the bid to achieve these long-term benefits, some households will be negatively affected as they may trade off current essential consumption expenditure for education expenditure in order to improve the chance of a household breaking out of the inter-generational poverty cycle.

This problem is compounded especially in the developing and less industrialized countries where policy has not been adequately formulated to encompass those households whose low-end consumption capabilities prevent them from accessing some basic social goods like education and health which tend to significantly improve livelihoods.

In order to help such poor households to meet some of these expenditures, countries may offer assistance in some related basic expenditure to lessen the burden of household members. The goal in this case is to cushion households so as to displace expenditure on social goods to consumption in the short run. This also implies that poor households who might not have had resources for such basic goods need not worry about this as they are able to concentrate more on their consumption needs.

In terms of the need for universal education, some policies try to lessen the burden of guardians by absorbing some costs related to feeding and sometimes boarding. The latter, considered as a luxury for certain households is a major cost component of secondary education that deters most individuals from pursuing higher education (Curto & Fryer Jr, 2014). With policies defraying such costs for low income individuals, poor households will be afforded additional resources to improve consumption capabilities. Such policies have been a part of international development and have gone a long way to promote access to education, enrolment, and retention, especially in developing countries (Bennell, 2002).

Ghana being a developing country has also made (and continues to make) various efforts to promote the literacy levels of its citizens. A policy such as the Free Compulsory Basic Education (FCUBE) was instituted with the aim of promoting basic education in the country. Considerable efforts have been made to promote the level of literacy in the country to the effect that in 2015

the previous literacy level of 57.9 per cent recorded earlier in 2000 had increased to 76.6 per cent (Knoema, 2017) due to the increasing number of investments going into the sector. This has greatly transformed the thinking of the citizenry as shown in trends of lifestyles, voting pattern, as well as social commentating. In the words of Nussbaum (2006: 387) nothing could be more crucial to democracy than the education of its citizens. Indeed, Nussbaum argues that primary and secondary education helps young citizens form habits of mind at a crucial age and stays with them through their lives.

Beside contributions to scholarly works, which are sometimes scarce in this domain with Abramovsky and Phillips (2015) being particularly similar to this study, there is first the need to know the actual extent to which various benefits policies influence households so as to inform policy makers on how much to give to relief the underprivileged. This need becomes essential when it concerns benefits in education which is a social good and has the potential to alter livelihoods. Second, there is the need for ample research support to form a strong basis for expanding the existing social protection programs in developing countries. Knowledge about how much to give and its possible impacts can guide future budgets. Third, it should be noted that the improvement on the microsimulation model for Ghana can be incorporated to facilitate the simulation of real-world scenarios in other sectors of the economy to aid future research and policy recommendations. Last, in terms of contributing to scientific knowledge, this study is going to adopt static microsimulation modelling techniques to analyse changes in an education reform. Although some contributions have been made for static models, this will be the first time the model will be empirically tested for observable changes in the government's education expenditure budget using Ghanaian survey data.

The study proceeds as follows. Section two describes the current institutional situation of Ghana's educational system with emphasis on upper secondary education as well as its associated financing status and the need to expand enrolment through a benefit policy. Section three presents the data and methods used in econometric analysis while Section four describes the microsimulation model and the education policy reform. The presentation of results is done in Section five after which Section six concludes and gives some policy recommendations.

2   Policy and secondary education in Ghana

Countless debates have risen for decades around the social impacts of education in developing countries (Schendel, McCowan, & Oketch, 2014). Initially, studies from the World Bank seemingly pointed to the idea that in developing countries, those investments that went into tertiary education would yield much lower social return than those in lower levels of education (Klees, Samoff, & Stromquist, 2012; Heyneman, 2003). In the Ghanaian case for instance where in the late 1980's and early 1990's, primary education was scarce and illiteracy was rampant, there was a clear economic argument for prioritizing basic education to fuel economic growth. These economic arguments were also supported by social justice concerns that emphasized the ways in which university admissions processes disadvantaged marginalized groups. In contexts where only a small proportion of the population reaches university, advocates for prioritizing funding for primary education have long argued that public support for higher education is likely to perpetuate socioeconomic divisions within society (Archer, Hutchings, & Ross, 2005).

With these assertions from development partners which were at that time valid concerns to some extent, most governments in Ghana in the late 1990's and early 2000's concentrated more on the improvement of basic education to the unfortunate detriment of secondary education, which manifested in a reduction of international aid and domestic funding in the country to the latter.

This inadvertently triggered a 'crisis of quality' in the education sector (Schendel, McCowan, & Oketch, 2014). Even though earlier arguments made for basic education were sound, population growth and progression to subsequent levels or grades defeated the goal of basic education promotion. Reasons being that adequate structures and infrastructure were not put in place to support secondary and tertiary education (Rolleston & Adefeso-Olateju, 2014), creating a shortage in the supply of that level of education.

Moreover, the growth in the technological production processes associated with globalization and the rise of the 'knowledge economy' which thrives where there is skilled labour availability and good educational system, have redirected international attention to the importance of secondary and tertiary education in development (Andrés, Asongu, & Amavilah, 2015). This has made basic education an inadequate qualification to meet demanding tasks that require higher levels of intellect and skills development. The case for Ghana has not been any different. In addition, citizens are keen on educating themselves in the bid to also improve their standards of living. This has called for more Ghanaians to demand at least some secondary education to meet the demands of the job market and also for their personal enlightenment.

It is a known fact that Ghana is one of the countries in Africa that spends a higher percentage of its total budget and GDP on education (see Canagarajah and Ye, (2001)). With an allocation of over 6 per cent of Gross Domestic Product (GDP), Ghana's spending on education is among the highest in Africa comparing a global average of 5 per cent (Bashir, Lockheed, Ninan, & Tan, 2018). It is worth noting that there was a 10 per cent increase in the allocation to the education sector in the 2017 budget, as compared to the amount apportioned to the sector in 2016. This increment, even though a normal trend, seems to have been necessitated by the government's policies in the education sector, prime among them was the free Senior High School (SHS) which represented about 5 per cent of government's contribution to funding of the education sector budget. In addition to this, there was also the restoration of teacher trainees and nursing students allowance, among others. The Ministry of Education's total budget, including the Ghana Education Trust (GET) Fund, saw an increase of 20.7 per cent in 2017 – from GH₵ 7.55 billion in 2016 to GH₵ 9.12billion (GoG, 2018). All these initiatives are being implemented in the bid to achieve the 'Knowledge Economy' status.

The demand for secondary education has been met equally with its supply as public, mission, and private secondary schools abound currently in the country. Ghana can boast about a considerable number of secondary schools actively operating under the Ghana Education Service (GES). With the rising need and awareness to educate, it is the dream of every parent or guardian to see their ward attain some secondary education. The problem however is that, although it is an undebatable fact that private schools are the most expensive, public secondary schools which outnumber the latter and should be accessible to all are quite expensive for the average Ghanaian to attend. This is mainly because total scholarly expenses are solely borne by the guardian. Although government is supposed to provide some subsidies to support the feeding of residential students, such resources are delayed, forcing authorities to charge these expenses to parents or guardians. This has created a class society where citizens higher on the income scale can afford to send their wards to the top-class secondary schools, while those below the income scale have no choice but to attend lower-tier secondary schools. In instances where the children from poor households may adequately qualify in grade to a highly rated school, they may not adequately qualify financially to bear the scholarly expenses of such schools. Perpetuating the state of poverty in the country, as such persons are likely to stay with their basic education qualifications and are not able to improve their earnings as discussed above.

Even though some considerable investments have gone into public basic education, the current state of such institutions is poor as Ghanaians who can afford it will prefer to patronize private basic school (Rolleston & Adefeso-Olateju, 2014). Private schools are however expensive, leaving the poor and vulnerable disadvantaged and lacking quality basic education, preventing such persons from accessing higher education. About 23 per cent of Ghanaians live in poverty (Ghana Statistical Service, 2014) and as such, there should be concerted efforts that are put in place to 'trampoline' such persons out of poverty. Policy makers in the country have a strong conviction that in the bid to reduce poverty and successfully achieve one of the major Sustainable Development Goals of ending poverty in all its forms, and the realization that not all households can have members with equal income generation capacities, there is the need for a minimum level of social protection.

To add to the above reason, we realize that, although it seems the government spends a lot on education, until recently, the majority of the money spent in the sector goes into the payment of salaries and wages with about 5 per cent spent on capital expenditure. It is an undeniable fact that, in some of the years, wages and salaries took almost 100 per cent of the allocation to the education sector with virtually nothing for capital expenditure. All the more reason why there should be a shift in allocation policy which has the potential to benefit human capital which is worth more than thousands of other material resources.

It is with these realizations of the state of secondary education in the country that the current government has instituted a Free SHS and Technical and Vocational Education and Training Policy to support secondary education in the country in order to address inequality and ensure equal opportunities for all students through the removal of cost barriers in public upper secondary schools. It is the belief that any society that aims to transform itself into a modern and productive player in the global market needs an educated workforce and should get its educational policies right. Although initially a campaign promise, the new government was able to start this policy immediately after the assumption of office in the 2017/2018 academic year. The key feature of this benefit is that beside free textbooks and other learning materials, all residential and non-residential students respectively benefit from a fully-sponsored scholarship package of GH₵1,002.47 and GH₵ 648.47 annually. By residential students, we mean individuals who do not spend any time travelling to and from school in addition to the notion that educational expenses related to food, board and lodging are paid directly to school authorities for this service to be offered and not offered by the household or household head. Having non-resident status means that the student spends some time going to and from the school compound or premises in addition to the fact that educational expenses relating to food, board and lodging are borne by the parent directly.

The case for residential or boarding students is a peculiar one due to the fact that, for many secondary students in Ghana, it is necessary to board because commuting to the secondary school of their choice is not an option as the said school may not only be in a different district but may also be regions apart. To explain further, many students do not have a day school within easy access, and must attend a more expensive boarding school, since there are only around 700 SHS for the entire country compared to over 9,000 Junior High Schools (MoE, 2008). As shown by Ajayi (2013), girls were 6 percentage points (20 per cent) less likely to ever reach SHS and some of those who do not enrol in SHS enrol in Technical and Vocational Institutes (TVIs) as observed in 2010. Even if guardians were willing to avoid boarding fees due to geographical locations, the quality of upper secondary schools close to them may be poor as most secondary schools that can provide quality education are centred around regional capitals particularly in the Greater Accra, Central and Ashanti regions. Fees for non-residents are also not cheap. In 2011, government-approved tuition fees for day (non-boarding) students in senior high school were around 500

Ghana cedis per academic year, a very large sum in a country where the per capita GDP that year was 2400 Ghana cedis[1]. This package not only caters for boarding but is also to cater for admission fees, library fees, science centre fees, computer lab fees, examination fees, and utility fees. These fees initially borne by guardians previously put poor households at a disadvantage just to enrol a single household member in secondary education. A unique feature in the policy is a situation where day/non-resident students will get a meal at school for free.

This benefit policy has been necessitated due to the fact that policy makers firstly saw the compounding costs that senior secondary education brought. Some of the above-mentioned costs which should have primarily been borne by the government were transferred to the guardian because subsidies which seemingly existed did not reach school authorities or were delayed to the extent that administrative activities came to a halt. Moreover, due to the large student population, subsidies were not enough to cater for increasing numbers and as such left authorities with no choice than to bill students irrespective of income status or standing. Second, the level of student exploitation in terms of fees and levies to be paid was quite alarming. Some school authorities took it upon themselves to add some illogical components to the students' bill. Examples of such components are Parent Teacher Association (PTA) dues, Construction levy, Teacher's Motivation fees etc. just to mention a few. To the middle-income Ghanaian, such additions may not weigh much on their purse, but this is different for poor households where such costs weigh heavily on them to the detriment of consumption expenditure. Typical of the Ghanaian education management style, students coming from such households are always driven out of class for non-payment of fees. Although no empirical studies have been conducted for Ghana, anecdotal evidence has thrown more light on the fact that driving out students for non-payment of fees has contributed to the increased levels of truancy among students.

Lastly, the need for a benefit policy which is overreaching enough to capture a majority of the poor households is non-existent. Presently, Ghana is expanding it Livelihood Empowerment Against Poverty (LEAP) cash transfer system which aims to target the poorest households (bottom 20 per cent of the poor) and has not even reached two thirds of the specified population. Moreover, with issues of eligibility under LEAP which is determined using a proxy means test, some households are omitted by virtue of being poor but not extremely poor yet, may have difficulty paying some of the costs enumerated. With the Free SHS benefit policy affecting a universal social good like education, it is a forgone conclusion that members of all poor households irrespective of how far or close they are to the upper or lower bound poverty line of GH₵1,314 and GH₵792 respectively will benefit so far as they qualify to be in SHS (currently, GH₵1 equals around USD0.23).

Bringing the importance of the above benefit policy to light as well as the need for it, the main objective of this study is to investigate the effects of the free upper secondary education reform on household poverty and inequality. The interest is to inquire if the free education reform policy will liberate resources for poor households for consumption as should be the case or will remain the same even in the presence of this benefit. Specifically, the study seeks to firstly ascertain exactly how much resources the government is spending in total on this education reform considering the amount spent per pupil. Secondly, investigate the impacts such a reform can have on household poverty and inequality and lastly suggest how the government can sustainably finance such an expenditure. In simple terms the study looks at the short term and therefore household consumption displacement of education spending.

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[1] See http://www.statsghana.gov.gh/docfiles/GDP/GDP_2014.pdf

3 Analysis: methods and data

3.1 Conceptual framework

The interest is whether free education will free up resources for consumption in poor households. That is the hypothesis that a study model needs to inform us on. In order to tackle this and other objectives, the study adopts mainly microsimulation modelling methods to analyse the redistributive results obtained. In terms of how this is done, it should be noted that policy reforms or discrete policy changes such as the one in question are understood as ad-hoc variations in the tax-benefit nexus which makes reference to eligibility rules, tax rate structure, benefit amounts etc. (Navicke, 2017). The effectiveness of the policy or otherwise is assessed against a status quo where tax-benefit parameters were normally adjusted before the policy or intervention.

According to Bourguignon and Spadaro (2006), the usual composition of microsimulation in redistribution analysis as used for modelling purposes, comprises three elements; first a micro dataset, containing the economic and socio-demographic characteristics of a sample of individuals or households; second the rules of the policies to be simulated—i.e. the budget constraint faced by each agent; third a theoretical model of the behavioural response of agents.

The concept of using a tax-benefit microsimulation model involves calculating the effects of a policy change or reform on household income, without changing any of the characteristics of the household members (Figari, Alari, & Sutherland, 2014). The way to finance such a policy can also be considered in terms of finding packages to support the reform. Moreover, in the era of the new policy certain indicators will not remain constant; individuals may at some point wish to change their behaviour in response to the reform, issues of labour supply and population may be affected based on the peculiarity of the existing policy and its inherent changes. These second order effects are important and should be clear enough not to be neglected (Bourguignon & Spadaro, 2006). Models that ignore altogether the latter behavioural changes or responses are called arithmetical models. This type of modelling primarily uses the variation in the budget constraint that households face due to the policy reform by ignoring any change in their market income and demographic characteristics. This is the concept this study seeks to use in its analysis. Although quite simple in nature, sight should not be lost of the fact that the computation of taxes and benefits require a few thousands of line codes.

It is quite evident that in this study an 'overnight' or 'morning after' analysis under various policy scenarios is of value in its own right as the immediate effect is relevant to answer particular research questions in this study. In trying to find out which reform impacts positively on income, it will equally be essential to reveal how much of the total effect on income can be as a result of the policy's direct effects. With this in hindsight, microsimulation modelling begins from defining sound baseline and counterfactual scenarios. The latter corresponding to how the world would look after implementing new policies or how the world would have looked without new policies or what would happen if policy changes where rolled back. As Figari, Alari and Sutherland (2014) explain as forward-looking and backward-looking analysis.

Following the notation used in Bargain and Callan (2010) and Bargain (2012a) who assess the impact of tax-benefit policy changes on income distribution over time, we provide a formal framework for decomposing changes in household income to separate the effects of policy changes. Assume a tax-benefit system, f_k defined on the following parameters; household socio-demographic (and labour market) characteristics (a vector) c, household original income (i.e. income before adding cash benefits and deducting direct taxes) x and m_k denoting other various monetary parameters such as tax brackets, benefit amounts etc. $f_k(c, x, m_k)$ will be positive if

cash benefits received by a household exceed direct taxes which the household has to pay, and negative if vice versa.

Households disposable income y is then

$$y_k(c, x, m_k) = x + f_k(c, x, m_k) \qquad (1)$$

In this study case, where original income and demographic characteristics are constant, the effect of policy changes (status quo (A) to counterfactual (B)) on disposable income is

$$\Delta y = y_B(c, x, m_k) - y_A(c, x, m_k) \qquad (2)$$

This shows the general process on how the effects of a proposed or hypothetical tax-benefit reform is analysed. Thus the 'morning after' effects in a situation where policy rules before and after the reform refer (implicitly) to the same time period. As explained earlier, this form of arithmetical microsimulation modelling in the field of redistributive economics simulate a variation in the rules for calculating tax or benefit payments which leads to a change in the real disposable income of individuals or households under the assumption that individual behaviour is unchanged. This can be related to as the effect of an increase in the indirect tax rate on good i for individual j in order to reduce the 'real' disposable income of j by an amount equal to the change in the final price caused by the tax times the consumption of good i by that individual. Similarly, the effect of a reform of the income tax is the change in the real disposable income that it generates for constant market income from labour or other sources. Under such assumptions of constancy, it is a simple matter, at least conceptually, to identify the winners or losers of any reform of the tax-benefit system and to compute how much everyone loses or gains in terms of real disposal income.

Although argued to be quite restrictive by users, it should be noted that an estimate of the first round effect from the reform can be ascertained, which is itself a good approximation of final welfare effect if changes are small enough and individuals may be thought to operate in perfect markets (Bourguignon & Spadaro, 2006). The theoretical justification for arithmetical microsimulation is explained by the theory of consumer behaviour with a simple income indicator of a variation in welfare due to a modification of the budget constraint as succinctly shown by Bourguignon and Spadaro (2006: 7). For the purposes of this study we do not go further to expand on decomposition techniques leading to changes in real disposable income form policy reforms accounting specifically for the time frame under which policy reforms are considered. We do not expand on this framework, not because of the additional complexities it introduces, but rather due to issues of data deficiency over time periods required.

3.2   Data and estimation results

Benefit obtained from the educational policy's alterations as well as those for counterfactual scenarios is implemented using the Ghana Microsimulation Model (GHAMOD). This is the new tax-benefit microsimulation model for Ghana (Adu-Ababio, Osei, Pirttilä, & Rattenhuber, 2017). It is based on the European Union tax-benefit microsimulation model and it simulates individual and household tax liabilities and benefit entitlements according to the policy rules in place in each member state (Sutherland & Figari, 2013). Using GHAMOD, research can examine the extent to which changes in public policies have contributed to reducing (or increasing) income poverty or inequality. It can also be used to simulate the effects of proposed, alternative or hypothetical policy changes. GHAMOD is a static model in the sense that tax-benefit simulations are abstract from behavioural reactions of individuals and no adjustments are made for changes in the population composition overtime.

Data for the study is sourced from the Ghana Living Standards Survey 6th Round (GLSS-6). This data has been collected since 1987 to provide national and regional representative indicators on household wellbeing. The database is provided by the Ghana Statistical Service (GSS). The Ghana Microsimulation Model uses the GLSS-6 as its base input data for household and expenditure variables. Of the 18,000 households, 16,772 were successfully enumerated leading to a response rate of 93.2 per cent (GSS, 2014). Detailed information on the Demographic characteristics of households, Education, Health, Employment, Migration and Tourism, Housing conditions, Household Agriculture, Household Expenditure, Income and their components and Access to Financial Services, Credit and Assets can be found in the original dataset. Data underpinning GHAMOD however sticks to only essential variables and categories that are required for the model to run simulations smoothly.

Data points on education used for simulation hinged mainly on levels of educational attainment of the adult population, current school enrolment, educational expenditure by households, adult literacy rates, and apprenticeship training. It can be inferred from the data (GSS, 2014) that about 20 per cent percent of the adult population (15 years and older) have never attended school. A higher proportion of females (24.3 per cent) have never been to school compared to males (14.6 per cent). Of those currently attending school, a higher proportion (71.9 per cent) are in public schools compared with those enrolled in the private schools (28.1 per cent), giving credence to the need for a benefit package directly affecting such person in that education category. This point is most amplified when the rural areas are put into perspective as about ninety per cent of the rural population 15 years and older are currently enrolled in public schools (GSS, 2014).

As the free SHS package deals primarily with education expenditure we try to reveal what the data points to in terms of current education expenses. On the average, households spent GH₵172.91 (GH₵353.80 in current prices) annually per household member attending secondary school with about 51 per cent of most educational expenses of household members being paid by the father of the enrolled individual and 17.5 per cent by the mother (GSS, 2014). This figure compares favourably to the benefits amounts the policy reform is giving to household members in senior secondary education for the 2017/2018 academic year. According to the 2013 data, literates in English are more than half of the adult population (56.3 per cent), although rates are higher for males (67.3 per cent) than females (46.9 per cent).

In terms of data points for estimation, all input variables generated were in line with the eligibility criteria of the free SHS education benefit. First, data is divided into four main education groups in order to single the group that is the most likely beneficiary of the reform i.e. individuals in upper secondary education. Second, this group is further broken down into resident and non-resident individuals in this category due to fact that benefit amounts differ based on the status of the student. By resident status we mean student spends zero time going to and from the school compound or premises in addition to the notion that educational expenses related to food, board and lodging are paid directly to school authorities for this service to be offered and not offered by the household or household head and vice versa for non-resident students. Each criterion has to hold for eligibility, otherwise household member is deemed not applicable to the variable categorization. Table 1 below shows results of probable household members who are to be included in the simulations.

Table 1: Residential status of upper secondary school student

Student Status	Frequency	Percent
Resident/Border	906	1.25
Non-resident	30	0.04
Not applicable	71,436	98.71
Total	72,372	100

Source: Authors calculations based on GLSS 6.

For the avoidance of all doubt, we do not consider household members who claim they spend some time travelling to and from school and yet pay for expenses related to food, board and lodging directly to school authorities into the eligibility bracket. Moreover, household members who state that they spend zero time travelling to school and also do not pay for expenses related to food, board and lodging are taken out of the eligibility bracket. Attention should however be drawn to the fact that data was collected in 2013 and as such, this particular reform policy will not be reflected in the number of individuals currently in upper secondary school. The study takes this into consideration during microsimulation. Table 2 below shows the distribution of the current International Standard Classification of Education (ISCED) levels of household members.

Table 2: Current ISCED level of household members

ISCED Level currently attended	Freq.	Percent
Not in Education	12,185.57	16.84
Pre-primary	32,661.89	45.13
Primary	13,306.68	18.39
Lower Secondary	4,751.05	6.56
Upper Secondary	2,452.97	3.39
Post-Secondary	319.516	0.44
Tertiary	645.0667	0.89
Not Applicable	6,049.26	8.36
Total	72,372	100

Notes: Results are based on survey weights.

Source: Authors Calculations based on GLSS 6.

4   Microsimulation: model and policy reform

We begin with the static tax-benefit microsimulation model, GHAMOD (Adu-Ababio, Osei, Pirttilä, & Rattenhuber, 2017). This paper uses results based on GHAMOD version 1.1. The model is built on the EUROMOD platform. The underpinning data set is the latest wave of the Ghana Living Standard Measurement Survey, from 2012/2013. The policy rules are updated until 2017 and all incomes are uprated to the 2017 level, but only with the Consumer Price Index, because other indices are not readily available. All the model simulations below are based on 2013 data points collected. The model currently simulates the personal income tax, social security contributions, the LEAP transfer programme, a school-feeding programme (or its monetary amount as it is an in-kind transfer), the value-added tax and all excises. The indirect tax simulations are based on the reported expenditures in the household data set.

The free SHS education reform is modelled in two ways. First, household members identified in the input data to be eligible are given the benefit as follows:

- Household members in public upper secondary education who have residence status are given a benefit of GH₵1,002.47 annually;
- Household members in public upper secondary education who have non-residence status are given a benefit of GH₵ 648.47 annually;
- Households who are benefiting from existing social intervention policies continue to benefit from them in addition to the new education reform.

Secondly, with the objective of this study to examine the displacement of income of poor households as well as the fact that the goal of this free SHS policy is meant for the poor, the study tries to examine the reforms effect on the poor by emulating a counterfactual scenario where extremely poor household members who fall within the upper secondary enrolment age but are not enrolled in upper secondary school are given a benefit package of GH₵ 648.47 annually. This assumes that such members are currently non-resident students in school.

We also simulate the impacts of financing these reforms by increasing the social security contribution (SSC) paid by workers in line with an amount that may raise the same or close to the same revenue as the free SHS reform cost. It is the belief that proceeds will roughly approach the new reforms costs. We chose to analyse financing options via this contribution as government has not categorically stated how it is currently fully funding the new reform with the exception of stating that some proceeds coming from net petroleum receipts designated as Annual Budget Funding Amount (ABFA), may be used. Moreover, as it is a flat rate, its implementation is undemanding, and changes can be made without additional complexities. Although some researchers may be quite apprehensive on the political economic implications of such a financing approach, we note that this benefit package is non-discriminatory. Formally employed workers who have their wards in upper secondary school will not be worried paying higher taxes if it is an established fact that the benefit of this will return to their own children.

It can be argued that the reform can equally be financed by increases in indirect taxes like the VAT or the Communication Service Tax. However, input data is consumption data deficient, preventing in-depth disaggregation of household purchases from formal or informal providers. Although efforts are underway to fully integrate indirect taxes into GHAMOD, it is still in its early stages and has not been fully conceptualized.

5   Results

The results from the static microsimulations are reported in Table 2 and 3 (results based on GHAMOD version 1.1). The former shows poverty and inequality measures based on consumption for status quo as well as non-revenue and revenue neutral scenarios or financing scenario. Although the policy reform directly changes original income, we convert these changes into consumption possibilities. In simple terms, we express how consumption will vary if all the additional income were spent. The former on the other hand shows government revenue and expenditure values for the same simulation scenarios.

In both tables the first column reports baseline/status quo results for the year 2013 while the next two columns show results of static microsimulation with no behavioural impacts. The first of this shows the impact of the free SHS education reform only (non-revenue neutral case) while the second shows the impact of the reform when an increase in employee social security contribution

is introduced to regain the revenue (revenue neutral case). In the latter scenario, government needs to increase the employee SSC rate by approximately 5 percentage points (from 3 per cent to 8 per cent) in order to fully support the new education reform. As the reform was implemented in the 2017/2018 academic year, the study tries to provide real results by uprating baseline results to reform year results in order to simulate the real impacts of the free SHS policy. Using an uprating index, the study analyses a 2017 reform based on 2013 data points.

It can be seen that the free SHS policy decreases overall poverty, as this is further amplified especially among households with children i.e. household members below 18 years. Although both overall poverty and poverty in households with children decrease by less than 1 percentage point, the fall in the latter (0.63 per cent) is slightly greater than that of the former (0.60 per cent). It is not surprising to see that female-headed households benefit fairly more than male-headed households as most children are likely to be with their mothers in the Ghanaian cultural setting. Households with older persons (at least one member above 65 years) are also beneficiaries of the educational reform. It can be concluded that the kind of coverage simulated for the education reform adequately spells out why households with children and female heads are particularly the highest gainers. Poverty gaps reduction show similar results as observed among the surveyed categories. This fall in poverty coincides with a reduction in inequality with the existing education reform. We can conclude that the government is adequately addressing the needs of citizens at the bottom of income distribution as the effect of the policy reform is inequality-reducing.

Table 3: Simulation results of the free SHS policy on poverty and inequality

	Status quo/Baseline	Non-revenue neutral education reform	Revenue neutral education reform
Poverty measures			
Share of poor population, in %:			
All	24.91	24.31	24.50
Male-headed households	26.64	26.12	26.30
Female-headed households	19.70	18.89	19.08
Households with children	27.47	26.84	27.03
Households with older persons	33.70	33.15	33.28
Poverty gap (average normalised poverty gap, FGT(1)):			
All	8.10	7.82	7.91
Poor households out of			
Male-headed households	8.80	8.54	8.63
Female-headed households	6.01	5.66	5.75
Households with children	8.93	8.62	8.71
Households with older persons	11.03	10.60	10.62
Gini	0.417	0.415	0.414

Notes: Poverty rates measured using consumption-based absolute poverty line of 1314 Ghanaian Cedi per adult equivalent per year. The Gini index is based on total household consumption expenditure.

Source: Authors' calculations using GHAMOD.

In the revenue-neutral case, effects on poverty and inequality remain generally similar, although with smaller magnitudes. The decrease in overall poverty is smaller but gainers still remain the same. However, in this case gains through the reduction in poverty among households with children now outweigh gains recorded within female-headed households. Interestingly, the effect of the policy change is also inequality reducing, but the accompanying decrease in inequality under this scenario is slightly greater than the non-revenue neutral case. This gives more credence for the

use of such a financing option within the context of our simulation analysis. As this financing option affects mainly formal sector workers within the model, the education benefit reform is greatly felt among poor households who do not make such contributions and also find themselves on the bottom portions of income distribution.

Table 4: Simulation results of the free SHS policy on government budget

	Status quo/Baseline (GHS)	Non-revenue neutral education reform (GHS)	Revenue-neutral education reform	Status quo/Baseline (GHS)
Free SHS Transfer	0	729	729	-
Employee SSC	486	818	1561	743
Employer SSC	1067	1796	1796	-
SSC	1553	2614	3357	743
Income tax revenue	2060	3534	3534	-
Tax increase (%)			5	5

Notes: The budgetary implications are expressed in millions of Ghanaian Cedi.

Source: Authors' calculations using GHAMOD

In the model and as shown in Table 3, the free SHS reform demands some significant cost to the government's budget. Since there are neither educational nor child benefit reforms in the baseline, no outlays are made to that effect. Although GHAMOD simulates the Ghana School Feeding Programme (GSFP), it is modelled as an in-kind benefit and does not factor in the disposable income of parents in order to directly affect poverty reduction. Introducing the free SHS reform to existing students and extending it to poor households who have qualified members means a new expenditure of GH₵730 million. In a revenue-neutral scenario, government almost doubles its revenue from employee SSC from GH₵818 million to GH₵1561 million with the intention of offsetting the additional outlay created as a result of the free SHS educational reform. The generated income from this increase in employee SSC can more than cover the expenses on each student as well as cover some administrative costs of the programme.

Although not shown in Table 3, one may consider the instance where simulations would cover only existing household members in education in order that some savings may be made on the government's budget. It is without a doubt that government may make some saving, but we realized that simulating based on such exclusion parameters does not yield very different outcomes from the results above, in both revenue and financing terms. The inclusion of poor households increases government expenditure by about GH₵4 million with no change to poverty levels. However, the interest is to mimic the current nature of the reform and its impact on poor households, hence, the use of such inclusion parameters.

Notwithstanding the fact that a change in SSC will have adverse effects on the number of formal sector workers, it is beyond the scope of this study and can be analysed in a behavioural microsimulation context. In this study the characteristics of micro units, especially labour stays constant by ignoring the behavioural responses which may arise from the increase in employee SSC contributions. As explained in the introduction, the pure arithmetic effect or the 'morning after' effect is what we see as illustrated in the results above.

6   Conclusion and policy recommendations

In the absence of formal literature using a developing country as case study, this study for the first time studied the poverty, inequality, and the financial impacts of introducing an education reform

as well as financing it using a static tax benefit model. We tried to estimate how much of consumption is displaced among poor households when their actual burden expenditure on education is relieved through a free SHS benefit policy.

The simulated policy involved providing some monetary benefits to household members who were in upper secondary school depending on their status as resident or non-resident students. Members with upper secondary residential status are given a modest amount of GH₵1,002.47 annually to cater for food, board and other scholarly expenses while members with upper secondary non-residential status receive GH₵648.47 annually to cater for scholarly expenses excluding food and board. The key was to simulate based on the existing structure and format of the education policy reform in Ghana which took effect from the 2017/2018 academic year using data points collected in 2013. Based on this dataset, the study expands the reform policy to household members who fall below the extreme consumption poverty line by providing benefit amounts of GH₵648.47 annually to members who are within upper secondary school going age based on the assumption that they are non-resident students and have qualified to be in upper secondary school. Poverty reduction from this reform is modest, with female-headed households and households with children benefiting most from the reform.

The cost of the programme would be approximately 730 million Ghana Cedis and finding an appropriate means to financing it means increasing the social security contribution of the formal sector employee rate from 3 to 8 per cent. The increase is adequate, given the narrow base of the tax as well as the size of the formal sector in the country. With this increase in SSC, extra revenue of 743 million Ghana Cedis is generated to not only cover the cost of the reform programme but also leaves some excess revenue to cater for some administrative costs that may arise from the implementation of the reform. Although other financing measures can be considered, data and software restrictions prevent the effective use of these other financing means. We note that financing the programme does not entail only monetary costs but also a relative increase in poverty compared to non-revenue neutral instances. Irrespective of these slight costs to poverty levels, households with children as well as female-headed households continue to gain in such scenarios. Most importantly, overall inequality as measured by the Gini coefficient falls modestly as compared to other reference cases with no exception to the status quo. It is evident that most households below the extreme poverty line are not in the formal sector, hence, are not affected by the rise in SSC. This conforms to the idea of efficiently taxing the rich to help the poor which equally reflects in inequality and gives credence to the financing option used in the revenue-neutral case. This goes to reinforce the point that taxes may not always have detrimental effects on the poor in cases where they are applied efficiently on the section of the population that feels its impacts the least just as has been illustrated in the simulation modelling done.

Considerable evidence suggests that participation in primary school is responsive to school fees, but less is known about how secondary school participation respond to fees, although the conditional cash transfer literature touches upon elasticity with respect to opportunity cost (Angrist, Bettinger, & Kremer, 2006; Barrera-Osorio, Bertrand, Linden, & Perez, 2011). However, the work by Duflo, Dupas and Kremer (2017) systematically proves the magnifying enrolment effects of a scholarship grant for upper secondary school students. For their whole sample, scholarship winners were 26 percentage points (55 per cent) more likely to complete secondary school, obtained 1.26 more years of secondary education, scored an average of 0.15 standard deviations greater on a reading and math test, and adopted more preventative health behaviour. Women who received a scholarship on the other hand, had 0.217 fewer children by age 25. Scholarship winners were also 3 percentage points (30 per cent) more likely to have ever enrolled in tertiary education. They were 5.5 percentage points (10 per cent) more likely to have positive earnings and had significantly higher (hyperbolic sine) earnings. Comparing this to our static

microsimulation analysis, we see that amounts simulated are nowhere near the actual costs that will be incurred albeit poverty reduction effects being similar. It is anticipated that the reform will cost the country GH¢1 trillion more than what was simulated, which is not surprising based on the literature.

While results may seem elegantly presented, sight should not be lost of some limitations of the model especially when interpreting them. The initial caveat has to do with the quality and reliability of income data points as compared to that of consumption. Primarily, the GLSS 6 is skewed towards consumption as the Statistical Service argues that as benchmarks to compare respondents' income which may be difficult to find or measure, it is appropriate to rely on consumption estimates although data points on income are present. Arguments hinge on the fact that at low levels of aggregation, these samples are rarely representative or of sufficient size to yield statistically reliable estimates. At the same time, census (or other large sample) data of sufficient size that allow disaggregation at lower levels have no information about income (GSS, 2015). One further caveat is that all household members employed in the formal sector are assumed to pay taxes although this may not always be the case. In the Ghanaian tax system, it may be difficult to evade taxes paid on the main or primary job as this is always subject to third-party withholding by employer. However, employees can still evade taxes from other income they earn but do not declare which more often than not depends on the tax rate. Typical of microsimulation models, we do not allow for any 'slippages' which usually manifest through administration misappropriation and corruption; very common terminologies in the developing country context with poor institutional capacities to prevent such phenomenon. With these caveats in mind, the free SHS policy yields very encouraging results on poverty and should be encouraged.

In terms of policy recommendations, it is a must that this education reform should be continued for the foreseeable future. Indeed, this has been the dream of the forebears of the republic; a Ghana where children will not be denied the opportunity of senior high school education because of the inability of their parents to support them financially. If free education means one thing, then it is the fact that the era where pupils dropped out from school for financial reasons, or had their education cut short, has become a thing of the past. Not only is this policy encouraging enrolment and retention in SHS, it is also reducing the share of households living in poverty as well as its associated gaps that exists thereof. The reform policy is seen to actually liberate resources for poor households for consumption as households are better off after the benefit is rolled out. Moreover, by estimating how much the reform will cost to the government purse, an appropriate financing option which does not weigh significantly on the poor, is found to cater for the reform cost, revealing the extent to which government can use SSC as a theoretical benchmark to tackle poverty.

Free SHS like any pro-poor policy or any policy intervention for that matter has its own challenges which might hamper the real intent of the reform if these challenges outweigh the gains. However, problems in the Ghanaian education sector did not start with the opportunity created for every child to receive free secondary education and it certainly won't end here. By providing this reform, it is evident that the number of individuals going into SHS will increase disproportionately to the current infrastructure, the latter being a universal problem for most developing countries. With this in mind, the government should continually make adequate provision for basic infrastructure like desks, beds, classrooms and learning equipment which enhance the quality of the free education obtained. Probably, subsequent studies should examine the extent to which free SHS education can compromise the quality and effectiveness of the education received.

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