International Labour Office
Geneva

Employment Policy Department

EMPLOYMENT
Working Paper No. 193

2015

Structural change, employment and education in Ghana

Theo Sparreboom
Roger Gomis

Employment and Labour Market Policies Branch

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ILO Cataloguing in Publication Data

Sparreboom, Theo; Gomis, Roger

Structural change, employment and education in Ghana / Theo Sparreboom and Roger Gomis ; International Labour Office, Employment Policy Department, Employment and Labour Market Policies Branch. - Geneva: ILO, 2015
xi, 50 p. (Employment working paper ; No. 193.)

ISSN 1999-2939 (print); ISSN 1999-2947 (web pdf)

International Labour Office; Employment Policy Department.

structural change / economic growth / employment creation / education / educational development / skill requirements / Ghana

03.02.1

Printed by the ILO, Geneva, Switzerland

Preface

The primary goal of the ILO is to work with member States towards achieving full and productive employment and decent work for all. This goal is elaborated in the ILO Declaration 2008 on *Social Justice for a Fair Globalization*,[1] which has been widely adopted by the international community. Comprehensive and integrated perspectives to achieve this goal are embedded in the Employment Policy Convention of 1964 (No. 122), the *Global Employment Agenda* (2003) and – in response to the 2008 global economic crisis – the *Global Jobs Pact* (2009) and the conclusions of the *Recurrent Discussion Reports on Employment* (2010 and 2014).

The Employment Policy Department (EMPLOYMENT) is engaged in global advocacy and in supporting member States in placing more and better jobs at the center of economic and social policies and growth and development strategies. Policy research and knowledge generation and dissemination are essential components of the Employment Policy Department's activities. The resulting publications include books, country policy reviews, policy and research briefs, and working papers.[2]

The *Employment Policy Working Paper* series is designed to disseminate the main findings of research on a broad range of topics undertaken by the branches of the Department. The working papers are intended to encourage the exchange of ideas and to stimulate debate. The views expressed within them are the responsibility of the authors and do not necessarily represent those of the ILO.

Azita Berar Awad
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[1] See http://www.ilo.org/global/about-the-ilo/mission-and-objectives/WCMS_099766/lang--en/index.htm

[2] See http://www.ilo.org/employment

Foreword

Between 2000 and 2013, Ghana's economy grew at an impressive average annual rate of 6.6 per cent. However, despite its strong recent record of GDP growth, Ghana's economic outlook is not altogether bright. The economy appears to suffer from Dutch disease, and is heavily dependent on exports of primary commodities. Moreover, in line with the broad pattern in Sub-Saharan Africa, Ghana's economic growth has not been translated into an equally impressive labour market performance. Despite some increase in the proportion of employees in the country's labour force between 2006 and 2012, the large majority of workers remain in vulnerable forms of employment.

It is in this context that this paper by Theo Sparreboom and Roger Gomis explores the link between structural change and employment on the one hand, and the change in educational attainment on the other. It aims at better understanding how different patterns of structural change in the economy and changes in educational intensity and skills profiles of jobs are related to productivity and the quality of jobs created in Ghana.

Structural change has been an important characteristic of Ghana, with employment increasingly shifting from the agricultural sector to services, accompanied by clear productivity gains. However, at the same time, the incidence of vulnerable employment in services did not improve, pointing to the low quality of much job creation, as confirmed by the expansion of low quality service employment, in particular in wholesale and retail trade.

Increases in productivity have been supported by Ghana's achievements with respect to raising levels of education. Yet despite these gains, Ghana's labour force continues to be characterized by a significant share of workers without educational qualifications and a low proportion of workers with advanced schooling. This underlines the need for continued investment in education, including in terms of the quality of education.

Ultimately, the critical challenge for the Ghanaian authorities is to develop economic policies to support decent employment creation in more innovative activities and dynamic sectors, as well as to adopt measures to improve working conditions and facilitate the formalization of the informal economy. Ghana's recently adopted National Employment Policy provides a welcome framework for concrete measures to be pursued in support of this vision.

The analysis in this paper is based on economic and labour market data from the Ghana Statistical Service, and in particular the Ghana Living Standards Surveys conducted in 2005/2006 (GLSS 5) and in 2012/2013 (GLSS 6).

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Acknowledgements

This paper benefited from comments and suggestions provided by Tariq Haq, Specialist on Employment Policies at the International Labour Office in Geneva, as well as from comments by participants at a seminar held in Accra, Ghana on 22 May 2015. Any remaining errors or omissions are the authors' own.

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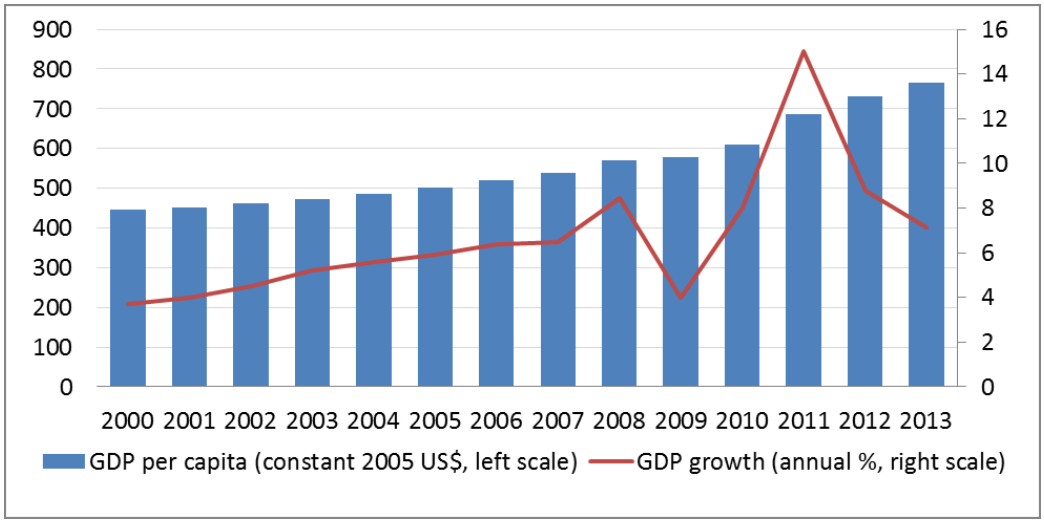
1. Introduction

Ghana witnessed an impressive economic performance in the period 2000-2013, growing at an average annual rate of 6.6 per cent. At the height of the global economic crisis in 2009, however, growth dropped back to 4 per cent, the lowest rate since 2000. Thereafter, it recovered sharply but displayed a higher degree of volatility (Figure 1). Nevertheless, Ghana is expected to maintain a robust growth rate due to oil and gas production as well as investment, both public and private (AfDB, 2014a and b).

A key determinant of the extent to which macroeconomic growth produces gains in social welfare is the quality of the jobs that the economy generates. Concerns are widespread in Sub-Saharan Africa that more than a decade of solid growth has not led to a significant improvement in labour market outcomes and in particular, has not generated few decent jobs. Many analysts have pointed to the need for pro-employment economic social policies, in particular based on structural change and productive transformation. One could expect that structural change towards higher value added sectors, and upgrading of technologies in existing sectors, would allow better conditions of work, better jobs, and higher wages. In Ghana, the debate on productive transformation has received further impetus due to the discovery of the Jubilee oilfield. Although oil rents contribute to the economy, they may also lead to adverse effects including 'Dutch disease' (CEPA, 2013).

Education and skills are intrinsically linked to productive transformation, as sectors applying more complex production technologies and research and development activities increase the demand for education and skills. At the same time, education and skills training do not create decent jobs by themselves, and an increase in educational attainment levels may also result in (graduate) unemployment or underutilization of skills. It is not uncommon to find high rates of unemployment among the better-educated in developing countries (ILO, 2013; Sparreboom and Staneva, 2014).

Figure 1. Real GDP growth and per capita GDP



Source: World Bank (2014).

In that context, this paper explores the link between structural change and employment on the one hand, and the change in educational attainment on the other. It aims at better understanding how different patterns of structural change in the economy and changes in educational intensity and skills profiles of jobs are related to productivity and quality of jobs created in Ghana. The paper is based on economic and labour market data from the Ghana Statistical Service, and in particular the Ghana Living Standards Surveys conducted in 2005/2006 (GLSS 5) and in 2012/2013 (GLSS 6). It summarises recent macroeconomic indicators and provides a microeconomic analysis of labour market outcomes and returns to education. Additional insights regarding the role of education and structural change are gained from an analysis of changes in the distribution of employment across sectors and other dimensions.

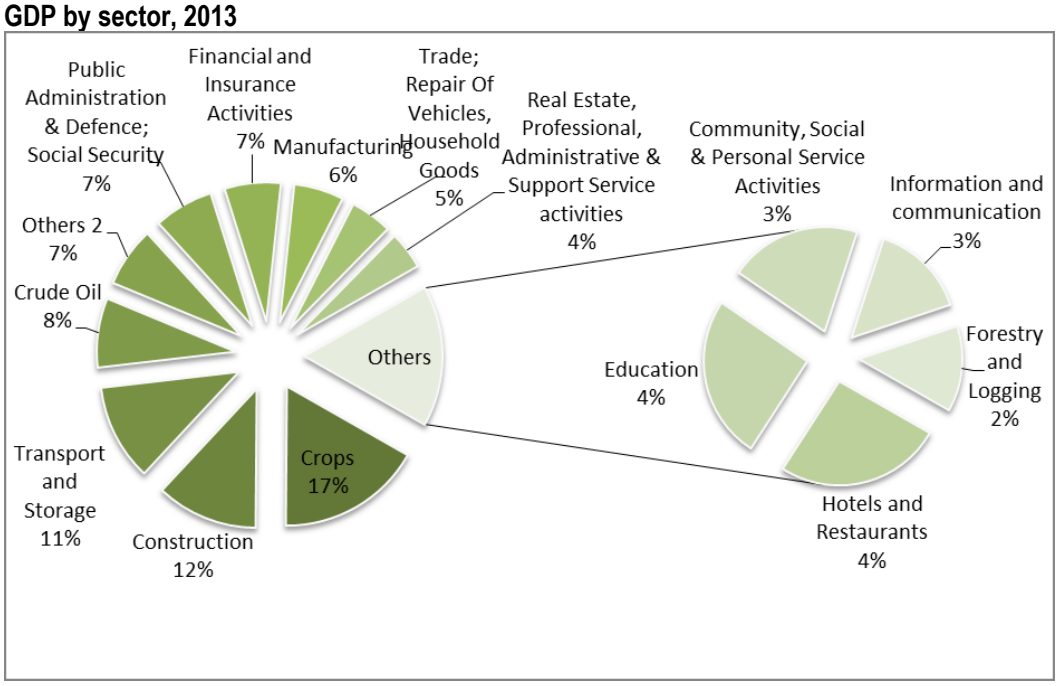
The paper is structured as follows. Section 2 discusses economic growth, employment and productivity development in Ghana, followed by an overview of education policies and enrolment rates in Section 3. Section 4 contains an analysis of the educational profile of the labour force, while educational intensification and structural changes are discussed in Section 5. Results of an assessment of qualifications mismatch are presented in Section 6. Section 7 provides estimates of returns to education in Ghana, including disaggregated results by broad economic sector. Finally, Section 8 concludes and provides some recommendations.

2. Economic growth, employment and productivity

Despite its strong record of economic growth, and expected growth rates for 2014 and 2015 of around 8 per cent (AfDB, 2014a) - among the fastest growth rates in Africa – Ghana's economic outlook is not altogether bright. The country is still heavily reliant on primary commodities as a source of value added. Crops represent 17 per cent of GDP, and oil 8 per cent, compared to the mere 6 per cent for by manufacturing. The construction sector, driven by a housing boom and infrastructure development, accounts for 12 per cent of GDP (Figure 2). Fiscal and monetary challenges are another cause for concern; the budget deficit stood at 7.8 per cent of GDP in 2013 and is estimated to remain at this level for 2014 and 2015. This is combined with a tight monetary policy pursued by the Bank of Ghana to contain inflation and the depreciation of the Cedi (AfDB, 2014b).

The pace of structural change is heavily influenced by the mining and the construction sector. The service sector is slowly increasing, while the share of agriculture in GDP declined from 2000 to 2012 by 8 percentage points (see Annex Table A1). Between 2000 and 2006 the industrial sector stagnated, followed by an increase of around 6 percentage points between 2006 and 2012 (Figure 3). Disaggregated data show that mining and utilities (largely reflecting oil)[3] as well as construction have increased roughly by 5 percentage points each, whilst manufacturing decreased by approximately 3 percentage points (from 10 per cent of GDP in 2006 to 7 per cent in 2012). Figure 3 also shows that, in comparison with Sub-Saharan Africa, the agricultural sector in Ghana is still large, while the services sector remains small.

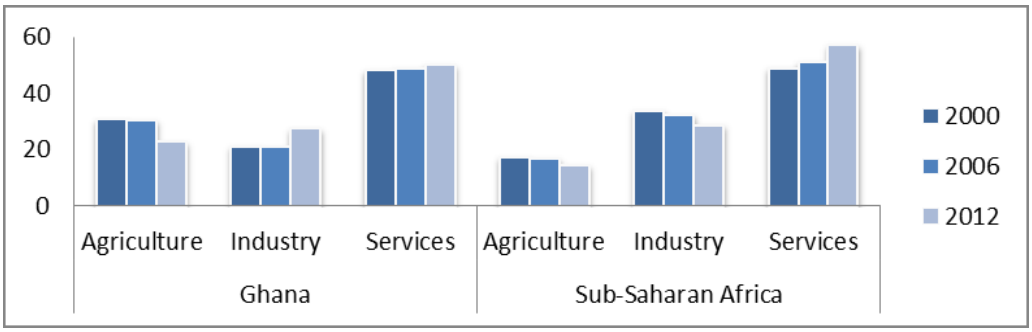
Figure 2. GDP by sector, 2013



Source: GSS (2014a).

[3] In 2012, crude oil accounted for over 60 per cent of the combined mining, quarrying and utilities economic activity at 2006 prices (GSS 2014a and b).

Figure 3. Structure of output in 2000, 2006 and 2012 (per cent of GDP)



Notes:
1. The calculation of Ghana's GDP was revised and the base year changed from 1993 to 2006 in 2010. This revision generated a substantial increase of Ghana's GDP, which is illustrated in Annex A, Figure A1 (based on World Bank, 2014). UN (2013) takes this discontinuity into account using 'backcasting', which is a method based on the ratio between the old and the new series. Figure 3 shows the new series and the adjusted old series.
2. Sectors are defined as follows: Agriculture includes categories A-B, Industry C-F and Services G-P in accordance with UN (2013).
Sources: World Bank (2014) for Sub-Saharan Africa; UN (2013) for Ghana.

The recent discovery of oil has raised the question whether Ghana's economy will be affected by 'Dutch Disease'.[4] Some studies suggest that Ghana is likely to suffer from it or is even presenting symptoms already (CEPA, 2013; World Bank, 2009). According to the Dutch disease scenario, the oil sector is expected to grow rapidly alongside non-tradeable sectors such as construction and particular services, while the development of non-oil tradeable sectors such as manufacturing will stagnate or decline. If this scenario persists the economy becomes increasingly dependent on a volatile commodity and the tradeable sectors will be damaged permanently (Krugman, 1987). Dutch disease may be triggered by real appreciation of the Cedi (due to income from oil), which undermines the competitiveness of the small manufacturing sector and the exporting agricultural sub sectors. Recent movements of the real effective exchange rate (REER) indeed point to a significant real appreciation of the domestic currency alongside the booming oil rents. The REER index stood at 100 in 2010 and dropped to 89.3 in 2013, the lowest value of the index since 2000 (World Bank, 2014).[5]

Demand drivers of growth show sharp variations since 2011 (when significant oil rents were obtained). Ghanaian private consumption has lost more than 20 percentage points since 1990, and even if some ground was recovered in 2013, is still far below the historical average (Table 1). On the other hand, public consumption reached new heights during the period 2011 to 2013. Exports increased as well, and in 2013 stood at 42.3 per cent of GDP compared to 29.5 per cent in 2010. Imports and gross capital formation do not exhibit a clear trend in recent years. Gross capital formation was at high levels both in 2011 and 2012, but fell in 2013. The fall is a consequence of a decrease in oil exploration and transport and machinery (GSS, 2014b). The increase in exports is a positive development and makes a large contribution to Ghana's economy, but it is concentrated in a few primary commodities. Gold, cocoa and oil accounted for an estimated 80 per cent of total exports in 2013 (KPMG, 2014).

[4] Dutch disease refers to the negative consequences of the vast increase in wealth of the Netherlands following the discovery of natural gas deposits, in particular through the crowding out of the traditional non-gas export sector in the 1960s. For more information, see:
http://www.imf.org/external/pubs/ft/fandd/2003/03/ebra.htm
[5] The real exchange rate is defined as the ratio of foreign to domestic prices times the nominal exchange rate. If the REER decreases, this indicates a real appreciation of the domestic currency (the Ghanaian Cedi).

Table 1. Demand side drivers of growth, selected years (% of GDP)

	1990	2000	2005	2010	2011	2012	2013
Private Consumption	85.2	84.3	81.0	80.4	59.3	51.0	64.2
Public Consumption	9.3	10.2	15.3	10.4	16.6	21.0	16.7
Gross Capital Formation	14.4	24.0	29.0	25.7	29.6	32.9	24.2
Exports of Goods and Services	16.9	48.8	36.4	29.5	44.1	48.1	42.3
Imports of Goods and Services	25.9	67.2	61.7	45.9	49.7	53.1	47.4

Source: World Bank (2014).

Analysis of growth across broad sector categories provides an insight into the key driving forces operating in the country (Table 2). Until 2011 the three broad economic sectors had grown, qualitatively, at a similar pace. Services experienced the strongest average growth, 6.4 per cent, while industry and agriculture grew on average at 5.5 and 4.3 per cent from 1994 to 2010. After 2011 however, growth in industry and services accelerated, whereas growth in agriculture stagnated. Consistent with the discussion above, concerns that the growth in oil related and non-tradeable sectors is achieved at the expense of other sectors, such as manufacturing but also agriculture, seem justified.

Table 2. Annual sectoral growth rates 1994-2012 (%)

Year	94/2010	1994	1996	1998	2000	2002	2004	2006	2008	2010	2011	2012
Agriculture	4.3	1.8	5.1	5.0	2.1	4.3	6.7	4.4	7.1	5.2	0.8	1.3
Industry	5.5	2.9	4.4	3.2	3.8	4.6	4.7	7.9	14.1	6.7	34.8	6.8
Services	6.4	4.9	4.5	5.7	5.2	5.0	4.9	6.6	7.7	9.4	9.0	9.8

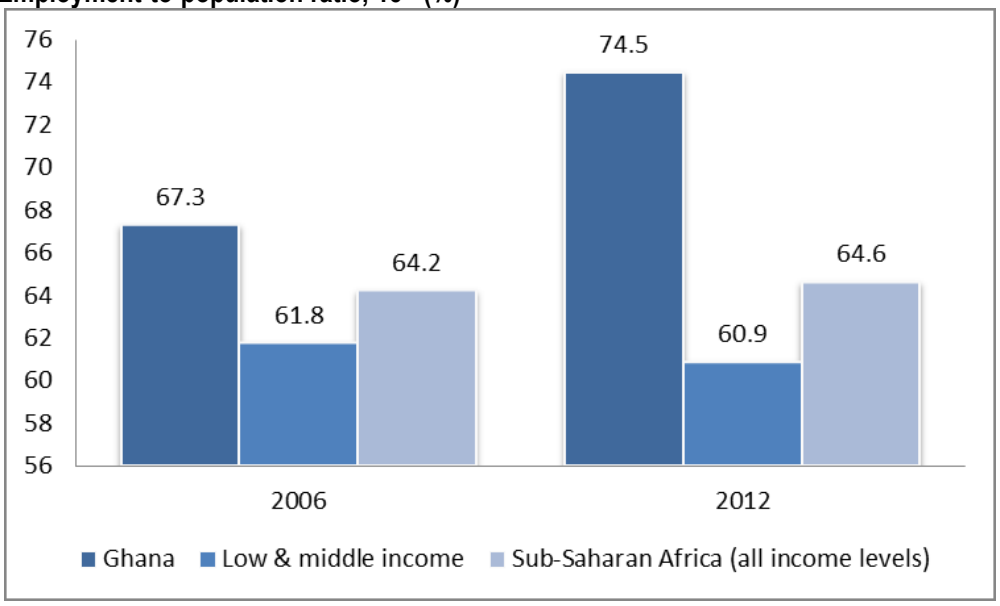
Source: UN (2013), selected years.
Note: Growth rates have been calculated based on value added in constant (2005) USD; the interval indicates the average during the period.

2.1 High levels of employment but few decent jobs

Overall employment levels in Ghana are slightly above the average in Sub-Saharan Africa, and considerably above the level of low and middle income countries (Figure 4). Ghana still is strongly dependent on agriculture as a source of employment. Even if the share of agricultural value added has been steadily declining, agriculture still accounted for 44.7 per cent of employment in 2012. Not surprisingly, agricultural jobs are concentrated in rural areas where 71 per cent of workers are in this sector, but only 17 per cent in urban areas. Both in rural and in urban areas the importance of agriculture declined from 2006 to 2012 (Table 3).

Structural change in the Ghanaian economy is to a certain extent reflected in employment. The share of employment in agriculture declined by 10 percentage points, while the share of workers in services increased by roughly 10 percentage points. The strong growth in value added in industry is, however, not visible in employment. As discussed above, growth in value added in the industry sector has been largely due to oil extraction, without contributing much to employment growth.

Figure 4. Employment-to-population ratio, 15+ (%)



Sources: World Bank (2014) and authors' estimates based on GSS (2006) and GSS (2013).

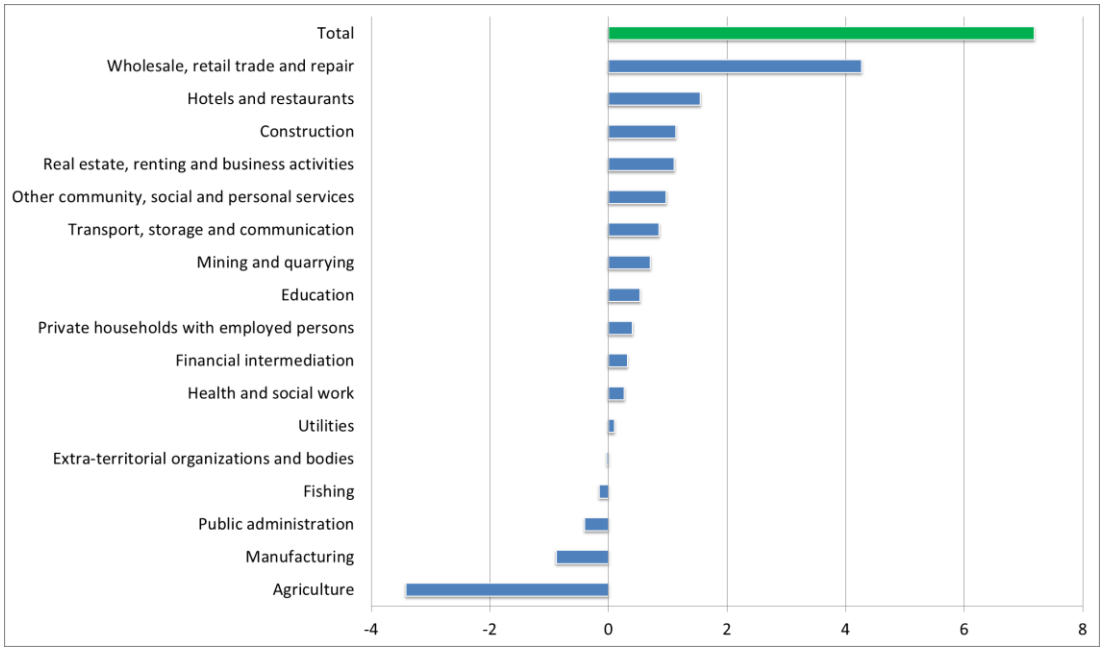
Table 3. Employment by broad sector (%)

	2006	2012
Agriculture	54.7	44.7
Industry	14.2	14.2
Services	30.8	41.1
	Urban	
Agriculture	18.3	16.8
Industry	21.8	18.6
Services	59.5	64.6
	Rural	
Agriculture	75.2	71.1
Industry	9.9	10.1
Services	14.7	18.8

Sources: Authors' estimates based on GSS (2006) and GSS (2013).

To examine the relationship between economic growth and employment growth it is useful to consider the contribution of different sectors to the change in the national employment-to-population ratio between 2006 and 2012 (Figure 5; see Annex B1 for methodological details). The largest positive contributions were made by wholesale and retail trade (4.3 percentage points) and hotels and restaurants (1.5 percentage points). Agriculture, manufacturing and public administration contributed negatively to the overall change. Within the broad industry sector, mining contributed less than 0.7 percentage points, while construction contributed 1.1 percentage points. The contribution of manufacturing was minus 0.9 percentage points.

Figure 5. Contribution of each sector to change in the employment-to-population ratio from 2006 to 2012 (percentage points)



Sources: Authors' estimates based on GSS (2006) and GSS (2013).

The quality of jobs is assessed here using the classification by status in employment and distinguishing between 'vulnerable' and 'non-vulnerable' employment. The analytical strength of this distinction derives from the fact that it overlaps to an important extent with the notion of dualism. Dualism in developing economies refers to the coexistence of a formal segment, which uses reproducible capital and employs regular, full-time wage employees, and a non-formal segment which relies much more on unskilled labour together with natural resources and simple tools or implements. Contrary to the formal segment, workers in the non-formal segment are self-employed or engaged in casual/irregular wage work.

Vulnerable employment consists of the sum of the status groups of own-account workers and contributing family workers. These workers are less likely to have formal work arrangements, and are therefore more likely to lack elements associated with decent work such as adequate social security and recourse to effective social dialogue mechanisms. Vulnerable employment is often characterized by inadequate earnings, difficult conditions of work that undermine workers' fundamental rights, or other characteristics indicative of decent work deficits (Sparreboom, 2011).

Vulnerable employment in Ghana is widespread, as more than three quarters of workers were own-account workers or contributing family workers in 2006, decreasing to 69 per cent in 2012 (Table 4). In both years own-account workers constitute the single largest group in the distribution of workers by status in employment (55 per cent in 2006, decreasing to 46 per cent in 2012). The main difference between men and women is that the latter are far more likely to be employed as contributing family workers (28 per cent of female employment compared with 16 per cent of male employment in 2012), and far less likely to be employees (16 per cent of female employment compared to 35 per cent of male employment in 2012).

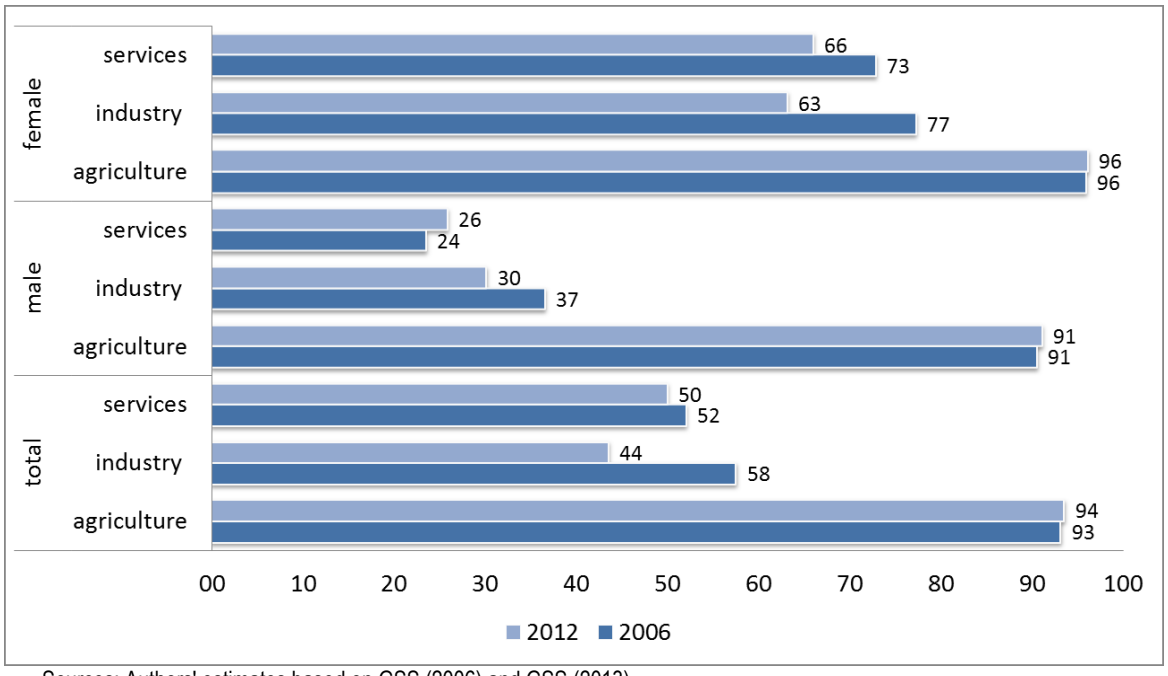
Table 4. Distribution by status in employment (%)

	2006	2012	Change (percentage point)
Employees			
Both sexes	20.0	25.0	5.0
Male	29.7	34.7	5.0
Female	10.9	16.0	5.1
Own-account workers			
Both sexes	55.0	46.3	-8.8
Male	53.1	41.8	-11.3
Female	56.9	50.4	-6.5
Contributing family workers			
Both sexes	20.4	22.3	1.9
Male	11.7	16.3	4.6
Female	28.5	27.8	-0.7
Employers			
Both sexes	4.5	6.1	1.6
Male	5.4	6.8	1.5
Female	3.7	5.5	1.8

Sources: Authors' estimates based on GSS (2006) and GSS (2013).

The highest incidence of vulnerable employment can be found in agriculture (94 per cent), followed by much lower levels in services (50 per cent) and industry (44 per cent). In contrast to agriculture and services, vulnerable employment in industry decreased strongly from 2006 to 2012 (by 14 percentage points). Gender differences in vulnerable employment by broad sector are much more pronounced in industry and services than in agriculture. In services, 66 per cent of women are own-account workers or contributing family workers, while the commensurate proportion for men is 26 per cent (Figure 6).

Figure 6. Incidence of vulnerable employment by sector (%)



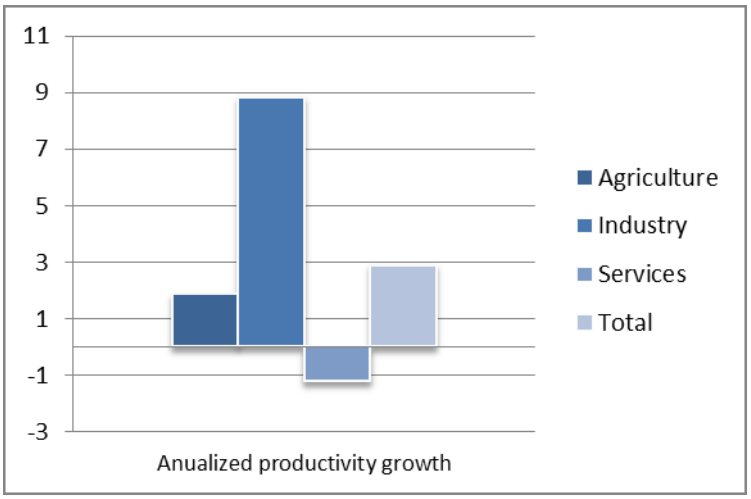
Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Structural change in the Ghanaian economy has resulted in substantial productivity growth. The (national) aggregate annualized productivity growth rate between 2006 and 2013 is 3 per cent, which is mostly due to the growth of output per worker in industry at more than 8 per cent annually (Figure 7a-I). The aggregate productivity growth rate can be broken down into a sector specific 'within component' and a 'between component' (see Annex B2 for methodological details). This breakdown demonstrates that an increase in labour productivity can result from either productivity improvements within the sector or from reallocation of employment across sectors, i.e. from low- to high-productivity sectors. The results from the breakdown show that industry contributed strongly to aggregate productivity growth through productivity gains within the sector, and the same is true to some extent for agriculture (Figure 8a-II). However, the contribution of services to aggregate productivity growth is exclusively due to the increase of the share of services in total employment, and not within-sector productivity gains. The share of both agriculture and industry decreased and therefore the between-sector effects of these sectors are negative.

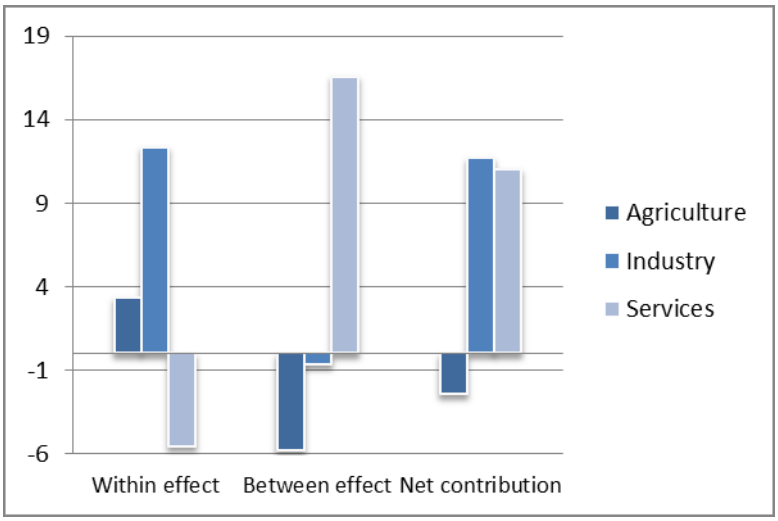
The breakdown at sector level shows a similar pattern as the breakdown by broad economic sector (Figure 7b). Noteworthy is that negative productivity growth in services is particularly driven by the trade and hotels sector, which is in turn due to the within-sector effect. The contribution of the manufacturing sector to aggregate productivity growth is limited by the fact that the sector is shrinking in terms of employment (and the between-sector effect is therefore negative).

Figure 7.a. Productivity by broad sector

I) Annualized growth rate by broad sector, 2006-2012 (%)



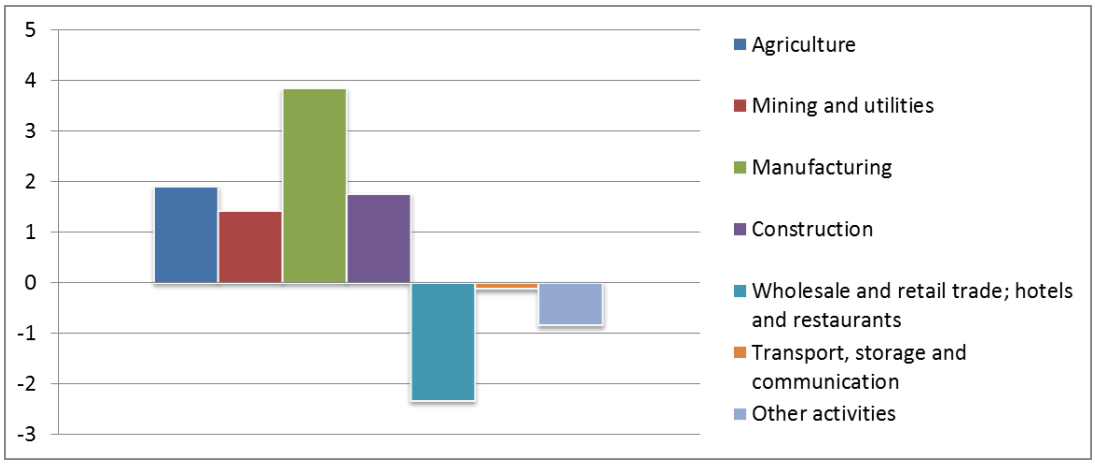
II) Contributions to aggregate productivity growth by broad sector, 2006-2012 (percentage points)



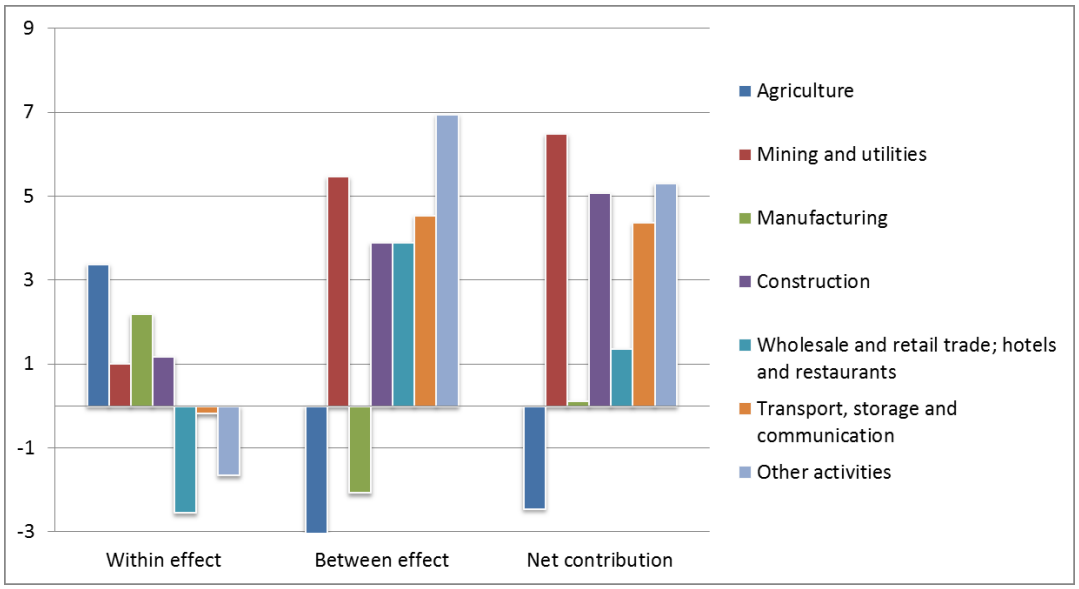
Sources: Authors' estimates based on GSS (2006) and GSS (2013) for employment and UN (2013) for value added.

Figure 7.b. Productivity by sector

I) Annualized growth rate by sector, 2006-2012 (%)



II) Contribution to aggregate productivity growth by sector, 2006-2012 (percentage points)



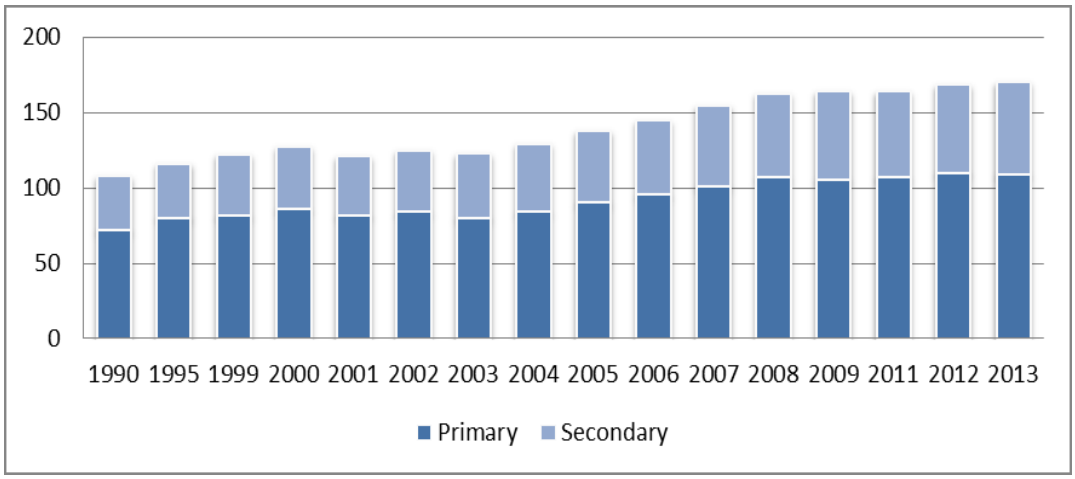
Sources: Authors' estimates based on GSS (2006) and GSS (2013) for employment and UN (2013) for value added.

3. Education policies and enrolment rates

Ghana is classified by UNDP's Human Development Index (HDI) as a 'medium' development country. The country's HDI stands at 0.558 corresponding to a rank of 135 out of 187 countries in 2012 (UNDP, 2013). This HDI is 8 percentage points above the average for Sub-Saharan Africa (ibid.). Education is one of the human development dimensions in which Ghana fares better than its regional counterparts, ranking 9th out of 28 in terms of the EFA development index (UNESCO, 2012a).

Since its independence in 1957, Ghana has enacted several education policy programmes. The Education Act of 1961 introduced free and compulsory education (IBE, 2010). In the late 1970s and early 1980s, participation in basic education declined, in part due to economic challenges and reduced resources (Allsop et al., 2010). Reforms in the late 1980s aimed to increase enrolment and improve quality, inter alia through better training of teachers and increased school hours (Thompson and Casely-Hayford, 2008). The 1992 Constitution reinforced the notion of free and compulsory basic education, and stressed the importance of access to secondary education as well as to adult literacy programmes and vocational training (IBE, 2010). Following the reforms in 2007, the structure of the basic educational system in Ghana includes 2 years of kindergarten, 6 years of primary school, and 3 years of junior secondary education (which complete compulsory education) (IBE, 2010). Despite substantial investment, textbooks and trained teachers remain scarce (Allsop et al., 2010).

Figure 8. Evolution of the gross enrolment rate in primary and secondary education (%)



Source: UNESCO (2014).

Policy efforts to widen access have been successful, to the extent that from 1990 to 2013 the gross enrolment rate at primary level increased from 72 to 109 per cent, and from 36 to 61 per cent at secondary level (figure 8).[6] In addition, net enrolment rates increased from 65 and 35 per cent for primary and secondary level, respectively, in 2000, to 87 and 51 per cent in 2013 (UNESCO, 2014). Furthermore, the positive evolution of the enrolment

[6] The gross enrolment rate is defined as the total number of students enrolled at a particular level of education, regardless of their age, as a percentage of the population in the age group associated with that level; the net enrolment rate is defined as total number of students enrolled at a particular level of schooling who are of the age associated with that level of schooling, divided by all persons of the age associated with that level of schooling.

rate has not been at the expense of the survival rate, which increased substantially for both levels, at roughly 10 percentage points between 1991 and the latest observation.[7]

The youth (aged 15-24) literacy rate appears to have responded to these improvements and increased from 71 per cent in 2000 to 86 per cent in 2010 (World Bank, 2014). Enrolment data also allow for moderate optimism regarding gender equality, with a ratio of girls to boys of 0.98 and 0.90 for primary and secondary level in 2010, compared to ratios of 0.93 and 0.82 for Sub-Saharan Africa (UNESCO, 2012b).

Apart from education provision for children and youth, an important policy goal has been the reduction of adult illiteracy. The National Functional Literacy Programme, which ran from 1992 to 2007, aimed to provide adults with access to literacy skills (ODI, 2006). The programme was developed in two phases, the first of which ended in 1997 and enrolled a total of 1.3 million adults. The second phase, which targeted women and rural poor, substantially achieved the goal of delivering basic literacy skills to one million adults (World Bank, 2010). The adult literacy rate (aged 15+) increased from 58 per cent in 2000 to 71.5 per cent in 2010 (World Bank, 2014).

Despite these achievements, a number of substantial educational challenges remain. Quality of education remains an issue, as only 1 in 4 pupils achieve proficiency in English, after 6 years of primary education, and 1 in 10 pupils in mathematics (Allsop et al., 2010). In fact, Hanushek and Wößmann (2007) suggest that only 5 per cent of 15-19 years old are fully literate. Allsop et al. (2010), based on two surveys (Brookings Institute, 2007, and World Bank IEG, 2007), attribute this to absenteeism amongst teachers and the limited school time actually devoted to learning activities. According to these surveys average teacher absence is 27 per cent, and time devoted to learning activities is not more than 39 per cent of the school year. Another factor negatively affecting the quality of education is the shortage of adequately trained teachers. In 1999, 72 per cent of teachers in primary education were trained, whilst that percentage had fallen to 53 per cent in 2013 (World Bank, 2014). Such a decline is likely to translate into lower average quality of education, even when outcomes improve due to the expansion of education.

Gender inequality in education outcomes is another issue. Literacy rates for men and women aged 15 and above were 66 per cent and 50 per cent in the year 2000, respectively, and by 2010 had increased to 78 and 65 per cent. This means that the gap between men and women did not narrow much. Youth fare better in this regard, as the gender gap decreased from 10 percentage points in 2000 to 5 points in 2010 (World Bank, 2014). Given the evolution in enrolment rates noted before, the gender gap is likely to further decrease.

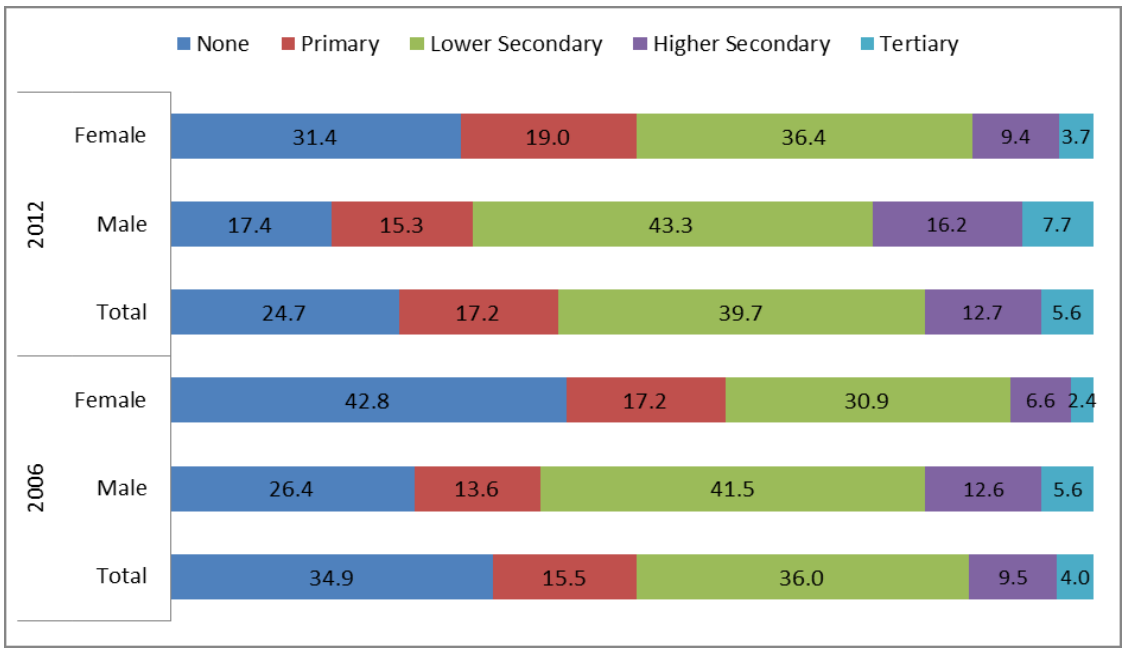
A final issue worthy of consideration is regional disparities. For instance, the gross enrolment rate for secondary education in the central region is twice as high as the rate for the northern region (Higgins, 2009). Access to education in rural regions is hampered by the higher cost of delivering the courses. According to UNESCO (UNESCO, 2012b) vocational courses in rural regions can be 20 times more expensive in rural schools than in urban schools. Overall, Ghana has made significant progress in education over the last decade. Nonetheless, further efforts are required to improve quality, increase adult literacy, especially targeting women, and expand education to rural areas.

[7] For primary level, the latest available data on survival rates in UNESCO (2014) refer to 2008, and in the case of secondary education to 2013.

4. Education profile of the labour force

The educational attainment of Ghana's labour force in 2006 is characterized by a large share of workers with lower secondary education (36 per cent), but also a large share of workers with no educational qualification (35 per cent) (Figure 9). The share of the labour force with only primary education is 16 per cent, while higher secondary and tertiary qualifications are rare and represent at most 10 and 4 per cent respectively of the labour force. Figure 9 also reveals stark gender differences. The share of women with no educational qualification is more than 16 percentage points higher than the commensurate share for men, and the gender gap in lower secondary is almost 11 percentage points. The share of women with higher secondary and tertiary education is roughly half the commensurate share of men.

Figure 9. Education profile of the labour force (%)



Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Levels of educational attainment in 2012 are higher across the board. The share of the labour force without educational qualifications is 10 percentage points lower, and the share with lower secondary education is 3.7 percentage points higher. The share of the labour force with higher secondary education increased by a similar amount, to 12.6 per cent, and the share with tertiary education to 5.6 per cent. Nonetheless gender disparities persist, and the difference between the male and female share with no educational qualification decreased by little over 2 percentage points to 14 percentage points. At the higher levels of educational qualifications the share of women continues to be around half the share of men.

Consideration of the distribution of workers by level of education across broad economic sectors shows that workers without educational attainment dominate the agricultural sector. Almost half of the workers in this sector had no educational qualification in 2006, decreasing to 39 per cent in 2012 (Figures 10 and 11). Almost no workers with tertiary education are active in agriculture.

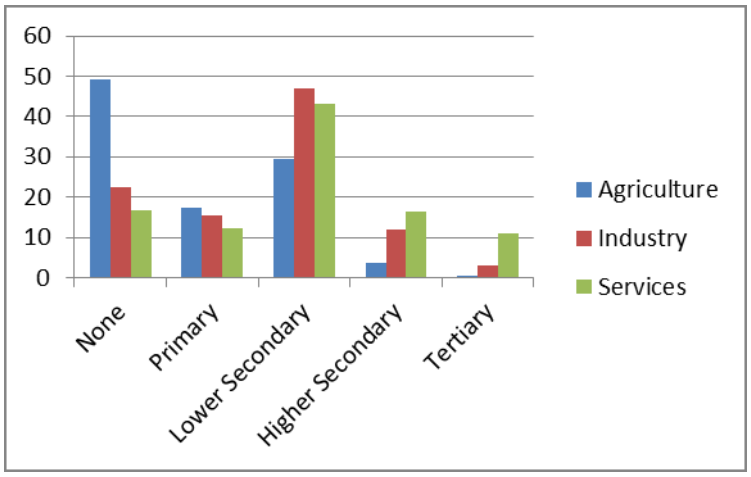
In industry and services, workers with lower secondary education constitute the largest group, accounting for at least 42 per cent of workers in both 2006 and 2012, followed by those with higher secondary education (15 per cent in industry, 19 per cent in services in

2012). The share of workers with no education in industry and services decreased to around 14 per cent in 2012. Services stand out for their much higher share of workers with tertiary education. In 2012, almost 12 per cent of workers had obtained a tertiary qualification, compared with less than 4 per cent for workers in industry and less than 1 per cent in agriculture.

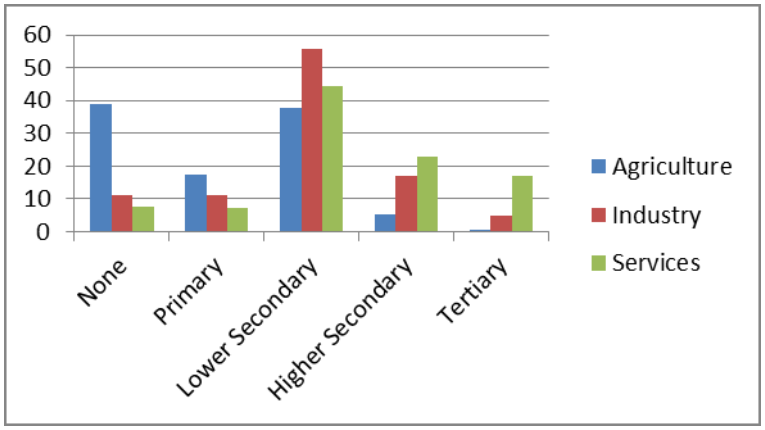
Although the pattern of educational attainment across broad sectors is similar for men and women, as was mentioned before, the proportion of women with no educational qualification is much higher.

Figure 10. Education distribution by broad sector, 2006 (% of sector employment)

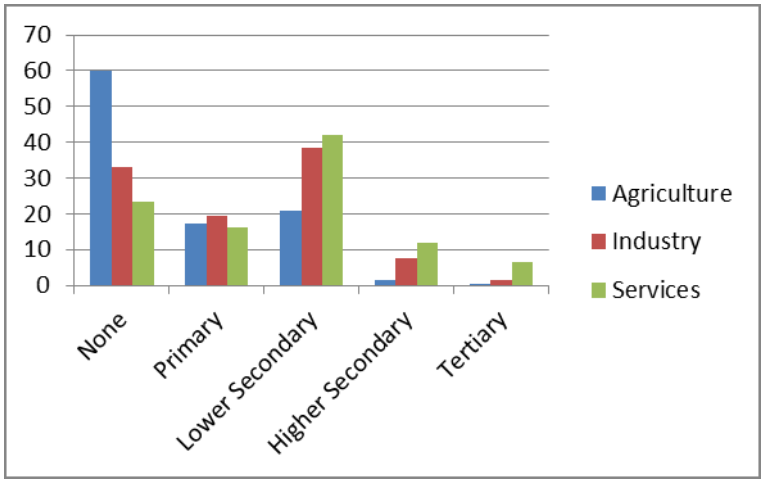
(a) Total employment



(b) Male employment



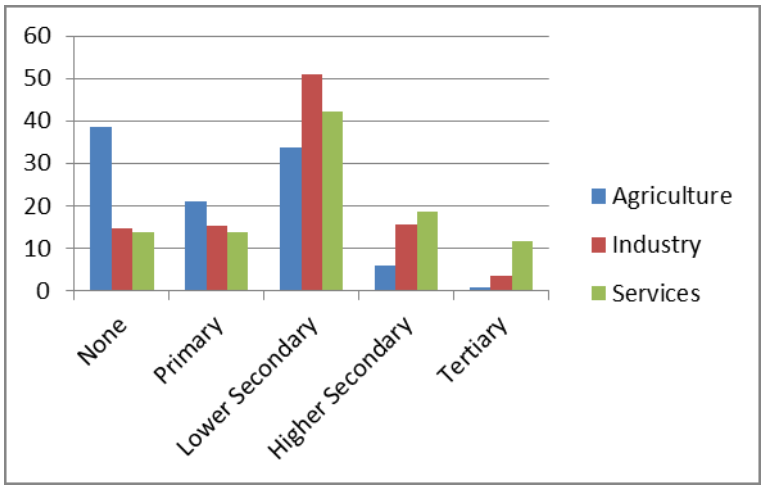
(c) Female employment



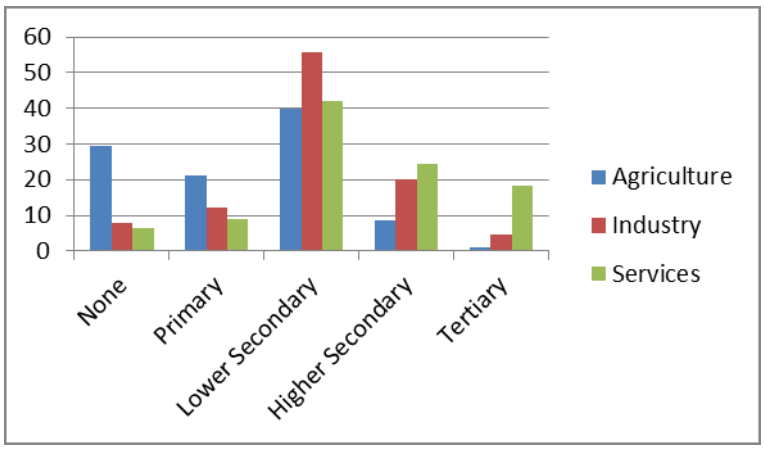
Source: Authors' estimates based on GSS (2006).

Figure 11. Education distribution by broad sector, 2012 (% of sector employment)

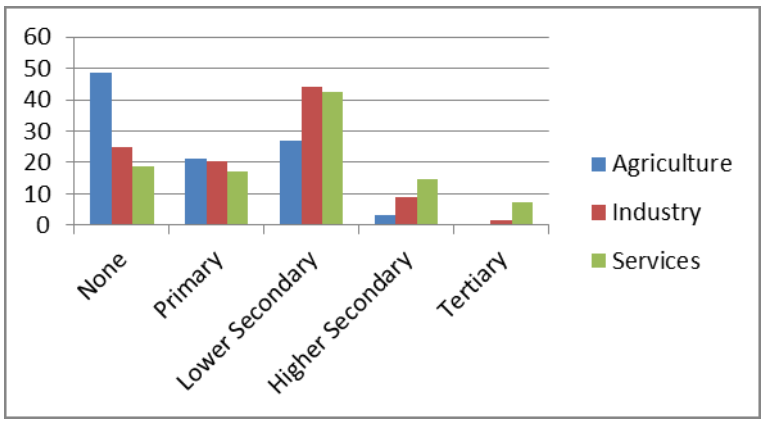
(a) Total employment



(b) Male employment



(c) Female employment



Source: Authors' estimates based on GSS (2013).

5. Education intensity and economic structure

Changes in aggregate (economy-wide) education intensity (the share of workers with a certain level of education) can be driven by the change in average educational attainment within sectors and changes in the sectoral employment structure (given that educational intensity differs significantly between sectors). Following Sparreboom and Nübler (2013), changes in education intensity can be broken down into components that capture the effects of these two drivers of change in the distribution of education – the so-called 'within-sector' and 'between-sector' effect. The within-sector effect captures the percentage point contribution of sectors to change in aggregate intensity due to a change in the intensity within each sector; and the between-sector effect captures the percentage point contribution of each sector to aggregate change in education intensity due to changes in the employment structure. The breakdown methodology is summarized in the following three equations:

(1) $e^{2012} - e^{2006} =$

(2) $\sum_i(\alpha_i^{2012} e_i^{2012}) - \sum_i (\alpha_i^{2006} e_i^{2006}) =$

(3) $e_i^{2006} \sum_i (\alpha_i^{2012} - \alpha_i^{2006}) + \alpha_i^{2012} \sum_i (e_i^{2012} - e_i^{2006})$

In equation (1), e^{2006} and e^{2012} are the education intensity of the labour force for 2006 and 2012, which each equal the sum of the sectoral education intensities e_i weighted by the share of each sector i in the labour force, denoted by α_i in equation (2). Rearranging of terms yields equation (3), in which the first part is the change in education intensity due to changes in sectoral employment shares (the between-sector effect), and the second part is the change in education intensity due to changing intensities within sectors. In other words, the between-sector change shows how much the aggregate education intensity would change if the education intensities of the individual sectors had remained at their 2006 levels. Subtracting the between-sector changes from the overall change in education intensity in each sector between 2006 and 2012 yields the remaining within-sector change of education intensity.

The education intensity of the labour force in Ghana, measured as the proportion of workers with at least lower secondary education, increased from 49.4 per cent in 2006 to 58 per cent in 2012 (Table 5a). An increase in educational intensity is observed in all broad sectors, and in particular among the unemployed (an increase by more than 10 percentage points) and in industry (almost 8 percentage points). The services sector experienced only a small increase by less than 2 percentage points. Services nevertheless are the largest contributor to the aggregate change in education intensity (8.3 percentage points), due to the very large increase of the share of workers in services. This share increased by 11 percentage points, while the share of workers in agriculture and unemployment decreased and industry's share increased only marginally. Apart from the large between-sector effect due to the expansion of services, there are more limited positive within-sector effects in agriculture and industry. The positive within-sector effect in agriculture offsets the negative between-sector effect, such that the overall effect is close to zero (see the last two columns of Table 5a).

The lack of significant within-sector increases in education intensity in particular in services, and to a lesser extent in industry, raises concerns about the nature of jobs that have been created in Ghana from 2006 to 2012, given that levels of education are in general important determinants of productivity, incomes and conditions of work. Such concerns seem to be confirmed by the breakdown of changes in education intensity for those in non-vulnerable employment, which represents the more productive part of the workforce and

tends to have higher levels of education (Sparreboom and Staneva, 2014). The increase in education intensity in economy-wide non-vulnerable employment is negative (-0.5 percentage points), and the within-sector effect in both industry and services is also negative (Table 5b). In other words, much of the increase in educational attainment of the Ghanaian labour force in the period under review was absorbed by the relatively unproductive segment of the economy, and services in particular.

Table 5. Education intensity and economic structure

(a) Labour force

	Share of labour force (%)			Education intensity (%)			Between-sector effect	Within-sector effect	Contribution	Contribution (%)
	2006	2012	Change	2006	2012	Change				
Agriculture	51.3	43.0	-8.3	33.4	40.2	6.8	-2.77	2.91	0.15	1.7
Industry	13.3	13.7	0.4	62.0	69.8	7.9	0.27	1.08	1.35	15.9
Services	28.9	39.6	10.7	70.6	72.4	1.8	7.57	0.72	8.30	97.2
Unemployed	6.5	3.6	-2.9	56.7	67.1	10.4	-1.64	0.38	-1.26	-14.8
Aggregate	100.0	100.0		49.4	58.0	8.5	3.44	5.10	8.54	100.00

Sources: Authors' estimates based on GSS (2006) and GSS (2013).

(b) Non-vulnerable employment

	Share of labour force (%)			Education intensity (%)			Between-sector effect	Within-sector effect	Contribution	Contribution (%)
	2006	2012	Change	2006	2012	Change				
Agriculture	15.2	9.1	-6.1	48.3	49.4	1.1	-2.94	0.10	-2.84	562.1
Industry	24.6	25.6	1.0	78.1	76.3	-1.8	0.79	-0.46	0.33	-65.1
Services	60.2	65.3	5.1	86.8	83.1	-3.7	4.42	-2.41	2.01	-397.0
Aggregate	100.0	100.0		78.8	78.3	-0.5	2.26	-2.77	-0.51	100.00

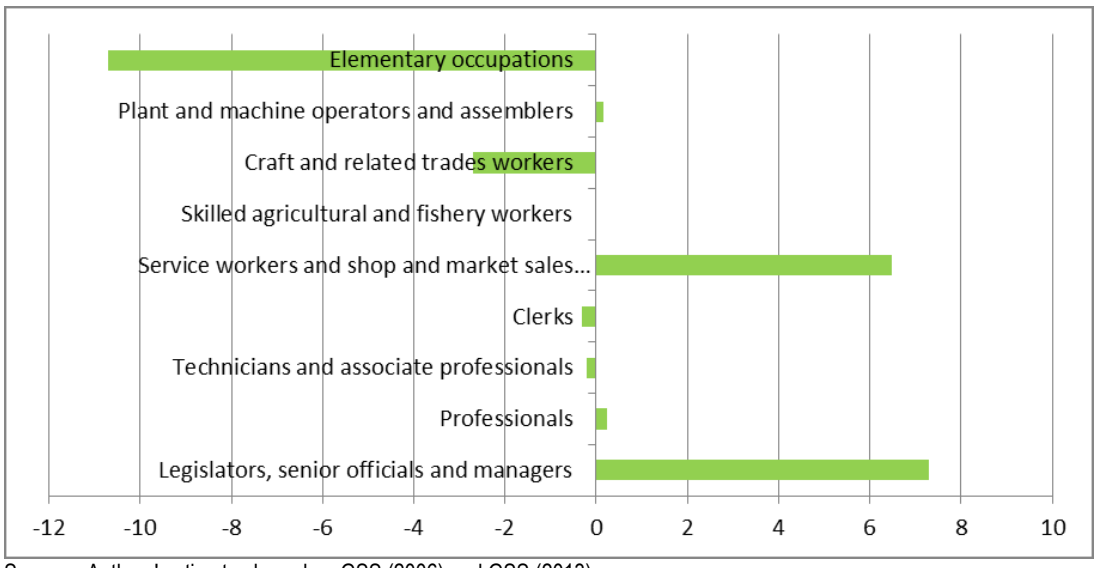
Sources: Authors' estimates based on GSS (2006) and GSS (2013).

A more detailed breakdown at the level of individual sectors as opposed to broad sectors shows that the largest positive contributions to aggregate education intensity are generated by sectors within broad services (see Table A2). Wholesale and retail trade represents 40 per cent of the aggregate change in education intensity, followed at a distance by hotels and restaurants. These contributions are mainly due to the between-sector effects. Consideration of the more productive segment of non-vulnerable employment shows that changes in educational intensity in non-vulnerable employment in wholesale and retail trade, in manufacturing and in fishing were strongly negative, and several other sectors experienced a decrease in education intensity (Table A3). The decrease in the wholesale and retail trade, in particular, and the small but negative within-sector effect in non-vulnerable employment in hotels and restaurants are consistent with the lack of productivity gains within these sectors as highlighted in Section 2.

The lack of a within-sector increase in educational intensity in the wholesale and retail sector is also visible in the occupational classification. The major groups in this sector experiencing increases in their share of sectoral employment are service workers and managers (including shop owners), while craft and related trades workers, as well as workers in elementary occupations, are experiencing a decline. Major groups with high

levels of educational attainment and high levels of productivity such as professionals and technicians remained stagnant from 2006 to 2012 (Figure 12).

Figure 12. Changes in the occupational distribution in wholesale and retail trade, 2006-2012 (percentage points)



Sources: Authors' estimates based on GSS (2006) and GSS (2013).

6. Qualifications mismatch

After decades of education policy reforms and efforts which have resulted in gradual improvements in educational attainment, it is important to consider the extent to which actual attainment levels match those required by the jobs workers are doing. The issue of skills mismatch is also relevant as skills contribute to productivity, diversification and employment, and may be a key factor of success in economies faced with the risk of Dutch disease (Darvas and Palmer, 2014). The argument is that if the effect of oil revenue is a decrease in the competitiveness of non-oil tradeable sectors, this decrease can be countered by an improvement in available skills. Furthermore, if a developing economy is moving from relative dependence on agricultural production to industrial and service sector employment, workers need to learn new technical, entrepreneurial and social skills. If the new demands cannot be met due to inadequate education, this hampers the transfer of production factors from lower to higher value added activities. Similarly, over-education and under-use of skills may lead to skills loss and generate greater employee turnover, which, in turn, is likely to affect firms' productivity levels.

One way to assess the availability of skills in Ghana is to consider qualifications mismatch. In this section and the remainder of the paper, qualifications mismatch is measured in terms of over-education and under-education.[8] Over-education and under-education are quantified following ILO (2014) according to the normative approach based on the International Classification of Occupations (ISCO). This normative measure starts from the division of major occupational groups (first-digit ISCO levels) into three groups and assigns a level of education to each group. In particular, the first three major groups are assigned tertiary education; major groups 4 to 8 are assigned secondary education (lower or higher); and major group 9 is assigned primary education (see also ILO, 2012). Workers in a particular group who have the assigned level of education are considered well-matched. Those who have a higher (lower) level of education are considered over-educated (under-educated). For instance, a university graduate working as a clerk is over-educated, while a secondary school graduate working as an engineer is under-educated.

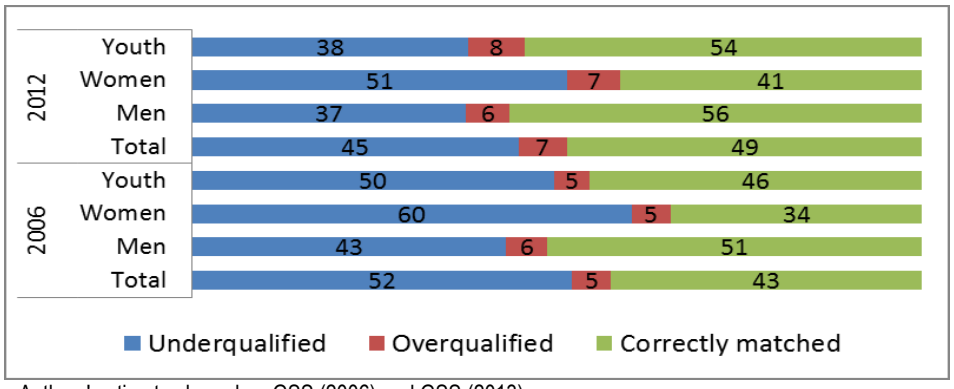
According to this normative approach, all major groups, except elementary occupations, are thus linked to levels of education above the primary level. The rationale is that, for most occupations, the ability to read information, such as instructions, to make written records of work completed and to accurately perform simple arithmetical calculations, is essential, and workers are therefore required to possess relatively advanced literacy and numeracy skills and good interpersonal communication skills. Particularly in countries such as Ghana, in which there are concerns about the quality of education (see Section 3), this rationale is reinforced to the extent that additional years of secondary education are required to achieve the objectives of primary schooling. Furthermore, lower secondary education is considered vital in the development of foundation and core employability skills (UNESCO, 2012c).

More than half of workers were underqualified in 2006 (52 per cent) and only 5 per cent were overqualified; the remainder (43 per cent) were correctly matched (Figure 13). By 2012, correctly matched workers had become the single largest group (49 per cent), and the proportion of underqualified workers had decreased to 45 per cent. There are large differences between men and women in terms of qualifications mismatch. The estimated share of underqualified women is much higher than the commensurate share of men, and

[8] See ILO (2014) and Quintini (2011) for a discussion of alternative methods of measurement of skills mismatch.

the difference did not decrease much from 2006 to 2012 (17 and 14 percentage points, respectively). The share of correctly matched young workers in both years is higher than that for the employed across all ages, which is mostly due to lower levels of under-qualification of youth.

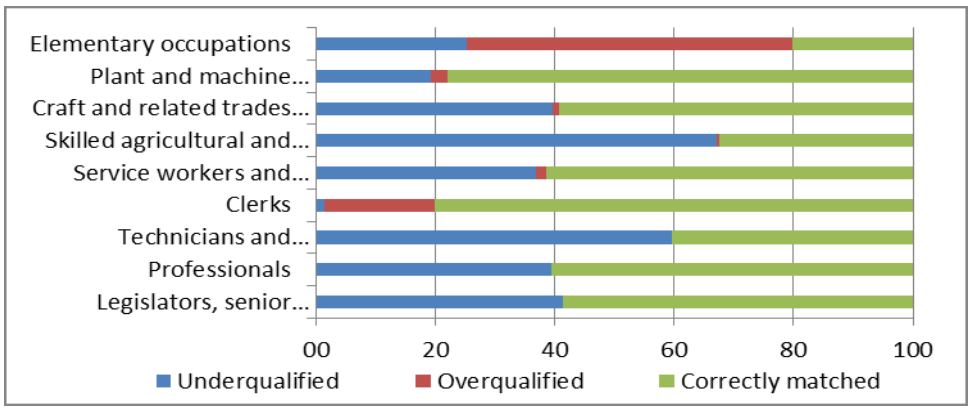
Figure 13. Qualifications mismatch, percentage of employment, 2006 and 2012



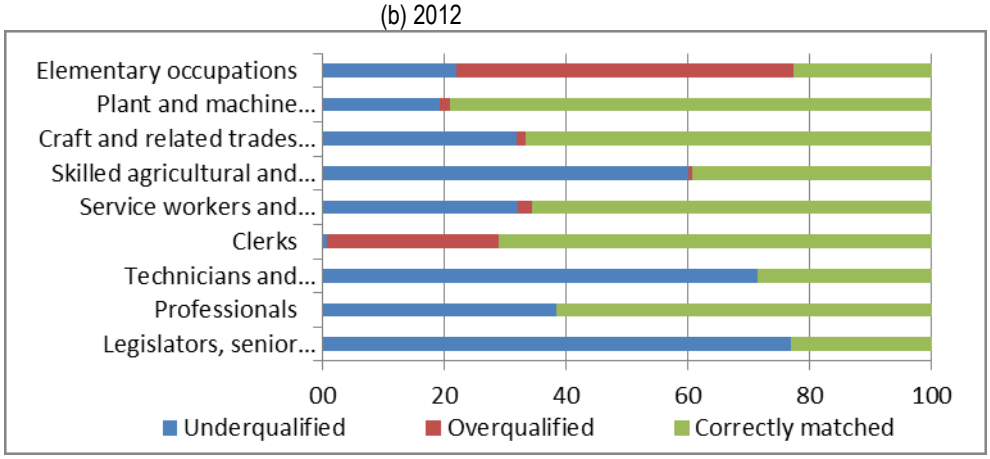
Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Figure 14. Qualifications mismatch, percentage of employment by major occupational group, 2006 and 2012

(a) 2006



(b) 2012

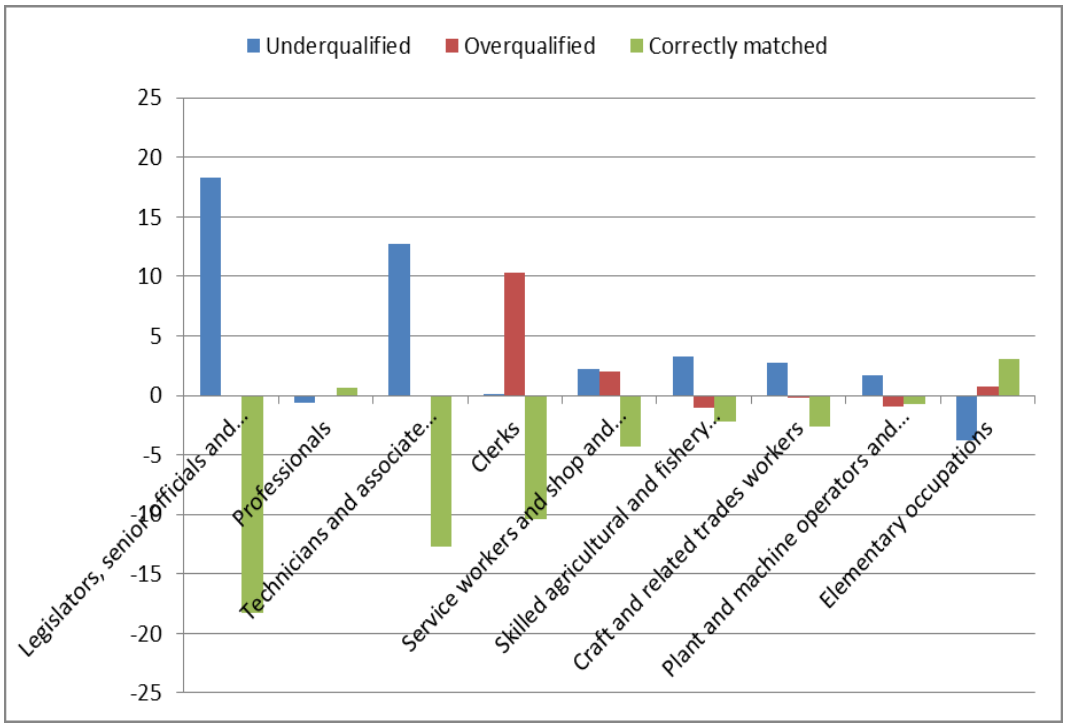


Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Consideration of qualifications mismatch by occupation shows that elementary occupations and clerks demonstrate the largest share of overqualified workers both in 2006 and in 2012 (Figure 14). In the major group elementary occupations, over-qualification is the most common status, while in the major group of clerks the share of overqualified workers increased by almost 10 percentage points in this period. Except in the major group - clerks, under-qualification is pervasive across all occupations and affects the majority of workers in the major groups - skilled agricultural workers, technicians and managers in 2012. In five major groups (professionals, clerks, service workers, craft workers and plant operators), the majority of workers are correctly matched. In all but three groups the proportion of correctly matched workers increased from 2006 to 2012 (see Annex Figure A2 and Figure A3 for qualifications mismatch for men and women separately).

Qualifications mismatch is less prevalent among workers in non-vulnerable employment. Except for clerks, the proportion of correctly matched workers is higher and levels of under-qualification are lower in almost all major occupational groups in non-vulnerable employment (see Annex Figures A4 and A5 for qualifications mismatch in non-vulnerable employment). Nevertheless, the proportion of correctly matched workers in non-vulnerable employment showed an improvement from 2006 to 2012 only in elementary occupations (and marginally in professional occupations), and was stagnant or declined in the remaining groups (Figure 15). Levels of under-qualification increased in most major groups, which appears to be consistent with the limited increase in education intensity in economy-wide non-vulnerable employment noted in Section 5.

Figure 15. Changes in qualifications mismatch from 2006 to 2012, non-vulnerable employment by major occupational group (percentage points)



Sources: Authors' estimates based on GSS (2006) and GSS (2013).

7. Returns to education

Rates of return are often high in Sub-Saharan Africa (Psacharopoulos and Patrinos, 2004b; World Bank, 2012), which is perhaps not surprising in view of the generally low levels of educational attainment. At the same time, returns may decrease over time due to increasing levels of educational attainment and lack of growth in non-vulnerable or formal employment. Rate of return analysis over time can therefore help understand the role of education, including with regard to patterns across sectors and in relation to structural change.

Returns to education in this paper are estimated using years of schooling and levels of educational attainment. We adopt a conventional Mincerian earnings function approach for the calculation of returns to education, which is detailed in Annex B3. The analysis is limited to workers in paid employment (wage and salaried workers), and conducted by broad sector as well as separately for men and women.

The return to an additional year of schooling in Ghana is estimated at 11.4 per cent in 2006, decreasing to 10.7 per cent in 2012 (Table 6). The return in 2006 is close to the mean rate of return of 10.9 per cent reported for low income countries in Psacharopoulos and Patrinos (2004b, Table 3), but lower than many estimates for sub-Saharan African countries. Both in 2006 and 2012, returns to education for women are higher than for men, which is a pattern commonly found in the literature.

The agricultural sector presents the lowest rates of return, 6.4 per cent and 3.1 per cent in 2006 and 2012, respectively, while services presents by far the highest returns (13.7 and 13.4 per cent).

Table 6. Returns to education, years of schooling (%)

Sex	Agriculture		Industry		Services		All Sectors	
	2006	2012	2006	2012	2006	2012	2006	2012
Total	6.4***	3.1*	8.9***	7.0***	13.7***	13.4***	11.4***	10.7***
	(3.2)	(2.0)	(6.9)	(6.9)	(17.7)	(24.9)	(19.0)	(24.0)
Male	7.3***	1.8	8.2***	5.9***	13.0***	12.1***	10.9***	9.2***
	(3.2)	(1.1)	(5.4)	(5.3)	(13.3)	(17.0)	(14.6)	(16.4)
Female	2.7	8.5***	8.7***	3.5	15.6***	15.1***	12.5***	13.2***
	(0.5)	(3.2)	(3.1)	(1.3)	(12.0)	(17.4)	(12.1)	(17.5)

Notes: see tables A4, A5 and A6 in Annex A for full results.
Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Although the global evidence for many years indicated higher returns at the primary level compared with secondary and tertiary levels, more recent studies suggest a lower return at the primary level as well as a decreasing long-term trend in returns to primary education, pointing at a convex earnings function (Colclough et al., 2010). Colclough et al. (ibid.) highlight that the average return to primary education in a sample of studies with similar methodologies shows a decrease by two percentage points in studies undertaken since the year 2000.

In Ghana, primary education presents the lowest rates of return to education, 2.0 per cent, decreasing to 0.8 per cent in 2012. In 2006 the returns rose monotonically by level of education, reaching 21.3 per cent for tertiary education. By 2012, this return had increased

to 25.1 per cent, but returns to higher secondary education considerably declined, by more than 8 percentage points to 6.1 per cent.

Even though tertiary education demonstrates the highest returns across all sectors, returns to higher secondary education in 2012 exceed those for tertiary education in agriculture. In industry and services, however, the returns to higher secondary are relatively low, both in comparison with lower secondary education and in comparison with tertiary education.

Rates of return for women are higher than for men at all levels of education except lower secondary. Furthermore, differences between rates of return to education for women and men increased at most levels from 2006 to 2012.

Table 7. Returns to levels of education (%)

Sex	Education level	Agriculture		Industry		Services		All Sectors	
		2006	2012	2006	2012	2006	2012	2006	2012
Total	Primary	8.1	-3.1	-2.6	-1.3	1.3	1.9	2.0	0.8
	Lower secondary	6.6	1.8	15.8	12.3	7.6	13.8	8.6	11.9
	Higher secondary	-0.8	17.7	13.6	2.1	17.2	9.7	14.2	6.1
	Tertiary	44.0	9.3	15.8	26.3	21.8	26.2	21.3	25.1
Male	Primary	7.3	-2.7	-2.5	-5.3	-1.1	1.6	0.6	-1.4
	Lower secondary	8.8	-3.7	14.2	12.9	5.2	9.7	8.1	9.9
	Higher secondary	5.7	19.4	9.6	1.1	17.4	9.0	13.8	5.5
	Tertiary	38.8	4.6	15.3	24.0	21.4	24.2	20.8	22.8
Female	Primary	11.1	-6.6	-2.7	3.1	3.9	0.7	3.4	2.8
	Lower secondary	-1.1	28.3	5.0	-5.6	12.1	15.6	6.4	8.5
	Higher secondary	.	.	37.4	0.1	18.6	13.9	18.9	12.1
	Tertiary	.	.	22.3	43.9	22.9	29.2	23.0	30.2

Note: Missing cells are due to insufficient sample size. See tables A7, A8 and A9 in Annex A for full results.
Sources: Authors' estimates based on GSS (2006) and GSS (2013).

8. Conclusions and recommendations

Similar to the broad pattern in Sub-Saharan Africa, Ghana's impressive record of economic growth has not been translated into an equally impressive labour market performance. From 2006 to 2012, the proportion of employees in the country's workforce increased by 5 percentage points, which is a significant achievement but also leaves the large majority of workers in vulnerable forms of employment for many years to come. Furthermore, the economy appears to suffer from Dutch disease, and is increasingly dependent on exports of commodities.

Structural change has been an important characteristic of Ghana. From 2006 to 2012, the share of agriculture in employment decreased by 10 percentage points, and employment in services increased by roughly the same amount. However, at the same time the incidence of vulnerable employment in services did not improve much (a decrease by 2 percentage points), pointing to the low quality of much job creation. The incidence of vulnerable employment did show a strong decrease in industry (14 percentage points), but employment in industry has been stagnant, and has decreased in the manufacturing sector.

Strong economic growth has been accompanied by sustained increases in productivity, which are an important determinant of conditions of work. Productivity gains have been achieved in agriculture and industry, as well as through the expansion of employment in services. At the same time, the breakdown of productivity growth shows that the contribution of services is exclusively due to the increase of the share of services in total employment, and no within-sector productivity gains have been achieved. This appears consistent with the expansion of low quality service employment, in particular in wholesale and retail trade. The latter sector made the largest contribution to the increase in the employment-to-population ratio in Ghana from 2006 to 2012.

Increases in productivity have been supported by Ghana's achievements with respect to education. The share of the labour force with at least secondary education increased from 49 per cent in 2006 to 58 per cent in 2012. This allowed for an increase in education intensity in the three broad economic sectors, despite the structural change and the much higher education intensity in the expanding service sectors. Nevertheless, the increase in education intensity in services was small, and decreased strongly in the more productive segment of non-vulnerable employment. Education intensity also decreased in non-vulnerable employment in industry. The pattern of education intensity is reflected in qualifications mismatch, which shows increases in under-qualification in non-vulnerable employment, despite the strong reduction in economy-wide under-qualification from 2006 to 2012.

Patterns of rates of return appear consistent with the role of education in Ghana's economy, and in particular the structural change experienced by the country. In view of the strong increases in the supply of educated workers an overall decrease in the rate of return to schooling can be expected. But such a decrease may also reflect the apparent limited use of educated workers in the more productive segment of the economy, which offsets the demand for better educated workers in the growing services sectors.

Despite the achievements in raising levels of education, Ghana's labour force continues to be characterized by a significant share of workers without educational qualifications and a low proportion of workers with advanced schooling. This underlines the need for continued investment in education, including in terms of the quality of education. The extent of qualifications mismatch also illustrates the need for policies to widen access to education at higher secondary and tertiary levels. Rate of return analysis in particular supports the expansion of tertiary education.

Improved education and training policies are required not just for skills development, but also for broadening the social knowledge base. Investment in R&D and transfer of advanced technologies are also required. In addition, industrial policies that enhance competitiveness through promotion of an enabling environment, enterprise clusters and value chains should be pursued.

Successful economic transformation is associated with a movement of labour out of the rural agricultural sector into the urban industrial and service sectors, leading to higher productivity levels and progressively rising income levels. To a certain extent this has happened in Ghana, and services absorb an increasing share of the labour force. Nevertheless, vulnerable employment remains widespread, in particular in services, and transformation towards higher value added activities within service sectors seems limited. Moreover, this is coupled with a deep and pervasive informal economy. Together with the lack of industrial job creation, this underlines the need for economic policies to support employment creation in more innovative activities and dynamic sectors, as well as to adopt measures to improve working conditions and facilitate the formalization of the informal economy.

Given the growth of extractive industries, if revenues are invested in related higher value-added downstream and service activities with high employment potential, this would provide a starting point for activities beyond mere export of commodities. This calls for both public and private investment. This is not to say, however, that concerted efforts and adequate resources should not also be directed towards improving productivity, wages and conditions of work in other segments of the economy. Indeed, the long-standing neglect of agriculture should also be reversed. Intensification of agriculture needs to be complemented by an increase in productive non-farm wage employment and successful entrepreneurship development. Tradeable services such as business services, finance, tourism etc. can also play an important role in creating productive employment when they complement or support diversification into higher value added segments in manufacturing.

To accompany the process of structural transformation, labour market policies and institutions will need to be developed and strengthened to better support and protect workers. Ghana's economic diversification will also require policies to attract domestic and foreign investment that is conducive to generating decent employment, while any rethinking of Ghana's fiscal and monetary policies should place employment as a central consideration. Effective social dialogue and coherence across a broad economic and social policy agenda will be critical to ensuring the success of such measures. Indeed, Ghana's recently adopted National Employment Policy, developed through tripartite dialogue, is a strong statement of intent to achieve this coherence by establishing mechanisms for multi-stakeholder coordination and cooperation in the pursuit of a comprehensive, integrated employment policy framework.

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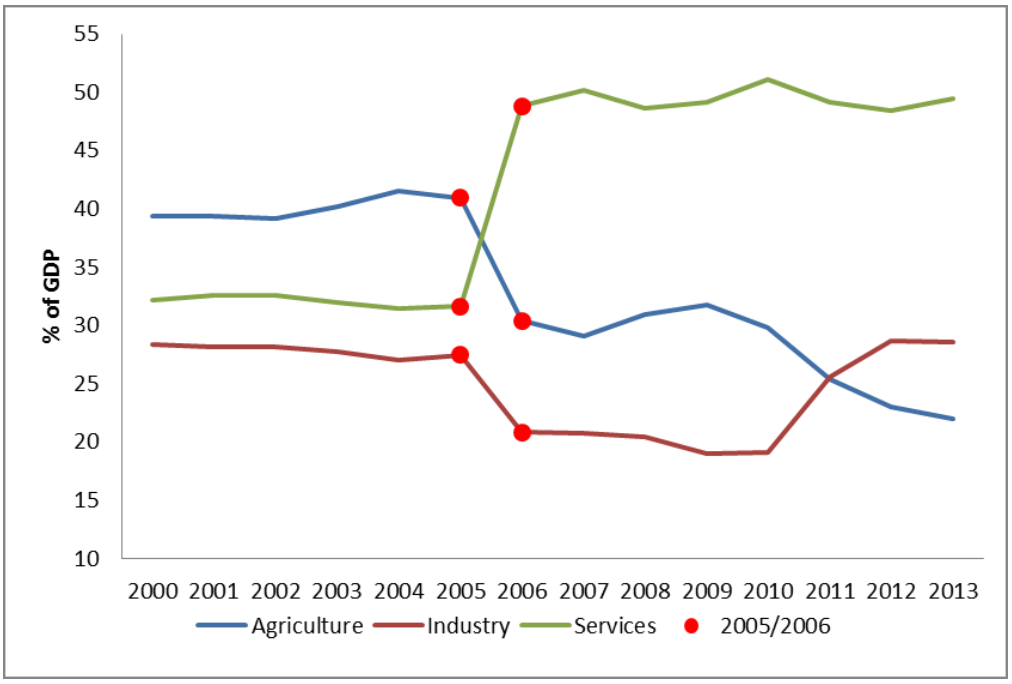
Annex A

Figure A. 1. Structure of output using World Development Indicators data



Source: World Bank (2014).

Table A 1. Economic structure 1994-2012 (% of GDP)

Year	1994	1996	1998	2000	2002	2004	2006	2008	2010	2011	2012
Agriculture	34.3	35.3	31.5	30.7	30.4	32.3	30.4	31.0	29.8	25.3	22.7
Industry	21.8	20.6	21.2	21.2	21.0	20.2	20.8	20.4	19.1	25.6	27.3
Services	43.9	44.1	47.3	48.1	48.7	47.5	48.8	48.6	51.1	49.1	50.0

Note: Shares have been calculated based on value added in national currency.
Source: UN (2013).

Table A 2. Education intensity and employment by sector

	Share of labour force (%)			Education intensity (%)			Between effect	Within effect	Contribution	Contribution (%)
	2006	2012	Change	2006	2012	Change				
Agriculture	49.9	42.1	-7.8	33.6	40.4	6.8	-2.63	2.86	0.23	2.7
Fishing	1.2	0.9	-0.3	27.4	32.1	4.7	-0.08	0.04	-0.03	-0.4
Mining and quarrying	0.7	1.6	0.9	70.5	70.5	0.0	0.61	0.00	0.61	7.2
Manufacturing	10.6	8.8	-1.9	58.0	64.7	6.7	-1.08	0.59	-0.49	-5.8
Electricity, gas and water	0.1	0.3	0.1	93.4	94.0	0.6	0.11	0.00	0.12	1.4
Construction	1.8	3.2	1.4	79.8	81.8	2.0	1.08	0.06	1.14	13.4
Wholesale and retail trade	14.9	19.4	4.5	59.9	63.5	3.7	2.70	0.71	3.40	39.9
Hotels and restaurants	1.9	3.7	1.9	49.8	59.3	9.5	0.94	0.36	1.29	15.2
Transport, storage and communication	2.8	3.7	0.9	83.8	82.4	-1.4	0.77	-0.05	0.72	8.5
Financial intermediation	0.3	0.7	0.4	97.3	98.4	1.1	0.38	0.01	0.39	4.6
Real estate and business activities	0.8	2.2	1.4	88.3	86.6	-1.7	1.23	-0.04	1.19	14.0
Public administration	1.4	0.8	-0.6	93.6	97.0	3.4	-0.57	0.03	-0.54	-6.4
Education	2.9	3.4	0.5	96.1	97.7	1.5	0.47	0.05	0.53	6.2
Health and social work	0.8	1.1	0.3	90.9	91.3	0.4	0.27	0.00	0.27	3.2
Community and social services	2.7	3.8	1.1	78.4	77.5	-0.9	0.85	-0.04	0.81	9.5
Private households	0.3	0.8	0.5	53.2	60.2	7.0	0.27	0.06	0.33	3.8
Extra-territorial bodies	0.0	0.0	0.0	100.0	100.0	0.0	-0.03	0.00	-0.03	-0.4
Unemployed	6.5	3.6	-2.9	56.7	67.1	10.4	-1.63	0.38	-1.25	-14.7
Undefined	0.3	0.0	-0.3	52.4	100.0	47.6	-0.15	0.00	-0.15	-1.8
Aggregate	100.0	100.0		49.5	58.0	8.5	3.50	5.03	8.53	100.00

Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Table A 3. Education intensity and non-vulnerable employment by sector

	Employment share (%)			Education intensity (%)			Between effect	Within effect	Contribution	Contribution (%)
	2006	2012	Change	2006	2012	Change				
Agriculture	14.2	8.2	-6.0	49.0	51.6	2.6	-2.92	0.21	-2.71	537.6
Fishing	1.0	0.9	-0.1	37.8	29.7	-8.0	-0.02	-0.07	-0.09	18.8
Mining and quarrying	2.4	4.7	2.3	70.3	74.1	3.8	1.59	0.18	1.77	-351.2
Manufacturing	15.8	12.4	-3.4	77.2	72.6	-4.6	-2.62	-0.57	-3.20	634.9
Electricity, gas and water	0.5	0.7	0.2	91.9	98.4	6.5	0.21	0.05	0.26	-51.5
Construction	5.7	7.8	2.0	82.8	81.6	-1.2	1.69	-0.09	1.60	-317.1
Wholesale and retail trade	13.0	16.3	3.3	81.4	73.2	-8.1	2.71	-1.33	1.38	-274.4
Hotels and restaurants	2.5	4.3	1.8	66.8	61.1	-5.7	1.19	-0.25	0.94	-187.2
Transport, storage and communication	10.7	10.2	-0.6	84.1	82.1	-2.0	-0.47	-0.20	-0.67	133.2
Financial intermediation	1.3	2.2	1.0	100.0	99.0	-1.0	0.95	-0.02	0.93	-184.4
Real estate and business activities	2.8	6.2	3.4	87.7	86.2	-1.6	2.99	-0.10	2.89	-574.8
Public administration	6.0	2.5	-3.4	93.6	97.0	3.4	-3.22	0.09	-3.14	623.2
Education	12.4	10.9	-1.5	96.1	97.8	1.7	-1.44	0.18	-1.26	249.9
Health and social work	3.1	3.4	0.2	96.8	95.7	-1.1	0.22	-0.04	0.18	-35.8
Community and social services	6.7	8.1	1.3	83.2	80.5	-2.7	1.11	-0.21	0.90	-177.8
Private households	1.3	1.3	0.0	59.8	79.6	19.8	0.01	0.25	0.26	-51.2
Extra-territorial bodies	0.2	0.0	-0.1	100.0	100.0	0.0	-0.14	0.00	-0.14	28.1
Undefined	0.5	0.0	-0.5	78.8	100.0	21.2	-0.40	0.00	-0.40	79.7
Aggregate	100.0	100.0		78.8	78.3	-0.5	1.42	-1.92	-0.50	100.00

Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Table A 4. Returns to education, years of schooling – both sexes

a) 2006

Sector	Agriculture	Industry	Services	Total
Years of Education	0.064***	0.089***	0.137***	0.114***
	(3.2)	(6.92)	(17.74)	(19)
Experience	0.044*	0.033***	0.044***	0.043***
	(1.95)	(2.71)	(6.4)	(7.62)
Experience squared	0	0*	-0.001***	-0.001***
	(-1.24)	(-1.79)	(-3.8)	(-4.9)
Constant	-2.429***	-2.332***	-3.08***	-2.765***
	(-7.73)	(-11.99)	(-27.36)	(-30.71)
Number observed	213	499	1597	2325
R squared	7.49%	12.56%	27.32%	21.14%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

b) 2012

Sector	Agriculture	Industry	Services	Total
Years of Education	0.031*	0.07***	0.134***	0.107***
	(1.97)	(6.89)	(24.9)	(24)
Experience	0.05***	0.026***	0.046***	0.041***
	(3.37)	(2.69)	(8.91)	(9)
Experience squared	-0.001***	0*	-0.001***	-0.001***
	(-3.49)	(-1.88)	(-5.95)	(-6.61)
Constant	-0.484**	-0.343**	-1.504***	-1.056***
	(-2.11)	(-2.2)	(-15.71)	(-13.35)
Number observed	256	1071	3393	4721
R squared	6.65%	6.09%	22.43%	15.75%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

Table A 5. Returns to education, years of schooling - male

a) 2006

Sector	Agriculture	Industry	Services	Total
Years of Education	0.073***	0.082***	0.13***	0.109***
	(3.23)	(5.38)	(13.32)	(14.64)
Experience	0.051**	0.027**	0.037***	0.037***
	(2.07)	(2.2)	(3.93)	(5.07)
Experience squared	-0.001	0	0**	0***
	(-1.55)	(-1.25)	(-2.33)	(-3.22)
Constant	-2.512***	-2.151***	-2.884***	-2.605***
	(-7.11)	(-10.12)	(-20.89)	(-23.98)
Number observed	166	406	1131	1716
R squared	9.58%	10.42%	23.75%	18.63%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

b) 2012

Sector	Agriculture	Industry	Services	Total
Years of Education	0.018	0.059***	0.121***	0.092***
	(1.05)	(5.29)	(17.03)	(16.41)
Experience	0.066***	0.023**	0.037***	0.033***
	(4.01)	(2.34)	(5.63)	(5.95)
Experience squared	-0.001***	0	-0.001***	0***
	(-4.28)	(-1.46)	(-4.44)	(-4.97)
Constant	-0.524**	-0.104	-1.14***	-0.68***
	(-2.05)	(-0.62)	(-8.8)	(-6.93)
Number observed	215	861	2207	3284
R squared	7.73%	4.87%	17.88%	11.71%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

Table A 6. Returns to education, years of schooling - female

a) 2006

Sector	Agriculture	Industry	Services	Total
Years of Education	0.027	0.087***	0.156***	0.125***
	(0.5)	(3.1)	(12)	(12.12)
Experience	-0.005	0.042**	0.051***	0.051***
	(-0.06)	(2.03)	(5.24)	(5.99)
Experience squared	0.001	-0.001***	-0.001***	-0.001***
	(0.35)	(-2.73)	(-2.91)	(-3.93)
Constant	-1.901*	-2.559***	-3.448***	-3.078***
	(-1.99)	(-6.22)	(-17.57)	(-18.89)
Number observed	47	93	466	609
R squared	4.59%	13.80%	36.11%	26.94%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

b) 2012

Sector	Agriculture	Industry	Services	Total
Years of Education	0.085***	0.035	0.151***	0.132***
	(3.22)	(1.34)	(17.44)	(17.48)
Experience	0.043	0.014	0.051***	0.049***
	(1.63)	(0.62)	(5.37)	(6.12)
Experience squared	-0.001	0	0**	-0.001***
	(-1.57)	(-0.96)	(-2.42)	(-3.49)
Constant	-0.894**	-0.399	-1.959***	-1.685***
	(-2.58)	(-0.98)	(-13.41)	(-12.6)
Number observed	41	210	1186	1437
R squared	13.88%	2.80%	30.97%	25.29%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

Table A 7. Returns to educational levels – both sexes

a) 2006

Sector	Agriculture	Industry	Services	Total
Primary	0.485*	-0.154	0.08	0.119
	(1.78)	(-0.72)	(0.51)	(1.02)
Low Secondary	0.682***	0.321*	0.307**	0.376***
	(3.05)	(1.86)	(2.27)	(4)
High Secondary	0.658**	0.729***	0.824***	0.803***
	(2.05)	(3.96)	(5.94)	(8.18)
Tertiary	2.418***	1.362***	1.695***	1.655***
	(2.64)	(6.41)	(12.2)	(16.67)
Experience	0.042*	0.04***	0.053***	0.049***
	(1.81)	(3.27)	(8.2)	(8.96)
Experience squared	0	-0.001**	-0.001***	-0.001***
	(-1.13)	(-2.47)	(-5.78)	(-6.36)
Constant	-2.509***	-1.99***	-2.425***	-2.339***
	(-6.9)	(-9.14)	(-17.35)	(-22.26)
Number observed	213	499	1597	2325
R squared	9.61%	14.94%	32.78%	25.71%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

b) 2012

Sector	Agriculture	Industry	Services	Total
Primary	-0.187	-0.08	0.111	0.049
	(-0.74)	(-0.51)	(0.9)	(0.52)
Low Secondary	-0.132	0.289**	0.524***	0.407***
	(-0.73)	(2.15)	(6.2)	(5.68)
High Secondary	0.399	0.351**	0.815***	0.591***
	(1.63)	(2.27)	(8.99)	(7.57)
Tertiary	0.77**	1.402***	1.863***	1.594***
	(2.2)	(7.89)	(22.17)	(21.62)
Experience	0.046***	0.027***	0.05***	0.044***
	(2.91)	(2.76)	(9.78)	(9.61)
Experience squared	-0.001***	0**	-0.001***	-0.001***
	(-3.02)	(-2.29)	(-7.29)	(-7.77)
Constant	-0.218	-0.006	-0.973***	-0.614***
	(-0.81)	(-0.03)	(-9.45)	(-6.91)
Number observed	256	1071	3393	4721
R squared	10.85%	9.14%	27.76%	20.69%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

Table A 8. Returns to educational levels - male

a) 2006

Sector	Agriculture	Industry	Services	Total
Primary	0.44	-0.149	-0.064	0.035
	(1.49)	(-0.54)	(-0.32)	(0.25)
Lower Secondary	0.704**	0.277	0.093	0.279**
	(2.48)	(1.35)	(0.52)	(2.32)
High Secondary	0.876***	0.564**	0.615***	0.692***
	(2.77)	(2.58)	(3.39)	(5.52)
Tertiary	2.429**	1.175***	1.469***	1.523***
	(2.6)	(4.8)	(8.09)	(11.95)
Experience	0.051**	0.032***	0.048***	0.042***
	(1.99)	(2.69)	(5.42)	(6.11)
Experience squared	-0.001	0*	-0.001***	-0.001***
	(-1.47)	(-1.92)	(-3.98)	(-4.38)
Constant	-2.574***	-1.785***	-2.089***	-2.1***
	(-6.46)	(-7.31)	(-11.55)	(-15.79)
Number observed	166	406	1131	1716
R squared	11.72%	11.81%	30.54%	23.43%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

b) 2012

Sector	Agriculture	Industry	Services	Total
Primary	-0.159	-0.315*	0.093	-0.083
	(-0.59)	(-1.81)	(0.56)	(-0.7)
Lower Secondary	-0.271	0.073	0.385***	0.215**
	(-1.35)	(0.48)	(2.99)	(2.2)
High Secondary	0.312	0.105	0.655***	0.381***
	(1.22)	(0.62)	(4.82)	(3.66)
Tertiary	0.495	1.063***	1.623***	1.294***
	(1.25)	(5.74)	(12.19)	(12.6)
Experience	0.065***	0.024**	0.042***	0.037***
	(3.86)	(2.46)	(6.53)	(6.68)
Experience squared	-0.001***	0**	-0.001***	-0.001***
	(-4.34)	(-2.08)	(-5.68)	(-6.14)
Constant	-0.293	0.366*	-0.596***	-0.184
	(-1.01)	(1.88)	(-3.93)	(-1.57)
Number observed	215	861	2207	3284
R squared	12.06%	8.42%	22.63%	16.23%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

Table A 9. Returns to educational levels – female

a) 2006

Sector	Agriculture	Industry	Services	Total
Primary	0.485*	-0.154	0.08	0.119
	(1.78)	(-0.72)	(0.51)	(1.02)
Lower Secondary	0.682***	0.321*	0.307**	0.376***
	(3.05)	(1.86)	(2.27)	(4)
High Secondary	0.658**	0.729***	0.824***	0.803***
	(2.05)	(3.96)	(5.94)	(8.18)
Tertiary	2.418***	1.362***	1.695***	1.655***
	(2.64)	(6.41)	(12.2)	(16.67)
Experience	0.042*	0.04***	0.053***	0.049***
	(1.81)	(3.27)	(8.2)	(8.96)
Experience squared	0	-0.001**	-0.001***	-0.001***
	(-1.13)	(-2.47)	(-5.78)	(-6.36)
Constant	-2.509***	-1.99***	-2.425***	-2.339***
	(-6.9)	(-9.14)	(-17.35)	(-22.26)
Number observed	213	499	1597	2325
R squared	9.61%	14.94%	32.78%	25.71%

Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

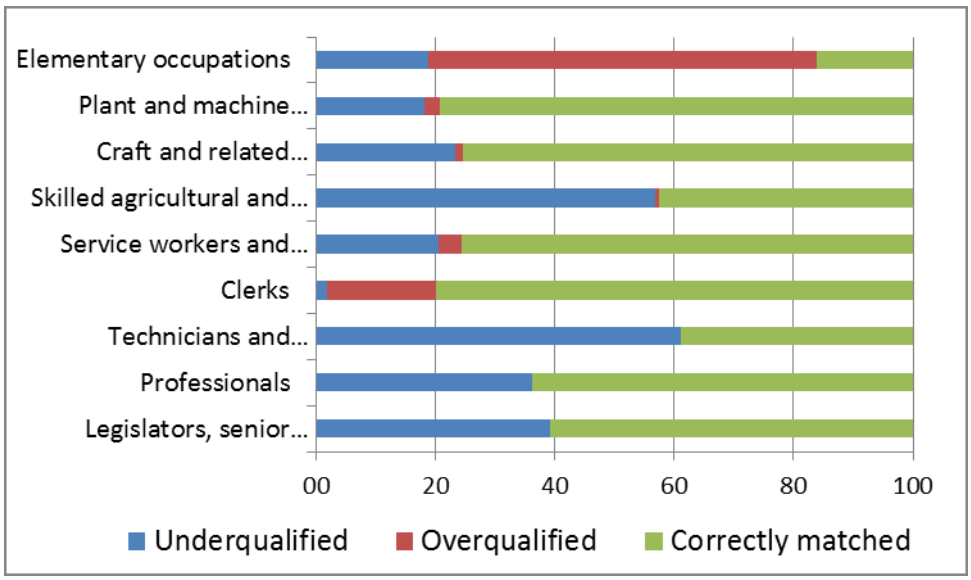
b) 2012

Sector	Agriculture	Industry	Services	Total
Primary	-0.398	0.185	0.042	0.169
	(-0.64)	(0.7)	(0.23)	(1.11)
Low Secondary	0.452	0.016	0.51***	0.425***
	(1.3)	(0.08)	(3.88)	(3.79)
High Secondary	.	0.018	0.928***	0.789***
	(0)	(0.05)	(6.9)	(6.56)
Tertiary	1.78***	1.773***	2.094***	1.995***
	(3.77)	(2.99)	(19.37)	(20.37)
Experience	0.034	0.015	0.053***	0.05***
	(0.9)	(0.64)	(5.94)	(6.47)
Experience squared	0	0	-0.001***	-0.001***
	(-0.71)	(-1.01)	(-3.3)	(-4.32)
Constant	-0.516	-0.284	-1.331***	-1.168***
	(-0.81)	(-0.76)	(-8.86)	(-8.56)
Number observed	41	210	1186	1437
R squared	28.90%	12.42%	38.66%	33.95%

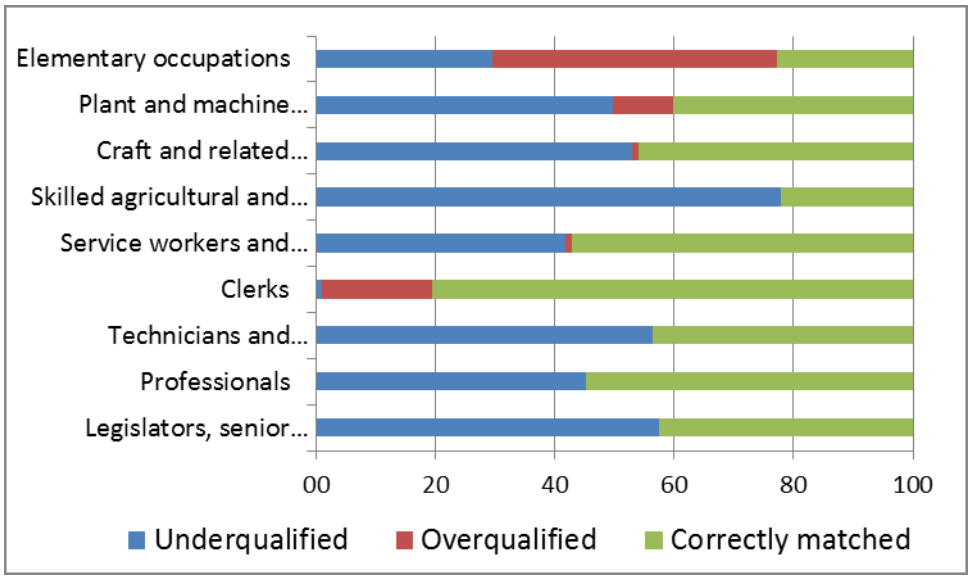
Sources: Authors' estimates based on GSS (2006) and GSS (2013).
Notes: t-statistics in parenthesis; significance levels are indicated by (*) at 10 per cent (*), 5 per cent (**) and 1 per cent (***).

Figure A. 2. Qualifications mismatch, percentage of employment by major occupational group and sex, 2006

(a) Male



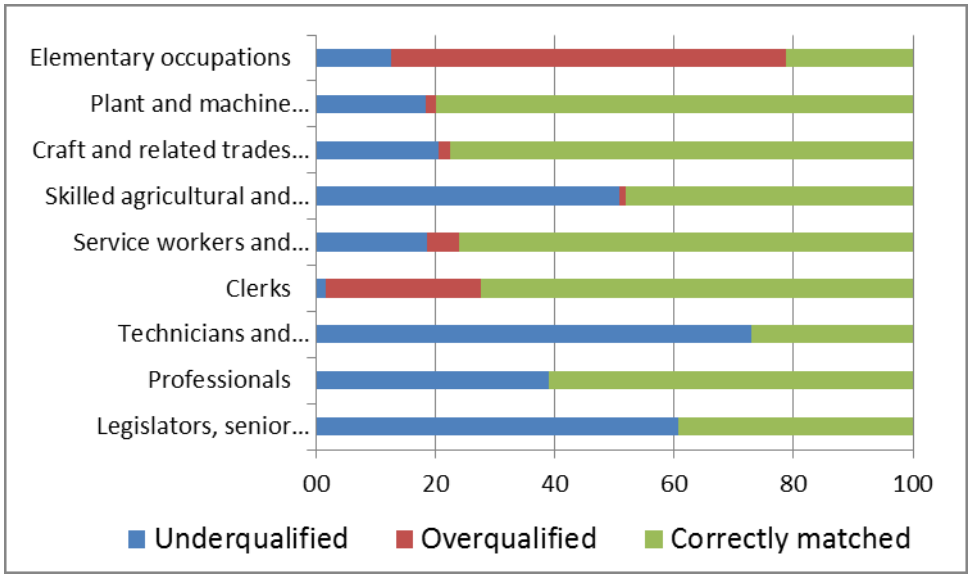
(a) Female



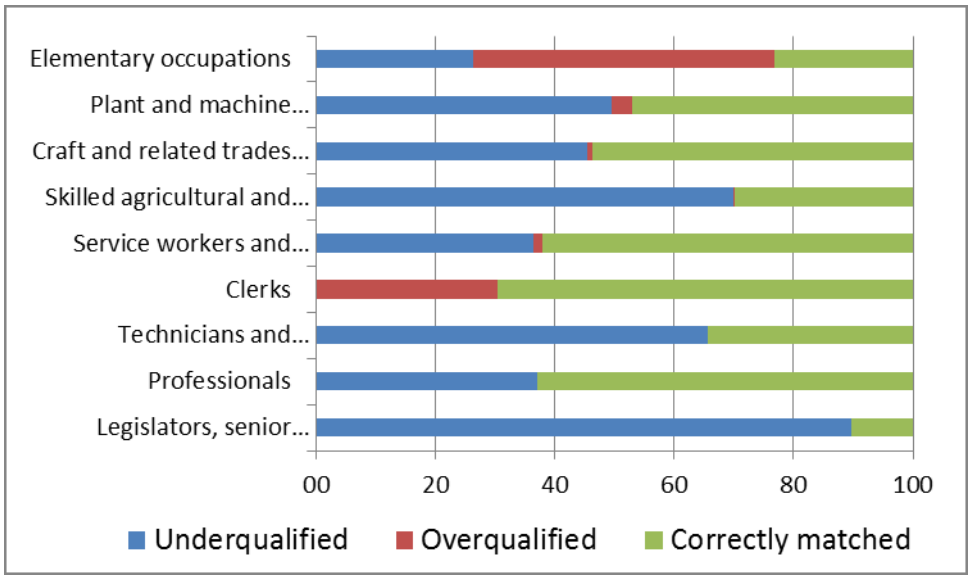
Sources: Authors' estimates based on GSS (2006).

Figure A. 3. Qualifications mismatch, percentage of employment by major occupational group and sex, 2012

(a) Male



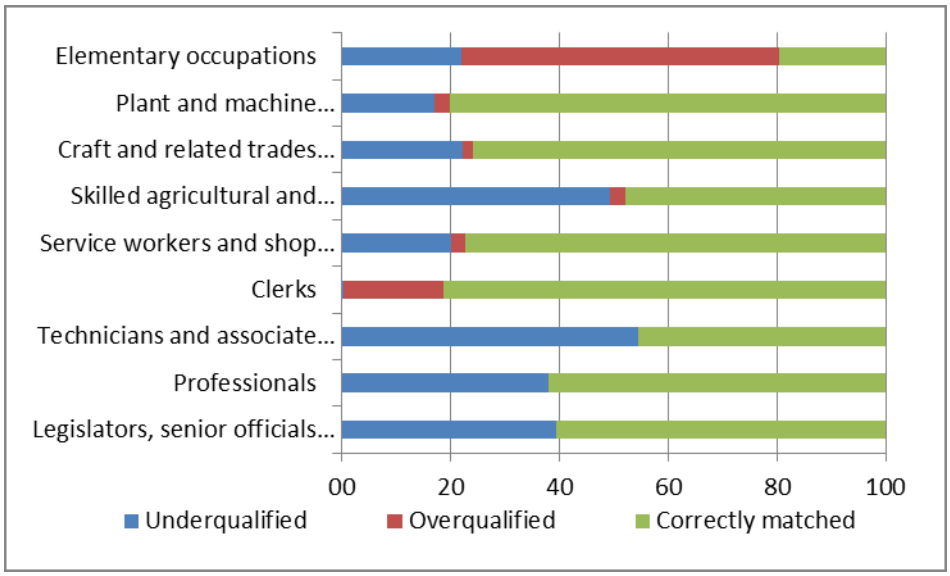
(b) Female



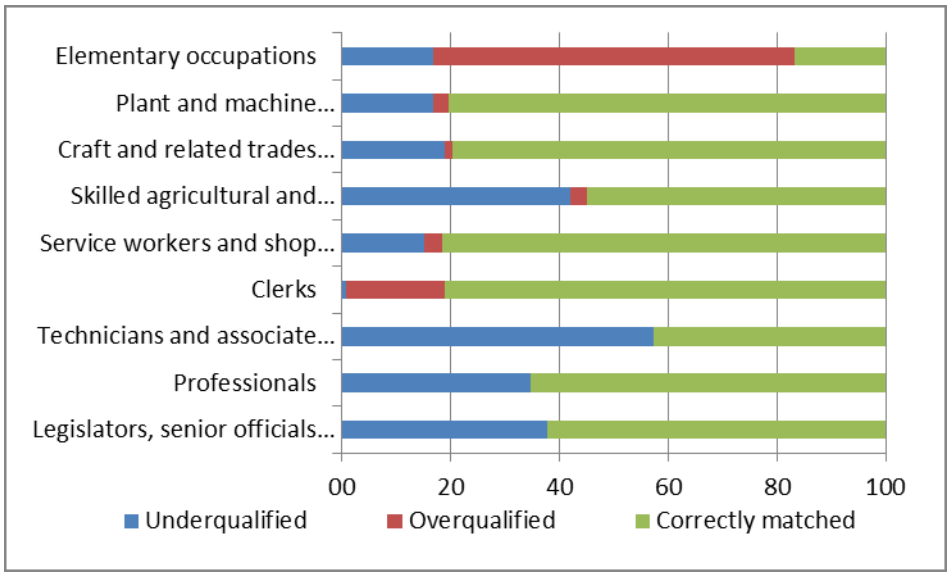
Sources: Authors' estimates based on GSS (2013).

Figure A. 4. Qualifications mismatch, percentage of non-vulnerable employment by major occupational group and sex, 2006

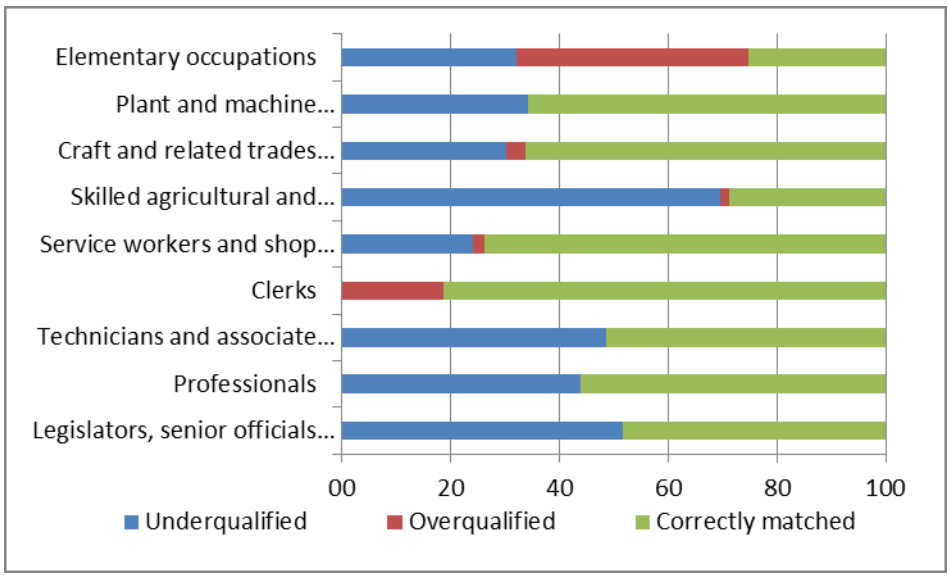
(a) Total



(b) Male



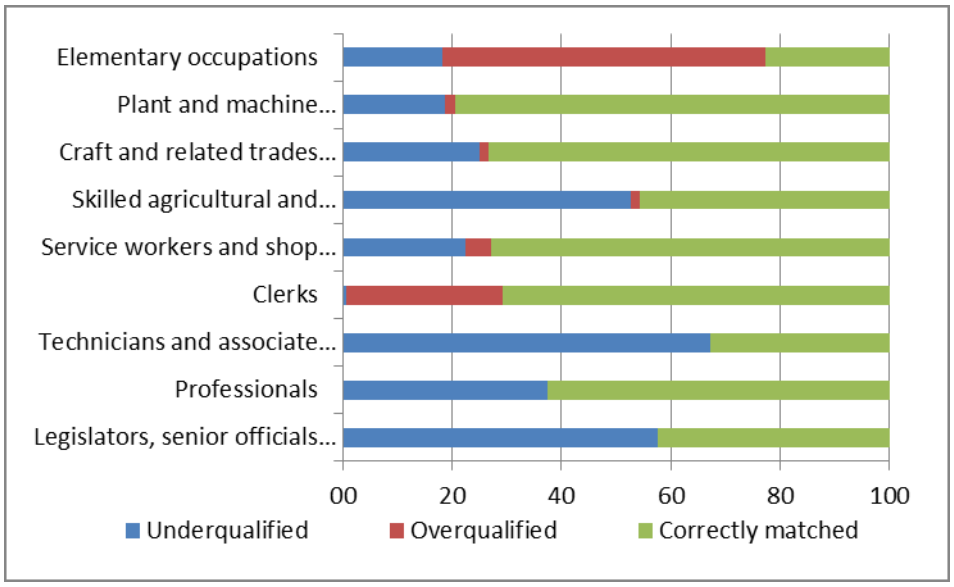
(c) Female



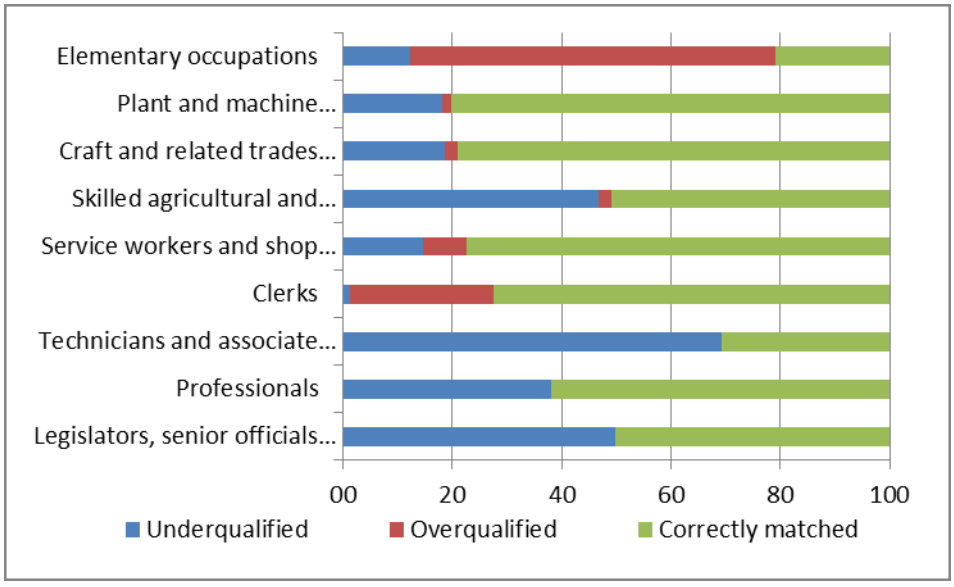
Sources: Authors' estimates based on GSS (2006).

Figure A. 5. Qualifications mismatch, percentage of non-vulnerable employment by major occupational group and sex, 2012

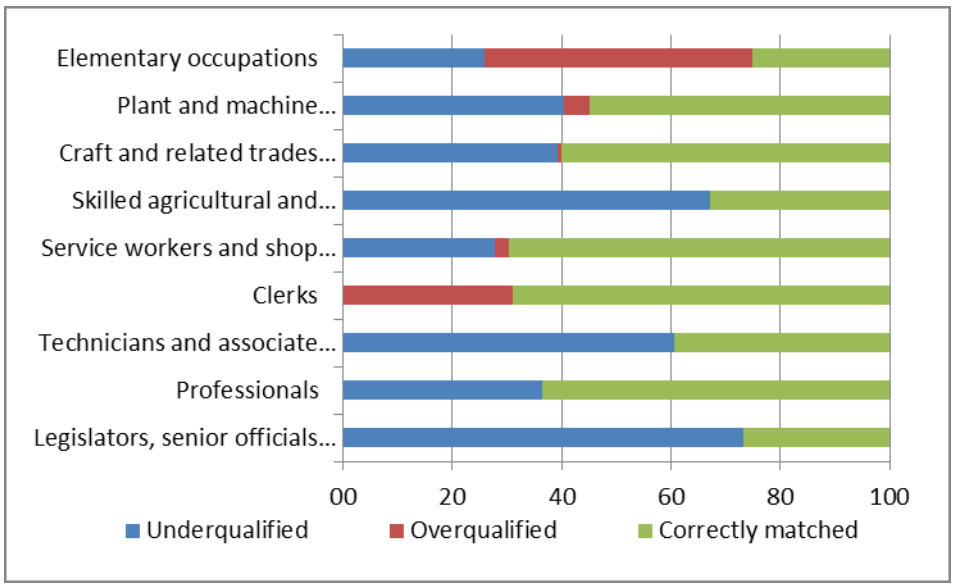
(a) Total



(b) Male



(c) Female



Sources: Authors' estimates based on GSS (2006) and GSS (2013).

Annex B

B1. Breakdown of the change in the employment-to-population ratio

Figure 5 shows estimates of the contribution of each sector to change in aggregate employment-to-population ratio (EPR). For this purpose, the change in the EPR is broken down as follows:

$$EPR_t - EPR_0 = \sum_i (EPR_{it} - EPR_{i0})$$

Where:

$EPR_t = E_t / L_t$ is the EPR at time *t*;

E_t is total employment;

L_t is the working age population;

$EPR_{it} = E_{it} / L_t$ is the ratio of employment in sector *i* to the working age population.

The term $EPR_{it} - EPR_{i0}$ therefore captures the contribution of change in employment in sector *i* to total change in the EPR in percentage points.

B2. Breakdown of productivity growth

Labour productivity growth can be broken down into the following components: a) a *within sector term*, which captures the growth of productivity within given sectors; and b) a *between term*, which captures the contribution of changes in the pattern of employment across sectors to productivity growth. Labour productivity (A) at time t is given as:

$$A_t = \frac{Y_t}{E_t} = \sum_i \frac{Y_{i,t}}{E_t} = \sum_i \frac{Y_{i,t}}{E_{i,t}} \frac{E_{i,t}}{E_t}$$

Where Y_t is total gross value added, E_t is total employment, $Y_{i,t}$ is output of sector *i* and $E_{i,t}$ is employment in sector i. The growth rate of aggregate productivity can therefore be broken down using the following relationship:

$$(1) \qquad \frac{A_t - A_0}{A_0} = \frac{\sum_i (\frac{Y_{i,t} E_{i,t}}{E_{i,t} E_t}) - \sum_i (\frac{Y_{i,0} E_{i,0}}{E_{i,0} E_0})}{\sum_i (\frac{Y_{i,0} E_{i,0}}{E_{i,0} E_0})} =$$

$$(2) \qquad \frac{\sum_i (\frac{Y_{i,t}}{E_{i,t}} - \frac{Y_{i,0}}{E_{i,0}}) \frac{E_{i,t}}{E_t}}{\sum_i (\frac{Y_{i,0} E_{i,0}}{E_{i,0} E_0})} + \frac{\sum_i (\frac{E_{i,t}}{E_t} - \frac{E_{i,0}}{E_0}) \frac{Y_{i,0}}{E_{i,0}}}{\sum_i (\frac{Y_{i,0} E_{i,0}}{E_{i,0} E_0})}$$

Where the first term in (2) captures the within sector effect and the second term captures the between effect. The within sector effect is due to the difference between sectoral value-added growth and employment growth (or sectoral productivity growth),

weighted by the employment share of the sector (which is held constant). A positive within-sector effect results when sectoral value added grows faster than sectoral employment. The between-sector effect is due to changes in sectoral employment shares, weighted by sectoral productivity (which is held constant). A positive between-sector effect results when sectoral employment shares increase.

B3. Regression model for returns to education

Rates of return to schooling in Ghana have been calculated based on Mincerian earnings functions, which are limited to wage employment, and following Psacharopoulos and Patrinos (2004a) and Walker and Zhu (2001). The log of hourly wages ($\ln W$) is regressed on years of schooling (S), years of experience in the labour market (EX) as well as its square (EX^2), using ordinary least squares.

The basic Mincerian earnings function takes the form:

$$\ln W_i = \alpha + \beta S_i + \gamma_1 EX_i + \gamma_2 EX^2{}_i + \varepsilon_i$$

In this equation, β can be interpreted as the average private rate of return to one additional year of schooling, regardless of the educational level this year of schooling refers to. This method assumes that foregone earnings represent the only cost of education, and so measure only the private rate of return. It further assumes that individuals have an infinite time horizon. As the function does not distinguish between levels of schooling, a series of dummy variables are substituted for S which correspond to discrete educational levels (primary, secondary and tertiary) to obtain the following equation:

$$\ln W_i = \alpha + \beta_p D_p + \beta_s D_s + \beta_t D_t + \gamma_1 EX_i + \gamma_2 EX^2{}_i + \varepsilon_i$$

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ISSN 1999-2939