

**TOWARDS INCLUSIVE AFRICAN LABOR MARKET: EMPIRICAL ANALYSIS OF GENDER EQUALITY
IN EMPLOYMENT AND ITS IMPLICATIONS FOR POLICY**

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Abstract

Thus, gender equality in employment is currently one of the greatest development challenges facing countries globally, including those in Africa. In 2011, male employment-to-population ratio, globally, was estimated at about 72.7% compared to female employment-to-population ratio of only 47.9%. For Africa as a whole, male employment-to-population ratio was estimated at about 69.2% compared to female employment-to-population ratio of only 39.2%. In addition to analyzing the characteristics of gender (in)equality in employment in Africa, this paper empirically studies the key drivers of gender equality in employment (proxied by the ratio of female employment rate to male employment rate for the age group 15-64 over the period, 1991 and 2009), using cross-sectional data. Our results suggest that for all-Africa and Sub-Saharan African samples, quadratic levels of real per capita GDP, greater ICT infrastructure availability, increased democracy (and quadratic form), higher prices, greater openness, more secondary school education, and higher urban share of the population increase gender equality in employment while higher real GDP per capita, higher gross domestic investment, population growth rate, sex population ratio, international wars and conflicts, and being a net oil-exporting country tend to lower it. However, North Africa is different. Indeed, apart from negative and highly significant North African dummy in the overall results, the North African specific sample results indicate that while quadratic element of real GDP per capita, increased democracy, higher urban share of the population, and high population growth increase gender equality in employment, higher real GDP per capita, and ICT infrastructure tend to lower gender equality in employment. The policy implications and lessons of these results are discussed for countries, both in Sub-Saharan Africa and North Africa, taking cognizance of the differentiated determining factors. These policies are directed at making the African labor market more inclusive and hence enhancing women's employment for the purpose of greater economic empowerment, household welfare and poverty reduction, in particular.

Keywords: Female employment-to-population ratio; male employment-to-population ratio; gender equality in employment; determinants, Africa; Sub-Saharan Africa; North Africa.

JEL classification: J16, J21, J64, J68, I32, C33, E24, O55.

I. Introduction

Gender disparities in terms of opportunities and the participation of women in economic activities have become important issues for the developing world and for African countries in particular. This is partly because of the potential negative effects that can result from the exclusion of women in employment on both sustainable growth and poverty reduction. It is, therefore, not surprising that gender equality and the empowerment of women is one of the main attributes of the United Nations Millennium Development Goals (MDGs) program. It is also the reason that gender equality is on the public policy agenda of almost every country of the world today. In this paper, we examine the characteristics – the nature, structure, extent, and some of the root causes of gender (in)equality in employment in African countries. We aim to identify strategies for more gender-inclusiveness in the labor market in the African continent (North Africa and Sub-Saharan).

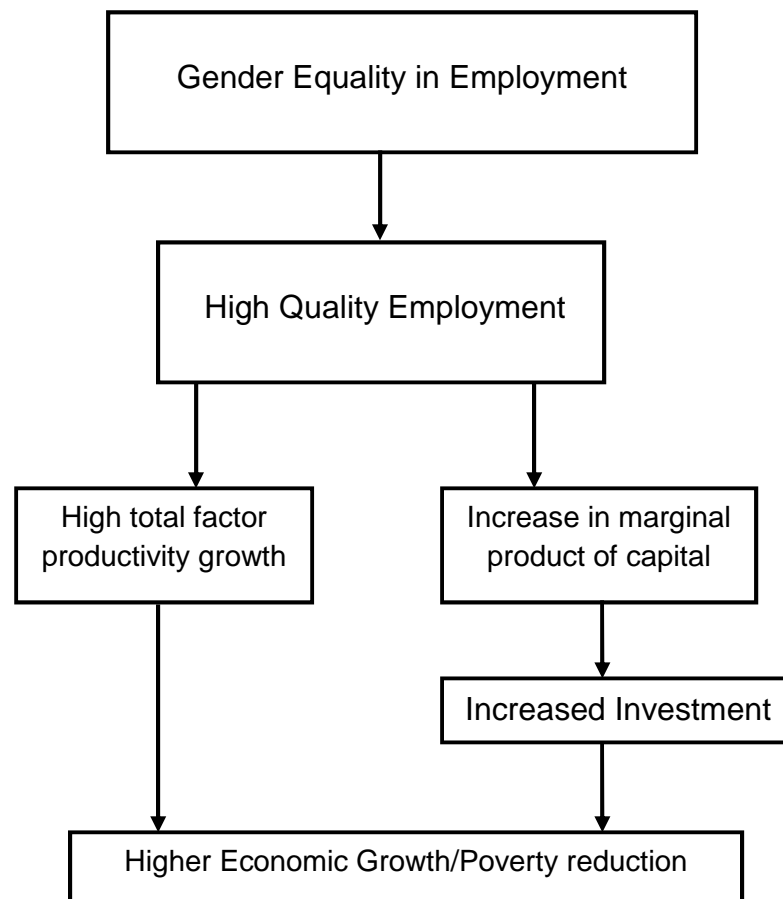
The focus on gender equality in employment in Africa is important for at least two reasons. First, women's employment is essential in the fight against poverty. This is not only because of the direct and interrelated contribution employment makes to household welfare, but also because of the personal power it provides women in shaping and making family decisions and in redirecting household spending on essential needs, especially in favor of children's education and healthcare. Second, from a rights-based perspective, gender equality in employment should be enhanced simply from the standpoint that, as recognized internationally, everyone deserves the same opportunities.

Indeed, as the World Bank (2012a) has noted, gender equality in employment is both about economic empowerment, fairness, equity, increasing productivity, reduction of efficiency losses, widening of the base of taxpayers and contributors to social protection systems, improving the opportunities and outcomes of the next generation, enhancing development decision-making, greater opportunities for businesses to expand, innovate and compete, economic/business freedom, fostering of stronger, better, fairer, more sustainable and inclusive growth and development (Figures 1 - 3).

Thus, gender equality in employment is currently one of the greatest development challenges facing countries globally, including those in Africa. In 2011, male employment-to-population ratio, globally, was estimated at about 72.7% compared to female employment-to-population ratio of only 47.9%. For Africa as a whole, male employment-to-population ratio was estimated at about 69.2% compared to female employment-to-population ratio of only 39.2%. While estimates for Sub-Saharan Africa stood at 70.4% to 58.8%, the data was much worse for North Africa. Women in North Africa faced an employment rate of only 19.6% (compared to the global average of 47.9%), the second lowest of all regions and sub-regions in the world – and against a figure of 68% for the men in the sub-region during the same year. The social exclusion of women in employment in Africa (especially in North Africa) is acute, given that unemployment issue was a key catalyst that triggered the Arab Spring ("revolution") in North Africa from January 2011, which had led to the fall of the governments in Tunisia, Egypt and Libya. It had

also triggered a spate of socio-economic cum political reforms in the other countries in the sub-region. In addition, it creates an unnaturally high employment dependency ratio.

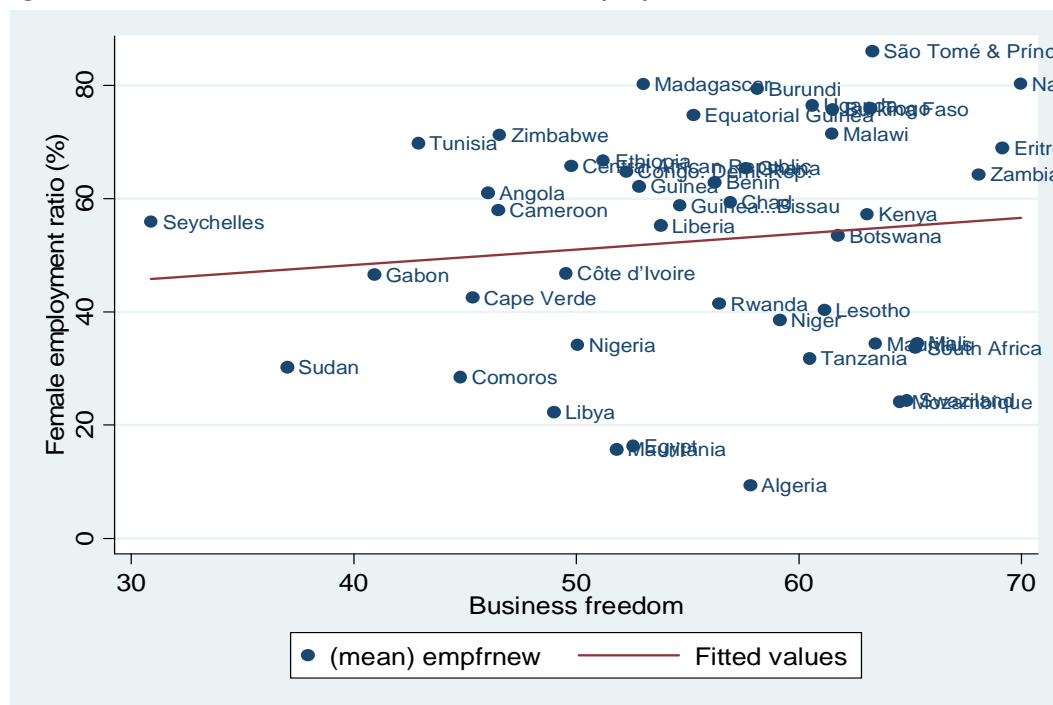
Figure 1: Gender Equality in Employment and Economic Growth



Source: Authors, using the literature

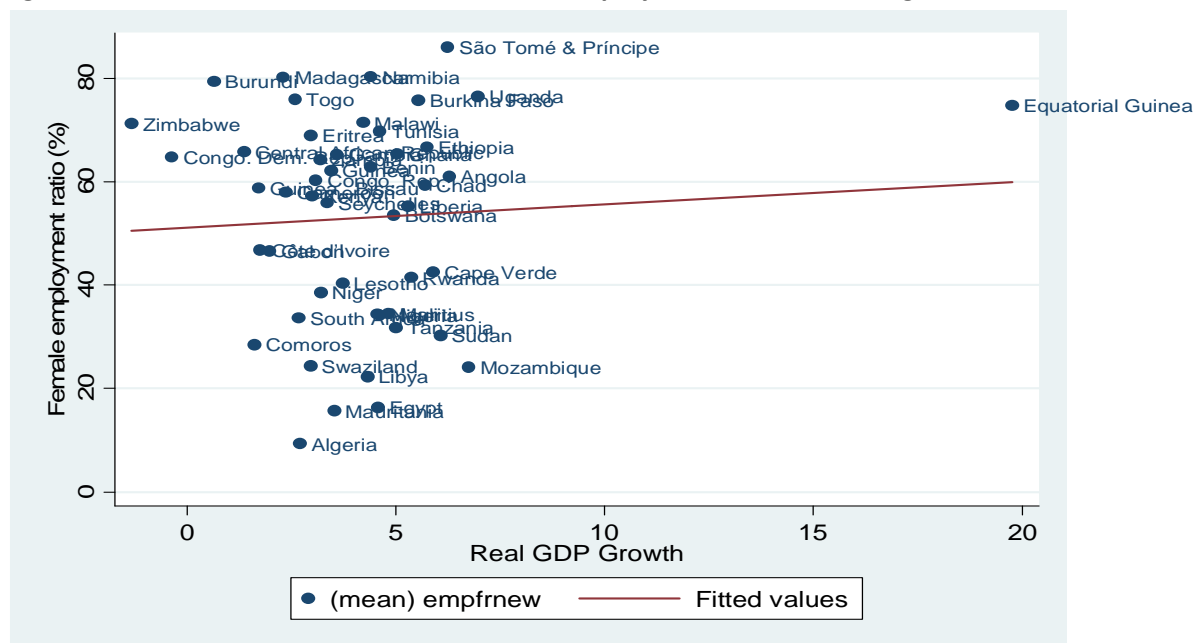
In addition to analyzing the characteristics of gender (in)equality in employment in Africa, this paper empirically studies the key drivers of gender equality in employment (proxied by the ratio of female employment rate to male employment rate for the age group 15-64 over the period, 1991 and 2009), using cross-sectional data. It also draws out important policy implications for African countries. The model is estimated by Ordinary Least Squares (OLS) method with country fixed effects. Therefore, a deeper understanding of the key determinants of gender equality in employment in Africa is crucial for implementing effective policies to make Africa's labor market more inclusive and promote gender equality in employment so as to reap its benefits in the shortest time possible.

Figure 2: Positive correlation between female employment and business freedom



Source: Authors, from World Bank/ILO databases.

Figure 3: Positive correlation between female employment and economic growth



Source: Authors, from World Bank/ILO databases.

The next section of the paper summarizes the trend evidence on the characteristics of, female, male and total, employment-to-population ratios (indicator of how effective a country utilizes its

productive potential) as well as the associated gender (in)equality in employment in the continent. The third section reviews some relevant empirical literature. The fourth section presents the model and data while section five presents the cross-country regressions of the key determinants of gender equality in employment in the entire continent, Sub-Saharan Africa and North Africa. The last section concludes with policy recommendations.

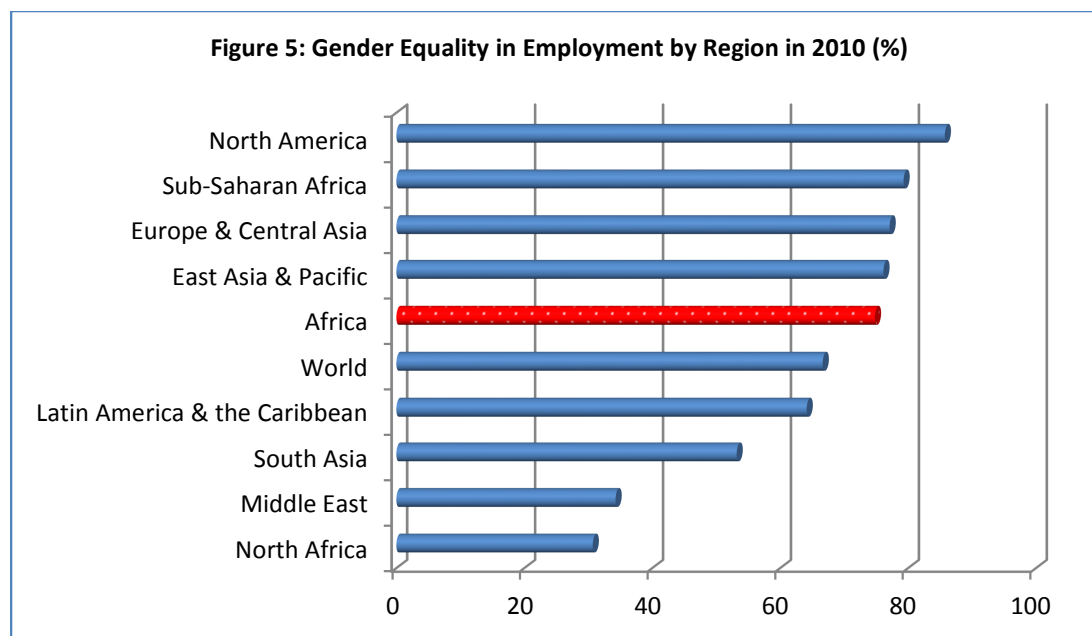
II. Characteristics of Gender (In)equality in Employment in Africa

Female employment ratio is relatively low in Africa as a whole but relatively high in Sub-Saharan Africa

In 2011, East Asia region had the highest average female employment ratio (at about 64%) and highest gender equality in employment in the developing world at 75% (Figures 4 and 5). While Africa's female employment ratio was low at 39% that of Sub-Saharan Africa was about 59%. Africa's performance was pulled down by North Africa's average of only 19.5%. With respect to gender equality in employment, Africa's average in 2011 stood at 75%, pulled up by Sub-Saharan Africa performance at 79% - North Africa's average was only 31% (Figure 5).



Source: Authors, using data from ILO database

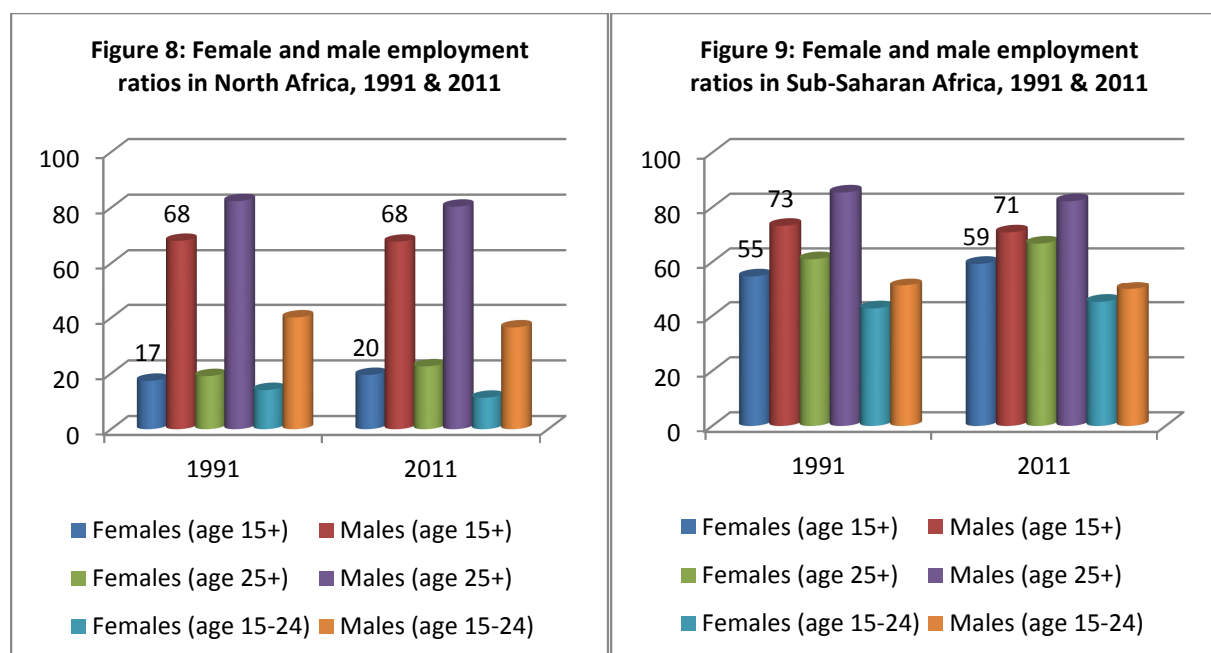


Source: Authors, using data from ILO database

Figure 6 presents the average employment ratio for women and men in African countries in 1991 and 2011. It shows that employment was significantly lower for women. For the continent as a whole, women employment ratio stood at about 39%, compared to 69% for men (1.8 times higher than for women) in 2011. However, these average figures hide huge disparities between North Africa and Sub-Saharan Africa (Figures 7). In addition, there is greater gender inequality in employment in North Africa than in Sub-Saharan Africa, and this is true for all age groups (Figures 8 and 9).



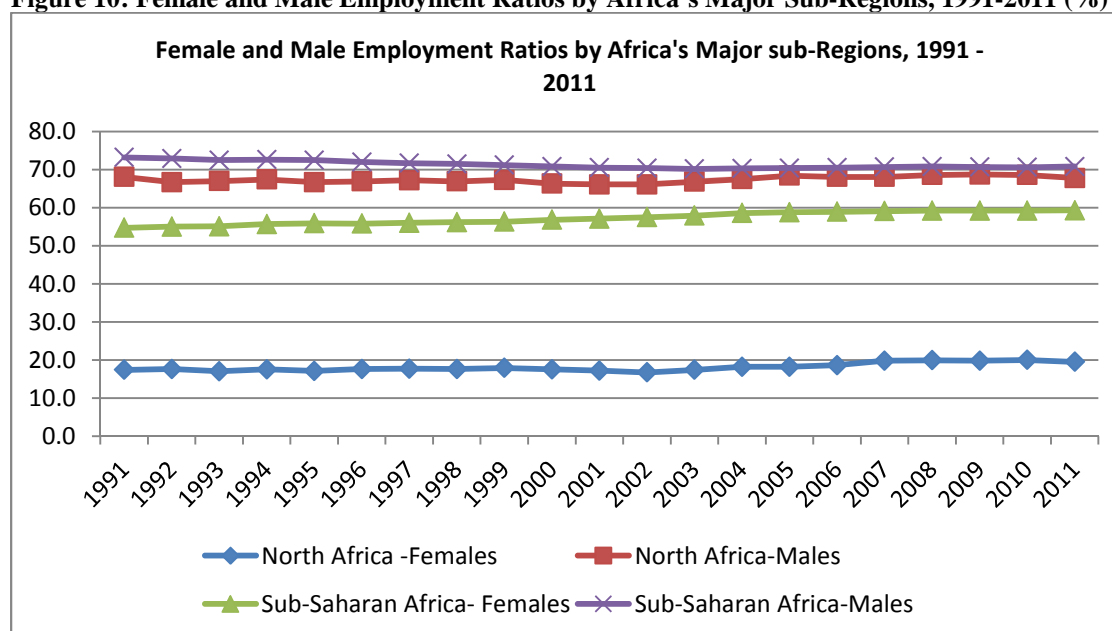
Source: Authors, using data from ILO database



Source: Authors, using data from ILO database

As Figure 10 demonstrates, female employment-to-population ratio in North Africa is very low at an average of 18% (against 57% for males and global average) – and indeed by far the lowest throughout the period, 1991 to 2011 of world regions. This huge gender gap in employment in North African countries largely explains the generally low levels of employment ratios in the sub-region. For the African continent as a whole, employment ratio averaged only 38% for females against 45% for the males between 1991 and 2011.

Figure 10: Female and Male Employment Ratios by Africa's Major Sub-Regions, 1991-2011 (%)



Source: Authors, using data from ILO database.

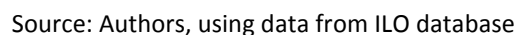
Scatter plot showing the relationship between Male employment ratio (X-axis) and Female-Male employment ratio (Y-axis) for various countries. The Y-axis is labeled 'Female-Male employment ratio' and ranges from 20 to 100. The X-axis is labeled 'Male employment ratio' and ranges from 50 to 90. A red line represents the fitted values. The plot shows a positive correlation, with many countries clustered around the fitted line.

Legend:

- (mean) genderequalityempnew
- Fitted values

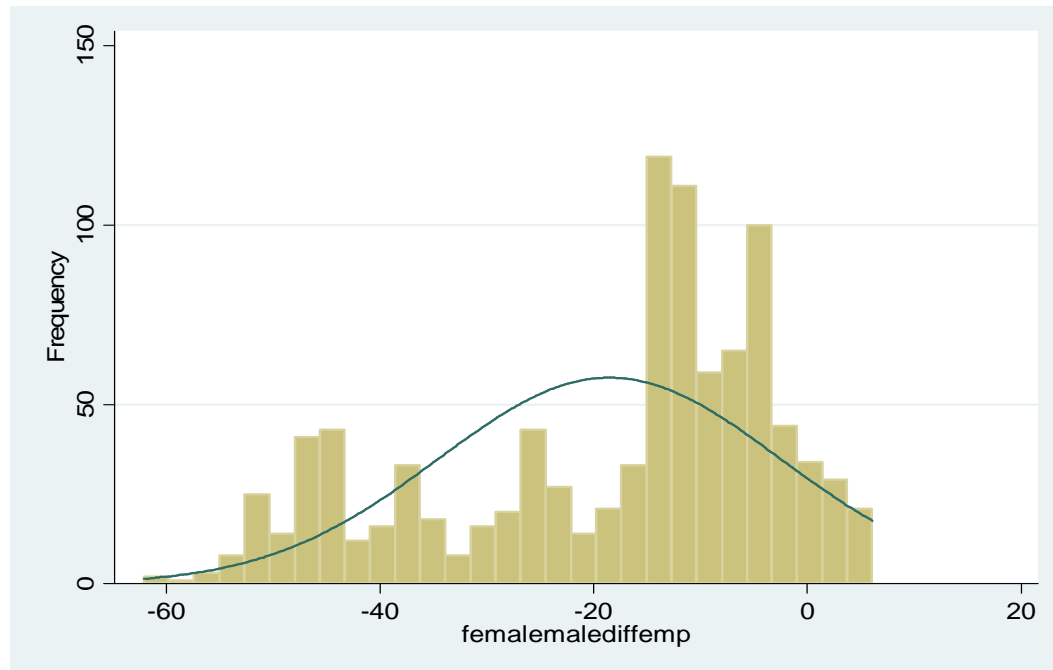
More women are in employment in Africa hence rising gender equality in employment

Figure 13: Gender equality in employment increased between 1991 and 2010



Overall, however, substantial gender inequality exists in African counties. As shown in the distribution of the difference between average female employment ration and male employment ratio between 1991 and 2011, the gap between the two is not symmetrically but negatively distributed, indicating gendered social exclusion (Figure 14).

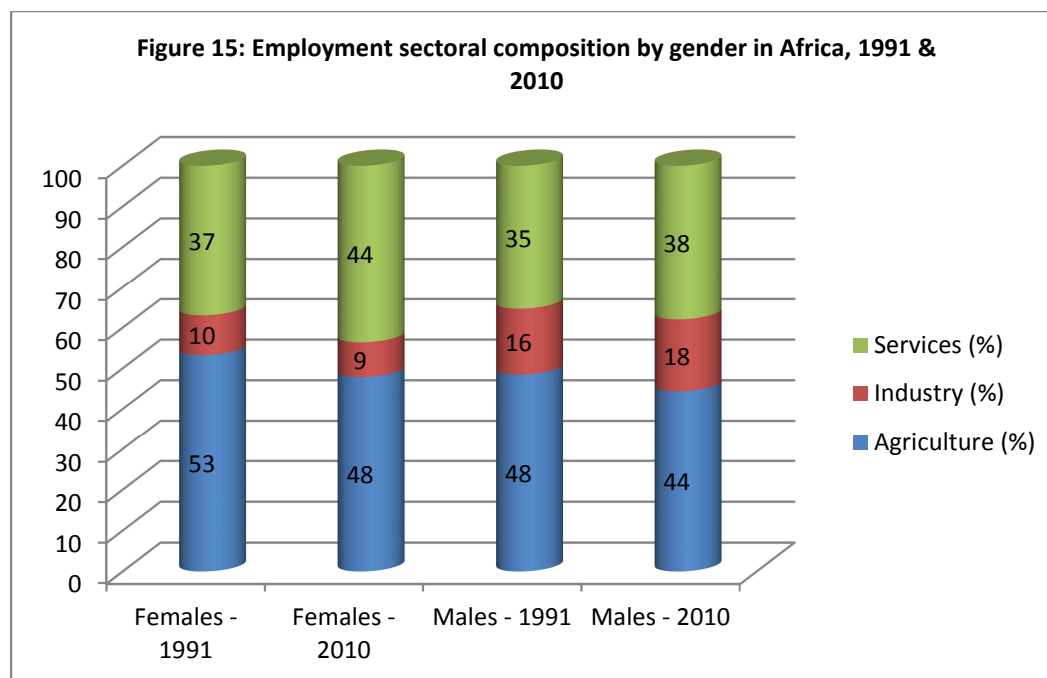
Figure 14: Distribution of average female minus male employment ratios, 1991 and 2011



Source: Authors, using data from ILO database

Minor structural transformation in African countries has changed the type of work conducted somewhat

African countries have witnessed small decline in the fraction of the workforce in the agricultural sector over the last two decades. Between 1991 and 2010, agriculture's share of total employment for women declined from 53% to 48% as well as from 48% to 44% for men. During the same period, services' share in total employment for women rose from 37% to 44% as well as from 35% to 38% for men. However, agriculture remains the largest sector of employment in Africa for both men and women (Figure 15). Women continue to dominate in both "agriculture" (so-called feminization of agriculture") and "service" employments while men dominate in "industry" employment, indicating the persistence of clear gender-specific patterns of employment in the continent.

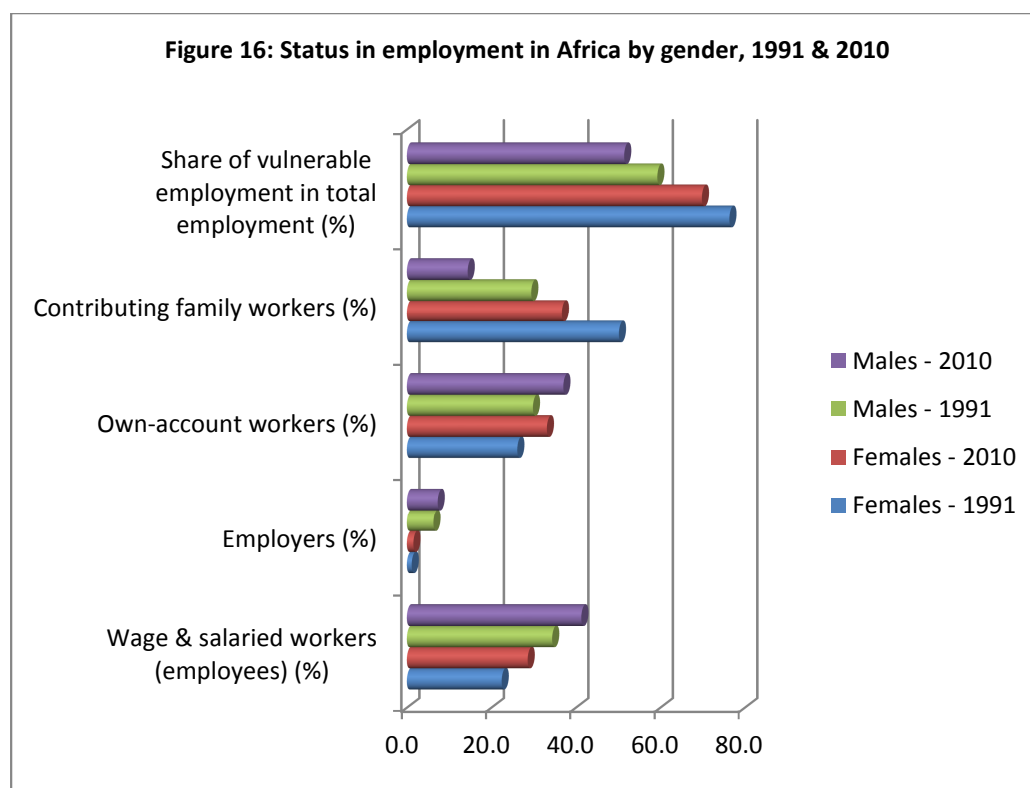


Source: Authors, using data from ILO database

Where and how African women work

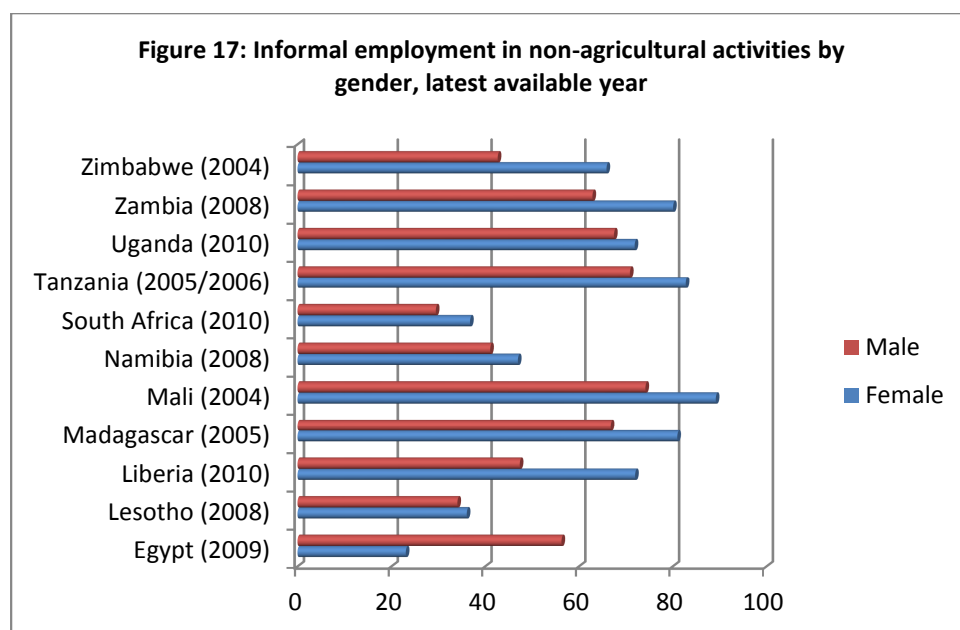
Figure 16 shows that in 2010, about 40% of male workers and less than a third of female workers engaged in regular wage and salaried employment in Africa, a strong indication of weak labor market institutions and a large informal economy. Less than 2% of all women workers in Africa were running their own business with paid employees, indicating that the entrepreneurial capabilities of African women are far from being tapped. In addition the figure shows that non-paid work in a family establishment is very much a female domain while men dominate the own-account (self-employment with no employees) and employer statuses.

We note that “contributing family workers” and “own-account workers” are classified as “vulnerable employment” in the employment-related target for MDG1 to eradicate poverty and hunger through “full and decent employment for all, including women and young people”. As Figure 16 confirms that not only did vulnerable employment account for more than half of total employment but also its share was higher for women (about 70%) than men (about 51%) in Africa.



Source: Authors, using data from ILO database

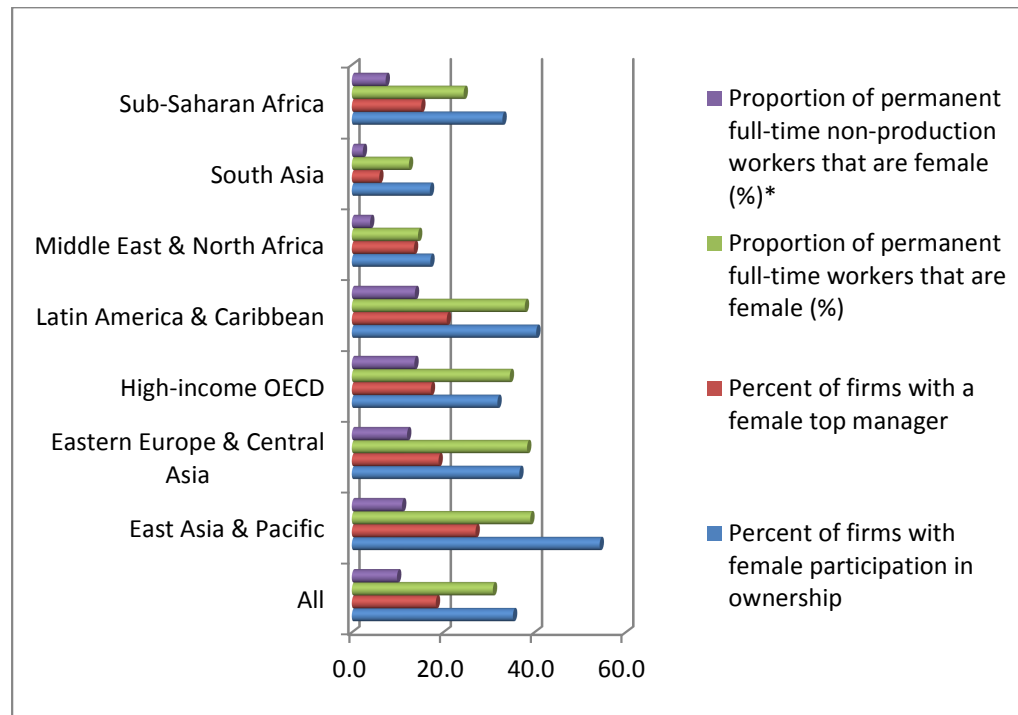
With the exception of Egypt among African countries for which data is available, the proportion of women in informal non-agricultural employment is larger than the proportion of men (Figure 17). Unfortunately, informal employment is closely linked to low earnings, poor quality jobs and poverty.



Source: Authors, using data from ILO database.

In addition, enterprise survey data suggest that female-employees (especially permanent full-time), female-owned and run enterprises are smaller than those for males (Figure 18)

Figure 18: Proportion of women in firm management, ownership and work



* Data from manufacturing forms only.

Source: Authors, using data from World Bank Enterprise Surveys, 2012.

III. The Review of the Literature

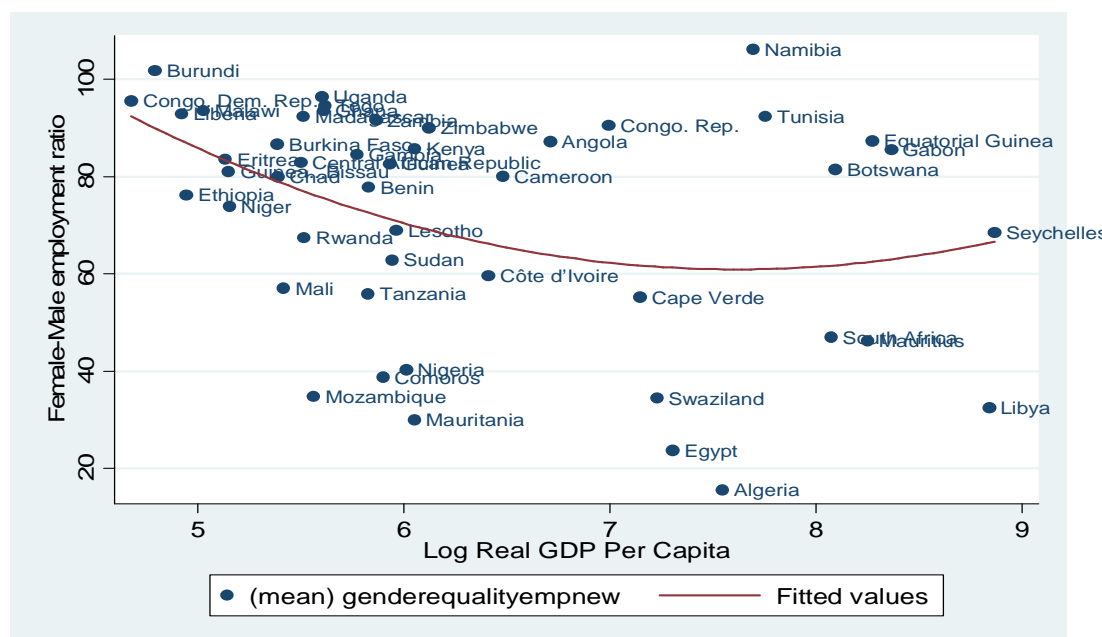
The literature suggests that the key factors affecting gender equality in employment relate to the level/stage of economic development, globalization, demographic factors, macroeconomic factors, infrastructure availability, education, cultural and social norms, perceptions and expectations, and political systems.

There is evidence that, as countries develop, female labor force participation, for example, displays a U-shaped trajectory. A number of hypotheses have been put forward as to why female labor force participation first falls before rising with economic development levels. Boserup (1970) suggests that men's greater access to education and technologies implies that they displace women from the labor force during the early stages of a country's development. As development continues and women gain more access to education and technologies, female labor force participation increases. Another well-established hypothesis for this phenomenon focuses on income and substitution effects. As development occurs, households' unearned

incomes rise, reducing the incentive of women to work outside the home. The negative impact of rising incomes on women's labor force participation is termed the "income effect," since greater household income implies that households are able to afford more female leisure time. On the other hand, the substitution effect works in the opposite direction—as female wages rise, more women have the incentive to enter the labor market (Goldin, 1995; Mammen and Paxson, 2000; Bloom et al., 2009; Chaudhuri, 2009; Tam, 2011). The stylized U-shaped curve holds for African countries. It can be seen in figure 19, which depicts the relationship between economic development (as captured by real GDP per capita) and female employment ratio across African countries between 1991 and 2011. Countries like Namibia, Tunisia, Equatorial Guinea, Botswana and Gabon have substantially higher levels of female employment ratios than the continental average relative to their per capita GDP levels, while employment ratio is near the continental average in countries such as Nigeria and Comoros.

The pattern of female employment ratio in Africa partly reflects natural resource endowment structure, whereby female employment ratio is lowest in fossil fuel-rich economies. For example, Algeria, Egypt, and Libya have very low employment ratios relative to their income levels. This pattern tends to conform with the often analyzed "cultural effect" in Muslim-dominated countries where female employment is considered socially and culturally acceptable as long as it does not interfere with women's primary role as wives and mothers given the notion, belief and persistent stereotypes that motherhood and child care represent a "woman's true vocation" (Blackburn, 2004; Stivens, 2006). As the case of Tunisia, however, demonstrates, legislation can codify social norms and "gendered beliefs" into gender-equalizing labor practices.

Figure 19: Africa: U-shaped correlation between gender equality in employment and GDP per capita, 1991-2011



Source: Authors, using data from ILO database.

Eastin and Prakash (2013) find a curvilinear relationship between economic development and gender inequality ('S shaped'), with three distinct stages. In the first stage, economic development improves gender equality because it enables greater female labor force participation. In the second stage, labor force stratification and gender discrimination encourage divergent male/female income trajectories, which decreases opportunity costs of female labor force withdrawal and lends credence to social resistance against rising gender norms. As a result, there is a decline in initial equality gains. In the final stage, gender equality again improves as greater educational participation and technological advancement provide new employment opportunities for women, increase opportunity costs of staying home, and encourage the evolution of new social institutions and norms that overcome prior discriminatory practices.

Recent empirical work finds that globalization can improve gender equality because foreign direct investment (FDI) and international trade can generate employment opportunities for women (Richards and Gelleny, 2007). According to Oostendorp (2009), inflows of foreign capital to local markets are held to have positive effects on gender equality as multinational corporations (MNCs) frequently provide women with employment outside of the home – often in countries where these opportunities would not have existed in its absence. However, in the long term, FDI may make women more likely to either lose their jobs to men or be pushed down the production chain into subcontracting work. Furthermore, FDI may further widen the gender gap as technical training is mostly offered primarily to men, thereby “improving male technical knowledge and reducing women’s access to technology and employment” (Parpart et al., 2000). Also, foreign investment could have a disproportional adverse effect on women if it serves to reinforce existing gender inequalities (Ward, 1984; see also Ernesto, 2011).

However, economic integration can solidify gendered occupational segregation, which forces women into poorly paid jobs. At the same time, policies designed to increase trade and FDI inflows reduce state revenue, and therefore reduce the government’s capacity to provide social services. Because women are often the key beneficiaries of these services, economic integration can undermine gender equality in many dimensions.

In a recent study, Tseloni, Tsoukis and Emmanouilides (2011) find that a relatively greater participation of women in paid employment is evidenced in more populous countries, with a greater share of women in their populations, more equal income distribution, and higher growth rates, but lower level of economic development, democracy ratings or international capital mobility (i.e., current account surplus or deficit/GDP). Also, declines in fertility have been found to exert a large positive effect on the labor force participation rate across the world (Bloom et al., 2009).

According to the findings of Niemi and Lloyd (1981), inflation has an independent, positive impact on female labor force participation. As a result of women’s lower cash holdings relative to men, it is posited that it possible that women are less adversely affected than men are by increases in inflation (Cardoso, 1992).

Chen (2004) shows that increases in the level of ICT infrastructure tend to improve gender equality in labor activity rates. In addition, the author shows that education among the general population, gender equality in education, and economic development are important for improving gender equality.

Lin (2012), in a study of the Japanese case, find that most of the aggregate changes in the country's gender employment gap result from changes in the regular and the non-regular employment between sectors. The combined effects of structural changes and the business cycle play the main roles in explaining the employment changes in Japan. Industry ICT intensity has increased the share of male regular employment in sectors that hire a larger proportion of professional workers but the opposite story is found in the case of women. This suggests that there is a gender bias in ICT usage within specialist/managerial occupations, with a larger share of women possibly involved in less complex computer tasks relative to men, and those tasks are more likely to be substitute by computer and irregular workers.

As Sakellariou (2011) had explained, changes in educational attainment, demographic profile of the population, explain changes in the female-male gap in labor force participation, especially in rural communities. Changes in education and literacy contribute to the explanation of variation in female labor force participation within a country (Ogawa and Akter, 2007; World Bank, 2010; Gallaway and Bernasek, 2004).

Recent findings by Cipollone,, Patacchini, and Vallanti (2012) show that increasing (positive) effect of the level of education and diminishing (negative) effect of fertility choices play important role in explaining women's participation to the labor market, with important differences across EU countries characterized by different institutional and welfare settings.

Campa et al (2011) analyze the extent gender culture affects gender gap in employment. They show that the index of gender culture based on firms' attitudes as well as female literacy and education are significant in explaining gender gap in employment in Italian provinces. As Forsythe et al. (2000), have noted, with respect to the effect of culture, "rapid development is particularly likely to be accompanied by greater gender rigidity in a country with a tradition of patriarchal institutional arrangements." Indeed, Boserup (1970), Moghadam (1994), Shukri (1996), Psacharopoulos and Tzannatos (1989) have found that Muslim and Latin American countries – countries with strong socio-religious views about women's role in the public sphere and the workplace - are more likely to be characterized by entrenched patriarchal institutions (see also Antecol, 2000; Fernández, 2010; Fernández and Fogli, 2005; Fernández, Fogli, and Olivetti, 2004).

In addition, the inter-state conflict literature, such as the seminal work by Hegre et al. (2001) supports a quadratic relationship between democracy and gender equality. Democracy could unleashes women's labor market potential and open up the decision-making process to the less privileged, including women, resulting in redistributive policies benefitting these groups. Democracy could also reduce gender inequality by increasing expenditures on social programs.

IV. The Model and Data

This section focuses on the econometric analyses of the determinants of gender equality in employment in Africa. We use the cross-sectional time series data covering 48 African countries to empirically study the key drivers of gender equality in employment in the continent, during the period, 1991 to 2009. The variable that proxies gender equality in employment (the ratio of the female to male employment for the age group 15-64 over the period (in percentage) was used as dependent variable. This indicator of gender equality reflects the gender gap in employment opportunities. Increasing values in the indicator indicate increasing levels of gender equality. The level of economic development along with other control variables, acted as independent variables.

Independent Variables

Level of economic development

To control for the level of economic development, we include a nation's real gross domestic product (GDP) per capita measured in terms of constant 2000 dollars. We also include the square of real GDP per capita in order to determine whether a non-monotonic relationship exists between development and gender equality in employment. The quadratic term tests the Böserup's (1970) assertion that the gap between men and women increases at intermediate levels of economic development but subsequently narrows after a nation has achieved a certain level of economic development. We also include economic growth (real GDP growth rate) separately to control for the possibility that an economic decline or slowdown might have adverse effects on gender equality in employment independent of the level of development.

Infrastructure

It is recognized that given that women (especially those in the rural setting) face severe time trade-offs between household chores and market work, programs targeted at reducing their time on chores are likely to increase their ability to engage in market-based income-earning opportunities. A good example is investment and provision of requisite infrastructure. These include access to affordable child care centers, energy, transport, and ICT infrastructure. It has been shown that new and emerging technologies, when accessible, can help to empower women, by opening new economic (including employment) opportunities, breaking down information barriers, enabling women to take collective action, and helping those in isolated communities engage in commerce. We use telephone and mobile phones (per 1000 persons), expressed in natural log form, to proxy infrastructure.

Institutionalized Democracy

It has been hypothesized that democracy increases equity in gender relations as women become empowered through the political process. This is because it is assumed that democratic regimes have greater respect for human rights, including women's rights, relative to

authoritarian regimes. We use the measure democracy from the Polity IV Project, in which a country's level of democracy is ranked along a 21-point spectrum, ranging from -10 for fully institutionalized autocracies to +10 for fully institutionalized democracies, based on research done at the Center for International Development and Conflict Management, University of Maryland. Since it is intuitively plausible that democratic countries encourage female employment, we expect that increasing levels of democracy act to increase gender equality in employment. Democracy is fitted as a quadratic function for capturing possible average across country non-linear effects.

Macroeconomic stabilization

Two indicators are used to measure macroeconomic stability: the inflation rate and domestic investment rate. With respect to inflation's effect on gender equality in employment, the current literature is inconclusive. Some experts contend that inflation will hurt women more than men since women are disproportionately represented among the poor and thus unable to protect their consumption levels in the presence of rising inflation. However, others assert that inflation will not harm women as much as men due to their lower cash holdings; further still, others contend that inflation may actually benefit women by increasing labor force participation. We expect inflation to have positive effect on gender equality in employment.

The second indicator of macroeconomic stability is a nation's domestic investment measured as a percentage of GDP. The higher the value of investment rate, the more resources a government ostensibly has at its disposal to spend on economic and social programs, including investments for employment creation.

Demographic factors

To measure the effect of key demographic variables on gender equality in employment, three indicators are used: population growth rate, ratio of female to male population of those 15 years to 64, and the share of urban areas to total population. Increasing population growth is expected to narrow the gender equality in employment. Inclusion of the sex population ratio ensures that changes in the population ratio due to changes in the sex population ratio are properly accounted for. In light of the above, the youth sex ratio is expected to have a positive effect on the student ratio. More specifically, increases in the youth sex ratio are expected to lead to increases in the student ratio. Thus, the higher the proportion of women in a nation's population, the higher will be the gender equality in employment. On the other hand, living in an urban area is associated with an increase in access to labor markets and formal employment opportunities. Women, like their male counterparts, have access to more economic opportunities in urban areas than in rural areas. This is because urban labor markets offer a wide variety of occupations, from manufacturing and services to clerical activities. Thus, increased urbanization rate is expected to lead to higher levels of gender equality in employment.

Globalization

In order to control for the effect of globalization on gender equality in employment, trade openness of the economy and foreign direct investment (FDI) are included as explanatory variables and it they measured as percentage of GDP.

A nation's openness to trade, defined as the sum of net exports of goods and services as a percent of GDP. An increase in openness is hypothesized to augment female labor force participation thereby narrowing the gender gap. In addition, if the export sector is primarily capital intensive, then gender equality is expected to increase as a result of differential access to productive resources.

As authors like Oostendorp (2009) have argued, FDI is assumed to be positively associated with gender equality in employment. On the other hand, other authors have argued that FDI can have a negative effect on gender equality by serving to reinforce existing gender inequalities in the access to the labor market and the gender division of labor. Indeed, in predominantly agricultural nations of Africa, men have a greater advantage in producing export crops, compared with women who predominately produce crops for subsistence and local consumption hence the greater the access to export channels through FDI would further widen the gender gap. Many African countries are today blessed with abundant natural resources, which have been attracting huge FDI. Unfortunately, most natural resources sectors such as minerals, are enclave and capital-intensive sectors, and operate to the advantage of men thus widening the gender gap in employment.

Level of General Education

Education tends to broaden one's views, reduce ethnocentricity, and thus increase one's flexibility of accepting new customs and norms. As such, the level of education attained by the general population plays an important role in increasing acceptance of the concept of gender equality. Indeed, women with higher levels of education are more likely to enter the labor market, especially in urban areas, which may reflect their higher wage premiums and higher opportunity cost of being inactive (Ogawa and Akter, 2007; World Bank, 2010a).

International Wars/Conflicts

International wars and conflicts can fundamentally disrupt jobs by destroying or damaging infrastructure and access to markets, as well as through altering incentives. In particular, when an entire country is affected by conflict, the employment challenge is particularly daunting as a result of institutional breakdown and fractured connectivity with the rest of the world. It has been argued that out of necessity, women may intensify their economic activity during periods of conflict. Indeed, conflicts increase female labor force participation, as women work to help their households cope with income shocks and to compensate for the absence of men who are fighting (World Bank, 2012a). However, gender equality in employment may suffer in conflict situations through direct victimization of women and indirect spousal and child loss (Gangoli,

2006). In addition, prolonged periods of conflict can limit a country's capacity to cultivate and develop social norms and invest in social programs that promote gender equality in employment (Jansen, 2006). We therefore control for a country's involvement in international conflict by including a dichotomous variable coded 1 if a country was a participant in a conflict and zero if not. The data are from the Uppsala Conflict Data Program and International Peace Research Institute, (UCDP-PRIO). International conflict is defined as a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, resulting in at least 25 battle-related deaths.

Country, sub-regional effects, and oil effects

We include country and the five sub-regional dummies to capture country and sub-regional effects. In addition, to capture the effects of net oil exporters, we add two dummies representing net oil exporters and net oil importers.

The Model

Based on the above review and following the frameworks posited by Chen (2004), Tseloni, Tsoukis and Emmanouilides (2011), and Eastin and Prakash (2013), the relationship that we want to estimate can be written as:

$$\log GE_{it} = \alpha_i + \beta_1 \log(rgdp_{it}) + \beta_2 \log(rgdp_{it}^2) + \beta_3 \log(telmobile_{it}) + \beta_4 (democ_{it}) + \beta_5 (democ_{it}^2) + \beta_6 (X_{it}) + \beta_7 (Z_{it}) + \varepsilon_{it}$$

$(i = 1, \dots, N; t = 1, \dots, T), \dots \dots \dots (1)$

where GE is the measure of gender equality in country i at time t ; α_i is a fixed effect reflecting time differences between countries; β_1 is the elasticity of gender equality with respect to real per capita income in 2000, $rgdp$; β_2 is the gender equality elasticity with respect to quadratic real per capita GDP; β_3 is the elasticity of gender equality with respect to infrastructure, $telmobile$; β_4 is the coefficient of democracy, $domec$; β_5 is the coefficient of the quadratic of democracy; X is the control variables, including inflation (inf), domestic investment (% of GDP) (inv), trade openness ($open$), foreign direct investment (% of GDP) (fdi), secondary school enrolment ratio ($educ$), urban population share ($urban$), population growth rate ($popg$), sex population ratio ($popratio$), and international wars ($intwars$); Z represents country, sub-regional and oil effects dummies used as fixed effects; and ε is an error term that includes errors in the gender equality measure. We use the North African dummy with its separate estimation to check if indeed, North Africa is different.

Data for these variables are largely drawn from the World Bank's WDI Online database, except as indicated in appendix 1. OLS regressions with country, sub-regional, and oil fixed-effects

were estimated to investigate the determinants of gender equality in employment. Table 1 provides detailed descriptions of the raw dataset.

Table 1: Descriptive Statistics of Main Regression Variables (Excluding Dummies), 1991-2009

Variable	Observations	Mean	Standard Deviation
Gender equality in employment	950	70.84	20.85
Real GDP per capita	960	1065.43	1573.73
Telephone & mobile phone	951	119.14	215.22
Democracy	916	-3.57	23.17
Inflation	877	92.66	1175.11
Domestic investment-GDP	950	20.78	11.13
Openness	942	75.10	38.56
FDI-GDP	962	3.88	9.45
Education	623	36.72	26.36
Urban population share	1007	38.23	17.31
Population Growth	1007	2.33	1.14
Sex Population Ratio	988	1.03	0.06
International wars	825	0.04	0.43
Economic Growth	966	3.93	7.68

Note: These are raw data before the log and other transformations.

Source: Authors' Calculations.

V. Model Estimation Results and Analysis

Table 2 presents the results of estimating the gender equality in employment equation (1).

Level of economic development

In our basic model, the coefficient associated with real GDP per capita is found to be negative and statistically significant in both the overall Africa sample and in the Sub-Saharan and North African samples. To test the hypothesis that real GDP per capita has a non-monotonic relationship with gender equality in employment, the squared real GDP per capita is included as an explanatory variable. The quadratic term is positive in sign and significant at the five percent level in all three samples. These results provide evidence of U-shaped relationship between real GDP per capita and gender equality in employment. Thus, our results suggest that although higher levels of real GDP per capita are negatively associated with gender equality in employment, the effect is not constant. Rather, for levels of real GDP per capita above a certain point, higher levels of real GDP per capita act to increase gender equality in employment, holding other factors constant. This relationship suggests that the marginal effect of real GDP per capita exhibits increasing returns for gender equality in employment. Thus, our findings support Böserup's (1970) assertion that the curvilinear relationship between economic

Variable	Africa		Sub-Saharan Africa		North Africa	
Real GDP per capita	-11.541 (-2.92)**	-11.981 (-3.00)**	-10.855 (-2.73)**	-11.189 (-2.77)**	-102.605 (-2.07)**	-66.213 (-1.32)
Real GDP per capita ²	0.646 (2.27)**	0.659 (2.31)**	0.607 (2.11)**	0.619 (2.14)**	7.291 (2.36)**	5.363 (1.74)*
Telephone & mobile phone	0.422 (2.85)**	0.425 (2.87)**	0.603 (3.87)***	0.603 (3.86)***	-1.937 (-2.97)**	-2.644 (-3.74)***
Democracy	0.237 (4.05)***	0.234 (3.99)***	0.225 (3.78)***	0.222 (3.72)***	1.803 (1.73)*	2.004 (2.00)*
Democracy ²	0.003 (3.92)***	0.003 (3.86)***	0.003 (3.62)***	0.003 93.57)***	-0.324 (-1.55)	-0.362 (-1.81)*
Inflation	0.006 (2.01)**	0.006 (2.08)**	0.001 (2.16)**	0.007 (2.19)**	-0.051 (-1.12)	-0.048 (-1.10)
Domestic investment-GDP	-0.040 (-2.70)**	-0.041 (-2.73)**	-0.043 (-2.90)**	-0.044 (-2.91)**	0.026 (0.45)	0.035 (0.63)
Openness	0.031 (4.24)***	0.031 (4.24)***	0.027 (3.62)***	0.027 (3.62)***	-0.035 (-0.860)	-0.024 (-0.60)
FDI-GDP	-0.033 (-1.55)	-0.035 (-1.67)*	-0.028 (-1.30)	-0.030 (-1.38)	-0.194 (-1.32)	-0.209 (-1.49)
Education	0.073 (3.64)***	0.076 (3.72)***	0.072 (2.86)**	0.075 (2.91)**	0.016 (0.50)	-0.029 (-0.77)
Urban population share	0.164 (2.73)**	0.160 (2.64)**	0.065 (1.03)	0.062 (0.98)	1.759 (6.25)***	1.919 (6.88)***
Population Growth	-1.542 (-5.96)***	-1.566 (-6.01)***	-1.484 (-5.62)***	-1.503 (-5.64)***	3.974 (2.99)**	4.217 (3.32)**
Sex Population Ratio	-21.396 (-4.43)***	-21.542 (-4.46)***	-22.574 (-4.44)***	-22.686 (-4.46)***	-8.221 (-0.91)	-9.468 (-1.09)
International wars	-0.923 (-3.67)***	-0.922 (-3.66)***	-0.905 (-3.63)***	-0.904 (-3.62)***		
Net oil exporters	-14.273 (-5.72)***	-7.953 (-2.42)**				
Net oil importers			3.463 (1.13)	4.533 (1.36)		
North Africa	-34.796 (-11.67)***					
Southern Africa	19.105 (7.06)***		19.496 (4.86)***			
Central Africa	24.762 (8.88)***		27.760 (9.84)***			
East Africa	-23.773 (-6.53)***		-13.544 (-3.26)***			
West Africa						
Real GDP Growth		0.018 (0.82)		0.012 (0.54)		-0.093 9-2.09)**
Constant	125.567 (7.72)***	147.202 (9.43)***	113.910 (7.29)***	143.905 (8.55)***	246.979 (0.233)	72.984 (0.35)
R-squared	0.9952	0.9952	0.9926	0.9926	0.9684	0.9722
Adjusted R-squared	0.9944	0.9944	0.9912	0.9912	0.9522	0.9566
F-statistic	1204.90	1182.20	725.64	709.56	59.54	62.18
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
N	373	373	322	322	51	51

Note: t-values are in parentheses; ***= 1% significant level; **=5% significant level; *=10% significant level.
Source: Authors' Estimations.

development and gender equality is U-shaped. However, this U-shaped relationship contradicts the findings of Chen (2004), Tseloni, Tsoukis and Emmanouilides (2011), and Eastin and Prakash (2013).

Infrastructure

Our results show that the coefficient of the ICT infrastructure variable is positive and statistically significant in the overall Africa and Sub-Saharan Africa data, but negative and statistically significant in North Africa. Thus, overall and in Sub-Saharan Africa, we can conclude that our results indicate that improvements in the level of the ICT infrastructure tend to lead to improvements in gender equality in employment. This result is consistent with those of Chen (2004) who used five different indicators of ICT infrastructure (the number of computers per 1,000 persons, the number of Internet users per 1,000 persons, the number of telephones per 1,000 persons, ICT expenditure as a share of GDP and ICT expenditure per capita to estimate their effect on the ratio of the female to male labor activity rates.

Institutionalized Democracy

Institutionalized democracy is positive and statistically significant across all samples (Africa, Sub-Saharan Africa, and North Africa), confirming earlier findings such as those of Tseloni, Tsoukis and Emmanouilides (2011), and Eastin and Prakash (2013). The quadratic term included to determine whether democracy has a nonlinear effect on gender equality employment is also positive in sign and statistically significant, indicating a positive accelerated relationship between democracy and gender equality in employment, holding other factors constant.

Macroeconomic stabilization

Except for North Africa, rising inflation is found to be positively associated with increasing levels of gender equality in employment. This is consistent with some of the results of Eastin and Prakash (2013). This finding may be attributed to that reduction of real wages increases female labor force participation as women enter the workforce to supplement household earnings, in addition to the fact that women's lower cash holdings relative to men makes women in the labor market less adversely affected than men are by increases in inflation.

As shown in Table 2, a nation's domestic investment rate is found to be negatively associated with gender equality in employment in the overall Africa and Sub-Saharan African estimations. The explanation is rooted in wastages, inefficiency, and corruption associated with most investment projects in most African countries. Investment in white-elephant, unproductive activities, remains a development challenge in Africa, especially in the Sub-Saharan African nations.

Globalization

Trade openness is positive in sign and statistically significant at the one percent level in each of the overall Africa and Sub-Saharan Africa estimations. This result supports the view that increasing levels of exports relative to imports may increase gender equality and further that an external market orientation may further enhance women's empowerment. This may also suggest that labor-intensive export sectors dominate the capital-intensive sectors, especially in Sub-Saharan Africa.

On the other hand, FDI-GDP ratio had negative but statistically insignificant effect on gender equality in employment, except in a case for the overall data. Our results, therefore, does not support the proposition that the inflow of foreign direct investment enhances gender equality in employment.

Education

The education variable has positive and statistically significant effect on gender equality in employment in the all-Africa and Sub-Saharan Africa estimations. This result is consistent with those of Chen (2004). This supports the hypothesis that education tends to broaden one's awareness of cultures and social norms that exist in industrial countries where women are in most circumstances entitled to the same freedoms and opportunities as extended to men (Chen, 2004).

Demographic factors

Increasing urbanization rates are found to be positively associated with increasing gender equality in employment in all-Africa and, especially, North Africa estimations. As seen in Table 2, this effect is statistically significant at the five percent level in the overall sample and at one percent level in the North African sample.

Furthermore, our results suggest that rising population growth rates have negative and statistically significant effect on gender equality in employment in Africa as a whole and in Sub-Saharan Africa. However, it has a positive and statistically significant effect on gender equality in employment in North Africa. The North African result supports the results of Eastin and Prakash (2013) for gender gaps in labor force participation.

The ratio of female to male population has negative and highly statistical significant effect on gender equality in employment in all-Africa data and Sub-Saharan Africa sample. Thus, the higher the proportion of women in a nation's total population, the lesser the level of gender equality in employment in that country.

International wars and conflict

International wars and conflict exhibit strong negative relationship with gender equality in employment in all estimations, except for North Africa. The results tend to confirm earlier findings, suggesting that wars and conflicts are highly detrimental to gender equality.

Economic Growth

In view of the various arguments about the effects of growth or development, we also entered the real GDP growth, in addition to real GDP per capita. The results do not change except that real GDP growth was insignificant for all-Africa and Sub-Saharan Africa estimations. However, it turned out to have a negative and significant effect on gender equality in North Africa – a partial indication of the non-inclusiveness of economic growth.

Sub-regional and Oil Effects

The sub-regional fixed effects, which shift the intercepts, imply that North African countries (with the exception of Tunisia), followed by those in East Africa, systematically have more gender inequality in employment compared to the rest of the continent while Sub-Saharan Africa shows less female exclusion but more female employment. This lends credence that North Africa is indeed different.

Our results also show that net oil exporting countries, generally have more gender inequality in employment compared to net oil-importing countries in Africa. This result suggests that, holding other factors constant, net oil-exporting countries experience higher levels of gender inequality in employment than net oil-importing countries. In this sense, our results lend support to the hypothesis advanced by Inglehart (1997) and Ross (2008) that oil-exporting nations tend to increase gender inequality by excluding women from the formal economy.

VI. Conclusion and Policy Recommendations

Our empirical estimates, using available cross-sectional data over the period, 1991 and 2009 suggest that all-Africa and Sub-Saharan African samples, quadratic levels of real per capita GDP, greater ICT infrastructure availability, increased democracy (and its quadratic form), higher prices, greater openness, more education, and higher urban share of the population increase gender equality in employment while higher level of real GDP per capita, higher gross domestic investment, population growth rate, sex population ratio, international wars and conflicts, and being a net oil-exporting country tend to lower it. However, North Africa is different. Apart from negative and highly significant North African dummy in the overall results, the North African specific sample results indicate that while the quadratic element of real GDP per capita, increased democracy, higher urban share of the population, and high population growth increase gender equality in employment, higher levels of real GDP per capita, and ICT infrastructure tend to lower gender equality in employment in the sub-region.

What are the implications of these results for African countries? Given our finding that domestic investment reduces gender equity in employment in African countries, achieving investment effectiveness must remain as an active goal of governments. All actors, from governments to civil society, share responsibility for making investment more productive, efficient and effective and preventing one of its main breakdowns: corruption. Political will and good governance, strengthening accountability and transparency as well as enlarging civil society space as a ‘watch dog’ are critical in this direction. Attention should be paid to both the design, implementation, and monitoring and evaluation phases of projects and programs. At the design stage, the aim should be to create achievable and quantifiable targets and to have all-stakeholder ownership through the collaboration of governments, the private sector, civil society and other development agencies. All stakeholders must follow through to ensure that projects and programs are implemented as designed. Also, stakeholders must ensure that those projects and programs are regularly monitored and evaluated against indicators established in the design phase and that are agreed on by the development partners.

Productive and efficient domestic investment requires the development of coordinated, objective and transparent processes for decision-making based on thorough and rigorous cost-benefit analysis. Adoption of high level best practice principles to inform the development of these processes will help African governments achieve this. Those broad principles should include the following key elements: a nationally coordinated approach to the development of significant strategic projects and programs; the promotion of competitive markets; decision-making based on rigorous cost-benefit analysis to ensure the highest economic and social benefits to the nation over the long term; a commitment to transparency at all stages of the decision-making and project implementation processes; and a public sector financial management regime with clear accountabilities and responsibilities. To reduce waste, fraud, and corruption, all African countries should embrace and fully implement Transparency International’s (2009) “Integrity Pacts”, that set out rights and obligations to the effect that neither side in contracts will pay, offer, demand or accept bribes, or collude with competitors to obtain the contract, or while carrying it out.

The current study suggests that, holding other factors constant, increasing levels of levels of FDI are associated with decreasing gender equality. Thus, to promote gender equality, and in turn, to ensure women have complete access to productive resources, African countries should regulate the inflow of foreign capital to ensure labor-intensive industries are not displaced by globalization. Further, to protect against threats to individual basic rights, the government should mandate that MNCs adhere to core labor standards, as provided by the International Labor Organization (ILO). Since labor-intensive employment represents a viable channel through which women are able to realize gains in real wages and social capital, the protection of these industries should be a policy priority for African countries.

In this study, we have found that infrastructure is critical in promoting gender equality in employment, especially in Sub-Saharan Africa. Women often face stark time trade-offs between household chores and market work, particularly in rural areas. Therefore, programs targeted at

reducing women's time on chores—for example, through investment in infrastructure—are likely to increase their ability to engage in market-based income-earning opportunities.

African governments should start encouraging entrepreneurship and access to financing, especially for the women (and men). The Continent needs entrepreneurs ready and able to explore new opportunities. Women need training in entrepreneurship and to be encouraged to take risks and start businesses and subsequently become employers themselves (WEF, 2012a, b).

Effective policies that invest in human capital of the workforce are needed. Policies that promote the up-skilling, better training and education for the low-skilled workforce are imperative. Both the up-skilling, labor market training, educational reforms that conform to industry needs will also help address the skills mismatches existing in many African countries.

Since unemployment benefits, social protection and employment protection are part of the core ILO labor conventions that member states have ratified, it is imperative that these conventions are being upheld by countries in African countries. Countries that do not proper social insurance systems need to enact innovative policies and strengthen labor legislation. Governments need also to foster inclusive societies and working environments, enforcing anti-discrimination laws and supporting equal opportunities and empowering women in the labor market.

African governments need to dialogue with large employers in creating employment for the women (and men) through strategic skills planning, skills development, and skills matching. Addressing the skills mismatch in the short-run will require improved training programs and closer links between tertiary and vocational educational institutions on the one hand, and the private sector on the other. Training programs should include on-the-job initiatives targeting those already working, as well as graduates with a general education who lack specific work skills. In addition, governments need to develop innovative public-private partnerships and the opportunities for collaboration among large employers, governments and other relevant stakeholders such as higher and vocational educational institutions to transform institutional structures and strengthen the region's economy (Ncube and Anyanwu, 2012).

Indeed, stronger university-industry linkages are essential. This can be done by including private sector representatives in national education and training policy bodies and on academic boards involved in curriculum development. No doubt, this will also facilitate private sector funding for research, scholarships, internships and apprenticeships.

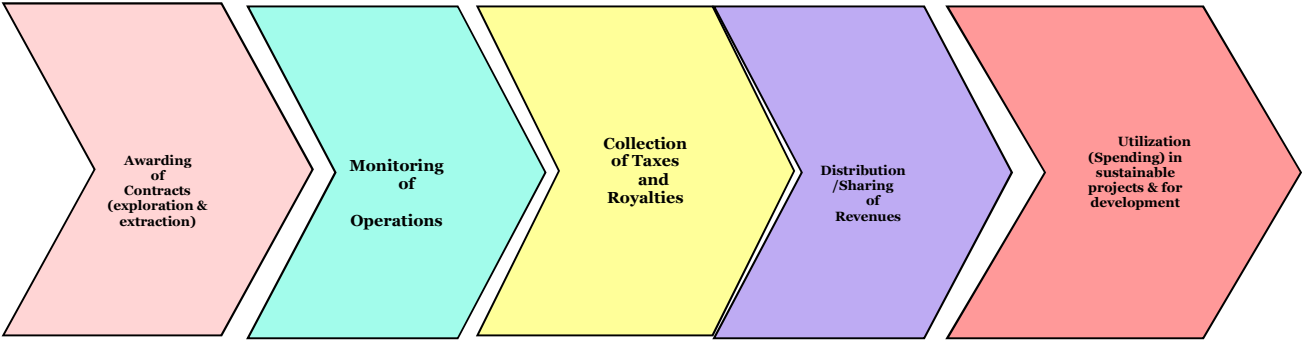
Our results also point to governmental efforts in not just increased human capital, especially for the women, but more importantly reforming the educational curriculum for better quality education and skills. Other measures include targeted government expenditure on women in addition to introducing legislations and enacting the right fiscal policies and investment climates to increasingly formalize the informal sector.

The literature has identified a number of possible policy instruments to deal with inequality of all forms, including, guaranteed employment schemes, labor market training, greater access to health, nutrition and education through increased social investments, affirmative action, and land and property rights reforms, especially to benefit rural dwellers (particularly women). Improving access to education, for example, can reduce inequality both by increasing individual productivity and by facilitating the movement of poor people from low-paying jobs in agriculture to higher-paying jobs in industry and services. More importantly, public spending on education (as well as on health and other human capacity), when targeted at women, especially the poor, can produce a double dividend, reducing gender inequality in employment in the short run and increasing the chances for women to access formal jobs and thus break free from poverty trap. Increasing educational levels (and its quality) should be accompanied by a strong investment climate to ensure that productive jobs are created for the newly educated men and women.

Policies to transfer cultural/social norms and practices, especially in North African countries, are essential. In particular, the process of rapid urbanization in North African nations that is currently underway brings with it the possibility of newly defined roles for men and women, as traditional social norms and production relations become more relaxed and new parameters regarding appropriate forms of behavior are formed. The education system should also be used as an important means to change gender inequality and promoting social norms from a young age. Indeed, the integration of gender equality principles into the school and professional curricula can tackle the value system of children early on and challenging discriminatory social norms. In addition, promoting women’s voice and participation in public settings and increased information obtained from exposure to enlightened television programming also play a critical role in changing social norms.

We have shown in this study that being a net oil exporting country promotes gender inequality in employment. Thus, efficient management of oil and other natural resources in African requires actions throughout the value chain (Figure 20).

Figure 20: Natural Resources Value Chain



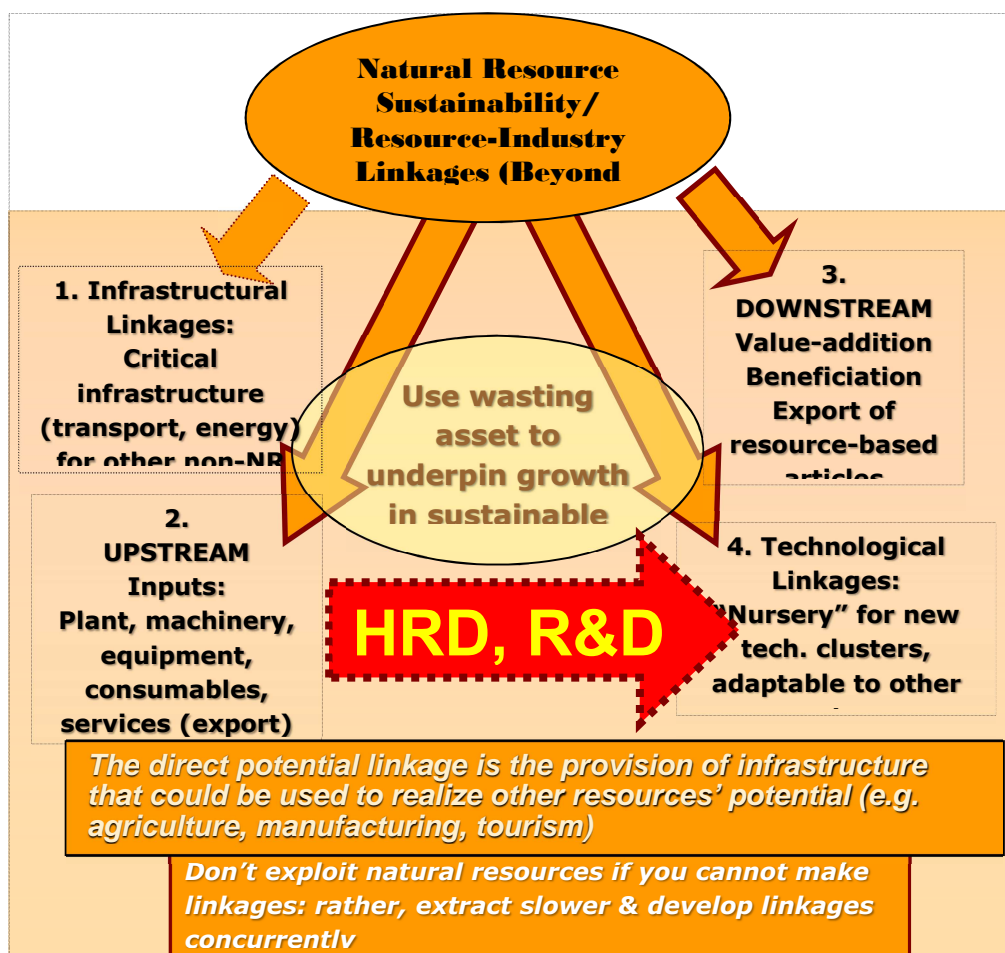
In particular, a new natural resources management framework is needed for better governance, sectoral linkages, economic growth and human, capacity and infrastructure

development – with strong parliamentary legislation, oversight, and representation throughout the resources value chain.

Key effective natural resource management practices will require the following measures:

- Enhanced good governance, especially as it relates to the way public money is spent, is a crucial factor in turning a natural resource boom into an opportunity for growth and development, job creation, and gender equality in Africa. Prioritizing public investment management system is imperative. Checks and balances need to be maximized through parliaments.
- Integrating the extractive sector into national development frameworks - Revenue optimization needs to be integrated with the downstream sector. Value-addition and natural resource-industry linkages are paramount. The many opportunities for improving positive linkages between the natural resource sector and development initiatives are shown in Figure 21.

Figure 21: Key Linkages - Natural Resources and Development



Source: Author, adapted & revised from AfDB (2007).

- Reinforcing institutional capacity and building strong and capable institutions.
- Sound fiscal policy and diversification of economy while using windfall taxes to protect against renegeing on taxation.
- There has to be full disclosure of terms of natural resources contracts and activating third-party brokers such as development partners (e.g. AfDB) and NGOs to ease information availability and reduce information asymmetry.
- African natural resource-rich countries should stop the practice of entering into bilateral development agreements with extractive companies for generous concessions in extraction contracts. Consequently, all contracts and terms should be legislated in the substantive law and implemented as such.
- African countries' company and financial laws should be reformed to require all extractive companies to use the EITI template in their annual financial reports by law.

We also find that wars exacerbate gender inequality in employment in African countries hence appropriate actions are necessary to reduce and prevent wars and conflicts in the continent. In another study on Africa, Anyanwu (2004) found that GDP per capita growth rate in the preceding period, the amount of natural resources, peace duration, democracy, social fractionalization, and population size are significant and strong determinants of the onset of civil wars in Africa. These results are guideposts for policy to reduce civil war onset in Africa. First, African countries and their development partners need to take measures to accelerate inclusive economic development given that rapid economic development will gradually make rebel recruitment harder. Second, the international community should take measures (including appropriate sanctions) to make it more difficult for rebel organizations to sell the commodities (such as conflict diamonds), which they loot. Third, African countries need to diversify their economies away from dependence upon primary commodity exports. Appropriate economic reforms and policies would therefore be imperative in this direction (see Collier, 2000). Fourth, to make loot-seeking rebels unpopular, African governments should transparently use revenues from primary commodity exports to finance effective basic social services, including education and health. However, economic development must be complemented by political development and liberalization to attain an amplified effect. The pace of political reforms toward better governance and improved political rights should be accelerated in Africa given that our results have shown that democracy is a useful tool to reduce the onset of civil war in the Continent as well as for accelerating gender equality in employment. African countries may also need to check population increase through a combination of economic and social as well as medical tools given the finding that the risk of civil war is proportional to the size of the population.

In this study, we have shown that both population growth and higher female ratios in the population (further reflection of higher population growth), there is urgent need to intensify family planning services efforts and activities in African countries so as to improve knowledge, acceptance and practice (KAP) of family planning. This will involve not only increased financial outlay but also research on fertility determinants as well as decentralized planning, delivery and supervision of family planning services (Anyanwu et al, 1998a, b).

A key question one might ask is: how will African countries raise the money that is required to achieve all the above, especially in the face of vanishing foreign aid, lean domestic resources and serious debt crisis in Europe and budget crises in the US? The good news is that a major part of what is required is not money but the political will, commitment, transparency and accountability, collaborative spirit to formulate and faithfully implement the requisite policies, strategies, plans and collective action as well as the institutional changes needed for increased job creation for the youth. Also, African countries need to redouble their efforts to mobilize domestic revenues, which in 2008 represented 10 times the total volume of aid flowing to the continent. To do this, African countries need tax reforms for fair and efficient tax systems, improved tax administration, deepened tax-base, diversified tax mix and encouragement of investment by the private sector, including foreign ones.

In addition, emerging partners like the BRICs are redefining international cooperation, especially with Africa. For example, some emerging partners (China, and to a lesser extent India, Brazil and Turkey) have grown to exert regional and global influence on development cooperation. Apart from increased trade that had hit about US\$150 billion in 2011, it has been estimated that between 2005 and 2010, about 14% of Chinese overseas investments went to sub-Saharan Africa. Forecasts have it that investments from China into SSA are likely to hit US\$50 billion by 2015, an increase of 70% from 2009. With a large chunk of these investments going to help build roads, rails, and ports, through dialogue local youth labor should be used for the execution of those projects instead of importing labor from abroad. Part of those investments could also be tapped for education in entrepreneurship and skills development.

Without doubt, sustainable inclusive growth and development as well as inclusive governance should be the basis for policy-makers and leaders in Africa to bridge the transformation between pain of current women unemployment time bomb, especially in North Africa and net oil-exporting countries, and the promise of the future.

APPENDIX 1

Appendix Table 1: Description of Variables	
Variable	Source
Employment ratios	World Bank/International Labor Organization (ILO) database
Per Capita GDP (constant 2000 US dollar)	World Development Indicators
Telephone & mobile phones	World Development Indicators
Democracy	Polity IV Project
Trade openness ((imports + exports)/GDP)	World Development Indicators
School enrolment rate	World Development Indicators
Inflation (annual percentage change in CPI)	World Development Indicators
Urban population ratio	World Development Indicators
Population	World Development Indicators
Domestic investment	World Development Indicators
FDI	World Development Indicators
International Wars/Conflicts	Uppsala Conflict Data Program and International Peace Research Institute, (UCDP-PRIO)

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