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# European Union's SPS and TBT Measures, Gender Specific Obstacles and Agricultural Employment

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## **Abstract**

*We investigate the implications of EU non-tariff barriers in the form sanitary and phyto-sanitary (SPS) measures and technical barriers to trade (TBT) on gender relations in the agricultural labour market between 1995 and 2012. Our results indicate that women are disproportionately disadvantaged in the agricultural sector not only because of the inimical effect of the non-tariff measure, but more so because of their unequal access to opportunities such as gender inequality in secondary schooling the heavy burden of reproduction actives which makes them less available for gainful employment. However, gender parity achieved in primary education and increased access to time saving infrastructure increases their share of employment in the agricultural sector. Thus, proactive measures aimed at infrastructure investment that reduces women care burdens and building the educational capacity of women to effectively deal with such non-tariff barriers, could work to remove these gender specific obstacles, enable women respond to employment opportunities and minimise any gender disparity caused by trade.*

**Keywords:** Non-tariff measures, Sanitary and phyto-sanitary measures, Technical barriers to trade, Employment, Gender, European Union

**JEL:** F13 F14 F16 J16 J43

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## **1.0 Introduction**

Agricultural is the backbone of many developing countries and a significant part of the production is exported to developed countries, thus, trade is used as a source of foreign exchange earner. However, as tariff has been negotiated down, there is an increasing proliferation of non-tariff barriers on agricultural products, particularly sanitary and phyto-sanitary (SPS) measures and technical barriers to trade (TBT), which may hinder the ability to access global markets. Over the past years, standards have emerged as increasingly powerful tool that provides guidelines for food regulations and it is regarded as one of the most trade inhibiting non-tariff barriers affecting developing countries (Maertens and Swinnen, 2009;

Czubala et al, 2009). By definition, these measures are usually imposed as a safeguard measure to ensure plant, animal, wildlife and human safety and health (WTO, 1999). Their advantages for international trade have been widely documented in the literature. SPS and TBT measures help in building value into certified goods and services by providing consumers with information and assurance about their health and safety (Kareem, et al, 2017).

However, SPS and TBT standards may either constitute a barrier or catalyst for export success. They may constitute a barrier to trade because meeting these restrictive standards imposes excessive costs on producers and farmers (Czubala, et al, 2009). For instance, the mean investment costs of compliance to product standards can be as high as 124% of firms' sales for Sub Saharan Africa, 13.36% in Latin America, 44.1% in the Middle East, 15.75% in South Asia and 55.65% in Eastern Europe (Maskus et al, 2005). Such huge costs may be difficult to bear particularly for small scale producers and farmers many of whom are women, consequently inhibit market access, leading to the contraction of labour in the agricultural export sectors. Although standards can be a barrier to trade and employment generation, it can however also be a catalyst for export success through foreign exchange and employment generation once countries comply with such measures. According to Jaffee and Henson (2008), it is not always the case that these standards are inhibiting trade but evidence suggests that some developing countries are upgrading their supply chains to comply with even stringent standards and are able to compete in the global markets, and are using trade to increase employment and alleviate poverty.

Notwithstanding, evidence however suggest that trade has been less favourable for women due to the inequality of opportunities and gender-specific obstacles that are already existing in the society. These obstacles relate to inequality in education and training, land tenure system which discriminate against women's right to hold land, poor health and infrastructure facilities which results into prevalence of diseases which in turn increases women's care burden, limited access to credit and more importantly, their lack of technical expertise to comply with agricultural regulations such as sanitary and phyto-sanitary standards and technical regulations (Fontana and Paciello, 2000). Women are usually disadvantaged in complying with these trade regulations because they usually lack the job specific technical expertise and skills as they seldom receive on-the-job training because they are occupationally segregated into activities which do not give them the needed opportunity for skill development and enhancement and also due to gender segregation in technical training or vocational programmes in which employees prefer to train men than women (Kabeer, 2012). In addition, the trainings if available to women are not designed to meet women's limited time constraints - arising from, their double burden of unpaid domestic care and productive activities resulting in significant time poverty and mobility constraint and limiting their ability to fully comply with international trade regulations and ability to engage in gainful employment and increasing their vulnerability to job losses. Thus, the purpose of this study is to investigate the gender implications of EU SPS and TBT regulations on agricultural employment. In addition, we investigate the extent to which the identified gender obstacles and opportunities are perpetuating existing (in)equality.

There is a growing body of literature looking at the gender implications of trade. Many of these studies have investigated the gender impact of trade liberalization, such as a tariff cut (Bhattacharya et al, 2008; Kucera et al, 2012), others concentrated on the gender effects of increased exports on manufacturing employment or economy-wide employment (Kucera and Milberg, 2000; Seguino, 2000; Tijani and Milberg, 2010;), or on the agricultural sector (Fontana and Paciello, 2009; Newman, 2002). However however, the gender impacts of food safety standards is still unclear as this remains under-researched despite the fact that the sector accounts for the bulk of female trade related employment activities especially in many

developing countries particularly in Africa and Asia where women workers are crowded into the agricultural sector (Fontana and Paciello (2009). The implications of such NTBs for gender outcomes is important given the fact that gender equality can stimulate economic growth and development (Balioune-Lutz and McGillivray, 2009; United Nations Trade and Development Board (2009). This is because empowering women increases the share of household budget allocated to children's health, education and nutritional related expenditures and significantly increasing human capital development (Duflo, 2000; MacPhail and Dong, 2007). More so, unused female employment potentials is indicative of an inefficient allocation of a country's resources (Korinek, 2005). New evidences on the gender impacts of NTBs not only needed to help us better understand the phenomenon and proffer targeted policy interventions that would bring would remove gender-specific obstacles that hinder women's ability to engage efficiently in the agricultural sector, respond to employment opportunities and benefit from trade.

In this study, we address this research gap by analyzing the impacts of food safety standards on agricultural employment using a panel data on 90 countries to examine the gender impacts of EU standards on agricultural employment between 2008 and 2013. Our focus on the EU is due to two important reasons. Firstly the EU standards remain one of the strictest in the world. Secondly, EU import a third of all exports, thus, any trade policy implanted by the EU would have meaningful implications on its trading patterns, thus necessitating our focus on the EU. Our major findings are that EU standards widens the gender gap disadvantaging women however, raising or resolving an concern about EU standards by affected countries significantly promotes gender equality, in favor of women. The gender employment effects are perhaps attenuated by the entrenched gender inequality in education and increased reproductive duties of women.

The rest of the paper is organized as follows. The next section provides some background on the gender conditions in the agricultural labour market and information on EU food safety standards. Section 3 reviews the literature and section 4 contains the methodology of the study. Section 5 discusses the empirical results. The last section concludes.

## **2.0 LABOUR MARKET CONDITIONS, EU AGRICULTURAL TRADE POLICY**

This section provides background information on the gender conditions in the agricultural labour market and how EU food safety standards can affect gender relations in the labour market.

### **2.1 Gender Gaps in the Labour Market**

Women always show some disadvantage gaps and positions in the labour market. Gender gaps in the labour market, defined as those labour market characteristics that disadvantage women to men (ILO, 2012). To understand the gender disparity in the labour market, gender gaps are calculated as the difference between the female and the male rates. The gap is quantified as positive if the female rates are lower than the male rates, indicating that women are disadvantaged, or it can be negative if it does not exist and women are not disadvantaged. Thus, a positive gap indicates that women are disadvantaged and a negative gap implied the reverse, and zero indicates the closure of the gap and also implies moving towards convergence. The closer the ratio is to zero, the more gender equal a country is since neither sex has a disproportionate share of employment. Thus, we examine the conditions of women's involvement in the labour market by analysing 3 major indicators of gender gaps between men

and women which disadvantage women in the labour market. These are on labour force participation and to a more specific level, the economically active population in agriculture and employment in agriculture. Comparison is done at the global level and among 9 major regions<sup>1</sup>.

### Gender Gaps in Labour Force Participation Rates

As a first broad indicator, we consider the labour force participation rate of female versus male to give a demographical picture of the labour market. Table 1 shows the male and female participation rate and the gap between them. Both globally and regional women are generally disadvantaged, as the participation rate is higher for male than for women between 1995 and 2013. These periods have therefore mainly witnessed positive gender gaps, indicating that women occupy a consistent disadvantage position in the labour market. Such huge gender gaps in labour force participation might have a very high and overriding impact on proportion of women employed across all the sectors of the economy, particularly in agriculture which usually serve as the major source of employment for many developing countries, where women are predominantly found.

**Table 1: Labour Force Participation Rate by Sex and Regions (%), 1995-2013**

Regions	Male Labour Force Participation Rate				Female Labour Force Participation Rate				Gender Gap			
	1995	2002	2009	2013	1995	2002	2009	2013	1995	2002	2009	2013
<b>World</b>	79.7	78.1	76.7	76.6	52.2	51.9	50.7	50.3	27.5	26.2	26.0	26.3
<b>Developed Economies and EU</b>	70.7	69.3	68.2	67.2	50.6	51.7	53.0	52.9	20.1	17.6	15.2	14.3
<b>Central &amp; Southern Europe (non-EU) &amp; CIS</b>	71.4	68.1	69.7	70.7	49.9	49.1	49.7	50.3	21.5	19.0	20.0	20.4
<b>East Asia</b>	84.1	81.2	77.6	77.9	70.7	67.9	63.4	63.3	13.4	13.3	14.2	14.6
<b>South Asia</b>	84.2	83.2	81.8	80.7	35.9	35.6	32.7	30.5	48.3	47.6	49.1	50.2
<b>South-East Asia</b>	82.7	82.7	82.0	82.0	58.8	58.8	58.9	59.2	23.9	23.9	23.1	22.8
<b>Latin America and Caribbean</b>	81.9	80.3	79.6	79.5	45.5	49.6	52.6	53.6	36.4	30.7	27.0	25.9
<b>Middle East</b>	76.4	74.0	73.4	75.4	14.3	17.2	17.9	19.1	62.1	56.8	55.5	56.3
<b>Sub Saharan Africa</b>	78.6	76.8	76.3	76.6	61.7	63.9	64.7	65.1	16.9	12.9	11.6	11.5
<b>North Africa</b>	75.5	73.9	73.9	74.5	21.4	20.5	23.3	24.0	54.1	53.4	50.6	50.5
<b>Africa</b>	77.8	76.1	75.8	76.1	52.3	53.8	55.2	56.0	25.5	22.3	20.6	20.1

Source: Authors' calculations using ILO Key Indicators of the Labour Market (KILM) database, 8th Edition.

Note: Gender gaps are calculated as the difference between the female and the male rates. Positive gaps implies that the female rates are lower than the male rates and female are disadvantaged, and vice versa for negative gaps.

In fact, as evident in Table 2, the agricultural sector is observed to be an important sector in the world among the other sectors of the economy providing about 31% and 42% of world employment between 1995 and 2013, although the relative importance of the sector varies by region. In the developed economies, it constituted about 6.4% of total world employment which almost halved to 3.6% by 2013. This is consistent with the argument that the share of labour in agricultures declines as a country grows. In contrast however, agriculture remains the major source of employment generation for sub-Saharan Africa accounting for over 62% of its total employment during the period. Its share in other regions in order of importance are between 39.3 to 52.5 for South-East Asia; 46.3 to 60.7% for South Asia; 30.3 and 49.7 for East Asia; 14.3 and 24% in the Middle East, 14.8 and 24.4 in the Latin America and Caribbean; 17.7 and 27.0% for Central and Southern Europe and CIS countries. However, it is important to know that while agriculture is an important sector for these countries, its relative absorption of employment has decreased starting from since the 2000s with the service sector increasingly gaining importance in terms of its employment share. This is particularly true for the Middle

<sup>1</sup> The countries under each region is provided in the appendix A1.

East, North Africa, and the Caribbean which are tending towards service dominated economy with the agricultural sector absorbing lesser employment share.

**Table 2: Employment Shares by Sector and Region, Both Sex (%)**

Regions	Agriculture (%)				Industry (%)				Services (%)			
	1995	2002	2009	2013	1995	2002	2009	2013	1995	2002	2009	2013
World	41.8	39.6	34.2	31.3	21.2	20.4	22.1	23.2	36.9	40.1	43.7	45.5
Developed Economies & EU	6.4	5	3.8	3.6	28.9	26.3	22.9	22.3	64.7	68.7	73.3	74.2
Central & South-Eastern Europe (non-EU) & CIS	27	23	18.8	17.7	26.7	25.5	25	25.5	46.4	51.6	56.2	56.8
East Asia	49.7	47.5	36.2	30.3	24.4	22.5	28.1	31	25.9	30	35.7	38.7
South Asia	60.7	56.3	51	46.3	15.5	17	20.7	23.5	23.8	26.7	28.2	30.2
South-East Asia & the Pacific	52.5	48.2	42.6	39.3	16	17.3	18.4	19.4	31.5	34.5	39.1	41.3
Latin America & the Caribbean	24.4	20.6	17.1	14.8	20.9	21.1	22	20.9	54.8	58.3	60.9	64.3
Middle East	24	22.3	16.4	14.3	23.5	24.2	26.2	27	52.5	53.5	57.4	58.6
North Africa	35.9	32.8	31.1	28	20.3	19.7	22.6	22.8	43.8	47.5	46.3	49.3
Sub-Saharan Africa	65.7	64.6	62.7	62	8.6	8.5	8.4	8.4	25.6	26.9	28.9	29.6

Source: ILO Key Indicators of the Labour Market (KILM) database, 8th Edition.

### Gender Gaps in the Agricultural Sector

Although agriculture is a major provider of employment globally and for the bulk of these regions, employment gains might however be different for female than to male due to the number of factors already discussed in the previous section. In terms of the demographic composition of the agricultural labour market, Table 3 shows that males are predominant in the agricultural labour market as measured by the higher share of male composition of the economically active population<sup>2</sup> in the sector. The trend also indicates positive gender gaps in the distribution of the economically active population, again buttressing the disadvantage position of women relative to men in the sector. This implies that generally, males are usually employed and are available for employment more than female. This confirms the findings of ILO, (2012), and Wamboye and Seguino, (2015) that women are generally less available for employment due to their heavy care burden, career interruptions resulting from childbearing activities, etcetera.

**Table 3: Economic Active Population in Agriculture (Percentage of Total)**

Regions	Male (% of total)				Female (% of total)				Gender Gap			
	1995	2002	2009	2013	1995	2002	2009	2013	1995	2002	2009	2013
World	58.0	57.7	57.3	57.1	42.0	42.3	42.7	42.9	16.0	15.4	14.6	14.3
EU	59.8	61.1	62.4	63.0	40.2	38.9	37.6	37.0	19.6	22.2	24.7	26.0
Southern Europe	57.5	56.2	55.1	54.2	42.5	43.8	44.8	45.7	15.0	12.4	10.3	8.6
East Asia	52.3	52.0	51.9	52.1	47.7	48.0	48.1	47.9	4.6	4.0	3.8	4.2
South Asia	66.6	66.4	65.4	64.9	33.4	33.6	34.6	35.1	33.1	32.8	30.8	29.8
South-East Asia	57.3	57.4	57.6	57.5	42.7	42.6	42.4	42.5	14.6	14.8	15.1	15.1
Latin America and Caribbean	73.1	80.1	79.1	78.9	26.9	20.0	20.9	21.1	46.2	60.1	58.3	57.8
Middle East	56.4	53.4	52.5	51.4	43.6	46.6	47.5	48.6	12.8	6.9	4.9	2.7
Sub-Saharan Africa	52.4	51.8	51.1	50.9	47.6	48.2	48.9	49.1	4.8	3.5	2.1	1.8

<sup>2</sup> The economically active population in the agricultural sector gives the total number of men and women that are employed in the sector and are available for employment in the agricultural sector.

North Africa	62.8	60.0	57.3	56.2	37.2	40.0	42.7	43.8	25.6	20.0	14.6	12.4
Africa	53.6	52.7	51.7	51.3	46.4	47.3	48.3	48.7	7.2	5.3	3.4	2.7

Source: FAOSTAT, 2014.

Figure 1 and Table 4 show how women have fared in terms of actual agricultural employment, in relation to the female and male employment rate. At the global level, over the years, participation in agriculture for female was lower than that of their male counterparts as women's share of total agricultural employment always fall short of their male counterpart.

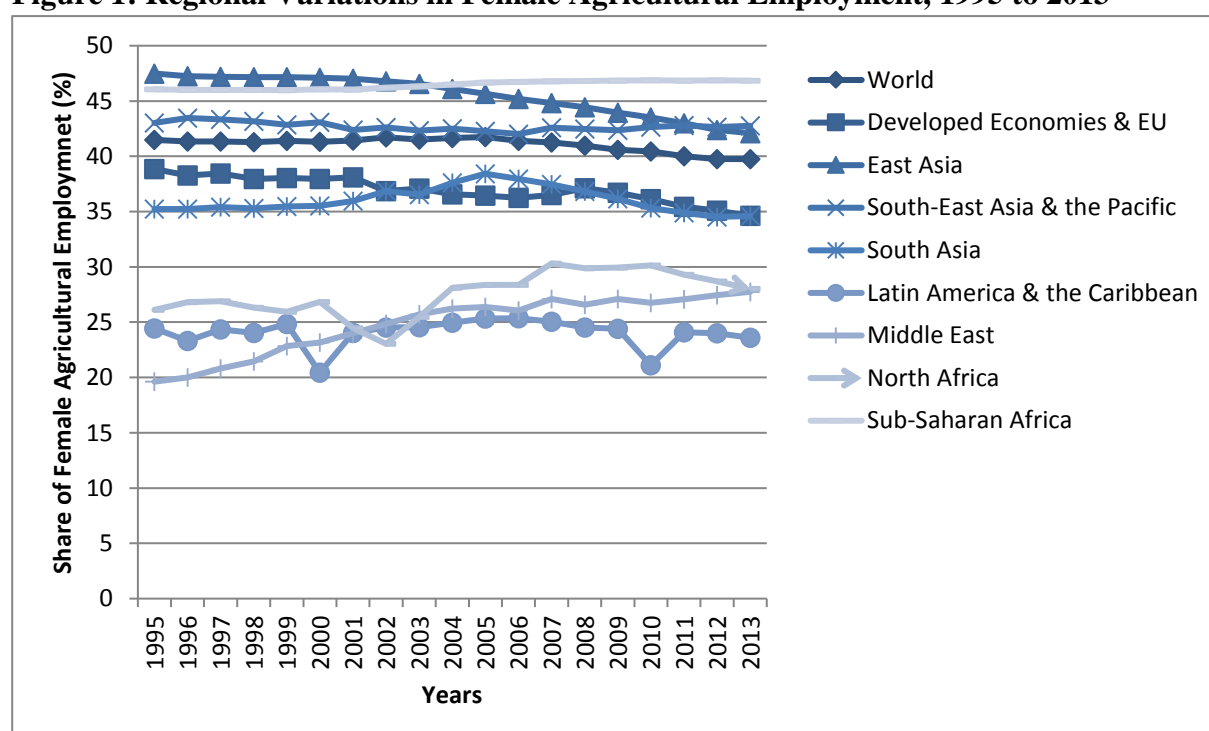
**Table 4: Distribution of Agricultural Employment by Gender, 1995 to 2013**

Year	Male (% of Total Agricultural Employment)				Female (% of Total Agricultural Employment)			
	1995	2002	2009	2013	1995	2002	2009	2013
World Male Agriculture Employment	58.5	58.3	59.4	60.2	41.5	41.7	40.6	39.8
Developed Economies & EU	61.2	63.2	63.3	65.4	38.8	36.8	36.7	34.6
Central & South-Eastern Europe (non-EU) & CIS	56.0	54.2	55.1	54.6	44.0	45.8	44.9	45.4
East Asia	52.5	53.2	56.1	57.9	47.5	46.8	43.9	42.1
South Asia	64.8	63.1	63.9	65.4	35.2	36.9	36.1	34.6
South-East Asia & the Pacific	57.0	57.4	57.6	57.2	43.0	42.6	42.4	42.8
Latin America & the Caribbean	75.6	75.5	75.6	76.4	24.4	24.5	24.4	23.6
Middle East	80.4	75.2	72.9	72.3	19.6	24.8	27.1	27.7
North Africa	73.9	77.0	70.1	72.0	26.1	23.0	29.9	28.0
Sub-Saharan Africa	54.0	53.8	53.2	53.1	46.0	46.2	46.8	46.9
Africa	55.9	55.8	54.7	54.6	44.1	44.2	45.3	45.4

Source: Authors' calculations using ILO Key Indicators of the Labour Market (KILM) database, 8th Edition.

There are however regional differences in how women are affected by the inequality in agricultural employment. Figure 1 depicts the regional variations in female's share employment share.

**Figure 1: Regional Variations in Female Agricultural Employment, 1995 to 2013**

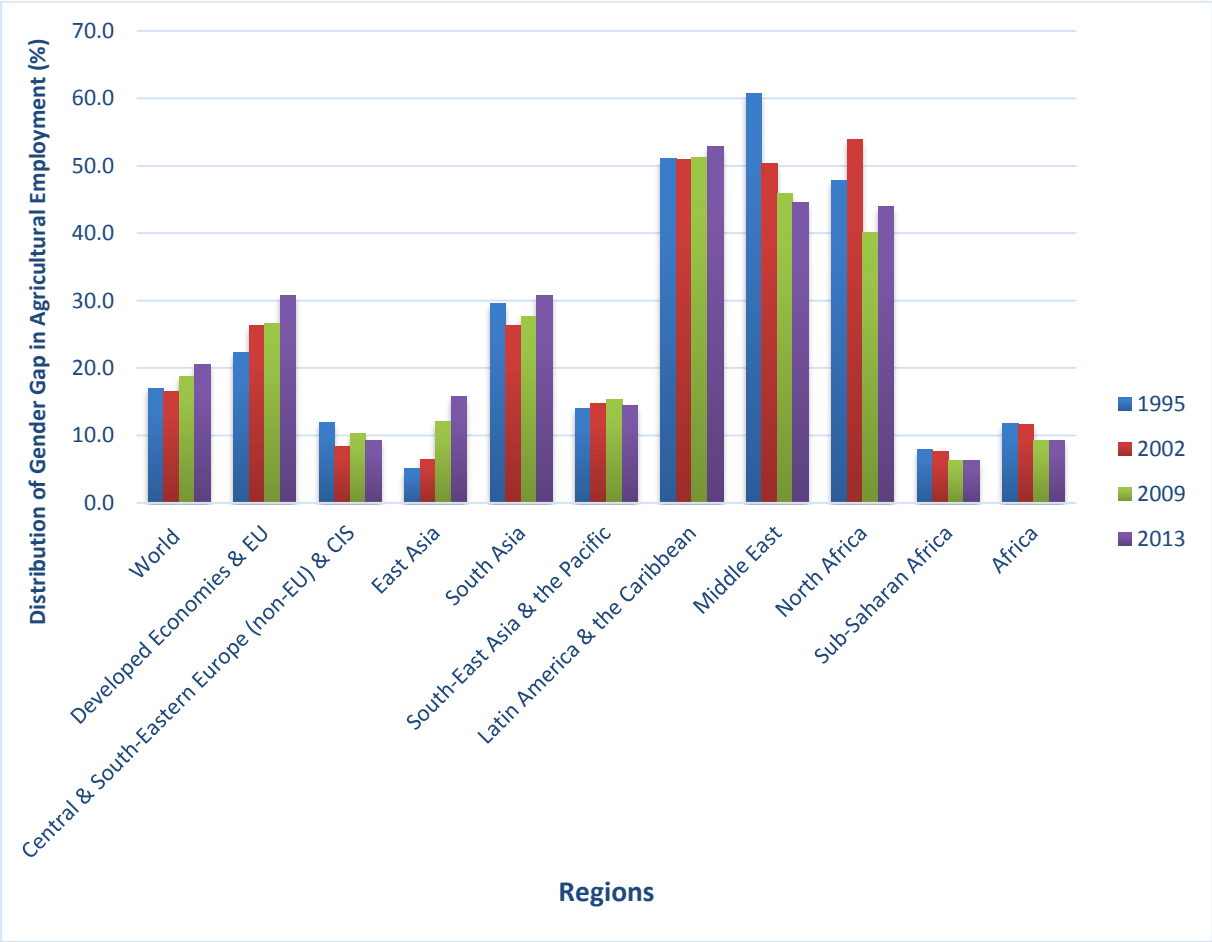


Source: Authors' calculations using ILO Key Indicators of the Labour Market (KILM) database, 8th Edition.

In all regions, women occupy less than 50% employment in the agricultural sector and East Asia the highest share of these agricultural employment before being over taken by Africa in 2004. Aside these two regions, other regions with high share of women in the agricultural sectors are South-East Asia and the Pacific, developed economies and the EU, and South Asia. Latin America and the Caribbean, Middle East and North Africa are regions having very low share of women in the agricultural sector. This relatively low female share of agricultural employment gives rise to significant positive gaps which shows that women are at a disadvantaged position globally and at all regions of the world (Figure 2). The gender inequality gap is wider for Latin America and Caribbean, the Middle East and North Africa, closely followed by South Asian and developed economies.

However, over the years the gender gaps in agricultural employment has widened globally and in some regions as more male gain agricultural employment. Figure 2 depict the distribution of the gender gap over the period 1995 to 2013. The gap has widened for the world increasing from 18% in 1995 to about 21% in 2013. Similar trend is also observed in developed countries, South Asia. East Asian and North Africa countries however show the highest widening of the gender employment gap, with marginal widening observed in Latin America and the Caribbean. The gap has however marginally narrowed in Central and southern Europe and CIS countries, South-East Asia and the Pacific, and sub-Saharan Africa and fallen in the Middle East, which is a significant improvement since the 1990 when the region has a record of highest gender gap in agricultural employment in the world.

**Figure 2: Regional Variations in Gender Gap in Agricultural Employment, 1995 to 2013**





Source: Authors' calculations using ILO Key Indicators of the Labour Market (KILM) database, 8th Edition.

Numerous explanations have been put forward for these employment gaps. On the one hand, the narrowing of the gap in some countries particularly in sub-Saharan Africa countries have been attributed not to an increase in female share in the agricultural sector but more to “a distress sales of labour” which occur in times of crisis and poverty (Wamboye and Seguino, 2015). Thus, the reduced gaps in Africa might be because of the persistent poverty in the region preventing women from dropping out of the agricultural sector (ILO, 2012). This is because women get involved more gainful employment in order to add to their husband’s income. On the other hand, the widening of the gap could be attributed to young women dropping out of agricultural sector to get more education in South and East Asian regions. Other factors are the prevalence of temporary and insecure contracts among women, differences in the educational attainments (*ibid*), family responsibilities and heavy care burden, carrier interruption for child rearing. Of relative importance is the economic shock or technological shocks brought about by the imposition of NTMs which alter the gender distribution of employment in the agricultural sector, by raising or lowering the gap, raising the gap in this case.

## 2.2 Agricultural Production and Performance

In order to better understand the nexus between trade and agricultural employment, this provide some information on the performance of agricultural sector of the selected regions of analysis<sup>3</sup>. We ended by providing information on the two important non-tariff measured imposed by the EU on agricultural products – SPS and TBT.

World agricultural output has almost tripled since 1995 (Table 5) with much of the increased output growth contributed by developing countries , particularly South-East Asia, East Asia and Africa. However, the success has not been uniformly shared across countries and regions as many of the best performing agricultural economies, in particular sub-Saharan African countries and Southern Asian countries have low marginal agricultural productivity given by the persistent fall in the contribution of the agricultural sector to economic growth (Figure 3). In other regions, agricultural sector’s contribution to GDP has declined over time but the decline has stabilized after the financial crisis.

**Table 5: Agricultural Production and Growth - Selected Regions, 1995 to 2012**

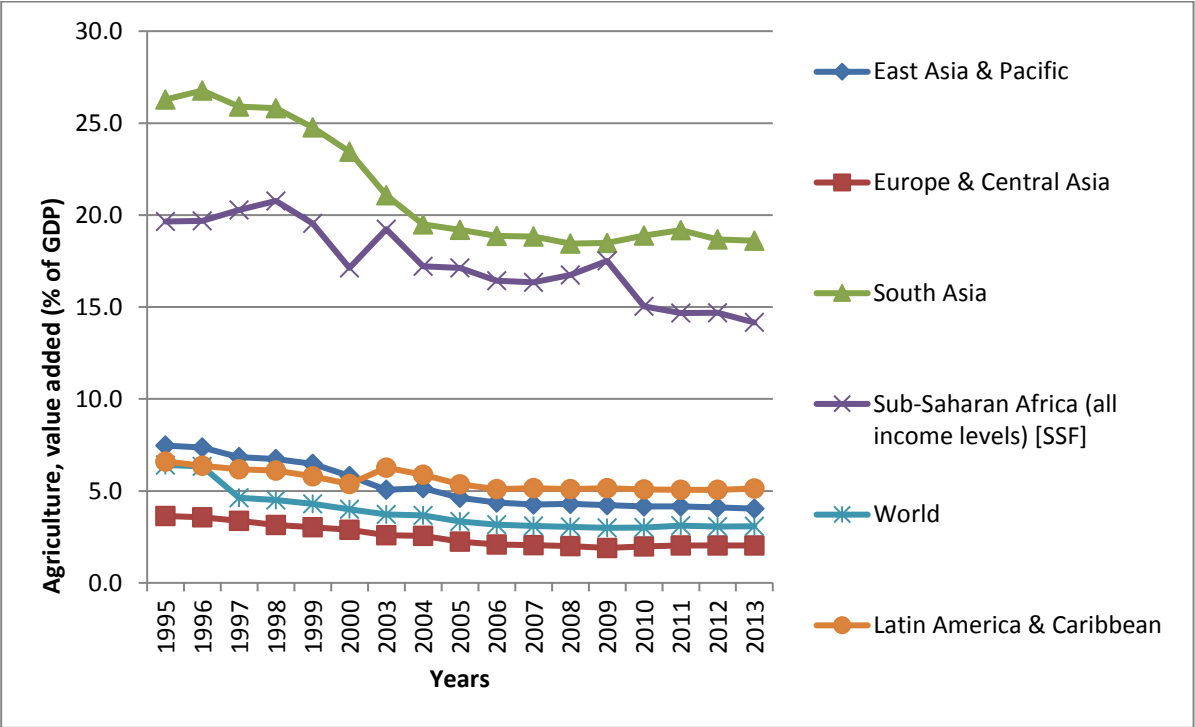
Regions	Average Production, 1995-2012 (billion US\$)	1995 (billion US\$)	2012 (billion US\$)	Growth Rate (1995-2012)
World	2051.6	1441.6	3840.9	6.4
Central America	39.4	23.7	59.9	4.4
Caribbean	5.2	4.5	7.2	3.7
South America	158.7	104.6	338.7	4.8
Eastern Asia	628.0	390.4	1388.3	9.3
Southern Asia	210.8	138.9	352.4	6.5
South-Eastern Asia	127.8	87.1	303.0	9.7
Middle East	65.3	43.6	110.7	6.7
North Africa	50.1	24.7	87.0	7.7
Africa	170.3	100.4	308.8	8.4

Source: Calculation based on Data from FAOSTAT, 2014

<sup>3</sup> A comprehensive list of countries in this study is given in Table A2 in the appendix

Trade and feminist economists have attributed the declines in these countries to stringent trade policies which constrain women’s ability in accessing international markets more than men, which particularly resulting into disproportionate job losses for women who constitute the bulk of the agricultural sector’s employment (Puri, 2004; Carr, 2004; Beviglia-Zampetti and Tran-Nguyen. 2004). For instance, Fontana and Paciello (2009) argued that due to women’s low level of training and education and technical expertise, and preference for employers to train men over women, they are thus more vulnerable to trade barriers and regulations which stipulates the requirements of products specification and which particularly dominate agro-food export markets. We therefore undertake a review of how such international trade policies on agriculture and possible implications on gendered employment.

**Figure 3: Distribution of Agricultural Value-Added by Region, 1995 to 2012**



Source: World Bank Indicators, 2014

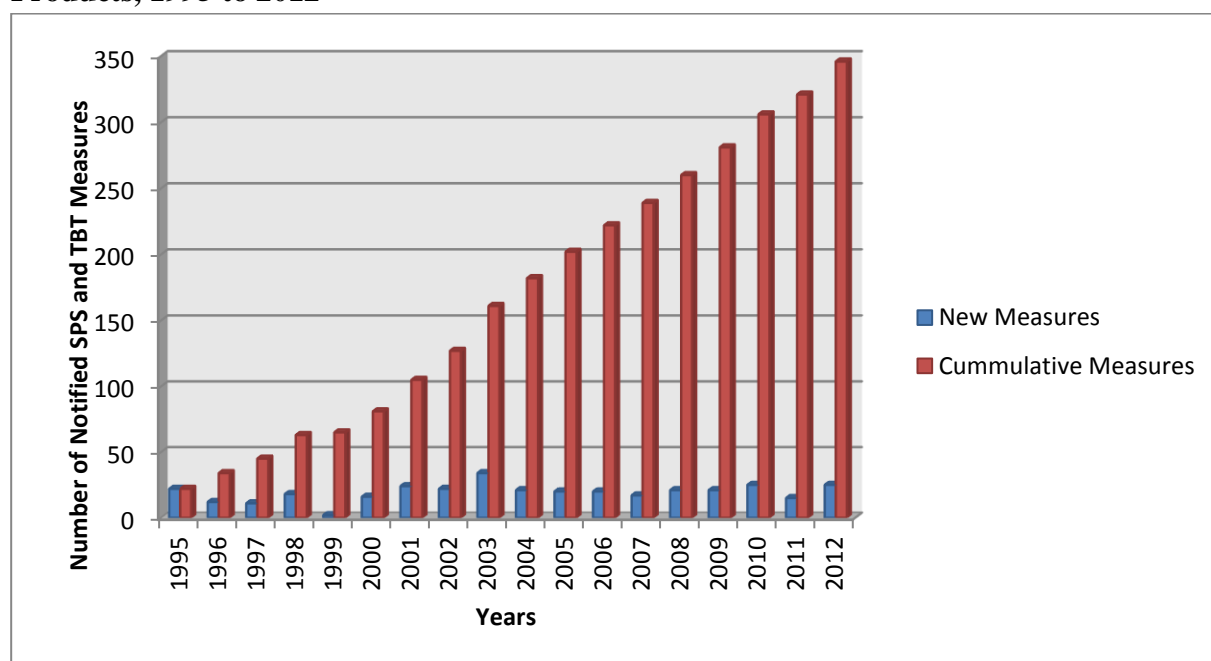
**2.3. Food Safety Standards in the EU and Gendered Employment**

As tariff has been negotiated down, a tangle of non-tariff measures (NTMs) are increasingly assuming importance in agricultural trade. Of all NTMs, more pervasive is the plethora of strict food safety requirements relating to food, animal and plant health, agricultural production and processes also known as sanitary and phyto-sanitary measures (SPS) and the assessment of the compliance to such SPS measures, known as technical barriers trade (TBT). Thus, SPS and TBT measures<sup>4</sup> have been identified as the single most important market access condition for exports, (Nicita and Gordon, 2012).

<sup>4</sup> Sanitary and phyto-sanitary measures entail health and hygiene standards or regulations to avoid the spread of food, animal and plant diseases and epidemics. TBT measures comprise technical standards, along with regulations on testing and inspection of agricultural products and processes to ensure compliance with safety and health regulations, and certification.

The bulk of these agricultural product requirements have mainly emerged in high income countries and regions such as the EU following a series of food scares in the 1980s and 1990s (UnNeverhr, 2003). In the EU, these measures are governed by European Commission (EC) Directive No 396/2005, which establishes the MRLs of pesticides allowed in products of plants and animal origin intended for consumption, based on scientific evidence from risk assessments, and food and agricultural products that do not meet its stipulated requirements are barred from being placed in its markets. These concerns for health and safety have resulted in the increase and proliferation of a number of SPS and TBT measures with EU measures emerging as one of the most stringent in the world. Figure 4 displays the proliferation of SPS and TBT measures notified on agricultural products by the EU between 1995 and 2012. The number of measures is found to have been on the increase, rising from about 22 in the year 1995 and cumulating to a total of 346 notifications in 2012.

**Figure 4: Total Number of SPS and TBT Notifications by the EU on Agricultural Products, 1995 to 2012**



**Source: WTO Integrated Trade Intelligence Portal (I-TIP) Database**

In the EU, compliance to such measures is required for both domestic products and third countries export, since they are applied on MFN<sup>5</sup> basis. Thus, farmers and exporters need to comply with these measures, which are usually imposed by developed countries<sup>6</sup> in order to guarantee market access for their produce. However, in trading and exporting their agricultural produce, these countries are often challenged by health and safety requirements relating to these SPS and TBT measures. Consequently, non-compliance can lead to serious actions being taken against defaulting exporting countries such as outright banning or import rejections. For instance, in the European Union (EU), there has been a significant number of border refusals of food imports by the EU due to non-compliance of exporting countries with EU food safety

<sup>5</sup> They are no preferential treatment in the issue of SPS and TBT, so every country receives equal treatment.

<sup>6</sup> In recent times, some developing countries are also increasingly imposing such measures too.

standards, amounting to about 9233 rejections between 2008 and 2013 (EU RASFF, 2014), with implication for export competition and employment in the export sector. In developing countries where agricultural exports offers an important source of generating employment, income and livelihood, thus, such market access problems thus constitute an important hurdle to their means of livelihood. More importantly, such market conditions can become barriers to entry, erode the competitiveness of women-intensive exports, barring effective market access particularly for gender-sensitive exports of developing countries, such as their agricultural sector. SPS and TBT regulations thus constitute an increasing challenge for women farmers, producers and exporters, especially those from developing countries.

Furthermore, SPS and TBT are special case of NTMs as they can either serve as *health objective* - safeguarding the health and safety of the consumers or *trade objective* – used as a trade policy measure or protectionist tool to restrict trade. They can also either serve as a *barrier* or *catalyst* to trade and employment through their trade inhibiting or trade promoting effect (c.f. Jaffee and Henson, 2008; and Xiong and Beghin, 2014). On the one hand, they are viewed as barrier to trade due to their cost effects as compliance with them involves huge costs which can be enormous for small scale farmers and exporters which characterize the exporting sectors of most developing countries, thereby preventing them from accessing the EU market. Because it exclude poor and small scale farmers and producers producing for exports and eliminate their source of livelihood, they therefore constitute a barrier to trade. Exporters that could not comply with such SPS and TBT are driven out of the international market alongside with domestic producers and farmers producing for export markets, consequently contrasting employment in the agricultural sector and other forward and backward integrated sectors such as the service sector. Women are vulnerable to job loss as they are in the first place hired to cut costs and are easy to lay off in times of crisis because they have low bargaining power, work under insecure working conditions, constitute flexible workforce are concentrate in temporary, casual and seasonal jobs (Fontana, 209; Chan, 2013).

On the other hand, SPS and TBT can be a catalyst for increased export penetration and expansion which is in line with their demand enhancing effects. According to this stance, SPS and TBT measures provide consumers with information and assurance about their health and safety, therefore stimulating import demand (Moenius, 2004). They also provide information to producers about the specifications and technicalities of the products, which can lead to technology diffusion and innovation (Baller, 2007). Compliance with such measures can trigger increased market access, expanded markets with significant impact on the female workforce as they are assumed to dominate the agricultural sector. Women thus stand to gain if they can avail the expanding opportunities to increase production for the expanding export markets and also export their agricultural export products. The expanded export market and the opportunity to deeply integrate into international supply chains as producers can benefit women farmers.

Given the above, the imposition of SPS and TBT measures can thus bring about changes in the structure of production of the country as some export oriented sector would contract or expand in response to the stringency of the measures, depending on how inhibiting or trade promoting the measures are. Thus, such trade regulation may or may not contribute to employment generation. It is important to acknowledge that men also face SPS and TBT concerns, however,

these constraints are gender-intensified. More so, women and men are usually affected differently by trade policies due to the existing social inequality already existing in the country as well as the entrenched gender norms (Tejani and Milberg, 2010). For instance, rigid gender roles in households where females are viewed as unpaid care economy, tend to be rigid and may prevent women from taking up employment even when SPS and TBT regulations brings in expansionary employment benefit for them. Gender roles in labour market and labour market discrimination also may prevent them from entering the expanding sector. In addition, limited access to productive resources and training, especially in most developing countries limits women's right to equal employment with men. Thus, SPS and TBT regulation as non-tariff measures may or may not contribute to gender equality in agricultural employment depending on a wide number of factors, including the existing gender structure and norms in the country, the economic structure, the labour market regulations.

Notwithstanding the eventual effect, such SPS and TBT might affect exports and employment, particularly those who depend on the EU as major market destination. Table 6 shows the direction of trade of all the countries considered in this study between 1995 and 2013. Clearly the top 8 countries have more than 50% of their total agricultural exports imported by the EU. They are thus highly vulnerable to any change in the stringency of EU SPS and TBT policies due to their overdependence on the EU market.

**Table 6: Direction of Agricultural Trade: Annual Average Export to the EU, 1995-2012 (%)**

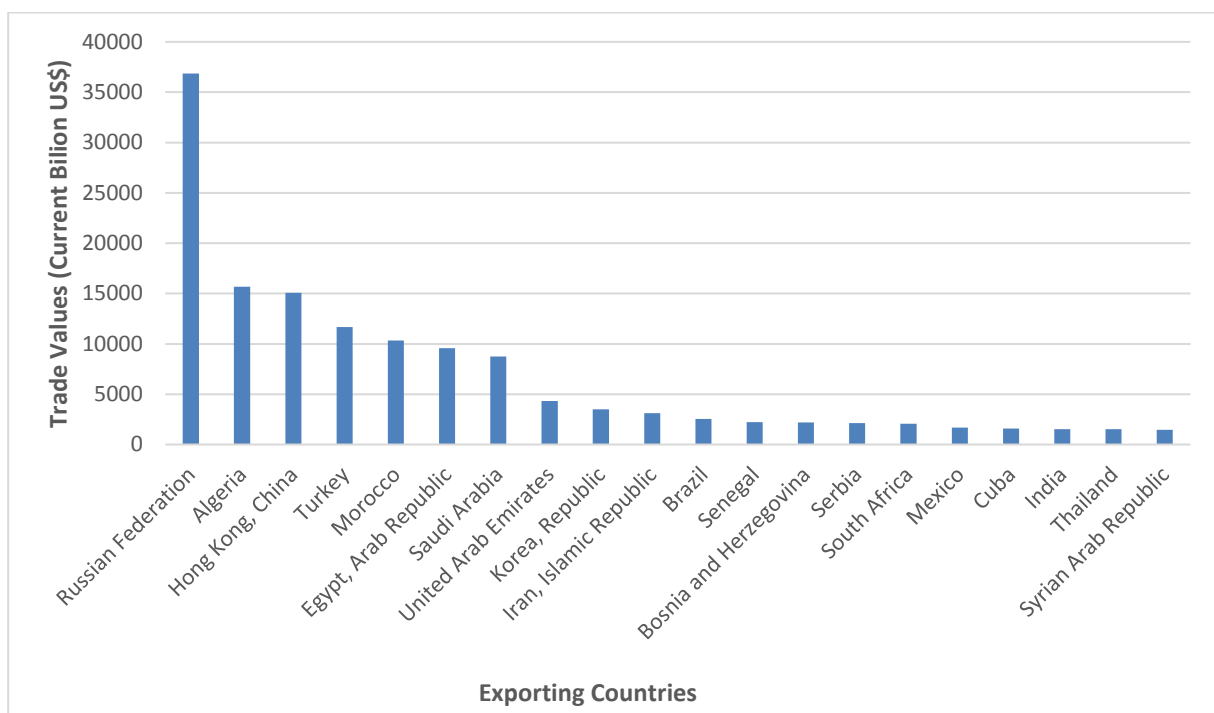
Rank	Exporters	Value	Rank	Exporters	Value	Rank	Exporters	Value
1	Madagascar	78.1	31	Oman	13.2	61	Barbados	4.1
2	Moldova	62.7	32	Namibia	12.4	62	Mongolia	3.9
3	Macedonia, FYR	60.4	33	Azerbaijan	11.8	63	Colombia	3.7
4	Bosnia and Herzegovina	58.0	34	South Africa	11.2	64	Bhutan	3.7
5	Cameroon	56.5	35	Iraq	11.1	65	Nepal	3.5
6	Senegal	56.4	36	Iran, Islamic Republic	11.0	66	Kyrgyz Republic	3.4
7	Mali	54.1	37	Montenegro	10.8	67	Maldives	3.3
8	Serbia	51.2	38	Dominica	10.6	68	Korea, Republic	3.2
9	Morocco	46.5	39	Ecuador	10.6	69	Cambodia	3.2
10	Algeria	43.4	40	Tanzania	10.5	70	Vietnam	3.2
11	Liberia	39.2	41	Qatar	9.7	71	Panama	3.1
12	Sierra Leone	38.9	42	Bahrain	9.7	72	Costa Rica	2.9
13	Russian Federation	38.9	43	Guyana	9.5	73	Macao	2.6
14	Mauritius	35.0	44	Zambia	8.2	74	Belize	2.6
15	Cuba	29.1	45	West Bank and Gaza	7.5	75	Indonesia	2.4
16	Suriname	26.1	46	Pakistan	7.3	76	Dominican Republic	2.2
17	Kazakhstan	26.0	47	Bangladesh	7.2	77	Botswana	2.2
18	Turkey	24.8	48	Argentina	7.1	78	Honduras	2.1
19	Ethiopia	24.5	49	Grenada	6.4	79	Bolivia	2.1
20	Saudi Arabia	21.4	50	Uruguay	6.3	80	Singapore	2.0
21	Armenia	18.6	51	Sri Lanka	6.0	81	Philippines	2.0
22	Ghana	18.3	52	India	5.7	82	Guatemala	1.9
23	Egypt, Arab Rep.	17.3	53	Antigua and Barbuda	5.5	83	Peru	1.9
24	Syrian Arab Republic	17.0	54	Trinidad and Tobago	5.5	84	Venezuela	1.8

25	Hong Kong, China	17.0	55	Zimbabwe	5.4	85	Paraguay	1.7
26	Saint Lucia	15.7	56	Chile	4.7	86	Mexico	1.7
27	Yemen	14.4	57	Bahamas, The	4.6	87	Malaysia	1.6
28	United Arab Emirates	14.1	58	Jamaica	4.6	88	Nicaragua	1.6
29	Georgia	14.0	59	Brazil	4.6	89	El Salvador	0.7
30	Lesotho	13.5	60	Thailand	4.2	90	Cayman Islands	0.7

Source: Calculated from World Integrated Trade Solution (WITS) Database (via UNCONTRADE)

However, the low percent should not be confused with these countries not engaging in meaningful trade with the EU. In fact, many of these countries in our sample ranked very low in Table 6 such as Brazil, Thailand, Korea Republic and even Mexico which trade less than 2% of its total agricultural exports with the EU (ranking 86 in Table 6) export more in quantity and value to the EU than Madagascar which directs about 78% of its export to the EU and was ranked as number 1. This is evident in Figure 5 which gives the top twenty countries in our sample which have the highest export values to the EU between 1995 and 2012. Thus, given the voluminous export to the EU, these countries with low direction of trade to the EU are also likely to be affected by its trade policies. In fact, the EU trade more with the Middle East as given by the high number of these countries found in the high performing twenty countries. It would thus be interesting to know if how these trade relations has impacted on gender (in)equality in the region as well as in other countries considered.

**Figure 5: Top 20 Agricultural Exporter to the EU, 1995 to 2012**



Source: Calculated from World Integrated Trade Solution (WITS) Database (via UNCONTRADE)

### 3.0 LITERATURE REVIEW

This session review both the theoretical explanations underlying the links between trade and gendered employment and also the related empirics.

### **3.1 Theoretical background**

Before, the distributive effects of trade policies on gender were assumed to be gender neutral. However, since women and men assume different positions in the economy which is also a gendered structure, the impact of trade policies would affect them differently. In analysing the link between importing countries trade policies, and employment outcome, we rely on the two major perspectives – the mainstream neoclassical economic theory and the heterodox trade theories.

#### **3.1.1 Mainstream Perspective**

In the neoclassical mainstream economic theory, two major theorem are used to explain the gender effects of trade expansion or contraction in countries – namely the standard international trade theory of Hecksher-Ohlin-Stolper-Samuelson and the Gary Becker's theory of labour market discrimination. According to the standard trade theory assumes that country will trade based on the factors that it has in relative abundant (i.e. capital or labour) and thus, export the commodity that use its relatively abundant factors most intensively. This is the principle of comparative advantage. According to the Heckscher-Ohlin-Stolper-Samuelson (HOSS) theorem, the returns to the country's relative abundant factor that is used more intensively in exports will rise, due to increase in demand for it (Heckscher and Ohlin, 1991; Stolper and Samuelson, 1941). Thus, because developing countries are relatively abundant in less-skilled labour and industrial countries are generally abundant in high-skilled labour, trade liberalization is thus expected to bring about the increase in demand for the relatively abundant of labour in these countries – i.e. the relatively skilled labour in industrial countries and the less-skilled labour in developing countries and vice versa.

Conversely, freer trade will reduce the demand for the scarce high-skilled labour in the developing countries and reduce the demand for the low-skilled workers in the industrial countries. Since women workers are assumed to predominate in less-skilled jobs in both developing and industrial economies, then this theory predicts that trade liberalization (restrictions) will increase (decrease) employment gains for female in export sectors of developing countries and employment loss for women in industrial countries. Consequently, in developing countries, this employment gains for women will lead to the narrowing of gender employment gap between unskilled (women) and skilled (men) labour, while in industrial economies, the disproportionate job loss for women (the unskilled workers) will lead to the widening in gender employment gap between skilled (men) and unskilled (women) labour.

This theory has implications for women's labour in agricultural activities is not farfetched. Because agricultural activities are still practiced at the subsistent level and involves a lot of low-skilled activities, women in many developing countries will thus experience employment gains relative to men in agriculture, narrowing the gender employment gap<sup>7</sup>. However, as agricultural activities is majorly carried out at a commercial level in industrial countries and involves a lot of relatively skilled activities, women in developed countries will thus experience employment loss relative to men in agriculture, widening the gender employment gap in agriculture.

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<sup>7</sup> These theories also have implications on wages and gender wage gap as well as the quality of employment. However, the scope of this study is limited on the impact on employment only.

Another strand of standard trade theory in support of this prediction is the *Becker theorem of labour market discrimination* which states that increased international competition created by trade expansion will reduce the scope of firms to discriminate against women as it becomes costly to employ men and cheaper to hire women (Becker, 1971; Black and Brainerd, 2004). According to this theory, women are usually discriminated against as firms pay a wage differential that is higher for male than for equally skilled and equally productive female workers. With increase competition among firms, Becker's theorem predicts that increase in competition among firms however induce a decline in this labour market discrimination against women because most competitive firms and industries are already highly expected to engage in less or no discrimination against women workers. Furthermore, the theory viewed discriminating against women as a huge cost to the firm rather than an advantage, since the firm pays a higher wage to male workers (that is usually higher than the marginal product of labour) because of their gender, thereby making it costly to employ men and cheaper to hire women. Thus, the theorem predicts that trade expansion and increased international competitive pressure will reduce the ability of firms to discriminate against women, firms will substitute the cheaper female workers for the costly male workers, and the demand for male labour will fall because it is relatively more expensive to employ them, while the demand for the cheaper female labour will rise.

### **3.1.2 Heterodox Perspective**

The predictions made by the standard trade theory have been constantly challenged by the heterodox trade theorists who posit that trade is based on the principle of competitive advantages as pointed out by Adam Smith and not on the principle of comparative or absolute advantage as suggested by the standard trade theory. The principle of competitive advantage assumes countries compete on absolute unit costs and not relative costs in order to gain competitive advantage over their competitors and gain market share. That is a given country that produce a commodity at a lower cost will dominate the global market, such that it exports commodities in which it has competitive advantage and import those in which it has competitive disadvantage in producing.

According to the heterodox labour market perspective, persistent discrimination is consistent with a competitive economy (Darity, 1989; Darity and Williams, 1985) due to the persistent of unequal power relation between employers and employees, as well as between different categories of workers and thus, access to employment opportunities are determined by the bargaining power of the workers, workers skills and the job characteristics. For instance, specific groups of workers are usually in a better position to bargain for favourable employment conditions in times of threat of joblessness, while others have very weak bargaining power. Thus, firms capitalize on this to boost profit and therefore, to achieve competitive advantage, firms use different cost strategies such as price cutting, unit labour cost reduction for certain class of employees so as to dominate the international market. This they do by strategically keeping a large lower wage low-skilled workforce that has weaker bargaining power and simultaneously combine it with a very small group of high-skilled workforce with better bargaining power. Thus, with export expansion, women workers who dominate the lower wage low-skilled workforce may experience gain in employment. On the other hand, with intense



international competitive pressure or import expansion, job competition among workers in import competing firms has the potential of negatively affecting the wages of those workers that are concentrated in weaker bargaining positions in terms of seniority, skills and sector of employment. Consequently (in this context), as they are usually characterized by these weaker positions, female workers may thus be relatively more vulnerable to job losses, or have limited access to newly created higher paying jobs relative to male workers.

In sum, with the neoclassical assertion, many women mostly have been predicted to gain employment in the labour intensive agricultural sector, even though the heterodox's assertion is less optimistic. Thus, since freer trade is theoretically predicted to avail exporters the opportunities to access international markets, then, these predictions will hold if SPS and TBT measures constitute catalyst for exports penetration. However, the reverse would be the case if standards constitute barrier to export, as the trade restrictions will erode exporting women's means of livelihood, contrasting employment.

### **3.2 Empirical Evidence**

There is no consensus in the limited existing literature on the effect of international trade on gendered employment, as the effect depend on part of the agricultural sector women are employed in and the region or country of analysis. Thus, for a comprehensive analysis, we take a holistic assessment of the gender employment of trade in the agricultural sector by distinguishing the impact among different employment status – namely whether they are women farmers, wage employment in the agricultural sector, women producers and exporters.

In spite of the importance of trade policies on employment, it is important to acknowledge that limited evidence exist due on the issue. However, the rather limited available evidence shows that the impact of agricultural exports is usually more favourable to male than to female farmers. For instance, due to trade, the commercial exploitation of a traditionally female intensive crops cause males to take over the production and marketing of such crops, thereby crowding out female farmers – a process termed *defeminization* of female labour in the literature (). This scenario was found for Uganda in leafy vegetable production (Shiundu and Oniang'o, 2007), in Zambia's groundnut production (Wold, 1997), and in Gambia's rice production (von Braun et al., 1994). In addition, due to agricultural modernization and export expansion, large NTAE businesses in developing countries have taken up commercial agricultural activities, eroding poor and less competitive farmers to abandon or sell their farm lands with disproportionate employment losses for women farmers. This was the case in the Philippines in which large NTAEs have pushed rural women into less fertile farmland and also displaced them to urban areas where they work as sex workers or domestic employees (Beviglia-Zampetti and Tran-Nguyen, 2004).

Furthermore, emerging evidence indicates that women, many of whom are small and marginal farmers are unable to compete in international markets due to a considerable number of a number of constraints they face, particularly those relating to inequality in education and training, women carrier breaks due to the reproductive activities, heavy domestic duties which are unpaid resulting in significant time poverty and mobility constraints, the lack of technical

expertise to comply with food safety standards and other NTBs limiting their ability to fully comply with international trade regulation (Fontana and Paciello, 2000; Kabeer, 2012). Evidence on the latter has also been documented in countries such as Samoa, Mozambique, and some other countries of Sub Saharan Africa by Beviglia-Zampetti and Tran-Nguyen, (2004) who find women producers face more challenges in accessing global markets than their male counterparts due to market access problems related to sanitary and phyto-sanitary standards, technical barriers to trade, product and process standards and regulations and related market entry barriers which they find difficult to comply with due to their relative lack of technical expertise and training needed to meet them compare to their male counterparts.

However, in contrast, women in agricultural wage employment, particularly those from agricultural based economies benefits more from international trade due to the wide range of wage employment opportunities in commercial farms and packing houses than directly from being farmers (Barrientos, et al., 2004; Chan, 2013). Thus, there is the feminization of employment for female agricultural wage earners who are preferred for this kind of work due to their low bargaining powers which make them to be relatively easy to be laid off in off season periods as they are seen as secondary workers (Barrientos, et al., 2004). These newly created wage employment however do not usually comply with good labour standards<sup>8</sup> as they neither provide security nor long lasting wage employment opportunities. In addition, these women are segregated into unskilled, low value-added positions which provide no opportunity for promotion and training and also suppress their union rights while men take up better paid and more secured managerial positions (Berik, 2006; Daraisani, 2008; Chan, 2013). The entrenched gender norms and stereotypes about women being suitable for caring work due to their nature, helps segment them into gender appropriate jobs and activities that are low skilled and low value-addition (Tejani and Milberg, 2010). For instance, in Bangladesh, female fry catchers and sorters are segregated to the most insecure chain of shrimp production (Gammage, et al., 2006). Similarly in Tanzania, while 85% of casual workers employed in the flower industry are women while the males take up managerial positions (Fontana and Paciello, 2009). Thus, feminization of labour has also contributed to new patterns of inequality and vulnerability for women (UNCTAD, 2012; Musselli and Zarrilli, 2012).

Further evidence also demonstrates women workers achieve gainful employment particularly in the non-traditional agricultural export sector (NTAE). Fontana and Paciello (2009) show that wage employment in NTAE sector has constituted a significant source of wage employment for rural women especially those in Latin American countries such as Brazil, Chile, Colombia, Ecuador, Mexico and Peru, and some countries in Africa such as Kenya, South Africa, Uganda and Zambia and more recently in Ethiopia. However, Wamboye and Seguino (2015) argue that the influence of NTAE sector on gender inequality depends on the region being considered. Their study on Sub-Saharan Africa shows that the expansion of cash crop exports in the region has generated more job opportunities for men than women.

In sum, these divergent empirical findings, it is difficult to claim that trade has benefited women as it is hard to make a valid conclusion based on the limited evidence available - as

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<sup>8</sup> While the scope of this study is beyond the quality of employment generated. However, it is still important to know that the job gains for women wage earners have led to new patterns of inequality.

there is more research to be done. In addition, many of these studies mainly focus on the implications of trade liberalization on gendered employment and not on NTMs such as the plethora of SPS and TBTs that are increasingly governing agricultural trade - a concern that this paper addresses.

## 4.0 METHODOLOGY

This section provides the description of the variables used in the study and the sources of data as well as the empirical strategy employed.

### 4.1. Variables and Data Description

Our major objective is to empirically investigate the impact of EU trade policies relating to SPS and TBT measures have led to increased female employment in the agricultural sector. We identified four categories of variables that influences female and male employment gaps societies. These are (1) EU trade policy via its SPS and TBT requirements; (2) economic structure and global integration; (3) infrastructure; (4) existing gender structure and women characteristics; (5) country-level institutions and policies. These are explained below.

#### 4.1.1 Measuring Gender Gap

Our dependent variable is agricultural employment segregated by gender. Following the feminist literature, we constructed 3 unique measures of gender inequality to measure the relative access of males and females to opportunities. The first is the gender disparity index (GPI), constructed as the ratio of the number of female to male employed in the agricultural sector over time, given as:

$$GPI_{it} = \frac{F_{it}}{M_{it}} \quad (1)$$

Where ‘*i*’ indicates the individual country and ‘*t*’ is the time period,  $F_{it}$  and  $M_{it}$  are respectively the female and male employees in the agricultural sector at time *t*.

In equation (1), an increase in the GPI indicates an increase in gender equality and women and vice versa and a decrease in the index indicates increase in gender inequality. So, the coefficient on it would be negative if it there is gender inequality.

#### 4.1.2 Data on EU Food Safety Regulations

Our main explanatory variable is the food safety standards imposed on agricultural products between 1995 and 2012. World Trade Organisation (WTO) obliged its Members to notify these measures to the organisation in order to avoid it constituting unnecessary barrier, and this is specified in the SPS and TBT Agreements<sup>9</sup>. By default, WTO ensure transparency of measures by obliging members to notify all their new public standards to the WTO so as to prevent protectionist use of them and provide time for trade partners to voice concerns over these measures and engage in bilateral dialogue if need be. Thus, we measure food safety standards

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<sup>9</sup> The general objective of these agreements is to achieve transparency in the levying of standards and at the same time protect human life and health, and consumers’ interests, ensures animal health and welfare, plant health and the environment.

using SPS and TBT measures that were notified by the EU to the WTO on all agricultural products between 1995 and 2012. As in all NTMs most of which are a mix of qualitative and quantitative requirements, one of the greatest challenges is to provide an acceptable measure in order to obtain unbiased estimates (Kareem, et al., 2015). Following the NTM literature, the frequency approach is used to quantify these notifications into measures of standards: the frequency and coverage ratio (c.f. Fontague, et al., 2005; Disdier, et al., 2008). A *frequent approach* entails a simple count of the total number of measures notified by the EU on all agricultural product at a given year.

The categories of SPS and TBT regulations notified to the WTO are usually divided into two. The first one are newly formulated *SPS and TBT measures*. The second categories of notifications are *specific concerns* raised by WTO Member countries in which they voice their grievances about the stringency of the notified SPS and TBT measures, as well as the specific concerns that have been resolved. Generally, raising specific concerns about SPS and TBT measures allows the WTO to intervene and ensures that the measures do not create unnecessary barriers to trade and economic growth and employment sectors of developing countries. For instance, raising concerns about unscientific basis of some EU measures particularly those relating to mycotoxins, beef hormone concerns raised by the US and Canada, and the Genetically modified organisms has at time made the EU to lessen the stringency of such measures which might have otherwise continuously contrasted employment in all third countries.

### **Construction of the Measures**

First, we constructed our frequency measure by counting the total number of SPS and TBT measures notified by the EU to the WTO in each year on all agricultural products. A notification is defined by us to be in force in a particular year if it was notified in that year or published prior to the year considered but it still exists and has not been withdrawn. So, the notifications are cumulatively added up in so far as they have not been withdrawn by the EU. Second, we also constructed a frequency measure of all the specific concerns notified by all third countries in relation to the EU SPS and TBT measures in the agricultural sector. Similarly, a specific concern is said to be in force if it was notified in that year or published prior to the year considered but it is still being deliberated upon at the WTO, minus resolved concerns. Similarly, we constructed a cumulative frequency of all specific concerns notified to the WTO between 1995 and 2012. A specific concern is said to be in force if it was notified in that year or published prior to the year considered but it is still being deliberated upon at the WTO, less the resolved concerns.

### **4.1.3 Other Data**

In relation to other explanatory variables, we had used country-level economic structure and its level of global integration; infrastructure; and existing gender structure and women characteristics. The first range of control variables include *agricultural value added* which shows the aggregate demand in the agricultural sector and also show a country's ability to create employment opportunities. Thus, increase in agricultural value added and production is expected to directly affect employment. Aside its economic structure, the degree of a country's integration into the global market would also influence their employment of women relative to

men. We control for this using a variable capturing *regional trade agreement* (RTA) with the EU. Countries which have trade agreements with the EU would enjoy some preferential benefits such as tariff reduction or elimination and quota preferences from the EU. This can bring in more trade flows to the EU, consequently generating more employment. EU agreements recognize and promote labour rights and standards including its gender ramifications. Thus, most of these agreements are based on the Fundamental ILO convention, particularly the EU GSP, while others are based on cooperative and dialogue on issues related to labour standards, such as the FTA with Algeria, Morocco and Cameroon (ILO, 2012). However, most of EU RTA have been making reference to the International Labour Organisation (ILO) core labour standards in its trade agreements since late 1990s (European Commission, 2001, 2004). To the extent that the EU imposes sanctions on countries violating labour laws and give additional preferential treatment in the event of full implementation of ILO core<sup>10</sup> labour rights and fundamental labour conventions. Thus, a priori, it is expected that EU RTA would have a positive influence in promoting gender equality in employment.

Till date, EU have undertaken numerous trade agreement with third countries and in the case of the countries in our analysis, 3 distinct RTA can be identified. These are the generalised system of preference (GPS) which has been in force since 1971; the free trade agreements (FTA) and the more recent economic partnership agreement (EPA). A detailed report of countries included in this RTA is provided in Table A in the appendix. Other important controls are those that directly affect women and their availability for employment. This includes country-level physical *infrastructure*, which affects female care burden and responsibility and thus their availability for employment. As noted in the literature, women unpaid care burden brings about considerable time poverty and mobility constraint for them which prevent them from taking up gainful employment in the labour market. This care burden can however be escalated or lessen for them depending on the availability of a country's physical infrastructure and its quality. For example availability and access to clean water and sanitary environment, good transport network and communication infrastructure can help reduce the time that women spend on unpaid care (Pierre-Richard et al., 2010; Wamboye and Seguinto, 2015). So, in our analysis, we capture infrastructure with two variables. These are the percentage of the population which has access to improved sanitation facilities, and percentage that have access to improved water source. The effects of these two variables are expected to have significant positive impacts on women's employment. The intuition is that improved sanitary facilities and water sources bring about improved health status and reduces the time women spend as caregivers in unpaid care activities. The second variable is access to water supply, which is also a direct measure of time saving infrastructure which lessen the time women spend in unpaid care activities.

Relatedly, the 'existing gender structure in an economy and women characteristics' would also have their own influence on their access to employment. For instance, women capabilities measured as their level of *educational attainment* which affect their ability to participate in and

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These core labour standards are made up of five standards that are contained in eight conventions. These are: freedom of association and recognition of the right to collective bargaining (Conventions 87 and 98); elimination of discrimination in employment and occupations (Conventions 100 and 111); the elimination of all forms of forced and compulsory labour (Convention 29 and 105); and the effective abolition of child labour (Conventions 138 and 182).

benefit from gainful and quality employment; variables capturing their reproductive activities which we proxy by the country level *fertility rate*. This variable is important as high level of fertility leads to career break or even total loss of jobs in most developing countries with little or no job security. We also control for demographic characteristics in the labour market using the *labour force participation rate* for female and male. This variable is important as huge gender gaps in labour force participation might directly affect the proportion of women that are gainfully employed.

Therefore, based on the above definitions, the regression model is given as:

$$\begin{aligned}
GPI_{it} = & \beta_0 + \beta_1 Ava_{ij} + \beta_2 SPS\_TBT_{it} + \beta_3 Concerns_{ijt} + \beta_4 FTA_{ijt} + \beta_5 EPA_{ijt} + \\
& \beta_6 GSP_{ijt} + \beta_7 Inf_{it} + \beta_8 Infra_{it} + \beta_9 InfraSq_{it} + \beta_{10} Lfm_{it} + \beta_{11} Pfm_{it} + \beta_{12} Sfm_{it} + \\
& \beta_{13} Fer_{it} + \beta_{14} FerSq_{it} + \delta_i + \delta_t + \varepsilon_{ijt}
\end{aligned} \quad (2)$$

Where  $i, j$ , and  $t$  are the exporting country, importing countries (the EU) and time respectively. Our dependent variable,  $GPI$ , is gender inequality in agricultural employment measured as the ratio if the number of female to male employed in the agricultural sector for people aged 15-64.  $Ava$  is the agricultural value added measured in current US dollars.  $GPS$ ,  $FTA$  and  $EPA$  are each RTA variables. We capture the influence of each of these RTAs using 3 separate dummy variables which is given as one if a country as a GPS agreement with the EU, zero otherwise; one if a country have a FTA agreement with the EU, zero otherwise; and one if a country has an EPA agreement with the EU, zero otherwise.

$Infra$  are the percentage of a country's total population that have access to improved sanitation facilities and water sources. This is a proxy of the availability of time saving infrastructure for women; this we constructed by taking the average of the two variables. We also included a square term of the variable in our analysis to capture any accelerating effect that increased provision of infrastructure might have on gender equality.  $Lfm$  is the ratio of female to male labour force participation ratio, while  $Pr$  and  $Sec$  are controls for gender gaps in education with  $Pfm$  is defined as the ratio of female to male primary school enrolment, while  $Sfm$  is the ratio of female to male secondary school enrolment. Lastly,  $Fer$  and  $FerSq$  are the fertility rate of women defined as the total number of birth per woman. We also include its squared term to capture the fact that the impact of women fertility rate might not be linear: the intuition is that increase in fertility rate might initially decrease the percentage of women working in the agricultural sector as women take career breaks but this can in the long run increases the number of women in the agricultural sectors particularly households which depend largely on contributory family labour for agricultural activities. Finally,  $\delta_i$  and  $\delta_t$  are the dummy variables controlling for region and time-fixed effects respectively factors influencing gendered employment otherwise not captured by the independent variables, while  $\varepsilon_{ijt}$  is the error term which.

## 4.2. Empirical Strategy

The total number of employment is a non-negative count variable. More so, some of the exporting countries have reported zero employment for their female in some years, for instance Cambodia and this gives rise to rise to the occurrence of a very few number of zeros in the dependent variable. This type of data generating process thus gives rise to a class count data

models (Cameron and Trivedi, 1998; Winkelmann, 2008) which are appropriate in modelling dependent variables whose observations are given as numbers. However, count data estimation techniques can also be extended in modelling ratios or proportional data. For instance, Gourieroux, (1984) posited that to obtain consistent estimates, the data need not follow a Poisson distribution, and the independent variable needs not be an integer. Since our dependent variables are measured as numbers and proportion, count data techniques therefore is deemed appropriate for our analyses.

#### 4.2.1 Model Specifications

To investigate the factors influencing female-male employment gap, we rely on the standard count data model which is represented in a general form of a conditional probability function:

$$\Pr(Y_{ijt} = y_{ijt} | x_i) = \frac{\exp(-\exp(x'_{ijt}\beta)) \exp(y_{ijt}x'_{ijt}\beta)}{y_{ijt}!} \quad (3)$$

Where  $y$  is the count variable, our dependent variable (s),  $x$  is the vector of independent variables of the model, previously defined earlier in equation (2), and  $\beta$  is the vector of the associated parameters. Equation (2) can then be estimated in its multiplicative form using the Poisson model known as the poisson pseudo maximum likelihood (PPML) estimation technique which estimates  $\beta$  by solving the following first-order conditions:

$$\sum_{i=1}^n [y_{ijt} - \exp(x_{ijt}\beta)]x_{ijt} = 0 \quad (4)$$

The PPML model has been shown to have a good performance in the presence of unobserved heterogeneity and heteroscedasticity. First, the model takes account of observed heterogeneity. Second, it provides a natural way of dealing with zeros occurrence in the dependent variable because the model is usually estimated in levels as the model need not be log-linearized. Third, the method also avoids the under-prediction of large values of employment by generating estimates of the number of employment and not its log. Finally, in their 2006 influential paper, Santos Silvia and Trenyero (2006) in a simulation exercise find the estimator to be the best performing estimator that naturally deal with zeros, consistent and gives the lowest bias among the other estimators.

#### 4.3. Data Sources

Our major objective is to investigate the impact of how EU food safety standard affects employment in agriculture with specific gender implications. We investigate the impact of EU food safety standards on gendered employment in Africa's agricultural using panel data from 1995 to 2012. This covers a total of 90 countries for which data on employment is available for both sex for at least two years to enable a panel analysis. These sample of countries covers 6 regions and are given in Appendix A3. Employment data disaggregated by sex are particularly underreported and at times not reported in every year and not reported for some countries, thus giving rise to an unbalanced panel of 674 observations spanning from 1995 to 2012. We confined our analysis to the period between 1995 and 2012 due to two reasons. One, SPS and TBT measures started to be notified to the WTO in 1995, thus, the data is available starting from 1995. Second, our analysis ended in 2012 as most countries employment data are still yet to be made available on the ILO website after 2012.

Data on agricultural employment disaggregated by gender was sourced from the 8<sup>th</sup> edition of the ILO’s Key and Indicators of the Labour Market (KILM) database. SPS and TBT measures on agricultural products were from the WTO’s Integrated Trade Intelligence Portal (I-TIP) database and data used in constructing the regional trade agreement dummies were sourced from WTO. Data on inflation and agricultural value added as a percentage of GDP measured in current US dollars, percentage of population having access to improved sanitation facilities and improved water sources were sourced from the World Bank’s World Development Indicators. Other control variables are female to male labour force participation rate, women’s fertility rate, which were also obtained from the World Bank’s World Development Indicator database. Data on total educational attainment which was measure by ratio of female to male primary school enrolment and ratio of female to male gross secondary school enrolment was sourced from UNESCO database. Other control variables are fixed and time effects which we capture by using regional dummies and time dummies. A description of the summary statistics of all the variables included in this analysis is reported in Table 7.

**Table 7: Summary Statistics**

Variables	Obs	Mean	Standard Deviation	Minimum	Maximum
Female Agricultural Employment (000)	905	1490.104	5253.14	0	79976.84
Male Agricultural Employment (000)	905	2732.778	9389.374	0.1	128282.4
Gender Parity Index	905	0.447	0.323	0	1.607
Female Share of Agricultural Employment	905	0.277	0.152	0	0.667
Male Share of Agricultural Employment	905	0.723	0.150	0.384	1
Agricultural Value Added (Current US Trillion \$)	881	9.948	58.409	0	857.197
Log of Agricultural Value Added	861	21.516	1.919	15.908	26.447
SPS and TBT Measures	905	173.768	104.354	22	346
SPS and TBT Specific Concerns	905	1.155	2.287	-1	14
Regional Trade Agreement: FTA	905	0.477	0.500	0	1
EPA	905	0.102	0.302	0	1
GSP	905	0.020	15.125	0	1
Inflation	889	9.009	115.125	-26.300	273.950
Access to Improved Sanitation Facilities	868	76.916	19.765	9.1	100
Access to Improved Water Sources	871	89.268	9.838	36.5	100
Female to Male Labour Force Participation Rate	888	61.453	18.880	14.190	98.920
Female to Male Primary School Attainment	714	97.205	5.213	55.837	114.144
Female to Male Secondary School Enrolment	621	101.957	12.253	36.53	149.931
Fertility Rate	899	2.580	1.017	0.836	6.802
Fertility Rate Square	899	7.693	6.655	0.699	46.267

## 5.0 RESULTS AND DISCUSSION

Table 8 presents the results of the PPML models with the dependent variable measured as the ratio of female to male in agricultural employment, earlier defined as the gender parity index. In Table 9, we report the results disaggregated by gender while Table 10 reports the regional differentiation of the gender impacts of EU SPS and TBT regulations. All models were estimated using White’s heteroscedasticity corrected standard errors (White, 1964) using the cluster robust option in STATA. Endogeneity may be an issue in our study, which may result either from reverse causality or omitted variable bias that could impact on both gender inequality and growth. For instance, the literature on gender and growth nexus has shown



extensively that the degree of gender inequality may affect trade share and other trade variables; and also, that trade variables may also affect the degree of gender inequality (Seguino, 2000; Klasen and Lamanna, 2009; Bandara, 2012). Using panel data could minimize this problem when country fixed or regional fixed effects are included to control for unobserved characteristics of the countries or regions. For this reason, we argue that the endogeneity problem would be negligible but cannot however be completely ruled out. Thus, we employed an instrumental approach in order to correct for potential endogeneity problem. In particular, we employed the instrumental variable approach using the Poisson approach is due to a recent development in count data models to account for the bias brought about by reverse causality in count data models. According to Windmeijer (2010), one can apply the moment condition to the PPML estimator to solve the endogeneity bias.

Our challenge is to find valid and equally relevant instruments that would be correlated with the endogenous variable (agricultural value added), but uncorrelated with the error term. To address this concern, we instrumented agricultural value added by total labour force and labour force participation rate as a percentage of total population aged 16 to 64. The intuition is that they affect the level of economic activities in the agricultural sector but they themselves do not directly contribute to gender inequality. Following standard instrumental variable estimation approach using the PPML or Panel Poisson instrumental estimation approach, we tested the validity of our instruments using the Hansen test of overriding restriction to ascertain if one or more of our instrument are valid. In all regression, the test did not reject the null hypothesis that our instruments are valid.

### EFFECTS OF SPS AND TBT ON GENDER (IN)EQUALITY

Table 8 reports the estimates obtained from the baseline regression of the employment effects of trade barriers on gender inequality, where the dependent variable is the gender parity in employment between women and men (GPI measured in 1000). Column 1 present the PPML estimation while columns 2 and 3 presents the PPML approach using one-step and two-step GMM, respectively. The results of the one-step GMM is very similar to that of the two-step GMM, so we will only focus on the interpretation of the two-step GMM.

**Table 8: Impacts of EU SPS and TBT Measures and Specific Concerns on Gender Inequality**

Dependent Variable: Gender Parity Index	(1) PPML Levels	(2) One-step GMM	(3) Two-step GMM
Agricultural Value Added	0.003	-0.110***	-0.111***
Cumulative SPS and TBT	0.029	0.028	0.027
Cumulative Existing Concerns	-0.00042**	-0.00039**	-0.00039**
FTA	0.00021	0.00017	0.00017
EPA	0.012	0.044***	0.044***
GPS	0.021	0.013	0.013
Inflation	-0.090	-0.005	-0.005
	0.084	0.049	0.049
	0.090	0.049	0.049
	0.138	0.069	0.069
	-0.760**	-0.793***	-0.794***
	0.326	0.277	0.277
	0.004*	0.004**	0.004**
	0.002	0.002	0.002

Improved Sanitation and Water	-0.024** 0.011	-0.030*** 0.008	-0.030*** 0.008
Improved Sanitation and Water Square	1.373** 0.631	1.674*** 0.518	1.677*** 0.518
Ratio of Female to Male Labour Force Participation	0.017*** 0.004	0.009*** 0.003	0.009*** 0.003
Ratio of Female to Male Primary Schooling	0.046*** 0.012	0.046*** 0.007	0.046*** 0.007
Ratio of Female to Male Secondary Schooling	-0.020*** 0.005	-0.024*** 0.003	-0.024*** 0.003
Fertility Rate	-0.288 0.185	-0.279*** 0.086	-0.279*** 0.086
Fertility Rate Square	0.047** 0.023	0.041*** 0.012	0.041*** 0.012
Constant	-7.676*** 2.579	-5.006*** 1.833	-4.988*** 1.824
R-Square	0.710	0.669	0.668
Number of Observations	549	549	549

Note: A positive coefficient implies trend towards gender parity disproportionately favouring women, while a negative coefficient implies trend towards gender inequality, disadvantaging women. Clustered robust standard errors, clustered by countries and time are in brackets and \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

The regression models in columns 1, 2 and 3 include our control of trade policy with other standards controls which captures both international (bilateral trade agreements) and national economic environments (inflation rates). In column 1, the standard PPML estimator, the estimated coefficient of agricultural value added, which captures the employment effects of changes in the agricultural sector is negative and statistically significant, whereas it becomes significantly negative once we have controlled for endogeneity as reported in columns 2 and 3. This implies that the increase in agricultural activities is significantly driving gender inequality, significantly disadvantaging women employed in the sector. Indeed, a one dollar increase in agricultural value added implies a 3.1% {that is,  $e^{-0.031} - 1 * 100$ } reduction in gender parity per thousand of women employed in the agricultural sector (or a 3.1% increase in inequality in employment). This results confirms that of Wamboye and Seguino (2015) who also find that the sector has led to the defeminization of women in sub Saharan Africa.

Crucial to this study are the trade policies variables. The estimates of SPS and TBT measures are negative and significant and hold across all estimation techniques. The results indicates that the imposition of SPS and TBT measures by the EU on agricultural exports have indeed been led to the gender inequality. In other words, a 10 percent increase in these EU measures would decrease women's relative employment approximately by 0.0034% per thousand women employed, which is equivalent to 3.4<sup>11</sup> decrease in employment. Interestingly, our results refute the hypothesis of the standard trade theory – the Heckscher-Ohlin model in which trade restrictions (liberalization) is hypothesized to (decrease) increase the employment of women.

<sup>11</sup> The dependent variable which was measured in 1000 unit, so, 3.4% = (10\*0.00034) \*1000

The results instead show that increased international trade barriers is in fact driving the defeminization of women in the agricultural sector.

This result is as expected as women relative to men have less technical education to comply with technical standards, the situation is also exacerbated due to their relative lack of financial assets or financial access to pay for standards certification and other technicalities which can be very costly particularly for small farmer holders (Czubala et al, 2009) most of which women in many developing countries. In fact this lack of technical education and financial access implies persistent unequal power relation between men and women and thus, and their inability to comply with such measures overtime can make them uncompetitive leading to a gradual defeminization in the sector. Thus, our results is in support of the heterodox standard trade theory which states that unequal power relation and increased international competition leads to the elimination of women in labour markets. The result instead shows that increased international trade barriers is in fact a driving force behind the defeminization of women in the agricultural sector.

However, our second measure which represent third countries notifications of their grievances and concerns about EU SPS and TBT turns out positive and statistically significant. In fact, voicing out grievances and stating concerns about stringent SPS and TBT or those who third countries are deem unnecessarily stringent and constituting barriers to their export trade is in fact stimulate an increase in women relative to men employment, thereby contributing to gender equality in agricultural employment. This is the case of EU overly stringent aflatoxin regulation and beef hormone standards in the 1990s that have stimulated many countries to raise concerns about such SPS and TBT measures which consequently have made EU to lower such standards through the intervention of WTO. Such concerns consequently removed the unnecessary obstacles caused by the measures and open up more trade and generated more employment. Our result is in support of the proposition made by Jaffee and Henson that voice is and can indeed be a tool to increase participation in international trade. Interestingly, in relation to this second trade policies indicator, our results is in line with the those predicted by the standard trade theory theory – the Heckscher-Ohlin model in which reduction of trade barriers is hypothesized to increase the employment of women.

Relatedly, contingent on the fact that regional trade agreements are undertaken to reduce trade barriers, with many of the EU RTAs incorporating the ILO Conventions on stopping discriminatory labour practices such as discriminatory practices against women. Our three measures of RTA between the EU and the countries considered in this analysis shows very different results. For instance, for FTA and EPA, we observe a gender neutral effects across all the regression models. Intuitively, this is as expected as the EU has been incorporating the ILO core labour standards in its trade agreements. Sanctions are given to violating countries while additional tariff reduction preferences is given to those who are fully implementing the labour standards. Thus, such RTA and the associated incentives is at least having a gender neutral effect. However, most of EU RTA have been making reference to the International Labour Organisation (ILO) core labour standards in its trade agreements since late 1990s (European Commission, 2001, 2004). To the extent that the EU imposes sanctions on countries violating

labour laws and give additional preferential treatment in the event of full implementation of ILO core<sup>12</sup>labour rights and fundamental labour conventions.

Turning to our measure of domestic economic indicator, our results shows that inflationary pressures indeed brings about a significant increase in employment opportunities for women relative to men. This is not surprising as women have been documented to engage in ‘distress sale of labour’ in terms of macroeconomic crisis especially in low quality and poorly paid jobs (see Wamboye and Segunino, 2015; Tejani and Milberg, 2012; Kabeer, 2012). In related to other explanatory variables, access to improved sanitation facilities and water sources and its squared, our measures of time saving infrastructure which lessen women’s domestic care burden, reduce their time poverty and makes them available to take up employment, turns out to be an important factor in ensuring increased participation of women in the agricultural market. In fact, across regression models, improved access to these facilities will result to more employment opportunities for women relative to men. In fact a 1 percent increase in population with access to these facilities would wider the employment gap in favour of women by 1.65 {i.e.  $-0.030+1.677$ } per thousand women.

Apart from this control variable, our variables controlling for unequal opportunities resulting from the entrenched gender norms and cultures also turns out to be significant in explain the observed gender differences in employment. For instance, norms and cultures that makes women not available for employment will impact negatively on their rate of participation in the labour markets relative to female. This unequal opportunity and participation in their labour participation rate is then expected to negatively impact on their employment status relative to their male counterpart. In fact, controlling for the gender participation of female relative to men in the total economy, we found out that increased participation of women in the economy-wide labour market is more likely to increase their employment in the agricultural sector relative to men and vice versa. Thus, removing entrenched norms that prevents women from participating in the labour market will indeed have increase the gender gap in agricultural employment in favour of women.

Relatedly, in terms of unequal opportunities, the literature have pointed out that defeminization of women in labour market is being driven by their lack of adequate education and training relative to men. Thus, to gain deeper insights into this, we have included each countries’ educational capabilities<sup>13</sup> to capture their human resource capacity. Our measure of female to male primary schooling also known as the gender parity index in primary schooling reveals that the increased female to male in primary schooling has indeed widened the employment gap in favour of women with a 0.046 favourable employment effect on women. This result as as expected, given the fact that gender parity has been achieved at least in primary education (ILO, 2014; Tejani and Milberg, 2012), and this is significantly resulting in relatively more job

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<sup>12</sup> These core labour standards are made up of five standards that are contained in eight conventions. These are: freedom of association and recognition of the right to collective bargaining (Conventions 87 and 98); elimination of discrimination in employment and occupations (Conventions 100 and 111); the elimination of all forms of forced and compulsory labour (Convention 29 and 105); and the effective abolition of child labour (Conventions 138 and 182).

<sup>13</sup> The inclusion of the two measures of educational capabilities drastically reduced our sample size as many of the countries considered have missing data for secondary schooling in many years.

opportunities for women. In contrast however, ratio of female to male pupils in secondary school is negative and statistically significantly declining the employment gap in favour of men.

Lastly, both our controls for women's fertility – fertility rate and its square which capture the availability of women for gainful employment turns out to be a significant in explaining the observed gender gap in employment in the agricultural sector. We found that a 1 percent increase in birth per woman would narrow employment gap in favour of women by 0.238 {i.e.  $-0.279+0.041$ } per thousand employed. However, initially, we see that increased fertility rate will initially result in more employment opportunities for men than women amounting to about 0.279 per thousand employed but after a turning point, the square term indicates there was an employment gain such that the total loss in employment fell slightly by 0.041, resulting in a total of 0.238 less employment for women relative to men. The latter gain in employment by 0.041 can be attributed to the fact that increase in birth ensure more people and family members become available for agriculture, particularly in developing countries and agrarian economies which depend largely on contributing family members and large sized families for labour.

### EFFECTS OF SPS AND TBT BY GENDER

Having established that women are at a disadvantaged position due to unequal access to opportunities, thus, to better understand the extent of the inequality between women and men, we proceed to investigate to what extent these factors and unequal opportunities are contributing to (de)feminization in the agricultural sector. Having established that women are at a disadvantaged position due to unequal access to opportunities, thus, to better understand the extent of the inequality between women and men, we proceed to investigate to what extent these factors and unequal opportunities are contributing to (de)feminization in the agricultural sector. Table 9 reports the estimates of the regression of the employment effects of SPS and TBT on separately on women and men, controlling for other factors which affect the employment gap.

**Table 9: Employment effects of SPS and TBT by Gender**

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)
	Female PPML	Male PPML	Female Onestep GMM	Male Onestep GMM	Female Twostep GMM	Male Twostep GMM
Agricultural Value Added	0.002	-0.003	-0.064***	0.034***	-0.061***	0.034***
	0.021	0.008	0.021	0.008	0.021	0.008
Cumulative SPS and TBT	-0.0003**	0.0001**	-0.0003**	0.0001***	-0.0003**	0.0001**
	0.0002	0.00006	0.0001	0.0005	0.0001	0.0005
Cumulative Existing Concerns	0.014	-0.002	0.032***	-0.010***	0.031***	-0.010***
	0.016	0.005	0.010	0.003	0.010	0.003
FTA	-0.074	0.021	-0.026	0.002	-0.025	-0.003
	0.068	0.023	0.033	0.014	0.033	0.014
EPA	0.061	-0.022	0.041	-0.022	0.040	-0.020
	0.104	0.040	0.049	0.018	0.048	0.018
GPS	-0.611**	0.099*	-0.622***	0.105**	-0.618***	0.100**
	0.240	0.059	0.203	0.046	0.204	0.046
Inflation	0.003	-0.001**	0.003**	-0.002***	0.003**	-0.002***
	0.002	0.001	0.001	0.001	0.001	0.001
Improved Sanitation and Water	-0.020**	0.006*	-0.023***	0.006***	-0.023***	0.006***
	0.008	0.003	0.006	0.002	0.005	0.002
Improved Sanitation and Water Square	1.186**	-0.268	1.308***	-0.214	1.297***	-0.205
	0.493	0.200	0.359	0.139	0.354	0.139
Ratio of Female to Male	0.012***	-0.005***	0.007***	-0.003***	0.008***	-0.003***

Labour Force Participation						
	0.003	0.001	0.002	0.001	0.002	0.001
Ratio of Female to Male Primary Schooling	0.034***	-0.011***	0.034***	-0.011***	0.034***	-0.011***
	0.009	0.003	0.005	0.002	0.005	0.002
Ratio of Female to Male Secondary Schooling	-0.015***	0.004***	-0.017***	0.006***	-0.017***	0.006***
	0.004	0.002	0.002	0.001	0.002	0.001
Fertility Rate	-0.224*	0.114**	-0.206***	0.067**	-0.204***	0.063**
	0.128	0.058	0.062	0.030	0.062	0.030
Fertility Rate Square	0.036**	-0.018**	0.031***	-0.009**	0.031***	-0.009**
	0.016	0.008	0.009	0.004	0.009	0.004
Constant	-6.786***	1.050	-5.047***	-0.225	-5.136***	-0.212
	1.949	0.758	1.329	0.554	1.310	0.558
R-Square	0.700	0.743	0.676	0.698	0.678	0.698
Number of Observations	549	549	549	549	549	549

Clustered robust standard errors are in brackets and \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

We again report the baseline regression model estimated by the standard PPML estimator and the one-step and two-step GMM using the PPML approach. In comparison to standard PPML, the estimates of the GMM approaches present a lower standard errors, implying more precision, while those of the GMM PPML estimators are similar in magnitude but the one-step GMM PPML estimator has slightly higher standard errors in one or two cases than those of the two-step GMM. Once again, for simplicity, we interpreted the two-step GMM estimator.

Crucial to this study are the estimates of the SPS and TBT measures. Despite the low magnitudes of the estimates, we observe positive and significant effects of SPS and TBT measures for men while the estimates are and statistically significantly negative for female in all models. As pointed out earlier, male significantly increase in employment share while women are a disadvantaged position as many small farmers most of which are female are unable access and compete in export markets compared to their male counterparts due to the constraints they face relating to their lack of adequate technical expertise to comply with such EU measures (Fontana and Paciello, 2000); they find it difficult to comply with standards as they seldom receive on the job technical trainings due to gender segregation in training with preference to train men (Kabeer, 2012); their low level of collateral and limited access to financial assets and credits implies that the huge costs of complying with such measures all prevent them from complying with such standards, thus increasing the presence of male in the agricultural sector particularly because male tends to have relatively higher technical expertise, more collateral security such as land holdings, and more access to credit.

However, one remarkable results relating to the SPS and TBT measures is the signs on the estimates of the ‘concerns’ raised by third countries on the EU SPS and TBT measures. Interestingly, voicing concerns about the high stringency of the EU measures increases women’s share of employment while it reduces men’s share of employment. As mentioned earlier, raising concerns about EU measures sometimes trigger the EU to significantly lower its trade barriers. However, this gesture benefiting women at the expense of men definitely confirms the Heckscher-Ohlin hypothesis that lowering trade barriers would lead to an increase in the labour intensive sectors of developing countries such as the agricultural sector, with women benefiting most in terms of increased employment since they predominate in the agricultural sector. However, the fact that the results does not differentiate between labour-

intensive and capital-intensive region underscores the importance of exploring the impacts of these EU measures by region or economic structure to see if the results holds irrespective of their economic structure.

From our regression models 5 and 6, we can see that the impacts of our control variables differ significantly for females and males. In fact, while increased value addition to agricultural activities is increasing the share of men in the agricultural sector, the same cannot be said for women as the coefficient is negative and significant, implying women are at a disadvantage in the agricultural sector in comparison to men. In fact a 10% increase in agricultural activities raises men employment share in the sector by 0.3% while it reduces that of women by about 0.6%. This unequal access to employment opportunities in the agricultural sector is indeed explaining and contributing to the observed pattern of gender inequality as was previously noted in our results in Table 8.

Also, buttressing our earlier results, we found that two EU RTAs in relation to FTA and EPA to have no impact on both female and male employment whereas, GPS significantly increases men employment by 0.1 while it reduces women employment share by 0.6. As implied by our studies, developmental policies are not gender neutral as women are negatively affected by the RTA while men benefit. However, in relation to domestic economic situation as measured by the inflation rates, we see that women share of employment increases significantly while men experience a fall in employment share. In fact, a 10 percent increase in inflation rate results in a 0.03% increase in employment for women and a corresponding 0.02% fall for men.

As discussed in the literature, crucial to women availability for employment is the provision and their access to improved sanitation and water which lessen their heavy domestic chores, reduces their time poverty, and increases their mobility. This hypothesis is confirmed in our results which shows that increased access to improved sanitation and water by the population will increase men employment opportunities by 0.06% but will raise women share of agricultural employment by 212 folds, amounting to about 12.74  $\{(-0.023-1.297)*100\}$ . Our results signify the huge benefits that would accrue to women following significant investment infrastructure, particularly time saving infrastructure. Furthermore, our control of existing pattern of gender relations in the country-level labour market using the ratio of female to male labour force participation rate also yield interesting results. While the coefficient is positive and significant for female, it is however negative and significant for male, implying that increased women participation in the economy-wide labour market will have positive spill over effect on their employment in the agricultural sector while men employment share in the sector would witness a decline. This result points out that gender equality in the agricultural sector can be achieved by removing the existing norms that prevent women from participating in the labour market would narrow the unequal gender relation in labour markets, significantly enhancing women's ability to benefit from employment opportunities in the agricultural sector and possibly other sectors of the economy.

In terms of educational capabilities, our results indicate that the parity in primary education achieved so far is increasing disproportionately in favour of women than men in the agricultural sector. That is, a 10% increase in the ratio of women to men in primary education increases women's employment share by 0.3% and reduces men's employment share by 0.1%. However,

according to the ILO (2014), educational parity have not yet been achieved at the secondary school level, as female students still fall short of male students. This report is in line with our study as we see that at the secondary school level, the low level of schooling of women relative to men has worsen their ability to take up employment opportunities in the agricultural sector, while it widens men’s job advantage. This gender differences in secondary schooling implies an increase in employment share by 0.02% for women and a decrease of about 0.01% for men. The differences in the level of secondary schooling reflect the possible women’s lack of technical expertise and trainings needed to comply with SPS and TBT measures, compared to their male counterparts. In fact, our findings confirm those of Kabeer (2012) and Beviglia-Zampetti and Tran-Nguyen (2004) both of who noted that women are at a disadvantage as they are seldom available for educational training due to their domestic activities which do not give them opportunity to enrol in school; and also because of gender preference and gender bias towards the male child in which households prefer to train the male child than the girl child.

Finally, fertility rate significantly reduce their ability to take up employment opportunities relative to men and is a significantly contributing factor to the observed gender inequality observed in the results reported in Table 8. For instance, a 10% increase in total birth per woman reduces women’s share of agricultural employment by 1.7%  $\{(-0.204+0.031)*10\}$  and increases men’s employment share by 0.5%  $\{(-0.063+0.009)*10\}$ . This result is due to two reasons: one, men take up women job positions when they give birth; two, pregnancy and childbirth can constitute significant breaks in women career and this can result into significant job losses for women particularly in developing countries which lack adequate social security and job protection to take care of such issues.

### DIFFENTIAL EFFECTS PER REGION

Lastly, we proceed to know the differential impacts of the EU trade policy measures by region as the regions considered differs in the level of agricultural activities and the labour intensivity of the sector. We re-estimated our models adding a set interaction variables between the EU SPS and TBT measures and the regional dummies in order to obtain the differential effects by region. The results of the one step and two step GMM are similar but we report the two step GMM results due to lack of space and this is summarized in Table 10.

**Table 10: Differential Impacts of EU SPS and TBT Regulations by Region**

Dependent Variables	(1) Gender Parity Index	(2) Female	(3) Male
Agricultural Value Added	-0.053**	-0.022	0.015**
	0.023	0.017	0.006
SPS and TBT Measures	-0.0008**	-0.0006**	0.0002***
	0.0004	0.0003	0.0001
SPS and TBT Measure*East Asian and Pacific	0.0009**	0.0007*	-0.0003**
	0.0005	0.0003	0.0001
SPS and TBT Measure*Europe and Central Asia	0.0004	0.0004	-0.0000
	0.0004	0.0003	0.0001
SPS and TBT Measure*MENA	0.0001	0.0000	0.0000
	0.0006	0.0005	0.0002
SPS and TBT Measure*South Asia	0.0006	-0.0000	-0.0000
	0.0011	0.0007	0.0004
SPS and TBT Measure*Sub Saharan Africa	0.0005	0.0007*	-0.0002
	0.0006	0.0004	0.0001
SPS and TBT Specific Concerns	0.033***	0.023**	-0.007***
	0.012	0.009	0.003



SPS and TBT Specific Concerns*East Asia Pacific	-0.087***	-0.062***	0.033***
	0.025	0.018	0.008
SPS and TBT Specific Concerns*Europe and Central Asia	-0.030	0.005	0.010
	0.070	0.047	0.026
SPS and TBT Specific Concerns*MENA	0.018	0.017	-0.010
	0.032	0.025	0.008
SPS and TBT Specific Concerns*South Asia	-0.068*	-0.024	0.025
	0.041	0.025	0.018
SPS and TBT Specific Concerns*Sub Saharan Africa	0.035*	0.021	-0.012**
	0.021	0.015	0.006
FTA	-0.071	-0.069**	0.017
	0.047	0.033	0.013
EPA	0.032	0.037	-0.010
	0.067	0.049	0.018
GSP	-0.808***	-0.652***	0.104**
	0.292	0.212	0.044
Inflation	0.004**	0.003**	-0.002***
	0.002	0.001	0.001
Improved Sanitation and Water	-0.026***	-0.021***	0.006***
	0.008	0.006	0.002
Improved Sanitation and Water Square	1.458***	1.209***	-0.205
	0.515	0.368	0.143
Ratio of Female to Male Labour Force Participation	0.012***	0.010***	-0.004***
	0.003	0.002	0.0007
Ratio of Female to Male Primary Schooling	0.047***	0.035***	-0.012***
	0.007	0.005	0.002
Ratio of Female to Male Secondary Schooling	-0.022***	-0.016***	0.005***
	0.003	0.002	0.001
Fertility Rate	-0.283***	-0.223***	0.093***
	0.090	0.066	0.029
Fertility Rate Square	0.045***	0.036***	-0.014***
	0.012	0.009	0.004
East Asia and Pacific	-0.002	-0.032	-0.050
	0.101	0.068	0.038
Europe and Central Asia	-0.893***	-0.649***	0.262***
	0.105	0.077	0.025
MENA	0.012	0.094	0.004
	0.185	0.136	0.048
South Asia	-0.073	0.001	-0.032
	0.186	0.142	0.068
Sub Saharan Africa	-0.428***	-0.283***	0.163***
	0.133	0.090	0.040
Constant	-6.185***	-6.126***	0.358
	1.820	1.323	0.531
R-Square			
Number of Observations	549	549	549

Clustered robust standard errors are in brackets and \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

Firstly, we report the differential value of gender inequality by region. Taking East Asia and the Pacific as the reference category, the regional dummies gives the differential intercepts and that gender gap is narrower in Latin America and the Caribbean and Sub Saharan Africa by 0.89 and 0.43 respectively in favour of men in by 0.89 compared to benchmark category. While the gender gap in other regions is not significantly different from that of East Asian and the Pacific region. Similar results hold for the regressions models in columns 2 and 3 where the dependent variables are female and male shares of agricultural employment. In this case, females in Latin America and the Pacific and Sub Saharan Africa are more affected having a lower employment share of 0.649 and 0.283 respectively less than the other regions, while male share of employment in Latin America and Sub Saharan Africa are significantly higher by 0.262 and 0.163 respectively compared to the other regions.

Secondly, implicit to our interpretation is that the impact of SPS and TBT measures are the same across the regions considered. However, to show if such assumption is tenable, we introduced some interaction terms. The interaction terms gives the differential effect of coming from a particular region. As reported in Column 1 of Table 10, our results shows that while the slope coefficient on SPS and TBT measures remains statistically significant negatively affecting female share in agriculture and gender equality, positively affectively male, as obtained in the previously discussed results.

Across all regression models, the regional interaction terms on it which give the differential slope coefficients for each region relative to the reference region (Latin American and the Caribbean) is statistically significant for only the East Asian and the Pacific region but not for the other regions considered except for Sub Saharan Africa in Column 2. This means that ceteris paribus, the average impacts of SPS and TPT measures on female is positive at 0.001 (i.e. -0.0006-0.0007) for East Asia and Pacific and Sub Saharan Africa and 0.0006 for the rest of the regions the differential intercept coefficients are not statistically significant implying that the impact are same as the Latin America and the Caribbean. In other words, EU SPS and TBT measures have actually increased female employment in countries in East Asia and Pacific and Sub Saharan Africa countries while other countries experience a decrease. In regards to males employment share, all the regional differential coefficients are insignificant except East Asia and Pacific, indicating that the average impacts of the measure is the same as the reference category, in this case, 0.0002 while the average impact for East Asia and Pacific is (-0.0001), implying that EU SPS and TBT measures significantly decreases male share of agricultural employment in all other regions considered while decreasing men's employment share in the East Asia and Pacific region.

Lastly, in relation to gender inequality, our results shows that the inequality is lower in East Asian and the Pacific by 0.9 per thousand employed, compared to the reference category which in our case is Latin American and the Caribbean. This is not surprising as our discussion of the results points out that the EU measure in the region increases the share of female and reduces the share of male in agricultural employment. However, there exist no significant difference between the other 4 regions and the reference category as the differential slope coefficients on the regional interaction term of the SPS and TBT measure are insignificantly different from zero. Our results imply that the total impact of the EU SPS and TBT measure on East Asian and the Pacific is 0.1 per thousand employed  $\{(-0.0008+0.0009)*1000\}$  while the impacts for all the remaining 5 regions remains the same and negative at 0.1 per thousand employed. These results are not unexpected as it would be recalled that in the previous discussions in the previous section shows that in East Asia and SSA, women occupy less than 50% employment in the agricultural sector and East Asia has the highest share of these agricultural employment followed by Africa since 2004. This predominance of females in low skilled agricultural employment particularly in East Asian countries could then explain why the EU measures increases female employment opportunities relative to men by about 0.0009 for the region

Furthermore, in relation to the SPS and TBT concerns, the slope coefficients across the 3 regression is given as 0.02 for female, significantly decreasing female share of employment; for male, it is negatively and statistically significant and given as 0.01 while its coefficient in column 3 is positive statistically significant given as 0.0328, indicating that the concerns are increasingly promoting gender equality. However, the differential slope coefficients for each region indicates that in East Asia and the Pacific, SPS and TBT concerns are decreases female share of employment and increases male share of employment by 0.03 and constitute to gender inequality by 0.07. However, the differential slope coefficients for each region indicates that

this results differs significantly across some regions. First, in relation to female employment, for all the regions except East Asia and the Pacific, the differential intercept coefficients are not statistically significant implying that the impact are same as the Latin America and the Caribbean (0.023), while it actually negative for East Asian and the Pacific (-0.039). Secondly, regarding male employment, employment share of male are significantly relatively more in the East Asia and the Pacific region by 0.033 and less in Sub Saharan Africa by 0.012 implying a total employment effect of (0.262) and (-0.189) in Sub Saharan Africa and (-0.007) in the rest of the regions. Finally, In addition, the benefits of equity promoting benefits of concerns are not equally shared in all region; the impact of concerns is East Asia and Pacific (-0.0538), South Asia (-0.035), Sub Saharan Africa (0.68), and (0.0328) for all other regions. In other words, raising and solving a concern significantly contributes gender equality in other regions and widens the gender gap in favour of men for East Asia and the Pacific and South Asian countries. In line with the ILO (2012) report, one major explanation for the variations in the impacts is that the widening of the gap could be attributed to young women dropping out of agricultural sector to get more education in South and East Asian regions. Other factors are the prevalence of temporary and insecure contracts among women, differences in the educational attainments (*ibid*), family responsibilities and heavy care burden, carrier interruption for child rearing which made them unavailable to benefit following the lowering of trade barriers such as the raising and resolving SPS and TBT concerns

### Robustness Checks

We did a number of checks to assure the reliability of our results. We tested the robustness of our results to alternative samples, different estimation techniques and alternative measures of gender inequality in employment. Our first paramount concern is to see whether countries with ‘outlier GPI’ are the one driving our results, particularly the results that shows that EU SPS and TBT concerns is promoting gender equality. A third and equally important concern relates to the robustness of our results to other estimation techniques. A final concern and equally important concerns relates to whether the results are driven by the choice of our measure of the dependent variable.

To address the first concern, we have excluded observations with large values of the gender inequality index particularly those that signifies parity in employment between both sex (i.e. where the GPI are equal to 1) and those that signifies an advantage for women (GPI greater than one). This we did by dropping observations for which the GPI is greater or equal to 0.95. That is, deleting observations points where female employment is approximately greater or equal to the male employment. Table 11 addressed the first concerns by reporting the estimates obtained when the outliers are excluded from the sample. Remarkably, these results further highlight our previous conclusion since they are similar to those obtained in Tables 8 and 9, although the coefficients of the fertility variable and its square are not statistically insignificant. Nevertheless, the basic message of this study particularly in relation to the impacts of the two non-tariff measures remains largely unchanged.

**Table 11: Robustness Checks with alternative Sample: Observations where Female Employment < Male Employment**

Dependent Variables	Gender Parity Index		Female		Male	
	(1) One Step	(2) Two Step	(3) One Step	(4) Two Step	(5) One Step	(6) Two Step
Agricultural Value Added	-0.164*** 0.037	-0.155*** 0.036	-0.100*** 0.028	-0.095*** 0.027	0.026*** 0.008	0.027*** 0.009
Cumulative SPS and TBT	-0.0003*	-0.0003*	-0.0003**	-0.0003**	0.0001**	0.0001**

	0.0002	0.0002	0.0001	0.0001	0.0000	0.0000
Cumulative Existing Concerns	0.057***	0.056***	0.039***	0.039***	-0.008**	-0.009***
	0.015	0.015	0.011	0.011	0.003	0.003
FTA	0.010	0.007	-0.011	-0.009	0.005	-0.003
	0.058	0.057	0.042	0.041	0.014	0.014
EPA	0.044	0.037	0.032	0.029	-0.028	-0.025
	0.074	0.072	0.055	0.055	0.018	0.018
GPS	-0.742**	-0.755**	-0.620***	-0.616***	0.093**	0.088**
	0.300	0.304	0.219	0.220	0.043	0.043
Inflation	0.004**	0.004**	0.003**	0.003**	-0.002***	-0.002***
	0.002	0.002	0.001	0.001	0.001	0.001
Improved Sanitation and Water	-0.008	-0.008	-0.011*	-0.011	0.004*	0.004
	0.009	0.009	0.007	0.007	0.002	0.003
Improved Sanitation and Water Square	-0.051	-0.068	0.364	0.361	-0.093	-0.084
	0.596	0.595	0.457	0.459	0.171	0.173
Ratio of Female to Male Labour Force Participation	0.006*	0.006*	0.006**	0.006**	-0.003***	-0.003***
	0.003	0.003	0.003	0.002	0.001	0.001
Ratio of Female to Male Primary Schooling	0.053***	0.054***	0.039***	0.039***	-0.011***	-0.011***
	0.007	0.007	0.006	0.005	0.002	0.002
Ratio of Female to Male Secondary Schooling	-0.031***	-0.030***	-0.022***	-0.021***	0.006***	0.005***
	0.004	0.004	0.003	0.003	0.001	0.001
Fertility Rate	-0.120	-0.124	-0.100	-0.098	0.064**	0.057*
	0.100	0.099	0.072	0.072	0.031	0.032
Fertility Rate Square	0.009	0.011	0.010	0.011	-0.008*	-0.008*
	0.015	0.015	0.011	0.011	0.005	0.005
Constant	2.052	1.709	-1.127	-1.368	-0.430	-0.420
	2.593	2.573	1.972	1.966	0.691	0.702
R-Square						
Number of Observations	512	512	512	512	512	512

Clustered robust standard errors are in brackets and \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

Second, as a further robustness check, we probe if our results are driven by our choice of estimation technique. Previously, we have applied the moment condition to the panel Poisson model in order to solve the endogeneity problem. In addition, our dependent variable given an the ratio of the total number of female to male employed in the agricultural sector was strictly non-negative and contains some zeros which prompted us to use a non-linear estimator to estimate the gender inequality equation. As an alternative instrumental variable approach, we have employed the two stage least square (TSLS) instrumental variable estimator employing the same instruments that were previously employed. The robustness result is reported in part A of Table 12. Remarkable, the results are similar to those obtained using the instrument approach of the PPML in Tables 8 and 9, although a few of the coefficients are slightly higher in magnitude. Thus, our major conclusion remain the same, particularly in regard to the impacts of the two the two measures of EU trade policies.

The final concern relates to the construction of the gender inequality indicator. We checked the sensitivity of our results to an alternative constructed measure of gender equality. We constructed a relative gap in men to women employment, which an alternative and equally acceptable measure of inequality. Here, the gender inequality gap can be calculated by subtracting they number of female employed in the agricultural sector from the number of males

employed in the sector over time divided by the number of males employed. Formally, the formula is given as:

$$Relative\_Gap_{it} = \frac{M_{it} - F_{it}}{M_{it}} \quad (6)$$

where all our variables are as earlier defined; ‘*i*’ indicates the individual country and ‘*t*’ is the time period,  $F_{it}$  and  $M_{it}$  are respectively the female and male employees in the agricultural sector at time *t*. This indicator now implies that we have both negative (when male employment is less than female employment) and positive values as observations in our dependent variable. Given the occurrence of negative values, we could no longer employ the PPML model as the underlying assumption of the model is strictly based on non-negatively numbers or observations. Alternatively, we thus applied the standard TSLS, maintaining the same set of instruments as before.

It would be recall that our GPI measure was constructed such as an increase in the GPI indicates an increase in gender equality, such that the coefficient on it would be positive if it there is gender equality and vice versa. However, in equations (6) our newly constructed dependent variable was constructed such that an increase in the gap indicates an increase in gender inequality in employment, disproportionality disadvantaging women, and vice versa. Given this, the coefficient on it would be negative signifying gender equality or positive signifying gender inequality. The results of this robustness check are reported in the part B of Table 12. As expected, the results are in line with those reported in Tables 8 and 9 with all the estimates having the opposite signs compared to what was obtained in Tables 8 and 9, mainly due to the way the new dependent variable was constructed. In particular, the impact of EU SPS and TBT measures is positive and statistically significant implying that an increase in the gender gap between men and female increases gender inequality in agricultural employment favoring men over women. In addition, the raising and resolving SPS and TBT concerns significantly reduces gender inequality as demonstrated by the statistically significant but negative sign of its coefficient.

**Robustness checks with alternative estimation technique and construction of another indicator of Gender Inequality**

Dependent Variables	PART (A)						PART (B)	
	Gender Parity Index		Female		Male		Relative Gender Gap	
	Fixed Effects	Random Effects	Fixed Effects	Random Effects	Fixed Effects	Random Effects	Fixed Effects	Random Effects
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Agricultural Value Added	-0.073***	-0.073***	-0.022***	-0.022***	0.022***	0.022***	0.073***	0.0734**
	0.017	0.017	0.007	0.007	0.007	0.007	0.017	0.017
Cumulative SPS and TBT	-0.0002**	-0.0002**	-0.0001**	-0.0001**	0.0001**	0.0001**	0.0002**	0.0002**
	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001
Cumulative Existing Concerns	0.017**	0.017***	0.007***	0.007***	-0.007**	-0.007***	-0.017**	-0.017***
	0.006	0.006	0.002	0.002	0.002	0.002	0.006	0.006
FTA	0.017	0.017	-0.003	-0.003	0.003	0.003	-0.017	-0.017
	0.027	0.027	0.012	0.012	0.012	0.012	0.027	0.027
EPA	0.027	0.029	0.014	0.014	-0.014	-0.014	-0.027	-0.029
	0.032	0.032	0.014	0.014	0.014	0.014	0.032	0.032
GPS	-0.157**	-0.157**	-0.090**	-0.090**	0.090**	0.089***	0.157**	0.157**
	0.0786	0.0786	0.0340	0.034	0.034	0.034	0.079	0.079
Inflation	0.004**	0.004**	0.001**	0.001**	-0.001**	-0.001**	-0.004**	-0.004**
	0.001	0.001	0.0004	0.0004	0.0004	0.0004	0.001	0.001
Improved Sanitation and Water	-0.008**	-0.008**	-0.005***	-0.005***	0.005***	0.005***	0.008**	0.008**
	0.004	0.004	0.002	0.002	0.002	0.002	0.004	0.004
Improved Sanitation and Water Square	0.230	0.230	0.238**	0.238**	-0.241**	-0.248**	-0.230	-0.230
	0.252	0.252	0.109	0.109	0.101	0.109	0.252	0.252
Ratio of Female to Male Labour Force Participation	0.003**	0.003**	0.002***	0.002***	-0.002***	-0.002***	-0.003**	-0.003**
	0.001	0.001	0.001	0.007	0.007	0.001	0.001	0.001
Ratio of Female to Male Primary Schooling	0.017***	0.017***	0.008***	0.008***	-0.008***	-0.008***	-0.017***	-0.017***
	0.0028	0.0028	0.001	0.001	0.001	0.001	0.003	0.003
Ratio of Female to Male Secondary Schooling	-0.010***	-0.010***	-0.004***	-0.004***	0.004***	0.004***	0.010***	0.010***
	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Fertility Rate	-0.078	-0.078	-0.052**	-0.052**	0.052**	0.052**	0.078	0.078
	0.052	0.0515	0.022	0.022	0.022	0.022	0.052	0.052
Fertility Rate Square	0.010	0.010	0.007**	0.0074**	-0.007**	-0.007**	-0.001	-0.010
	0.007	0.007	0.003	0.003	0.003	0.003	0.007	0.007
Constant	1.197	1.173	-0.168	-0.171	1.162***	1.164***	-0.197	-0.173
	0.981	0.979	0.424	0.423	0.425	0.424	0.981	0.979
R-Square								
Number of Observations	549	549	549	549	549	549	549	549

Clustered robust standard errors are in brackets and \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

## **6.0 CONCLUSION**

This study investigates the gender impact implications of EU SPS and TBT measures on gender relations in the agricultural labour market for 6 different regions of the world between 1995 and 2012. We measure EU food safety standards using SPS and TBT measures notified by the EU to the WTO. Our results indicate that EU SPS and TBT measures contribute to gender inequality in the agricultural sector significantly disadvantaging women. In addition, gender specific obstacles and inequality in opportunities such as gender inequality in secondary schooling, women care burdens and reproductive activities also make them less available for gainful employment. However, gender parity achieved in primary education and increased access to improved sanitation facilities and clean water infrastructure are significantly increasing women share of employment in the agricultural sector.

In fact, in relation to our two measures of EU standards, we find that while the raising and solving of specific concerns about the imposed EU measures significantly widens the gender employment gap in favour of females. This trend hold for most of the regions considered except in the South and Eastern Asian region and the Pacific where raising and solving a concern widens the gender gap in favour of men due as young women leave the agricultural sector to get more education. In contrast, evidence emerging from our results indicates that SPS and TBT measures imposed by the EU inability to comply with these measures particularly by small and marginal farmers many of whom are women considerable results into reduced employment opportunities for them relative to men. Slight differences however exist among regions particularly in Sub Saharan Africa and Eastern Asia and the Pacific where EU SPS and TBT measures were found to actually increase female employment primarily because of the predominance of females in low skilled agricultural employment which are abundant in these regions. Aside EU food safety standards, the situation of women is aggravated due to existing gender structure which women faces more challenges than their male counterpart such that women are usually disadvantaged in complying with such trade regulations due by their lack of education and specific technical capacity to comply with the EU agricultural trade policies. Even when available, most trainings are not designed to cater for their limited time constraints resulting from the unpaid domestic care work, which also limit their availability for gainful activities. Coupled with this is their relatively limited access to credit and collateral facilities also constrain their ability to comply with the huge investment costs are needed to made to meet such measures which are usually enormous for them to borne associated with complying costs of investing in such.

Our results thus have several important implications for policy formulation and implementation. Improving gender equality is at the fore front of achieving economic growth and development. To move up the developmental ladder, women needed to be equally represented in all economic activities in an economy. This will ensures that the economy is not underutilising it economic resources as a gainfully employing woman can be a means to increasing economic growth as women who are gainfully employed have better feed children, reducing undernourishment in the country and have an increased probability of sending their children to school, thus increasing the quality of a countries future labour force. Thus, the problem of gender inequality can be addressed through policy measures that reduces inequality in opportunities for women and reduces women's time poverty and care burdens. Comprehensive reforms and long term commitments to the implementation of sustained and inclusive growth as well as targeted policies targeted to changing the observed gender relation that is already entrenched in the customs and norms of the society which are in fact perpetrating inequality of opportunities for women needed to be changed. More so, gender inequality is being perpetuated due to unequal

opportunity for women such as unequal access to education. It is thus pertinent for the government to implement a sound and inclusive educational policies that would extend to both female and male and help in bringing the economy' growth and development to its frontier. Given that gender parity achieved in primary education has a gender enhancement effects, with significant employment increases for women, a similar improvement gender parity in higher level education such as the secondary school and tertiary schools can indeed widen the gender employment gap in favour of women. In addition, investments in time saving infrastructure that reduce women domestic care burden should be undertaken to alleviate their time poverty, increase their mobility and free them to participate in gainful employment.

Finally and crucial to this study is the finding that similar to other policies, non-tariff measures are not gender neutral. Engaging in sophisticated scientific and technology transfer as well as providing both financial and human development assistance to women farmers many of whom dominate the developing countries agricultural sector are important policy imprint. Deeper trade integration agreement with the EU should include the provision of technological and scientific assistance to the agricultural sector, particularly to small scale women farmers and producers who dominates the scene in Africa so as to assist them in complying with the EU's SPS and TBT measures and ensure increased representation on women in the agricultural sector even at the commercial level. Although the EU has been taking measures to achieve this objective as evident from the incorporation of the core ILO conventions into its trade agreements, to achieve maximum results, ccoordination at the third countries therefore remains essential for the implementation of best practices. Thus, addressing these challenges through a strong commitment to policy reforms will be key to ensuring gender parity and also achieving increased economic growth in general as women are.

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