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The Role of FDI in Augmenting the Agricultural Productivity of Female Farmers in Eastern and Southern African Countries[1]

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Abstract

This study provides the first econometric analysis on the impact of FDI's spillovers effects on females' agrarian productivity in Eastern and Southern African countries. The analysis is based on a sample of longitudinal panel data set on seven countries covering the period from 1980 to 2013. The study employs pooled ordinary least squares (OLS) and both fixed and random effects methods to run the empirical investigation. The results indicate that FDI' presence, while controlling for a number of other variables, exerts a negative impact on the productivity of females engaging in agrarian activities. These findings remain robust even when another FDI measurement is allowed for. On the whole, the results add a strong support to the already existing proposition that the spillovers effects obtained from FDI would be utilized if and only if there is a considerable level of human development in the recipient countries. Therefore, besides offering concessions to host larger amounts of FDIs, serious policies regarding the allocation of FDI between different sectors should be generally emphasized.

Keywords: Females, African, Productivity, Fixed and Random Effects.
JEL Classification: C33, F21, F43, J63

1. Introduction

Foreign direct investments (FDI) are argued to stimulate economic development by facilitating host countries' access to modern technologies, raising employment as well as transferring physical capital from developed to developing countries (Markusen, 1997; Bhagwati, 2002; Moran and Blomstrom, 2005, and Morgan, 2007). Along with these well-established tangible contributions, FDI is also anticipated to contribute intangibly in enhancing total factor productivity through the so-called the spillovers effects (Blomstrom, 1991; Kokko and Tansini, 1996; Blomstrom and Koko, 2001; Liu and Wang, 2003; Blomstrom and Kokko, 2003 and Girma et al., 2008). However, despite the existence of a concrete theoretical consensus

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on the FDI tangible contributions to total factor productivity, its intangible aspects, as represented by spillovers effects remain as one of the hotly debated areas in the current literature, particularly when labor factor is considered. In other words, apart from this theoretical agreement, empirical evidence on the role of FDI spillovers effects in increasing labor productivity has provided mixed results. Moreover, most of the previous works that link FDI spillover effects to labor factor productivity have focused mainly on labor productivity in the entire economy without giving attention to the dissimilarities that may arise due to gender and sectoral variations. These variations are expected to have a great say in deciding the level and the evolution in labor factor productivity resulting from the gains reaped from FDI presence. For instance, no attention has been drawn towards the role that could be played by the potential FDI spillovers effects in supplementing the productivity of agrarian labor in recipient countries. This occurred although the agrarian activities capture the lion share in the values added to the GDP and employment in most of the developing economies.

The biasness against conducting a separate investigation for the probable impact of FDI spillovers effects on the agricultural productivity of labor in general and females' labor in particular has many interpretations. First, the majority of FDI projects tends to concentrate in sectors that enjoy a systematic production process such as industry and services and faraway from agricultural sector which is often characterized by seasonality and fluctuations. Second, the argument by many development scholars such as Arthur Lewis (1955) and others, has advocated a zero marginal productivity for agrarian labor. The prevalence of such rule of thumb has blocked researchers from taking the distinguished features of agricultural labor into account when investigating the relationship between FDI and labor productivity. Third, most of the previous studies which examined the impact of FDI spillovers effects on labor productivity were basically concerned with countries that have taken wider steps in freeing their economies from the dominance of agriculture. Driven by this reality, these studies were either devoted to explore the link between FDI and total factor productivity or the productivity of labor employed in recipient economies' leading sectors. Fourth, females are expected to lack the minimum levels of technical knowledge that could ensure their recruitment in businesses instigated by multinational corporations (MNCs). Consequently, the bulk of jobs offered by MNCs would turn out to be enclaves for male workers. Due to this fact, the share of females in the modern knowledge and skills brought in by FDI will be negligible. Accordingly, due to this biasness, a little is known about the impact of FDI's spillovers effects on the productivity of agrarian labor. Narrowing down, the image becomes more unclear especially when the concern is directed to the role of these spillovers effects in augmenting the productivity of females engaging in agricultural activities. It is worth mentioning that in most of the developing countries, females participating in farming activities are illiterate, marginalized, and maintain the lowest share in running high returns activities.

As reported by UNCTAD, females represent an average of 41% of the total labor force employed in agrarian activities at global level (UNCATD, 2014). In the developing countries contexts, this percent drops to an annual average of 19.12% (UNCATD, 2014). Nevertheless, this is not the case for all developing countries. For instance, in Africa (excluding South Africa) females are accounted for a large segment of agricultural labor force representing roughly 44.63% of the total labor force in this sector (UNCATD, 2014). In particular, in Eastern and Southern African countries (hereafter ESAC), farming activities accommodate almost half of the females total labor force. According to UNCATD (2014), the participation of females in agrarian

labor force in ESAC grew from an annual average of 47% during the period 1980 -1984 to more than 48% during 2010 to 2014, indicating the propensity of females to work in farming activities. Putting things together, in the last three decades, ESAC has become one of the most favorable destinations for FDI operations. FDI flows into ESAC countries rose dramatically from an annual average of less than $11.42 billion in 1970s to an annual average of $ 66.32 billion in 1990s, and to an annual average of $522.93 billion during 2000s (UNCTAD, 2014). Similarly, FDI as a percentage of GDP has gone up from an average of 0.43% in 1970s to 1.52 % in 1990s and to 4.78% in 2000s (UNCTAD, 2014). These significant upward trends in the amount of hosted FDI are expected to boost, with other influential factors, ESAC's economic performance by improving labor factor productivity in general and female farming productivity in particular. However, transmitting FDI spillovers effects to local workers including females would probably occur in sectors such as industry, services and manufacturing more than in agriculture. In other words, the advantages of the FDI such as the spillovers effects will be diverted away from agriculture, therefore, releasing slight or no productivity gains for female farmers. Seen from these perspectives, this study aims at examining the impact of FDI spillovers effects on females' agricultural productivity in ESAC countries. Detecting the impact of these spillovers effects on females' farming productivity is considered essential to understand the contribution of FDI in improving livelihoods in the ESAC countries. Specifically, the higher reliance on agriculture in this group of countries makes it crucial to test empirically the role that could be played by FDI spillovers effects in upgrading females' farming productivity. By identifying these effects, the intended study would pave ways for mitigating the incidence of poverty among females and, therefore, circumvent the prolonged gender inequalities in ESAC. Furthermore, since agriculture represents unfavorable destination for FDI operations, the findings obtained by this study would convey intra industry's FDI spillovers effects on labor productivity which cannot be captured if the concern is confined to total factor productivity. Finally, detecting the contributions of FDI spillovers effects to labor factor productivity according to gender is of a great interest for policymakers in the ESAC. In the end, giving accurate findings on this issue would help in coining the appropriate policy actions that aim at maximizing the productivity improvements gained from FDI.

With these issues in mind, it seems that there is an urgent need to explore the role that FDI, through its potential spillovers effects, plays in promoting female farming productivity in ESAC. Towards this end, the intended study utilizes a country level panel data set covering the period 1980-2013 for a representative sample from Eastern and Southern African countries including Kenya, Mauritius, Mozambique, Uganda, Sudan, Tanzania and Zimbabwe. The data used for the analysis is drowned from World Bank (WB), United Nation Conference on Trade and Development (UNCTAD) and Barro and Lee's educational database. To carry out the analysis, the study uses three panel econometric techniques, namely pooled ordinary least squares (OLS), fixed effects and random effects methods.

The rest of this study is set out as follows: Section 2 gives some stylized facts on labor market in ESAC countries. The emphasis is directed to females' labor force participation, females' employment and the interactions between FDI's presence and females' agrarian productivity. Section 3 establishes the theoretical framework on which the intended analysis is based. Section 4 discusses and critically assesses the relevant literature. In Section 5, the empirical model, data and estimation methodology are set up. Section 6 introduces empirical results and finally, Section 7 concludes and gives some policy implications.

2. Females' labor market in ESAC countries: Some stylized facts

The Eastern Southern African Countries are located in east and south east African continent. Most of the countries constituting the group are bordered by the Indian Ocean to the east and the land locked African countries to the west. This distinguished geographical location facilitates these countries with opportunities to reap great economic benefits. Above and beyond its excellent geographical location as well as its richness in natural resources, the region possesses human resources with a moderate level of literacy that offer great challenges and opportunities for ESAC's economies. These abundant resources, if employed efficiently, would diversify the region's economies and, thus, pave ways for realizing the desirable level of economic development. However, even with these opportunities to comprehend diversification, ESAC's economies remain heavily dominated by agrarian activities. This can be indicated by the remarkable contribution of agricultural value added in the region's GDP. Table 2.1 displays the shares of agriculture's value added in the ESAC economy along with some comparable regional and international groups. As can be indicated from the table, the ESAC appears to go against the overall regional trends with a share of agricultural value added to GDP remaining quite high and, to some extent, stagnant during the last four decades. As the percentages in the table demonstrates, the agricultural value added to the GDP in the ESAC economies exceeds those observed for the groups under comparison, namely world, Northern Africa, Sub-Saharan Africa, MENA (Middle East and North Africa), Africa, and EAC (East African Community).

Table 2.1: Agriculture's Value Added in ESAC's GDP with Some Regional Comparisons

	World	Northern Africa	Sub-Saharan Africa	MENA	Africa[*]	EAC[**]	ESAC
1970-1975	9.20	17.61	26.384	15.06	27.51	37.16	35.68
1976-1981	7.63	13.47	24.64	9.59	23.73	35.40	33.07
1982-1987	6.60	11.94	24.79	9.77	23.28	35.90	32.36
1988-1993	5.02	15.33	21.09	11.16	22.40	35.31	32.53
1994-1999	4.07	14.47	19.36	10.20	21.18	34.12	32.00
2000-2005	3.50	13.02	19.96	7.93	20.26	30.41	27.89
2006-2012	3.97	12.85	19.39	6.22	19.39	27.55	26.77

Source: UNCTAD Statistics on Foreign Direct Investment (2014),[*] excluding South Africa, [**] (East African Community)

The significant contribution of agricultural value added implies that the desirable economic transformation in the ESAC countries cannot be obtained without enhancing production and productivities in agrarian sector. The current statistics indicate that the agrarian activities act as a fundamental source for job opportunities for a wide range of population in the region, particularly the females. This conclusion can be backed by the percentages reported in Table 2.2. According to this table, females working in farming activities represent, on average, 48.18% out of the total labor force employed in the agricultural sector during 2010-2014 (UNCATD, 2014). This percentage is quite higher when compared to the world and other comparable regional groups. Many reasons may possibly push females in ESAC to participate heavily in the agrarian labor force. First, the high percentages of females in farming sector may signify the rapid growth in females' population. As reported by many international organizations, the region has witnessed significant improvements in the standards of living in the last three decades. These improvements give birth to substantial increases in population and, as a consequence, raise females' labor force participation. Second, the engagement of females in agrarian activities may

reflect the fact that this category of population is underrepresented in other sectors, particularly those with greater earnings such as industry and services. Third, the rigidity in customs and the widespread of traditions such as polygamy, early marriage probably block females from acquiring sophisticated knowledge and practices that could possibly qualify them to participate in high-paid economic activities. Thus, females are forced to join agricultural employment as enrolling in agrarian activities doesn't need any prerequisite qualifications.

Table 2.2: The Percentage of Females in Agricultural Labour Force in ESAC with Some Comparisons

	World	Northern Africa	Sub-Saharan Africa	MENA	Africa	EAC	ESAC
1980-1984	40.7	31.5	45.9	32.3	44.5	51.8	47.1
1985-1989	41.3	34.5	46.2	35.9	45.4	51.8	47.2
1990-1994	41.8	36.2	46.8	38.5	46.2	51.9	47.4
1995-1999	42.1	38.2	47.3	40.9	46.9	52.2	47.8
2000-2004	42.3	40.2	47.8	43.2	47.5	52.2	48.0
2005-2009	42.6	42.1	48.4	45.2	48.2	52.3	48.2
2010-2014	42.8	43.5	48.8	47.2	48.7	52.3	48.2

Source: UNCTAD Statistics on Foreign Direct Investment (2014)

Fourth, the lowest educational attainment might also represent one of the factors that confine females in farming activities and, concurrently, obstructs their exposure to productivity's enhancing inputs. The existing statistics advocate this point of view. In most of the countries that comprise ESAC, the statistics on education show that the percentage of unschooled females is more than 70% of total females' population during 1970-1974. However, as Table 2.3 indicates, compared to the 1970's records, this percentage has dropped significantly during the last decades indicating a great progress in educational attainment (Barro and Lee, 2014). Nevertheless, the reduction in the percentage of illiterate females is not evenly distributed if considered at a country level. For instance, in countries such as Kenya, Mauritius and Zimbabwe, the proportion of females with no schooling is lower than the ESAC's average, while countries like Mozambique and Sudan are still maintaining high portions of unschooled females.

Table 2.3: The Percentage of Females with No Schooling in A sample of ESAC Countries

	Sudan	Uganda	Tanzania	Zimbabwe	Mozambique	Mauritius	Kenya
1970-1974	90.7	74.3	73.7	36.4	88.4	33.4	72.7
1975-1979	87.4	68.1	68.3	32.4	88.0	29.6	64.3
1980-1984	83.5	62.4	60.2	29.9	85.6	25.9	53.5
1985-1989	78.2	54.3	51.6	24.4	85.1	21.9	42.7
1990-1994	73.5	45.0	45.5	17.1	86.3	17.6	34.9
1995-1999	69.5	37.4	40.8	12.9	85.9	14.3	30.0
2000-2004	66.1	30.3	35.0	10.4	84.4	11.9	26.7
2005-2009	63.4	22.1	28.3	8.13	80.9	8.99	22.3
2010-2014	60.9	14.2	20.1	6.10	75.3	7.39	16.7

Source: Barro and Lee Statistics on education (2014)

Summing up, with these obstacles against enhancing females' agricultural productivity, female farmers in ESAC will remain vulnerable to the incidence of chronic poverty. Hence, achieving economic advancement in the region would be hanged on and determined by the improvements realized in per worker female agrarian productivity. This is so because raising productivity adds significantly to the region's GDP and, therefore, makes it possible to defeat social illnesses among population including illiteracy, poverty and endemic diseases. In this

regard, many factors can assist in elevating females' agrarian productivity including education, training, transmitting modern technologies in agriculture and making the region's a hospitable destination for FDI. Of these factors, foreign direct investments by MNCs represent one of the alternatives that can be exploited to boost females' farming productivity.


Figure 2.1: FDI Stock (% of GDP) in ESAC Region with Some Regional Comparsions
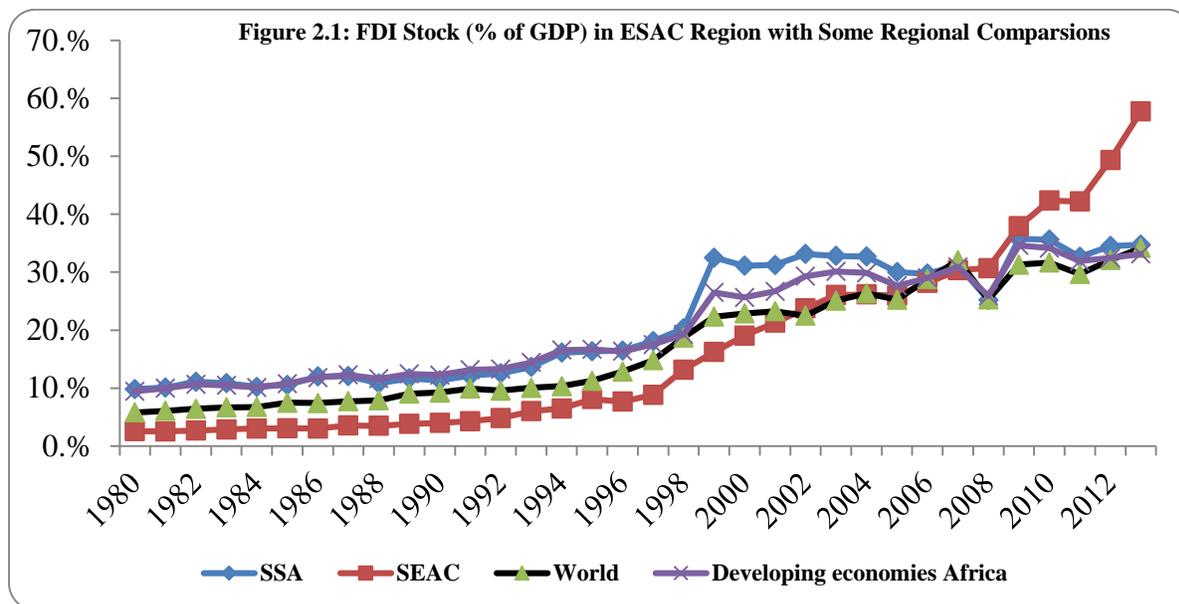
It is worth mentioning that during the last three decades many ESAC countries have initiated series of policies and regulations with an aim to attract larger amounts of FDI. In nominal terms, for instance, from the negligible amount seen in 1980s, FDI stock in the region rose from an annual average of $ 3314.72 million in 1980 to an average of $ 4085.29 million in 2000, and continued its impressive rise to $ 52702.32 million in 2013 (UNCATD, 2014). Furthermore, as seen in Figure 2.1, by the mid of 2000s, FDI stock as a percentage of the ESAC's GDP has become greater than that has been realized by the world, Sub-Saharan Africa and African developing countries

These significant increases in FDI presence in the region raise a question about its potential role in stimulating per worker female agricultural productivity. As documented by previous studies, FDI spillovers effects are argued to boost total labor productivity. However, for the labor working in agriculture the situation may turn out to be different. This has been the case because this type of labor possesses distinctive characteristics that make the impact of FDI spillovers effects take a different course, particularly in developing countries context such as ESAC. Figure 2.2 plots the annual growth rates in females farming productivity against FDI as a percentage of GDP in a group of ESAC countries, namely Kenya, Ethiopia, Sudan, Uganda, Tanzania, Zimbabwe, Mozambique, Mauritius and Madagascar throughout 1980-2014. A glance at the figure shows that there is no preliminary correlation between growth in per female worker farming productivity and FDI (%GDP). Specifically, during the 1980s and till the mid of the1990s, the growth in female agricultural productivity seems to be negative and highly fluctuated. A little enhancement can be seen after the year 1995. However, the negative trends

can also be detected throughout the 2000s, the period characterized by huge increases in FDI inflows into the region.

Figure 2.2: Growth in Productivity Per Worker Female in Agriculture and FDI (%GDP) in ESAC Region
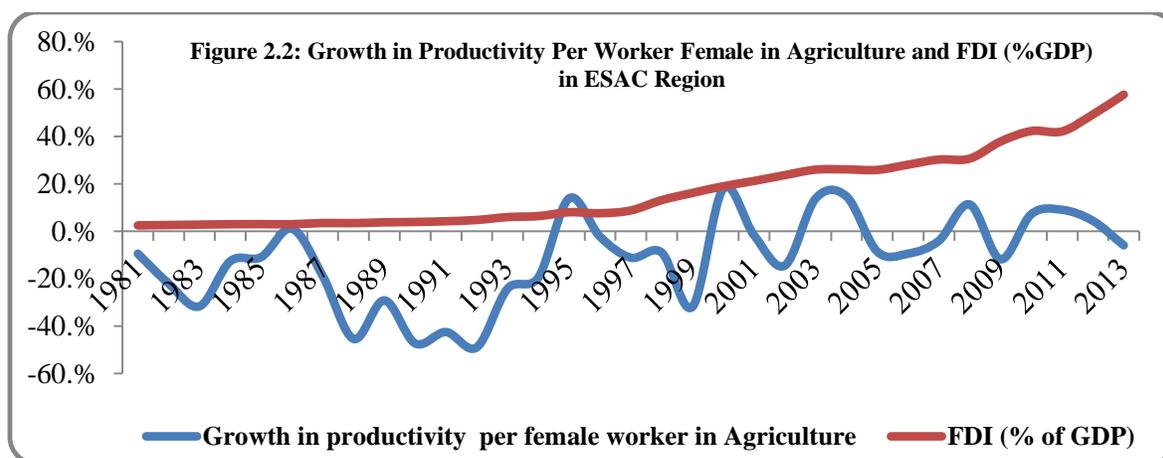
*Source: UNCTAD Statistics on Foreign Direct Investment (2014)*

On the whole, it can be argued that the significant rise in FDI presence may not necessarily add to the productive capabilities of female farmers in ESAC region. This conclusion has many justifications. For instance, FDI flows are mostly attracted by the region's richness in natural resources. Such type of investments are eager to achieve a quick profit and, thus, instead of hiring local labor, they use cutting-edge technology to extract the largest amount of these resources. Moreover, these types of FDI are expected to work in isolated geographical areas, preventing the interaction with domestic sectors, particuarly agriculture. Additionally, since most of the MNCs' employees are deployed from parent countries, such type of FDI (i.e the resource-seeking FDI) avoid conducting valuable training programs for native workers. Furthermore, the acclerated growth rates of females population, coupled with wide spread of illitercy, may exert negative impact on the productivity's gain that perhaps results from hosting FDI. In the end, due to its usage of intensive-capital production techniques as well as its geographical segregation, these foreign businesses leave no room for transmitting gainful productivity's spillovers effects to domestic labor in ESAC.

3. The Theoretical Underpinnings

A large segment of existing literature confirms the role that could be played by FDI spillovers effects in elevating labor factor productivity in recipient countries. However, as outlined above, the empirical evidence on exactly how and when FDI could contribute to labor productivity remains uncertain. Theoretically, the probable influence of FDI spillovers effects on labor productivity is likely to emerge from both tangible and intangible sources. The tangible sources, as represented by transmitting physical capital into recipient economies, increases capital intensity allowing labor factor to realize productivity's gains. On the other hand, the intangible sources, as embodied in the spillovers effects, equip labor with modern knowledge and business practices permitting growth in productivity. However, while FDI's tangible contribution to labor productivity has been well recognized in the literature, its intangible gains remain, to some extent, subject to debate. In part, this debate emerges from the fact that the

impact of FDI spillovers effects on labor productivity is difficult to measure and detect. Additionally, this disagreement may arise due to the researchers' failure to identify the channels through which these intangible effects are transmitted. To shed some light on this issue, this section attempts to construct a theoretical framework to highlight the potential linkages between FDI spillovers effects and labor productivity in a recipient country. As portrayed in the right hand segment of Figure 3.1, FDI's tangible contribution to labor productivity can be gathered in raising capital intensity as well as diffusing modern technologies into country's domestic sectors. Based on the law of diminishing marginal productivity, injecting economies with significant amounts of capital, while keeping other inputs constant (i.e. labor, land,…, etc.), is likely to push the average productivities of these inputs beyond the levels observed before FDI's entry. Similarly, switching to modern technologies would raise efficiencies of the used inputs and, thus, adds positively to labor factor productivity in this hypothetical recipient country.

Figure 3.1: FDI's Potential Impact on Labor Productivity in a Recipient Economy
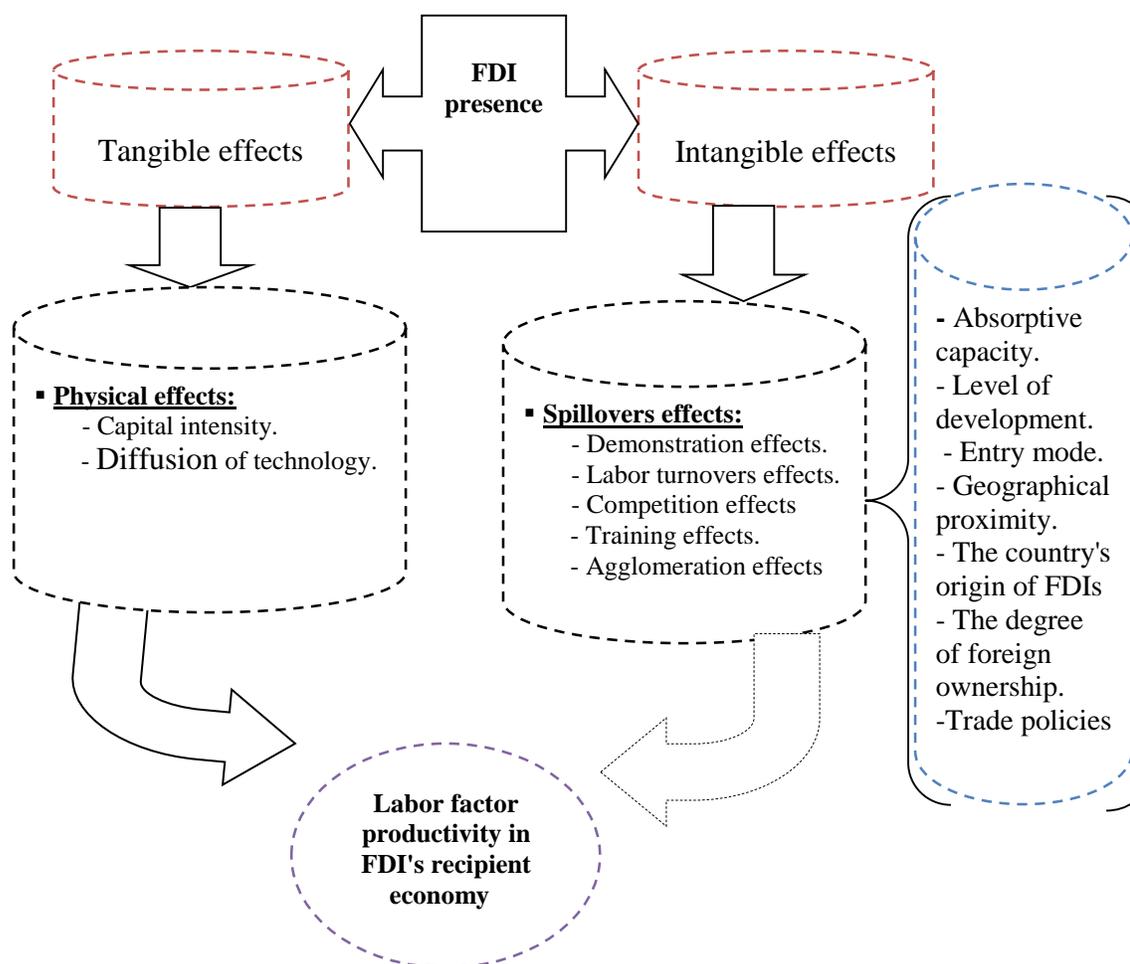
On the other hand, FDI's intangible effects occur when native workers find opportunities to acquire managerial knowledge, modern business practices and the know-how from foreign firms. As the figure illustrates, there are several channels that through which FDI's spillovers effects can be transferred to domestic firms in recipient countries. These channels may include labor turn over effects, demonstration effects, training effects, and agglomeration effects.

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Specifically, the first route through which FDI spillovers effects support labor productivity would depend on the abilities of local firms to recruit workers who were previously employed in MNCs and who have known how to deal with modern technologies (Haacker, 1999; Fosfuri et al., 2002; Glass and Saggi, 2002, and Crespo et al., 2007). However, the impact of these spillovers effects on labor productivity may also hinge on the adaptability of MNCs to absorb skilled labor as well as the ability of workers to internalize the potential spillovers effects.

Many scholars have viewed the demonstration effects as a good channel to transfer FDI spillovers effects to domestic workers and, thus, enhancing productivity (Das, 1987; Wang and Blomstrom, 1992, and Barrios and Strobl, 2002). By the same token, the competition imposed by FDI presence acts as another channel to convey FDI's productivity spillovers effects to domestic workers (Caves and Barton, 1990). These productivity enhancements are likely to take place if the entry of MNCs generates higher competition in domestic markets and, thus, forces domestic firms to use complicated technologies. However, the labor productivity can be destructively affected by the existence of competition, as the entry of some MNCs might lead to losses in domestic firms' market shares, forcing them to work at less efficient scale.

Also, the spillovers effects from foreign to local firms can be tracked through training effects (Lindsey, 1986 and Gershenberg, 1987; Ramirez, 2000; Blomstrom and Koko, 2002 and UNCTAD, 2004). MNCs are expected to conduct training programs for local workers in order to guarantee the quality of goods and services being produced. The agglomeration of economic activities can also be counted among the channels that enable intensifying FDI spillovers effects on labor productivity in recipient countries. Specfically, agglomerating bussinesses in one geographical space will reduce the costs of production and ease communications between local and foreign firms and, consequently, lead to positive spillovers effects on labor productivity.

According to above schema, the presence of MNCs in a recipient country creates potentialities for spillovers effects and technological diffusion both of which lead to productivity's gains for labor factor. However, the operationalization of these effects is likely to depend on a variety of stimulus factors that relate to both MNCs and recipient countries' characteristics. As illustrated in the figure, these factors may include the absorptive capacity of labor in recipient country, the technological gap between foreign and domestic firms, the level of development, the entry mode of FDI, the degree of foreign ownerships, the geographical proximity, trade policies, and the level of technological advancement in FDI parent countries. As the figure shows, the level of human development in recipient countries plays a pivotal role in capturing the full advantages of the productivity's gains arising from FDI spillovers effects (Li and Zhang, 2004). Likewise, these spillovers effects can be promoted through geographical proximity and spatial concentration of bussineses. The entry mode of FDI and the degree of foreign ownership are also projected to exercise a great influence on foreign gains obtained by local labor. In particular, compared to the FDI in the forms of greenfields and joint venture, FDI in the form of merger and acquisitions are anticipated to contribute less in enhasing labor factor productivity.

Besides, the success of spillovers effects rests not only on the amounts of FDI received, but also on the level of technological advancement in the country from which foreign firms are originated (Haskel et al., 2002 and Banga, 2003). In addition, trade openness can also assist in diffusing productivity-enhancing technologies by increasing the volume of trade between developed and less developed countries. In this regard, the econometric literature concerning the effect of trade openness on the determinants of FDI indicates that MNCs are more likely to

establish businesses in countries with high trade openness and, thus, give high potentiality to generate positive productivity's spillovers effects (Barrel and Pain, 1999).

In sum, according to the above theoretical schema, the role of FDI spillovers effects in boosting labor factor productivity is highly feasible as long as the conditions relating to both MNCs and recipient countries are fulfilled.

4. Literature Review

A huge number of empirical studies have been conducted to assess the contributions of FDI's spillovers effects to total factor productivity in recipient countries. The findings on these contributions, however, are generally inconclusive. Some studies, for instance, find positive spillovers effects that trickled from FDI to total factor productivity (Lichtemberg and Siegel, 1987; Blomstrom and Wolff, 1994; Barrel and Pain, 1997; Hubert and Pain, 2000; Djankov and Hoekman, 2000; Branstetter, 2000; Liu, 2002; Sinani and Mayer, 2002; Piscitello and Rabbiosi, 2005; Wei and Liu, 2006; Haskel and Slaughter, 2007; Uttama and Peridy, 2010, and Fillat and Woerz, 2011). Picking some of these studies, Blomstrom and Wolff (1994) find that total factor productivity in the Mexican manufacturing industry has increased significantly due to spillovers effects resulting from hosting MNCs. Barrel and Pain (1997) document that around 30% of growth in productivity in UK's manufacturing sector during 1985- 1995 could be interpreted by the presence of foreign firms. Raising the same question in the same country, Hubert and Pain (2000) use industry level time series panel data to assess the productivity gains from FDI in UK manufacturing sector. The authors find a strong evidence for intra and inter-industry productivity's spillovers effects from FDI. The study by Djankov and Hoekman (2000) employed firm level data spanning from 1992 to 1996 to investigate the role of FDI in nurturing total factor productivity in the Czech Republic. Their results confirm that FDI exercises positive spillovers effects on total factor productivity. Using patent citation data to inspect the importance of MNC in augmenting domestic factors productivity, Branstetter (2000) finds that FDI represents a significant channel for transferring knowledge spillovers from both American firms to Japanese MNCs and from Japanese firms to American MNCs.

Some studies give specific attention for testing the impact of FDI spillovers effects on labor productivity in recipient countries. Of these studies, Fillat and Woerz (2011) used industry level data from a sample of OECD, Asia and Eastern Europe countries to examine the influence of the sectoral FDI on labor productivity. The authors find that exports oriented FDI has positive effects on the productivity of labor in the countries studied. Similarly, Piscitello and Rabbiosi (2005) studied the impact of FDI occurring through acquisition on labor productivity in Italy. Their findings indicate that the spillovers effects arising from this type of FDI lead to increases in labor productivity in Italian firms.

In contrast, a number of recent studies conclude that FDI presence either has no or weaker positive spillovers effects on total factor productivity (Cantwell, 1989; Haddad and Harrison, 1993; Aitken and Harrison, 1999; Kathuria, 2000; Kinoshita, 2000; Hanson, 2001; Gorg and Strobl, 2003, and Mebratie and Bedi, 2013). Aitken and Harrison (1991) examined the influence of the FDI spillovers effects on Venezuelan industrial sector. He concludes that FDI's presence exerts negative effects on factor productivity in the upstream industries. In the same way, in his recent survey for the literature on the relationship between FDI and productivity, Hanson (2001) argued that the evidence that FDI generates positive productivity spillovers effects in recipient

countries is fragile. In a similar line of argument but by examining the impact of FDI spillovers effects on labor factor, Mebratie and Bedi (2013) argue that there is no productivity gain for labor in South Africa.

Summing up, the evidence concerning the feasible role of FDI spillovers effects in raising total factor productivity in general and labor factor in particular seems to be inconclusive. Researchers have frequently attempted to give persuasive explanations for this inconclusiveness. Many studies have pointed out that the capabilities of domestic firms to internalize the potential FDI spillovers effects are strongly reliant on the existence of some conditions in recipient countries (Findlay, 1978; Pack and Westphal, 1986; Wang and Blomstrom, 1992; Haddad and Harrison, 1993; Kokko and Tansini, 1996; Sjoholm, 1999; Driffield and Taylor, 2000, and Haskel et al., 2002). These conditions, as proposed by these studies, include variations in productivities, absorptive capacity, entry modes of the FDI, degree of foreign openness and the technological gap between FDI's home and host countries.

Taking the aim of this study into consideration, a number of important conclusions can be drawn from the above reviewed literature. First, some evidence has emphasized the role of the FDI spillovers effects in augmenting total factor productivity, while others have proved the opposite. Second, most of these studies have focused mainly on examining the impact of FDI spillovers productivity in manufacturing sector, turning no or a little attention to the factor productivity in the rest of the other sectors. Third, most of these studies have analyzed the impact of FDI spillovers effects on total factor productivity and, thus, turned a blind eye to labor factor. In the best cases, these studies examined FDI spillovers effects on labor factor productivity in the entire economy without considering the heterogeneity characterized labor factor across different sectors and firms. The presence of such heterogeneity in labor factor may possibly lead to great differences in the capacities to absorb the outcomes brought by FDI. Fourth, no scholarly work has been done on the role of the FDI spillovers effects in raising agrarian labor productivity in developing countries' contexts. Specifically, to the best of the author's knowledge no study has attempted to detect the impact of FDI spillovers effects on the females' farming productivity in ESAC. Thus, with all these shortcomings in mind, a very imperative question on the role of FDI in boosting females' agrarian productivity in ESAC countries can be raised.

5. Research Methodology

Whether FDI's presence leads to gains or losses in farmer females' productivity in ESAC countries can be decided empirically. This section is devoted mainly to develop the methodological approach through which the intended empirical investigation can be conducted.

5.1 The Empirical Model

Based on the argument of Caves-type model (1974) and Gera et al. (1999), the productivity spillovers effects that may by trickled down from FDI to the agricultural productivity of females in ESAC can be denoted by the following empirical model:

$$FFP(t) = FLP(t)^{\varphi_1} K_d(t)^{\varphi_2} FDIS(t)^{\varphi_3} OPEN(t)^{\varphi_4} H(t)^{\varphi_5}(t)e^{\varphi'_0} \rightarrow 5.1$$

Where FFP represents the per female worker agricultural productivity measured by agricultural value added to GDP divided by females total labor force in agriculture, FLP is the female labor force participation in agriculture, K_d is the physical capital intensity in agriculture which is measured by capital labor ratio to indicate the average level of physical capital needed per worker employed in agriculture, $FDIS$ is the stock of foreign direct investment as a percentage of GDP, $OPEN$ is the degree of trade openness (the sum of exports and imports divided by GDP), H is the human capital development measured by the percentage of total secondary educational attainment for female population aged 15 and over.

In order to measure the impact of the explanatory variables on female agricultural productivity in terms of percentage changes, equation 5.1 is rewritten in logarithmic form as follows:

$$ln\ FFP_t = \varphi_0 + \varphi_1 ln\ FLP_t + \varphi_2\ ln\ K_t + \varphi_3 FDIS_t + \varphi_4 \text{OPEN}_t + \varphi_5 H_t + \varepsilon_t \rightarrow 5.2$$

Where $ln\ FFP_t$ is the natural logarithm of agricultural productivity per female working in agriculture, $ln\ FLP_t$ is the natural logarithm of female labor force participation in agriculture[2], $ln\ K_t$ is the natural logarithm of physical capital intensity in agriculture, ε_t is an error term which is supposed to be normally distributed and the subscript t represents time. The coefficients $\varphi_1, \varphi_2, \varphi_3,\ \varphi_4$ and φ_5 measure the percentage changes in per worker female agricultural productivity in response to a one percentage change in $FLP, K, FDIS$, OPEN and H, respectively.

The rationale behind the inclusion of female labor force participation in the above equation is straightforward. According to the law of diminishing marginal productivity, the average productivity per female working in agriculture is a decreasing function of females' agrarian labor force participation. Accordingly, the coefficient associated with labor force variable (FLP) is expected to be negative ($\varphi_1 < 0$). In contrast, the productivity per female working in agriculture is an increasing function of physical capital intensity (capital per worker). The increases in capital intensity in agrarian activities elevate females' farming productivity. Therefore, the coefficient of capital intensity variable (K) is expected to carry a positive sign ($\varphi_2 > 0$). Moreover, the average agricultural productivity per worker female is likely to be influenced by the presence of FDI. The model also includes FDI stock ($FDIS$) to capture the potential FDI spillovers effects on agricultural productivity per worker female. The magnitude and the sign of this variable's coefficient (φ_3) is of particular interest for this study. The coefficient measures the percentage change in female farmers' agricultural productivity in response to the percentage change in FDI stock. As noted in the literature, the empirical evidence indicates that FDI, through its spillover effects, could have a positive or negative impact on labor productivity. Thus, the sign associated with $FDIS's$ coefficient remain undecided ($\varphi_3 =?$).

The sum of exports and imports as a ratio to GDP has been included in the model to capture the impact of trade openness on female farmers' agricultural productivity. According to previous literature, trade openness brings many benefits to participant countries, including the provision of cheaper raw materials, bringing in sophisticated technologies as well as creating connections

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[2] As mentioned above, it is generally difficult to obtain a reliable data on indicators such as female employment per sector and agricultural capital intensity in developing countries such as ESAC. Therefore, the study employs female agricultural labor force participation as a proxy for the number of female employed in agriculture, and the level of capital-labor ratio to measure capital intensity in agriculture.

with foreign markets. In view of that, since most of the ESAC countries have agro-based economies, expanding trade openness will lead to improvements in the average productivity of female farmers. Thus, the coefficient of trade openness variable is expected to be positive($\varphi_4 > 0$). Finally, the connections between human capital and factor productivity have been well established in economic literature. Besides, as noted in several studies (Pack, 1987; Gundlach, 1995; Borensztein and Lee, 1998, and Djankov and Hoekman, 2000), the existence of an adequate human development represents a crucial prerequisite to labor factor qualified to reap the full benefits arising from FDI spillovers effects. Therefore, the coefficient in front of human capital variable is expected to be positive ($\varphi_5 > 0$).

5.2 Data

As mentioned above, this study aims at investigating the impact of FDI spillovers effects on female farmers' productivity in ESAC countries. However, the reliability and the availability of the data on indicators such as employment, per gender productivity, capital intensity in agriculture and educational attainment for all ESAC countries represents one of the challenges facing the intended analysis. Therefore, the final sample includes seven eastern southern African countries, namely Kenya, Mauritius, Mozambique, Uganda, Sudan, Tanzania and Zimbabwe. The data is an unbalanced country level panel data set, spanning up to 34 years from 1980 to 2013 when data is available. Accordingly, the sample to be estimated consists of 34 years for seven countries, totaling 238 observations. Ethiopia and Madagascar are excluded from the sample because Barro & Lee international database doesn't report data on educational attainment for both countries. Data on agriculture's value added, gross domestic capital formation and trade openness are sourced from World Bank Indicators (WDI) database provided by World Bank. The real values of these variables are obtained using GDP deflator, which is also provided by World Bank. Data on foreign direct investment as a parentage of GDP (both flow and stock) and females' agricultural labor participation are accessed from the statistics by United Nation Conference on Trade and Development (UNCTAD). The data on education are sourced from Barro & Lee international database. However, since the data on this variable has been reported for every five years during the period from 1960 to 2010, the data for each four years gap for the period spanned from 1980 to 2013 has been computed by using a specific equation.

5.3 Estimation Method

To address for both the variations between sub sets of the data used and time effects, the study adopts a panel data analysis as an appropriate method to carry out the empirical investigation. The standard model for panel data can be written in a general notation as follows:

$$Y_{it} = \acute{z}_{it}\varphi + \acute{x}_i\alpha + \mu_{it} \qquad\qquad 6.1$$

Where $i = 1, ..., N$ refers to the unit of observation and $t = 1, ..., n$ refers to the time periods ($t = 1980, ..., 2013$); Y_{it} represents the dependent variable for cross-section unit i in time t (agricultural productivity per female farmer in country i and year t); z_{it} refers to time-invariant independent variables for the cross-section unit of observation i at time t, excluding constant term; x_i refers to the constant term and a set of time-invariant variables, and μ_{it} represents an error term of the cross-section observation unit i and year t. The matrix $\acute{x}_i\alpha$ refers to an individual effect matrix, or the heterogeneity matrix where x_i conveys a constant term and a set

of individual or group of specific variables, which may be observed or unobserved, such as country's own social and economic features (individual effects). If x_i is observed for all countries included in the sample, the model under consideration would fit the identical linear OLS regression model and, thus, adopting such technique will result in efficient estimates for both α and the slope vector φ, provided that the BLUE (best linear unbiased estimators) assumptions are fully satisfied. In the model under estimation, the pooled OLS model just put the 34 observations (34 years extended from 1980 to 2013) for each of the seven countries one on top of the other, regardless of the space and time features of the data. Nevertheless, such tough restrictions may violate the core assumptions of OLS. According to Park (2011), if individual effect (μ_i) is not zero in the panel data, heterogeneity (individual characteristics) may violate some OLS's core assumptions such as exogeneity and homoscedasticity. In this case the estimation procedures can be executed through the fixed or random effects panel data modeling.

The fixed effects model deals with the situation in which x_i is unobserved and at the same time correlated with z_{it} ($y_{it} = z'_{it}\varphi + \alpha_i + \mu_{it}$), where α_i equal $\acute{x}_i\alpha$ conveys all the observable effects. Alternatively said, the fixed effects regression assumes that each country has its own intercept α_i but allows the slopes of regressors φ to remain constant across countries and time period. In contrast, the dependent variable Y_{it}, the explanatory variables in z_{it} and the error term μ_{it} are permitted to vary over countries and time, as indicated by the it. If the unobserved individual effect is assumed to be uncorrelated with any regressor in z_{it}, the model can be established as:

$$y_{it} = z'_{it}\varphi + \alpha + \mu_i + \varepsilon_{it} \qquad\qquad 6.2$$

Applying the procedure of random effects, the above equation assumes that the seven countries included in the sample are a random drawing from the diversified environments in these countries. These countries share a common mean for the intercept (α) and the individual differences in the intercept coefficients of each country are reflected in the error term, which is identical over the time period.

Finally, three specification tests are performed to determine the goodness fit for each of the models under estimation. A simple F test is run to distinguish between the fixed effects and pooled OLS models. Likewise, the random effects are examined by the Lagrange Multiplier (LM) test (Breusch and Pagan, 1980). The Hausman specification test is performed to compare between Fixed and random effects models under the null hypothesis that individual effects are uncorrelated with any explanatory variables (Hausman, 1978).

6. Empirical Results

The empirical results pertinent to equation 5.1 which conveys the impact of FDI spillovers effects on females' agricultural productivity in the ESAC countries are reported in Table 6.1. As outlined in the methodology section, the estimated coefficients represent the elasticities of females' agricultural productivity in response to a one per cent change in the right hand side variables. As can be observed in the table, the results on both random effects, fixed effects as well as pooled OLS regressions, show that the FDI presence (FDIS) exercises a negative and significant impact on females' average agricultural productivity. It is interesting to note that the coefficients are remarkably similar, varying from -0.004 to -0.009. More precisely, the results

from both random and fixed effects reveal that for every one percent increase in FDI stock, the per worker females' agrarian productivity decreases by 0.5 and 0.4 per cent, respectively. Similarly, the results on the pooled OLS regression show that the coefficient associated with FDI variable is negative, however it lacks the significance even at conventional levels. Taken as a whole, such results suggest that FDI's presence in ESAC countries doesn't preserve its predicted positive spillovers effects on female farming productivity.

Table 6.1: Panel Regression Estimates:

Dependent variable : Female farmers' agricultural productivity			
Variable	**Random effects**	**Fixed effects**	**Pooled OLS**
C	32.08***	24.69***	33.04***
	(1.689)	(2.047)	(1.598)
	[18.99]	[12.06]	[20.67]
HD	0.033***	0.037***	-0.007
	(0.005)	(0.005)	(0.004)
	[7.086]	[7.769]	[-1.493]
FDIS	-0.005*	-0.004*	-0.009
	0.0027	(0.003)	(0.006)
	[-1.924]	[-1.676]	[-1.612]
Log FLP	-1.990***	-1.454***	-1.997***
	0.115	(0.146)	(0.109)
	[-17.26]	[-9.973]	[-18.18]
Log K	0.884***	0.944***	0.494***
	0.021	(0.023)	(0.038)
	[41.77]	[40.62]	[12.98]
OPEN	-0.004	-0.009***	-0.006
	0.003	(0.003)	(0.005)
	[-1.638]	[-3.019]	[-1.321]
Number of observations	226	226	226
Adjusted R^2	0.92	0.96	0.72
F-statistic	584.44***	480.53***	117.34***
Hausman test (random versus fixed effects)	45.31		
	(0.000)		

Notes: Figures in first raw of parentheses below coefficients are t-statistics in the pooled, random and fixed effects regressions. Figures in the second raw of parentheses below coefficients indicate the standard errors. The asterisk (***), (**) and (*) denoted as significant level of 1%, 5% and 10%, respectively.

The rest of the variables are associated with statistically significant coefficients of expected signs. For instance, the results show that the elasticity of females' agricultural productivity in response to the improvements in human development (HD) is positive and statistically significant at the one percent level. According to results on random and fixed effects regressions, respectively, a one percent increase in human development leads to 0.033 and 0.037 percent increases in per female agrarian productivity. This indicates that the progress in human development front represents an important factor in boosting females' agricultural productivity and, as a result, acts as a primary determinant of the value added by agriculture to the GDP. As anticipated, the results also show that the variable of females' agricultural labor force participation is associated with a negative and significant sign. Specifically, a one percent

increase in the mumber of females in agricultural labor force results in, a nearly, 2 percent decrease in average agrarian productivity per female worker. This is strongly complying with the argument of the law of diminishing marginal returns.

Table 6.2: Panel Regression Estimates:

Dependent variable : Female farmers' agricultural productivity			
Variable	Random effects	Fixed effects	Pooled OLS
C	32.69***	24.99***	33.93***
	(1.676)	(2.056)	(1.517)
	[19.50]	[12.16]	[22.36]
HD	0.031***	0.035***	-0.007
	(0.006)	(0.005)	(0.005)
	[6.810]	[7.574]	[-1.510]
FDIF	-0.006	-0.007	-0.013
	(0.009)	(0.009)	(0.020)
	[-0.747]	[-0.8247]	[-0.653]
Log FLP	-2.028***	-1.473***	-2.060***
	(0.115)	(0.1467)	(0.104)
	[-17.67]	[-10.04]	[-19.77]
Log K	0.893***	0.952***	0.508***
	0.021	(0.0226)	(0.038)
	[43.38]	[42.15]	[13.49]
OPEN	-0.006*	-0.009***	-0.009
	(0.003)	0.003	(0.005)
	[-2.082]	[-3.422]	[-1.637]
Number of observations	226	226	226
Adjusted R^2	0.93	0.96	0.73
F-statistic	584.438***	475.61***	115.76***
Hausman test (random versus fixed effects)	46.185410		
	(0.000)		

Notes: Figures in first raw of parentheses below coefficients are t-statistics in the pooled, random and fixed effects regressions. Figures in the second raw of parentheses below coefficients indicate the standard errors. The asterisk (***), (**) and (*) denoted as significant level of 1%, 5% and 10%, respectively.

Expectedly, the capital intensity variable (Log K) has a strong positive effect on female farmers' productivity with coefficients of 0.885, 0.944 and 0.494 and high t-ratios in the three regresions under consideration. In contrast, the results indicate that trade openness (OPEN) exerts a negative influence on females' farming productivity. According to the random effects estimates, the variable's coefficient is negative and statistically significant, demonstrating that a one percent increase in the degree of trade openness leads to 0.4 decrease in females' agricultural productivity. Additionally, the coefficient on the intercept is found to be positive and highly significant across the three methods. This may indicate that, due to presence of abundant resources as well as the favorable climatic conditions in ESAC countries, a large share of the agricultural value added is nature's given or produced autonomously without exploiting other factors of production.

Further robustness for the above results is done by substituting FDI stock as a percentage of GDP (FDIS) by FDI flows as a percentage of GDP (FDIF) in the model investigated. Table 6.2 exhibits the coefficients, standard errors and t-ratios for the three methods of estimates. Interestingly, the insertion of this variable does not change the previous results. Most of the control variables (i.e. trade openness, human development and capital intensity) continue to

display the same statistically significant coefficients. The critical point is that the negative coefficient in front of the FDI variable, as confirmed by a t-test, turns out to be statistically insignificant. This indicates that, compared to FDI stock, FDI flows exercise insignificant influence on females' farming productivity in ESAC countries. Again, this supports the argument that females working in agririan activities are eliminated from reaping the positive spillovers effects of FDI.

Consistent with the results displayed in Table 6.1, an increase in females' agricultural labor force participation (Log FLP) is found to be having a negative impact on females' average farming productivity. According to the random and fixed effects estimates, the coefficients of -2.028 and -1.473 imply that a one percent increase in females' agricultural labor force participation diminishes females farming average productivity by, approximately, -2 and -1.5 percent, respectively. A notable conclusion here is that when FDI stock (FDIS) is replaced by FDI flow (FDIF), the magnitudes of both females' labor force participation and trade openness coefficients increase and acquire more significance. Similar to results reported in Table 6.1, the impact of capital intensity (Log K) on female farmers' productivity is found also positive and statistically significant indicating that the accessiblity to capital for female farmers represents a crucial factor in upgrading females' farming productivity in ESAC countries. Furthermore, this may not appear to be a surprising outcome since in the undercapitlized countries like ESAC, the provision of capital would generate great positive effects on labor factor productivity.

On the whole, the findings on the impact of the FDI spillovers effects on female farming productivity are altogether not surprising as the empirical evidence on FDI spillovers effects on total factor productivity have been mixed. Yet, the undesirable impact of FDI presence on females' agricultural productivity in the ESAC can be justified based on many reasons. First, the high rates of illiteracy among female farmers might act as one of the causal roots for lowering the absorption of positive spillovers effects arising from FDI. Several empirical studies document that the potential spillovers effects depend largely on the educational and technological capabilities of domestic workers that may enable them to assimilate and absorb further knowledge and skills (Pack and Westphal, 1987and Cohen and Levinthal, 1989). Second, the stylized facts on the FDI flows indicate that most of the FDI's projects are transplanted into recipient countries' advanced sectors such as services and industry instead of agriculture. As said by Arthur Lewis, there is a great gap between modern sectors (industry and services) and traditional sector (agriculture). This gap, which is mainly manifested in the modes and production relations, may contribute in reducing the demonstration of knowledge, experience and skills acquired from hosting MNCs. Third, the technological dichotomy between agricultural and modern sectors in which FDI presence is expected to be relatively higher, is likely to hinder the transmission of spillovers effects to female farmers and, thus, delays the growth in the productivity of agricultural labor in general and female farmers in particular. Many researchers have confirmed the role of the technological similarity in pushing firms to locate closer to each other and thus maximize the potential benefits from FDI (Marshall, 1920; Krugman, 1991 and Jaffe et al.,1993). Fourth, the higher birth rates in ESAC, accompanied with the fact that females represent half of the population, is expected to contribute directly in lowering farmer productivity by raising females' agricultural labor force participation.

In terms of the overall significance of the results, the models perform reasonably in terms of tests such adjusted R^2 and F-statistic. The adjusted R^2 values, which are above 90 percent in both

random and fixed effects models imply that the predictor variables give explanation for more than 90 percent of the existing variations in the agrarian productivity of females in ESAC countries. The F statistic in all regressions is significant at one percent level confirming the hypothesis that the selected explanatory variables are crucial in explaining female's farming productivity. In terms of the selection between the models, the hausman test indicates that the fixed effects model is the best. However, based on these results, the rejection of the null hypothesis should not be interpreted as a complete acceptance for fixed effects model and rejection for random effects model (Hsiao and Sun, 2000 and Baltagi, 2001). Therefore, results from both regressions are reported.

7. Conclusion and Policy Implications

To date, there has been relatively a little econometric evidence on the extent to which FDI affects ESAC countries' economic performance in general and total factor productivity in particular. Owing to this shortcoming, an attempt has been done by this study to investigate the impact of FDI on females' agricultural productivity in these countries. The study uses a longitudinal country level panel data extended from 1980 to 2013 for a sample of seven eastern southern African countries, namely Kenya, Mauritius, Mozambique, Uganda, Sudan, Tanzania and Zimbabwe. The empirical investigation has been conducted using fixed effects, random effects and pooled OLS panel econometric techniques. Under the three methods used, the results indicate that FDI's presence has significant negative spillovers effects on females' agrarian productivity in this group of countries. These findings are altogether not surprising as the empirical evidence on FDI spillovers effects on total factor productivity, particularly labor factor, has been also mixed. Excluding FDI, the estimates provide evidence that females' agrarian productivity in ESAC countries depends critically on the level of educational attainment, capital intensity and females' agricultural labor force participation.

Based on these outcomes, policymakers in ESAC should work on coining appropriate policies that target correcting the negative impact of FDI on farmer females' productivity. First, there is an urgent need to adopt a constructive educational reform in a manner that helps females engaging in farming activities to attain higher degrees of education and, therefore, prepare them to join modern sectors. Given their higher participation in agricultural labor force, recruiting females in these sectors would facilitate the diffusion of FDI positive spillovers effects into farming sector and, concurrently, raises females' agricultural productivity. Moreover, to help female farmers to adopt and imitate knowledge and skills brought in by FDI, policy actions need to be launched to encourage their enrollment in vocational education and training. This would also help female farmers to adopt and imitate the new knowledge and skills brought in by FDI. Second, policymakers are also advised to implement a rational population policy so as to keep a balance between population and GDP growth, as well as a balance between population and the value added by agriculture. Initiating such a policy would lessen females' labor supply and, thus, increases per worker female agricultural productivity. Third, to make FDI spillovers effects beneficial for the labor in the ESAC economies in general and agricultural labor in particular, policymakers should work honestly on granting attractive incentive packages for foreign investors who have a tendency to invest in agricultural activities.

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