

## **Determinant of Foreign Direct Investment Spillovers; Kenya's Domestic Firms Case**

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### **Abstract**

*Developing countries and emerging economies increasingly see foreign direct investment (FDI) as a catalyst to the development of domestic firms. This development can be through spillover effects whose presence can affect development of business enterprises in the host economy. FDI in developing countries is perceived not only as a source of capital inflow, but also as a vehicle for acquiring modern technology and the necessary managerial know how that these countries require for development. These are some of the reasons why most of the developing countries have continued to pursue domestic policies that encourage more FDI inflows. Many countries have gone further than simply removing barriers to inward foreign investment and have taken a more proactive approach towards attracting FDI through the use of fiscal and financial incentives. It appears therefore, that although the aggressiveness and effectiveness of the government's policies in prompting FDI growth not been refuted, the effects of FDI on domestic firms and factors that determine spillovers are far from clear. Therefore, this study investigates the main firms' characteristics that determine FDI spillovers. Firm level primary and secondary panel data were collected for the period 2012 to 2015. A structured questionnaire was administered to both domestic and foreign firms from different sectors. FGLS techniques was used and it was evident that firms that had skilled workers, high technology and research and development expenditure were able to attract horizontal and vertical spillovers.*

**Keywords:** Foreign direct Investment; Spillovers: determinants; FGLS

### **Introduction**

Since the mid-1980s, the rate of growth of worldwide outflow of FDI has substantially exceeded that of world GDP, worldwide exports, and domestic investment. The developed countries have continued to attract the bulk of the inflows (UNCTAD, 1998), but recent evidence indicates that the flow of FDI to developing countries has increased substantially. According to UNCTAD (2010), developed countries received an average of 29% of the total global flow of FDI in 2007. Given that the economies of most developing countries are small, even a small amount of foreign inflow makes a big impact in these economies. The increase of FDI to developing countries is due to multiple factors. These include sustained economic growth being experienced by most of the less developed countries (LDCs) and continued liberalization and privatization that is taking place in these countries (UNCTAD, 2005).

Developing countries and emerging economies increasingly see foreign direct investment (FDI) as a catalyst to the development of domestic firms. This development can be through spillover effects whose presence can affect development of business enterprises in the host economy. FDI in developing countries is perceived not only as a source of capital inflow, but also as a vehicle for acquiring modern technology and the necessary managerial know how that these countries require for development. These are some of the reasons why most of the developing countries have continued to pursue domestic policies that encourage more FDI inflows.

Many countries have gone further than simply removing barriers to inward foreign investment and have taken a more proactive approach towards attracting FDI through the use of fiscal and financial incentives. The entry of any company with high productivity should naturally encourage other companies within the same sector to improve their performance and its competitiveness. Increasing the efficiency of production can happen by copying new technologies or by hiring trained workers and managers from foreign firms (Javorcik, 2004); these are called horizontal spillovers.

In addition, companies from other sectors may be affected by the presence of foreign companies. These include companies that supply or provide services to the foreign firms. Moreover, it is also likely that the higher standards provided by foreign companies to domestic firms might improve the domestic firm’s efficiency and performance; these changes are called vertical spillovers. Borensztein and Lee (1998) found that FDI had a positive effect on growth but the magnitude depended on availability of human capital in the host country. Hence, various factors have been considered to condition the effect of spillovers.

A popular hypothesis is that negative spillovers in developing countries are due to the low “absorptive capacity” of domestic firms. It is argued that the larger the technology and the level of skill (human capital gap) between the domestic and foreign firms, the less likely the domestic firms are able to exploit the potential of spillovers. The implication is that positive spillovers should be found in more technologically advanced firms, sectors or countries. On the other hand, Findlay (1978) and Haskel *et al.* (2002), using micro data from UK firms, concluded that firms further away from technology and human capital, gained most from foreign presence.

Theoretical literature also suggests that firms with better skilled workers could adopt foreign technology more easily into the domestic firms thereby increasing the productivity of domestic firms. However, firms with skilled labour may be more affected when their workers exit to better paying foreign firms hence leading to reduced productivity of domestic firms if wages in the domestic firms are lower than in the foreign firms. It appears therefore, that although the aggressiveness and effectiveness of the government’s policies in prompting FDI growth have been unrefuted, the effects of FDI on domestic firms and factors that determine spillovers are far from clear. Therefore, this study investigates the main firms’ characteristics that determine FDI spillovers. This is because, it is important for the policy makers to understand the factors that determine spillovers in order to initiate proper policies that would place domestic firms strategically in order to maximize benefits from foreign firms.

**Literature Review**

**2.1 Selected Empirical Literature**

Wang and Blomstrom (1992) developed a model and used it to investigate whether the technological gap was a major factor that determines FDI spillovers. The study investigated whether international technology was transferred from MNCs by means of interaction with a domestic firm. The study used US majority owned foreign affiliates in 33 host countries. The model used for the study began by assuming that technology affected demand. Consumer preferences was represented by a utility function of the form

$$U(Y) = U(\sum G_i Y_i) \dots\dots\dots 2.1$$

Where, Y is an industry output index,  $Y_i$  is firm’s output, and  $G_i$  reflects the attractiveness of firm’s products.  $G_i$  Increases in relation to the firm’s technology level  $K_i$ . The author assumed a logarithmic utility function, with  $G_i(Y_i)$  taking the form  $K_i^a$ , where  $a$  is a positive constant. The U(Y) was expressed as:

$$U(Y) = U(K_d^a Y_d + K_f^a Y_f) \\ = U(K_d^a (Y_d + (K_f^a / K_d^a) Y_f)) \dots\dots\dots 2.2$$

Then the model was monotonically transformed to take the form of

$$U(Y) = \alpha LnK_d + Ln(Y_d + k^a Y_f), \dots\dots\dots 2.3$$

Where  $k$  is the technology gap, defined as the ratio of the foreign firm's technology level to that of the local firm, subscripts  $d$  and  $f$  referred to domestic and foreign firm, respectively. The study found out that learning effort of host country was an important factor that determined the rate at which MNCs transfer technology to domestic firms.

Kokko (1994) evaluated the impact of technological gap between domestic firms and foreign firms. The study represented a pioneering contribution in this area. In order to accomplish this task, the study used a detailed industrial data from Mexican manufacturing industry. The study considered three variables; the level of technological complexity, the average capital intensity of MNCs and the technological gap. The results suggested that an increase in technological gap complexity and capital intensity makes the occurrence of FDI spillovers less likely, but that an influence of the technological gap was neutral. However the study concluded that wide technological gap, together with large foreign market shares generate a less favorable situation for the emergence of spillovers since in this case MNCs may operate without connections with domestic firms. However, the study did not take care of time effects and endogeneity problems and this could have affected the robustness of the results.

Girma and Wakelin (2001) conducted a study to find out how interaction between size of the domestic firms and absorption capacity determined benefit of spillovers to domestic firms. The study used established level data taken from the UK census of production. To control selectivity and endogeneity problem, the study used semi parametric approach in the analysis. The conclusion was that large and highly skilled domestic firms do not benefit from foreign presence because they are probably the nearest to foreign multinationals in terms of technology and market share, and may already operate at the technology frontier. However, the group of firms that gain most from foreign presence consisted of small ones with a high proportion of skilled labor.

Kinoshita (2001) conducted a study to find out whether research and Development is a determinant of spillovers to domestic firms in Czech Republic. The study used R&D as a proxy for absorption capacity, as it was considered that this increases the capacity of domestic firms to imitate new technologies. With statistical information for the Czech Republic, the study confirmed that domestic firms only benefited from foreign firms when they performed R&D actively, that is, when they developed the ability to imitate new technologies. Thus, R&D activity and FDI appeared to be complimentary in the productivity of domestic firms.

Havranek (2011) estimated vertical spillovers and why the results vary and the true effects on Czech Republic firms. He found that average spillovers to suppliers are economically significant, whereas spillovers to buyers were statistically significant but small. Greater spillovers were received by countries that had under developed financial system and were open to international trade.

Gorodnichenko, s vejnar and Terrell (2013) Using a rich firm-level data and national input-output tables from 17 countries over a period between 2002- 2005, tested new and existing hypothesis about the impact of foreign direct investment on efficiency of domestic firms in the host countries. The study estimated the backward spillovers of MNEs on the firms that sell to MNEs, in addition to estimating the usual –industry level spillovers. The study using Cobb-Douglass baseline regression with pooled data for all 17 countries provided the support for the findings of recent single –country studies that there are positive backward spillovers on efficiency among virtually all the categories of firms.

Munteanu (2015) analyzed the role of FDI in sustainable development in terms of increasing technological level of the economy. The study did an evaluation of knowledge spillovers effects on economic activity in host countries. Using ethnocentric model and agent based modeling; the study found that the positive effect generated by FDI in terms of increasing technology is often offset by negative effects on the competitiveness of national firms. However, the study found that spillovers and propagation effect, especially in terms of technological knowledge and know-how enabled the creation of robust innovation growth both

## ***Methodology***

### **3.1 Model specification**

Vertical and Horizontal spillovers, were regressed against their determinants in addition to technological gap. These determinants were identified from literature review and theoretical frame work. The FDI spillovers function can be expressed as a linear regression model to show the relationship between dependent and independent variables (Greene, 2006)

$$X_{it} = f(TG, SZ, ETHICINDEX, R \& D, SKL, \dots, Zi) \dots\dots\dots 3.1$$

Where:  $X_{it}$  is FDI spillovers, TG is the technological gap, ETHICINDEX is the index for calculating ethnicity, R&D is research and development, SKL is skills and  $z_i$  represent other factors that determine spillovers. Specifically the equation 3.1 becomes;

$$HS_{it} = \alpha_i + \beta_1 ETHIC_{it} INDEX + \beta_2 GED_{it} INDEX + \beta_3 SKL_{it} + \beta_4 TG_{it} + \beta_5 SZ_{it} + \beta_6 R \& D_{it} + S_1 D_{it} + S_2 D + \mu_i + \varepsilon_{it} \dots\dots\dots 3.11$$

$$VS_{it} = \alpha_i + \beta_1 ETHIC_{it} INDEX + \beta_2 GED_{it} INDEX + \beta_3 SKL_{it} + \beta_4 TG_{it} + \beta_5 SZ_{it} + \beta_6 R \& D_{it} + S_1 D_{it} + S_2 D + \mu_i + \varepsilon_{it} \dots\dots\dots 3.12$$

Where HS was horizontal spillovers, VS was vertical spillovers ETHIC INDEX was ethnic index, GED INDEX was gender index, SKL was skills, TG was technological gap, SZ was size of the firm, R&D was research and development,  $S^1 D$  and  $S^2 D$  was Sectorial dummies that captured sector heterogeneity,  $\mu_{it}$  was the unobservable individual firm specific effects, which was constant and captured unobserved firm heterogeneity effects and  $\varepsilon_{it}$  is the error term.

**3.2 Definitions and Measurement of the Variables**

**Technological Gap (TG)** was the difference between the highest average productivity of the foreign firm and that of domestic firm in the same industry.

$$TG = \left[ \frac{Y}{L} \right]_{For} - \left[ \frac{Y}{L} \right]_{Dom} \dots\dots\dots 3.13$$

Where,  $\left[ \frac{Y}{L} \right]_{For}$  was average productivity of foreign firms and  $\left[ \frac{Y}{L} \right]_{Dom}$  was average productivity of domestic firms in that industry.

**A horizontal spillover (Hs) was** a mechanism for the transfer of spillovers from a foreign to a domestic firm. It was measured by labour turnover from foreign to domestic firm. This channel was adopted because it was easier to get quantitative measure unlike other channels e.g. demonstration and competition effect.

**Vertical spillovers (VS):** This is when a foreign firm in a sector leads to an increase in the productivity of the domestic firms in different sectors. The indicator was measured by value of goods and services sold to foreign firms in other sectors. Similar approaches have been used by Jurat (2007); Subash (2006) and Gachino (2007).

**Foreign Ownership (FO):** This was captured using a dummy variable ( $D_i$ ) that took the value of one if the company had more than 10% shares owned by foreigners and took a value zero if the company was owned by Kenyans.

**Size of the firm (SZ):** This was measured by total number of employees in the firm.

**Ethnic Diversity (ETHNIC INDEX)** was referred to as employee nationality in a firm and it was based on the following categories, Kenyan, Asian, Other African, Whites and Chinese. To calculate ethnic diversity in each firm ethno linguistic fractionalization (ELF) index was used. The index used was represented as;

$$ELF = 1 - \sum_{k=1}^K P_k^2 \dots\dots\dots 3.14$$

Where  $P_k$  is proportion of employees who belong to different categories in each firm, k is the number of categories.

**Gender Diversity (GED INDEX)** was the proportion of female to male working in a firm. It was measured by calculating gender diversity of each firm using ELF index. Gender diversity (GED INDEX) index was represented by two categories of employees' i.e. male or female

**Skills (SKL)** was a segment of the workforce with a high skill level that created a significant economic value through the work performed. It was proxied by total number of workers who had some special skills and has gone through college level, university, or technical training.

**Research & Development (R&D)** was the total amount of money in Ksh. used by each firm on research and development.

### 3.3 Data Collection, Type, and Sources

To answer the research objective, firm level primary and secondary panel data were collected for the period 2012 to 2015. A structured questionnaire was administered to both domestic and foreign firms from different sectors. The target respondent was the director, human resources managers or financial directors of each firm.

### 3.4 Diagnostics Tests

Diagnostics tests were undertaken to ensure the estimated models were appropriate for ensuring consistent coefficient estimates. Test of independence of error term was done in order to identify which model to use between fixed and random effects model. The total sum of all the differences, estimated using random effect, and fixed effects was 0.6043. From Wald statistic, this difference was not significant. Therefore, the study did not reject the null hypothesis and hence random effect model was most preferred. On test of heteroskedasticity, the study used Wald test for group wise heteroskedasticity. The null hypothesis was that, there was constant variance. The results showed that the null hypotheses for both equations were rejected and concluded that there was presence of heteroskedasticity. Hansen (2007) noted that the random effect estimator in the presence of heteroskedasticity produces inefficient results and proposes a feasible GLS. In addition, according to Chen (2011), if there was presence of heteroskedasticity, a more general kind of feasible GLS is needed which is unrestricted. FGLS is based on a two-step estimation process. First, the model is estimated by random or fixed effects, and then its residues are used to estimate an error covariance matrix for use in a feasible GLS analysis. This framework allows the error covariance to be fully unrestricted and is therefore robust against any type of heteroskedasticity or serial correlation (Wooldridge, 2003 and Kiefer, 1980). Therefore, the study used FGLS for estimation.

## 4.0 Results and Discussion

After the diagnostics tests were conducted, the equations were estimated to achieve objective three. Table 4.1 shows the feasible GLS results of determinants of both horizontal and vertical spillovers.

**Table 4.1: FGLS Regression Results of Determinants of FDI Spillovers.**

| Variables              | Horizontal spillovers |                 | Vertical spillovers  |                 |
|------------------------|-----------------------|-----------------|----------------------|-----------------|
|                        | Coefficient.          | RobustStd. Err. | Coefficient          | RobustStd Error |
| Ethnicity              | 0.3038<br>(0.241)     | 0.0259          | 0.323<br>(0.293)     | 0.3079          |
| Skills                 | 0.0011**<br>(0.018)   | 0.0009          | 0.2643**<br>(0.041)  | 0.0872          |
| Gender                 | 0.1298<br>(0.132)     | 0.2601          | 0.1775<br>(0.190)    | 0.0764          |
| Technological Gap      | -0.068***<br>(0.002)  | 0.022           | 0.0640*<br>(0.090)   | 0.2604          |
| Size                   | 0.0026**<br>(0.030)   | 0.062           | -0.0099**<br>(0.038) | 0.0047          |
| Research & Development | 0.0176**<br>(0.023)   | 0.0059          | 0.0734***<br>(0.000) | 0.6919          |
| Sectorial Dummy(Man.)  | 0.03423<br>(0.723)    | 0.0567          | 0.0248<br>(0.234)    | 0.0967          |
| Sectorial Dummy(Agr.)  | 0.2341<br>(0.241)     | 0.0787          | 0.0972<br>(0.192)    | 0.1280          |
| Constant               | 7.05***<br>(0.000)    | 1.064           | 2.4679***<br>(0.000) | 0.7823          |

\*\*\*, \*\* and \* Significant at 1%, 5% and 10%

Figures in parenthesis are p values

**Source: Constructed from Survey Data**

When horizontal spillovers were regressed against labor diversity variables, it was observed from Table 4.1 that the coefficient of skills was positive and significant at 5 percent level. It was evident from Table 4.1 that if firms increased skills by one unit, the horizontal spillovers of the firm would increase by 0.001 units. This implied that firms that had workers that are more skilled were able to attract spillovers that are more horizontal. This can be explained by the fact that skilled workers in a firm are an indication of high absorption capacity. In addition, the coefficient of skill was still significant when vertical spillovers were regressed against other independent variables.

An increase of skilled workers by one person, increases vertical spillover of the firm by 0.264. This conforms to the theory that foreign firms do business with domestic firms that have good quality of products, because skill is correlated with high quality products (Crespo and Fontoura, 2007). Besides, skilled workers in domestic firms are able to learn new methods of production, and new technology from those workers coming from foreign firms that is: they have higher absorption capacity. In addition, high skilled workers are able to receive training from foreign firms' workers and this improves their efficiency and quality of production (Koen, 2003). These results conform to similar results by Koen (2003), Crespo and Fontoura (2006) and Subash (2006). Therefore, we can conclude that for domestic firms to be able to attract both vertical and horizontal spillovers, the skills of the employees they have, is a major determinant.

In both horizontal and vertical spillovers, the coefficient of gender was positive and insignificant. Hence, the variable did not determine or influence both spillovers to domestic firms. This is in contrast to the hypothesis that firms with gender diversity can be a source of better information and can form a link to foreign firms, which accelerates the pace of FDI spillovers compared to firms that have homogenous workers (Osborne, 2000).

For horizontal spillovers, the coefficient of technological gap was negative and significant; specifically an increase in one unit of technological gap decreased horizontal spillovers by 0.068. This implied that domestic firms with high technology (low technological gap) were bigger recipients of horizontal spillovers. This meant that workers who moved from foreign firms to domestic firms were able to pass more spillovers if the domestic firm had a small gap in technology with foreign firms. This was in support of the study by Kokko (1994), the study found that wide technological gaps together with large foreign market shares generate a less favorable situation for the emergence of spillovers. However, it was contrary to the theory by Findlay (1978), who hypothesized that the greater the technological gap between foreign and domestic firms the greater will be opportunities for technological advancement enjoyed by domestic firms and the greater the possibility of technological spillovers.

For vertical spillovers, the coefficient of technological gap was positive and significant at 10 percent level. Specifically an increase of technological gap by one unit would increase vertical spillovers by 0.064 units. This implied that domestic firms that had big difference in technology with foreign firms were the ones that benefited from customer-suppliers relationship with foreign firms. From the results, it was clear that foreign firms outsourced their raw material or services from domestic firms that had lower technology. The results of this study were in support of the results of the study done by Saggi (2002) and Subash (2006).

In both horizontal and vertical spillovers, the coefficient of research and development was positive and significant. For horizontal spillovers, an increase of research and development expenditure by one unit would increase horizontal spillovers by 0.017 units, while for vertical spillovers an increase of R&D by one unit would increase vertical spillovers by 0.0734 units. This implied that domestic firms which invested in research and development were able to attract more spillovers hence a major determinant of FDI spillovers from foreign to domestic firms. Cohen and Leviathan (1989), with statistical information for the Czech Republic, confirmed that domestic firms only benefited from presence of foreign firms when they performed research and development actively that is when they developed the ability to imitate new technologies. Keller and Yeaple (2003) also analyzed the case of the USA and concluded that only firms which invested in more R&D benefited from positive FDI spillovers. However, the results were in contrast with the study by Damijan et al. (2003) who obtained negative relationship of R&D in case of Estonia and Latvia firms.

From Table 4.1, it was also clear that the size of firm was a major determinant of spillovers to domestic firms for both horizontal and vertical spillovers. On horizontal spillovers, the coefficient of the size was positive and significant meaning that large domestic firms were able to attract more spillovers than small sized companies were. In contrast, for vertical spillovers, small firms benefited more than large firms did.

This is because the coefficient of size was negative and significant. Specifically, an increase in size of the firm by one unit would decrease vertical spillovers by 0.0099. This meant small domestic firms were able to attract more spillovers than large domestic firms, hence foreign firms preferred to do business with domestic firms that were small in size. Similar results were also obtained by Dimelis and Louri (2001), who concluded that only small firms benefit from FDI spillovers. In addition, Girma and Wakelin (2001) who considered FDI from Japan and Europe also concluded that small sized firms were the ones that benefited more from FDI vertical spillovers. In contrast, Aitken and Harrison (1999) found that the large firms benefited more from spillovers than small firms did.

#### **4.1 Summary of the study**

The main objective of the study was to investigate various determinants of FDI spillovers to domestic firms in Kenya. This was done by regressing vertical and horizontal spillovers against various variables. Horizontal spillovers were measured through labour movement because other channels of horizontal spillovers that is competition effect and demonstration effects were more of qualitative nature and hence the choice of labour movement. From the regression of horizontal spillovers against variables that show labour diversity, the coefficient for skills was positive and significant which meant that skilled workers increased firm's absorption ability of horizontal spillovers. Research and development was positive and significant which implied that domestic firms that invested in research and development were able to attract more spillovers that are horizontal. The coefficient of size was also positive and significant meaning that large firms were able to attract more horizontal spillovers than large firms were. Finally, the technological gap coefficient was negative and significant hence, firms that had a small gap in technology with foreign firms were able to attract more spillovers than those that had a wider technological gap. However, other coefficients such as ethnicity and gender were positive and insignificant.

For the vertical spillovers, labour diversity variables that were positive and significant included skills which implied that firms with high skilled workers were able to attract more spillovers. But other labour diversity variables like gender and ethnicity were positive and insignificant hence they had no impact in attracting vertical spillovers. The coefficient of size was negative and significant. This implied that small firms were able to attract more spillovers than large firms. It was therefore the case that foreign firms preferred doing business with domestic firms that were small in size in Kenya.

#### **4.2 Policy implication**

From the findings, skill was one of the variables found to be significant in determining domestic firms' productivity. This implied that firms should target skilled workers in employment and invest more in training their employees. In addition, skills being a factor that determined both vertical and horizontal spillover from foreign to domestic firms, the Government, and policy makers in the firms should come up with policies that encourage investment on human capital. This could be through giving incentives to people who need further training and reducing the cost of developing skills. This could increase domestic firm's absorption ability of technology from foreign firms and hence increase productivity. It was also clear from the findings that expenditure in research and development had an impact on determining spillovers from foreign to domestic firms in Kenya. Firms should therefore focus more on investing on research and development as this would help them to be more innovative and enable them to have ability to imitate the new technology from foreign firms.

Lastly, it was also evident that there was need for firms to invest in technology in all the sectors as this was found to increase productivity and determined spillovers from foreign to domestic firms.

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