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Productivity Spillovers from Foreign Direct Investment: The Case of Ethiopia

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Productivity Spillovers from Foreign Direct Investment: The Case of Ethiopia

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Abstract:

This paper presents the spillover effect resulting from the foreign direct investment with a focus on the manufacturing firms in Ethiopia. Being one of the pillars of the Growth and Transformation Plan (GTP), identifying the productivity spillovers arising from the FDI to the sector is timely. The research covers extensive econometric analysis based on the Central Statistics Agency's (CSA) survey, for the years 2004 up to 2010, on the manufacturing firms and an Input-Output matrix, for the year 2005/6, constructed by the Ethiopian Development Research Institute (EDRI). My analysis suggests that there is an econometric evidence for positive Backward spillovers and negative Forward spillovers to the total productivity of the manufacturing firms in the country. The paper's findings on this aspect are limited. Because, the analysis entirely rely on industry level secondary data and only one year Input-Output matrix. Therefore, there is a potential for further research work; given this benchmark finding.

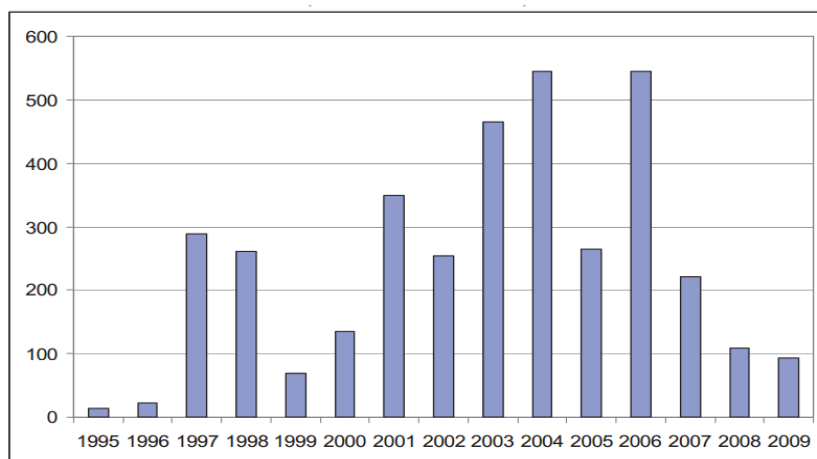
Keywords: Foreign Direct Investment, Spillover Effect, Total Factor Productivity
JEL: F2, F21, F23

1. Introduction

Open economies with skilled workforces and good growth prospects tend to attract larger amounts of foreign direct investment than closed, highly regulated economies. Hence, the principal objective of the paper is to analyze productivity externalities spilling over from multinational companies (MNCs) to the domestic firms resulting from this direct investment by the foreigners; together with its economic contribution. Given the economic theory of the small open economies and protection of infant industries in the developing countries, this analysis is reasonable and timely in this age of economic globalizations.

According to the 2011 ¹UNCTAD report on the implementation of the investment policy review, annual FDI inflows to Ethiopia has shown an increasing trend with almost a double increment over the years 1998 up to 2007 (from about 200 million dollars over the years 1998 up to 2002; to a more than 400 million dollars in the years between 2003 up to 2007). Yet, there is some volatility in this trend mainly because of the recent economic crisis. The report also stated that most of the foreign investments were in the manufacturing and agriculture sectors. It is believed that the country has comparative advantages in three main sectors: the textile and garments, meat leather and leather products, and the agro-industry.

Figure 1: Annual FDI inflows, 1995-2009 (Millions of dollars)



Source: UNCTAD report on the implementation of the investment policy review, 2011

¹See UNCTAD's report on the implementation of the investment policy review of Ethiopia, 2011

The Turkish textile company AYKA is one of the foreign investors in the lead with initial investment of about 140 million dollars in 2007/8. It presently has about 1,200 employees; with a plan to increase its work force to 10,000. The Indian firm Karuturi Global Ltd, on the other hand, takes the lead in the agriculture and horticulture investment sectors with three hundred thousand hectares of land holding. In the leather industry, a UK investor owned firm, Pittards Tannery and German footwear manufacturer Ara AG are the prominent ones, as compared to the other relatively small firms in the sector. In addition to these are large varieties of medium and small-size investment projects which are more diversified type.

With the growing trend of the Chinese economy, it will also be worth mentioning that a significant number of Chinese investors also take part in the FDI activity of Ethiopia with a plan to develop a Chinese industrial Zone in Ethiopia. Yet, there still is a room for increasing the trend of the FDI flows to the country through stronger promotional and targeting efforts, particularly related to privatization, and opening of the financial and telecommunication sectors for investors together with due attention for the strategy to protect domestic firms in this same sectors.

With this reality of the FDI in view, this paper tries to econometrically analyze the spilling over effect resulting from the linkages between the domestic and Multinational firms. The analysis is based on a firm level data which will mainly be used for examining the industry level productivity spillovers. The paper will employ the existing methodology for analyzing a panel data. The log transformed production function augmented for the spillover proxies is the main specification estimated using a simple ordinary least square, Fixed Effects and Random Effects. In addition to these is the Levinsohn-Petrin productivity estimator capturing the endogeneity problem underlying the basic production function. 2004 up to 2010 are the years under coverage for this analysis.

The working hypotheses for this purpose are firstly, productivity externalities spilling over effects from MNCs to domestic firms from Foreign Direct Investments are hardly internalizable in the poor economies like Ethiopia. Secondly, I tested the hypothesis that the spillover effect from FDI to the domestic firms in the host country is economically significant; which actually was proved to be in the vertical linkages. And also, I thereby tested the hypothesis which states that there is a mixed effect of foreign direct investment on the domestic firms' production

capacity; with a positive effect for the backward linkages and negative effect for the forward one. There also was a trend in which foreign firms perform better than their domestic counterparts with the economies of scale and there is a competition effect created in the business environments. Therefore, ultimately, it proved that the ultimate impact of FDI on output growth in the recipient economy depends on the scope for efficiency spillovers to domestic firms.

There are two important worth mentioning limitations for this paper. The first is that, with the financial and time constraint, the analysis is mainly based on only the industry level analysis and it does not contain the firm level analysis for the interactions between individual firms, suppliers and buyers at the very micro level. In addition, the Input-Output matrix used for this analysis purpose is only the one for the year 2005/6, which actually does not take in to account for the variety across years.

To my knowledge, there is no empirical analysis done on the spillover effect of the FDI on Ethiopia; especially with the vertical and horizontal linkages like the one this paper covers. Hence, I believe that this study will shed more light on the benefits and costs of the existing foreign direct investment; thereby stating the possible policy implications. The whole content of the paper is categorized in to six main parts, including the introduction. The second chapter presents the theoretical and conceptual framework about the subject. And the third chapter gives an over view to the Ethiopian economy with a detailed presentation about the trend of FDI in the country. The fourth chapter deals with the data description and methodology; with the fifth chapter presenting the data analysis and main finding of the paper. Finally, the last part concludes the paper with further policy implications.

2. Literature review

2.1 Foreign Direct Investment- an over view

Foreign direct investment is a direct investment made by a foreign investor (a company or an individual investor) in the production or business of a given host country for a profit or other socio-economic motive. The theory of capital movements was the earliest explanation for FDI, which was viewed as a part of portfolio investments. There are two types of investment: one of these is the direct investment; referring to the investment on the physical capital like that of buildings, machineries and equipment. The second type of investment is the indirect investment;

mainly of a portfolio investment. The merger and acquisition of a company or an enterprise outside the investing firm's home country has also been included in the definition for the foreign direct investment following the swift growth and change in global investment trends. Within it is the direct acquisition of an overseas firm, construction of a transportation and other related facilities, or investment in a joint venture or strategic alliance with a domestic firm with assistant input of technology, and the licensing of intellectual property rights.

Seen positively, a foreign direct investment (FDI) has a paramount importance for the international business; with a key role on the economic globalization. To mention some, the creation of new markets and marketing channels, varied and new products, lower production costs with broader availability of input choices, knowledge and technological transfer, skills and means of financing are some of the benefits. The competition effect on the domestic firms is another worth mentioning; provided the recipient economy's scope of competency. And it plays a significant role in the economic development of a given country in which the investment is conducted. However, the net effect of such an investment differs across countries, mainly depending on the competency levels of the host country; as is proven in various literatures.

In the recent years, major changes in the methods, scope and sizes of the investment by the foreigners in countries other than their home country have taken place in response to the recent moves of liberalization and related changes in the regulatory framework of industries, technological advancements, with the changes in capital markets. On this regard, the radical evolution of possession rewards from the investment, and the ways in which international companies transfer such rewards through the Foreign Direct Investments have been discussed in plenty of literatures. The advancement in the information technology in our age of internet and the diverse telecom services across countries have extensively ease the global communication. And this has contributed much for running foreign investments other than once own country with an ease of managerial communication across borders. This has also reduced the possible communication costs of the firms. As stated above, the policy adjustments on the industrial and trade regulation systems of nations have played a catalyzing role in fastening the pace of the foreign direct investments and the increase in their flows; of which liberalization took the lead. The changes that took in the domestic trade policies and the relaxation on the restrictions of

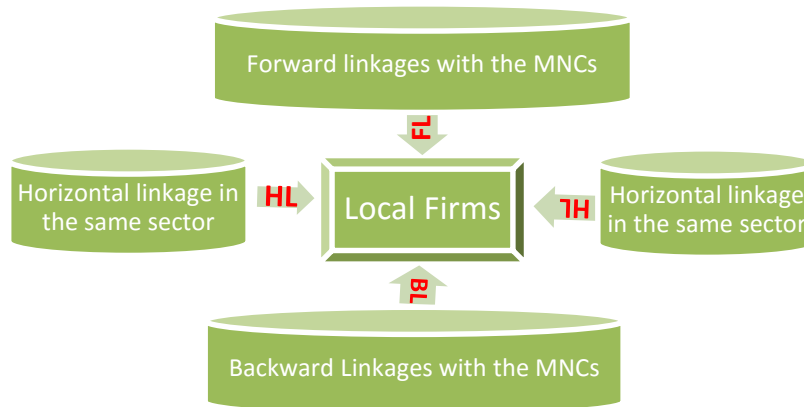
overseas investment with a possible openness of the economy for foreign competition have a prominent contribution to this angle.

There are different views on the impact of Foreign Direct Investment. Supporters of FDI argue that the investment flows is good for both of the countries (the host and the home) that take part in such an international business deal. On the other hand, opponents point out the possible threats that international big companies can create on the domestic weak firms driving them out of the market if there is no protection for such firms. According to P. Graham and Spaulding (2005), the truth lies somewhere in the middle. They argue that for the medium and small scale enterprises, foreign direct investment creates a chance for more actively involved international business activities to the bearers.² More than 70% of the FDI is made in the form of fixtures, machinery, equipment and buildings and from this, big MNCs and conglomerates take the largest share. Hence, this will have another dimension on the analysis of the impact of such investment, specifically to the home country.

Some of the reasons behind making a foreign direct investment are that it allows companies to avoid foreign government pressure for local production and for eliminating trade barriers. Furthermore, it helps to shift from the local export sales to home-based national trading centers. Joint production, ventures and marketing with the domestic partners, and trading license to operate in the country other than one's origin are also some of the merits in running such a direct investment. The high impact of a significant foreign direct investment in a specific market on consequent investment decisions of other firms has implications for aspiring foreign markets that want to attract such an investment. And since firms tend to imitate the main market choices of well performing stronger peers, countries can profit from well directed efforts to attract FDI from large and successful companies, Sabine and Anja (2010). Hence, according to them, investment decisions of these prestigious prior movers send signals about a market's attractiveness to other firms and these signals take effect beyond a firm's industry. They further stated that the strength of such signals further increases if the firm has problems to evaluate the attractiveness of a market correctly and consequently, the government of aspiring foreign markets can profit from "investing" in these signals.

² See http://www.going-global.com/articles/understanding_foreign_direct_investment.htm web retrieved on Dec. 2015

Fig 2: Defining Spillovers and linkages



Where, LH = Horizontal Linkage, BL = Backward Linkage and FL = Forward Linkage, and the arrows stand for productivity spillovers.

2.2 The investment-development cycle: Generic model

Generic model is a descriptive model which shows the shift in the trend of the flows of foreign direct investment across countries. It depicts that transnational companies assess the potential investment destinations for their business. In the evaluation process, the conventional determinants of the foreign direct investment and the favorable business environment in the target region for their purpose of establishment play a key role. Once they identified their destination and done the cost-benefit analysis of investing in that region, the companies run towards their target area before a potential competitor takes the lead and/or share the market. As is explained well above in the regional factor for the changes and disparities in the flow of the FDI, market entry on a regional basis has a number of advantages. As we have seen above, a common infrastructure, intraregional trade without any barriers and the networking opportunities that exists in the countries with in the same region adds lots of value to invest in such a group of countries at the same time than structurally dispersed countries. The regional economic groupings like that of the EU states are some of such a kind.

There is an intense competition between the rival multinational enterprises and their rival investors, and also in between the recipient countries, especially for the emerging local players.

Consequently, with the host countries motive to attract the foreign investors through all the possible incentives and the investors rush to invest in strategically important regions, there is a significant decline in the profit margins of the FDI. The multinational companies do also work on excavating new destinations for their investment and open additional marketing niches in order to keep their pace of competition with that of their rival competitors or/and even surpass, Their prior choice on this regard are those countries/regions which have conducive business environment with open economies and have well organized infrastructural facility. Even though the evaluation of the target regions is based on the traditional determinants, there also is a consideration for a different composition as compared to that of the original destinations. Such trend of acquiring new investment area and then moving forward to look for a better and less competitive destination with efficiency choices continues to circulate as long as the competition among the players prevails.

2.3 The internalization theory

The internalization theory of the Trans National Companies reflects the post war expansion in Western economies the changes in the economic environment that followed it. The Theory was developed on the back of Coase's analysis of the firm (1937). When markets present transactional imperfections there is an incentive to internalize, Grazia (2013). It is related in some way to the industrial organization hypothesis and states that FDI arises when firms are able to replace market transactions with internal transactions. Thus, such firms enjoy the advantages of lower transaction costs, the ability to minimize technology imitation and maintaining reputation by effective management and quality. Why do firms internalize? What are the limits to internalization? There are benefits of internalization and there are also costs; the balance between the two will determine the limit to internalization. The benefits of internalization stem from transactional market imperfections and relate to one or more of the following situations.

- When there are long time lags between initiation and completion of the production process and, at the same time, futures markets are nonexistent or unsatisfactory.
- When the efficient exploitation of market power over an intermediate product requires discriminatory pricing of a kind difficult or impossible to implement in an external market, though possible to implement internally.

- When imperfections would lead to bilateral concentration of market power and thus to an unstable situation under external markets.
- When there is inequality in the position of the buyer and seller regarding knowledge on the value, nature and quality of the product; the resultant buyer uncertainty may encourage forward integration.
- When there are imperfections deriving from government intervention in international markets such as the existence of ad valorem tariffs, restrictions on capital movements, discrepancies in rates of taxation.

According to Buckley and Casson (1976) in their presentation of the evolution of the Internalization Theory, towards a new Theory; they argued that the two most important areas of internalization relevant to Trans National Companies are markets for intermediate products and markets for knowledge. Hence, imperfect markets generate incentives to internalize; and the market for knowledge is highly imperfect, so there are strong benefits in internalizing it. Their reasoning being held to the earlier decades back can't extend out to the externalization decades of the present trend. And in this regard, Grazia (2013) viewed that the internalization theory tries to explain why firms prefer the FDI rather than licensing route to growth, thus why they prefer internalization to market based relationships. However, even accepting that internalization is to be favored because it cuts transactional costs, it is not clear why firms should prefer the FDI rather than the exporting route: the first implies internalization across borders; and the latter modality implies internalization within the nation state.

2.4 Determinants of Foreign Direct Investment

Javorcik (2004) stated some basic determinants of vertical spillovers. According to her, a firm's output depends on capital and labor; (in line with the fundamental production theory) materials consumption, foreign share, and other proxies for FDI spillovers operating through horizontal, backward, and forward linkages. Russ (2007) on the other hand tried to view the endogeneity of the exchange rate as one of the factors determining the foreign direct investment. And he argued that when the exchange rate and the estimated sales in the host country are jointly determined by underlying macroeconomic variables, the foreign direct investment flows' functional specification on both exchange rate levels and volatility of the exchange rate will result in a biased estimation. The shocks that take place in the transnational company's home

country and the host country determine the ways in which the company responds to the exchange rate volatility shock that took place. The analysis depicted a prior path in an analysis of foreign direct investment behavior with that of currency; departing from the firm-wise analytical framework.

2.5 Empirical Evidence

A number of empirical studies have been conducted on the determinants of foreign direct investment and its spillover effect on the domestic economy, and as well threaded the impacts on the host countries in relation to the ownership advantages. Theories assuming imperfect markets, Hymer and Kindleberger in 1976, presented the first economic analysis of FDI. FDI as an international flow of capital has been explained by capital arbitrage arguments. Some empirical works on the area, like Hymer (1976), outlined the specific characteristics and advantages of investing firm used to explain the FDI decision. For them, due to the underlying disadvantages facing foreign firms when competing in the host country, these firms must possess a set of countervailing advantage over local firms and that the market for such advantages must be imperfect; and these advantages need to be transferrable to foreign subsidiaries. This is called the industrial organization hypothesis and has been threaded as well by some other subsequent works on FDI. Factors such as, political risk and country risk, tax policy, trade openness and governance were also used to explain FDI.

Javorcik (2004) analyzed FDI and the Productivity of Domestic firms in relation to it and explained the spillovers through backward linkages. She examined whether the productivity of local firms is correlated with the presence of transnational companies in the downstream sectors or the upstream sectors; and detection of such effects in this form of analysis according to her implies a presence of vertical spillovers resulting from the foreign presence. Moreover, her paper tried to point out on determinants of vertical spillovers. Using the survey on the manufacturing firms which was conducted by the Lithuanian Statistical Office for the period between 1996 up to 2000, her analysis result provided economically meaningful magnitude effect. In addition, her results indicate consistency with the existence of positive spillovers from FDI taking place through backward linkages, but she did not found robust evidence on the existence of a horizontal and forward linkages. Hence, she argues that the productivity of the firms for this case study showed a positive correlation to that of the extent of potential contacts with the

MNCs; but not with the existence of transnational enterprises in the same sector or the existence of such enterprises in the supply chain of intermediate inputs.

Vacek (2010) also employed the same methodology to that of Javorcik (2004) and Blalock (2008) in his study conducted on the Czech Republic. Using firm-level measures of Backward and Forward linkages, he found an evidence for the positive spillover effect of the backward linkages. Yet, he did not find any significant effect of forward spillovers. Mishra (2011) also conducted a study on the Indian firms, following the same approaches to that of Javorcik (2004) and Du, Harrison and Jafferson (2011). They used a firm level panel data for the Indian firms encompassing twenty-two sectors with in the manufacturing category. Their study indicates a marginal direct impact, which actually was not statistically significant. There also were a mixed spillover effects on the productivity of domestic Indian firms resulting from the foreign direct investment inflows.

However, there still is some inconsistency in the findings across studies. Havranek and Irsova (2011) conducted a Meta-analysis on the studies of vertical spillovers from FDI by questioning why the results vary across studies and they identified what the true effect of these spillovers is. They argued that model misspecifications and publication biases for relatively large estimates are some of reasons for the results' variation across models and countries. And their analysis on 3626 estimates of spillovers and quantitative review of literatures pointed out that on average, spillover effects to suppliers is economically significant, while they realized a small and statistically significant spillover effect to the buyers. A related work by the same authors (Havranek and Irsova (2013)) identified factors that influence spillover magnitude and pointed out that the effect from the horizontal spillovers is zero on average, whose magnitude and sign, according to them depends on the characteristics of the domestic economy and foreign investors. Likewise, a Meta-analysis conducted by Meyer and Sinani (2009), in synchronizing the findings across varied studies identified that productivity spillovers effects vary across countries and depending on the economic development level (mainly level of income, institutional framework and human capital).

Sethi et al. (2003) on their analysis of the Trends in foreign direct investment flows provided the reason behind the changing trends of the flow of FDI and the factors that determine a foreign direct investment (FDI) with the firm strategy and macroeconomic considerations. They tried to

empirically analyze different aspects of their model at hand, using data on the United States' direct investment in the Western European and Asian countries in the period between 1981 to 2000. They proposed five key propositions in this paper and focused on four of them, left the fourth proposition for further studies and provided only general statistics on the liberalization measures in developing countries.

Their propositions were; firstly, notwithstanding each multinational institution's unique direct investment location decision, collectively such flows target economically and culturally integrated regions rather than specific countries. Secondly, they proposed that the transnational investments initially flow to the region that provides the best mix of the traditional FDI determinants. Thirdly, build-up of intense competitive pressures in the original host region would cause such institutions to make efficiency-seeking investments into countries with cheap labor in order to run a cost effective business. Fourth multinational institution's' efficiency and market-seeking investments into a region will depend on the countries in that region adopting investor-friendly liberalization policies. And fifth proposition, which states that the optimal mix of the foreign direct investment determinants for low-wage countries, would be different from the mix for the developed countries which they considered them to be the original FDI destinations.

As per their analysis, there are statistically significant changes in the regional distribution of the foreign direct investments proven from the investigation on the United States multinational enterprises direct investment. They also found a change in some of its conventional determinants of the FDI. The paper pointed out that in the period under consideration, the economic liberalization measures and the infrastructural developments across countries to some extent accounts for the shift in efficiency-seeking US's direct investment to these countries, which further have also affected the FDI trends over time. In summing up, they strongly argue that both macroeconomic and firm strategy factors must be taken in to account in explaining the changing trends of foreign direct investment (FDI) flows across countries.

Now, let us see some empirical works on the Ethiopia's Foreign Direct investment operation. Haile et al. (2006) identified the determinants and nature of Foreign Direct Investment in Ethiopia with a time-series analysis. The study gave an extensive account of the theoretical explanation of FDI and review of the policy regimes, the FDI regulatory framework and institutional set up in the country over the period 1974-2001. Using the data from IMF

International Financial Statistics Year Books and the World Bank World Development Indicators CD-ROM 2003, they employed a linear regression model of FDI as a function of Growth Rate of Real Gross Domestic Product, Real Gross Domestic Product per capital, Exports as percentage of GDP (measures openness), Annual rate of inflation based on consumer price index, Rate of adult illiteracy, Gross Fixed Capital Formation (as percent of GDP), Telephone lines per 1000 people, liberalization. Their empirical analysis shows that growth rate of real GDP, export orientation (Openness), and liberalization, have positive impact on FDI. While else, macroeconomic instability and poor infrastructure have negative impact on FDI. Hence, they argue that liberalization of the trade and regulatory regimes, stable macroeconomic and political environment, and major improvements in infrastructure are essential to attract FDI to Ethiopia.

On the other hand, Ayelech and Helmsing (2010) on their work about the Ethiopian cut flower industry addressed the question to what extent a country benefits from the comparative advantage in the long run in the view of the new industry, if foreign direct investment is the principal driving force. They further tried to assess whether the cut flower industry cooperates with or is accompanied by a process of development of domestic capabilities, a track which they denominated it to be “endogenisation”. In Ethiopia, Dutch investors are the dominant players in this industry, which also accounts for the biggest share of the export trade auction. In addition, the Dutch development cooperation (DDC) plays a significant role in the development of the sector in the country.

They used a value chain framework to examine the industry and thereby develop plenty of indicators on the development direction. According to them, this framework provides a helpful tool through which to examine the effects of FDI in a country, and the direction of development in the industry concerned. The framework shows how each functional element in the production sequence involves transactions, and depends on technological and other inputs, including production technology and related research and development, and also transports logistics and communication processes. They formulated a set of indicators which includes, production, trading in export markets, and sectoral development. Based on their analysis, they conclude that endogenisation is a two-way process. And it depends both on the degree to which FDI has an interest to draw on domestic firms, enter into relationships and share technologies; and on the

interest and ability of domestic firms to take up such opportunities, and on the creation of supporting institutions and infrastructures to make this take-up possible.

Furthermore, according to them, a few endogenisation spheres are happening in the country and, yet it for now is insignificant being at its initial stage. Much more specifically, there is a very few opportunity for the direct technological transfer from the Dutch direct investment in the horticulture sector. However, there is joint collective action on what they called non-core activities, mainly of the transportation; which accounts for the largest share in the total cost. And the Dutch cooperative flower auctions play a key role in giving an opportunity for the domestic growers to easily access the international market. They also stated Ethiopian entrepreneurial capacities as the main challenge and the lack of technical competence to meet growing competition in the industry locally.

3. An Overview of the Ethiopian Economy and the Foreign Direct Investment

Ethiopia is a land locked country, located at the horn of Africa. Agriculture is the back bone of its economy; accounting for about 47 percent of the GDP and 85 percent of the labor force engage in this sector. This sector also accounts for the greatest share of the total employment in the country. It is Africa's second most populous country with greater share of the young population. Yet, with the underdeveloped labor market, lots of the labor force is engaged in the informal economic activity. Privatization has taken place in many of the sectors, though some of the service sectors (The Ethiopian Telecommunications, Financial and Insurance services, and Air and Land Transportation services) and the retail are owned by the government for a strategic reason. The country is one of the least industrialized economies in the world. For about half a century, the industrial sector contribution to the GDP ranged between 9 and 11 percent, and the growth rate of the sector is very little as compared to the agricultural sector.

According to the 2013 Economic freedom index, Ethiopia's economic freedom score is 49.4, making its economy the 146th freest in the 2013 Index. This index has increased to 50.0 in the year 2014, making its economy the 151st freest. The improvements in the economic freedom of the country have mainly been in the trade, fiscal, and investment freedoms.

The major export of the economy comes from coffee, which accounts for about 26.4% of the country's foreign exchange earnings. About 25% of the total population engages in this cash

crop production and marketing, making it one of the critical cash crops in the agricultural sector. Live animals, leather and leather products, chemicals, gold, pulses, oilseeds, flowers, fruits and vegetables and khat are some of the other domestic products penetrating the international market following the coffee. According to the African Economic review, in the year 2012, Ethiopia's rate of economic growth was about 7% making it in the ninth ranking of the whole continent's growth. The growth was broad-based with an increasing role for services and industry and this momentum has continued in 2013 and 2014, at a slower pace though.

Table 3.1: Major Economic Indicators for Ethiopia

Subject Descriptor	Units	Scale		2010	2011	2012	2013	2014	2015
Gross domestic product, current prices	U.S. dollars	Billions		29.684	31.715	41.906	46.306	49.715	54.407
Inflation, average consumer prices	Index			285.459	380.324	466.858	505.508	554.010	603.871
Volume of imports of goods and services	Percent change			14.713	-0.871	22.175	15.073	3.881	4.882
Current account balance	Percent of GDP			-4.021	0.634	-5.815	-7.524	-6.479	-6.535

Source: World Economic Outlook Database, April 2013

Attracting Foreign Direct Investment (FDI) being generally considered as an integral part of the development policy blend of successful emerging economies that leads the way to the required sustained economic transformation, Ethiopia is also following such a trend. Yet the share of the FDI relative to the GDP has remained to be to lower rate, and as a result the government's effort towards attracting foreign investors with promissory incentives to invest in the country is paramount. The trend in the global industrial redistribution is supposed to provide an opportunity for emerging African countries like Ethiopia to attract FDI and upgrade its economic structure. It has competitive advantage over the East Asian countries who had dominated the FDI attraction for the last three decades.

Lower costs of land, relatively smooth regulatory compliance towards foreign direct investment, cheap cost of labor, privileged access to high-income markets, and growing domestic and regional markets are some of the advantages that the country has as an incentive for the foreign direct investment attritions. However, it is not that easy to attract all that flows from foreign investors, since there is strong competition from within lower income countries in Asia and other parts of the world, including Africa. And hence, it should promote itself as an alternative focal

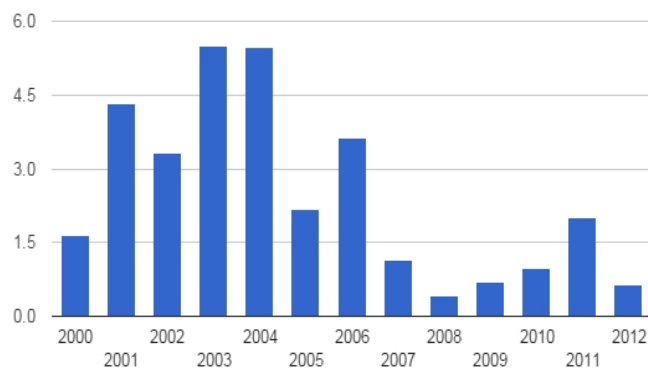
point for global companies to find new and favorable production centers with its competitive advantages.

Chorching, et al. (2012) identified four major reasons that attracts Chinese investors to Ethiopia. According to them, one is to take advantage of a good understanding of the investment climate gained from entrepreneurs' social networks. Secondly, to take advantage of the perceived opportunities provided by the current state of the Ethiopian economy; which includes the limited market capacity and market competition, cheap labor, cheap land, and an expanding Ethiopian market. Thirdly, the Chinese investors come to Ethiopia to maximize cross border investment incentives provided by the Ethiopian and Chinese governments. The incentive by the Ethiopian government includes tax holidays and tariff free policy for FDI equipment imports. And fourthly, is to make a strategic move of the parent company into the African market and to invest in favor of the stable political environment of Ethiopia. As far as the foreign investment is concerned, these principal reasons also work for the other foreign investment actors in the country.

The average annual FDI flows to Ethiopia from 2003 to 2006 were only 399 million dollars, which is only 1.56 percent of FDI flows into Africa. The country accounted for only 1 percent of the continent's inward FDI stock, while representing close to 9 percent of the population of the continent as whole. Ethiopia's per capita inflows were 5 dollars in 2006, lower than 39 dollars for African countries as a whole. FDI accounted for about 0.8 percent of the GDP in the year 2006, compared with 1.6 percent for African countries as a group. FDI flows to the country increased from an annual average of 131 million dollars in 1995-2000 to 312 million dollars in 2001-2006 although there are fluctuations in between. The unstable political environment of the country may be one of the reasons of the fluctuations.

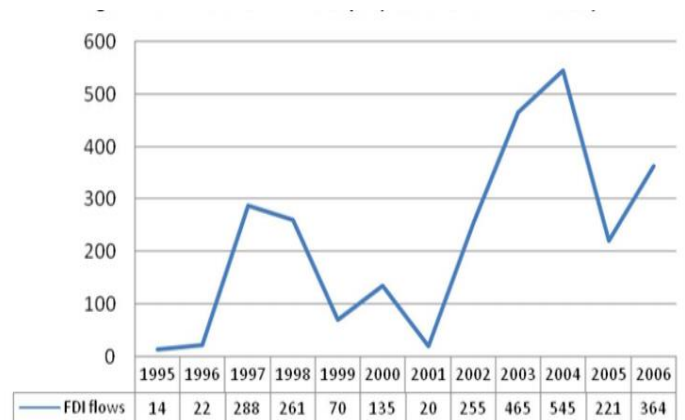
As can be seen from chart (a) in the figure below, the highest share of the FDI to the GDP during the period was about 5% percent with a minimum share of less than 1 percent during the economic crises period.

Fig3.1 The trend of FDI in Ethiopia



(a) Foreign Direct Investment, percent of GDP

(Source: TheGlobalEconomy.com, World Bank and 2007, UNCTAD)



(b) FDI Flows to Ethiopia (In Millions of USD)

(Source: world investment report 2001, 2003, 2006)

Table 3.4: Countries ranking by Inward FDI performance Index and Inward FDI Potential Index, 2007–2009

Economy	Inward FDI			Economy	Inward FDI		
	Performance				Potential Index		
	2007	2008	2009		2007	2008	2009
Yemen	89	56	127	Burkina Faso	129	129	..
				Congo, Democratic			
Kenya	99	133	128	Republic of	132	130	..
Gabon	106	114	129	Niger	136	131	..
New Zealand	97	66	130	Malawi	137	132	..
Tajikistan	11	11	131	Togo	130	133	..
Ethiopia	129	131	132	Ethiopia	131	134	..
Nepal	139	136	133	Madagascar	133	135	..
Latvia	37	70	134	Guinea	134	136	..
Japan	134	129	135	Haiti	135	137	..
Kuwait	138	137	136	Benin	138	138	..
Slovakia	71	74	137	Rwanda	140	139	..

Source: UNCTAD, World Investment Report 2010

NB: Ranking is based on the latest data on hand for 141 countries and the potential index is based on 12 economic and policy variables.

According to the UNCTAD report on the implementation of the investment policy review (IPR), 2011, Ethiopia commenced an Industrial Strategy in the year 2003. The strategy, according to the report, mainly focused on three main sectors where it is believed that the country has comparative advantages; namely, the textile and garments, meat leather and leather products, and the agro-industry with numerous incentives to enhance the development of these sectors.

Recently, there is a sluggish trend in the manufacturing industry. According to The Reporter news on the 24th May 2014, the Ministry of Industry, Ahmed Abtew, reported to the house of people's representatives that the sector underperformed in spite of the paramount efforts to attain the 5 years Growth and Transformation Plans (GTP). The Ministry of Industry, which planned to secure revenue of about \$825.05 million Ethiopian birr over the fiscal year 2013/14, reported that only 39.3% of the planned revenue was achieved. The recurrently encountered power shortage with electric power cuts and low supply of raw materials for local factories were two of the most important factors mentioned for this sluggish trend in the sector.

Coming specific to the issue of the raw material shortage, there has been recurrent report of such a problem in this sector. For instance, in March 2009 Capital Ethiopia reported that, Coca Cola: East African Bottling Share Company (EABSC) in Ethiopia had temporarily stopped its production due to acute shortage of crown cork which it used to import from India. The report stated shortage of foreign currency was one of the reasons for the shortage and import substitution with the local materials couldn't fit all their requirements as they mentioned to the reporter.

This had been common problem in the beverage industry including Harar Brewery, Bedele Brewery and soft drinks producer, Moha, which has resulted to cut their potential production. However, St. George Beer and Dashen Beer producers were in the normal pace during this time; with their import of the cork from abroad. In addition to these, Plastic processing industries do also heavily rely on the imported Plastic Raw Materials. Ergendo Trade and Industry PLC,

Mohan International, Berhanu & Family Plastic Products Manufacturing P.L.C, and Three Y Flexible Packaging Plc are some of the factories who import Plastic Raw Material to Ethiopia.

Furthermore, there recently is raw material shortage in the textile, hides and leather industries. This has been a very recent phenomenon encountered in these industries. The Capital Ethiopia, in its news on October 2014 had reported that cotton shortage has hampered the textile industry's production capacity. As a result, the government of Ethiopia encourages imports of new material from abroad, than exhaustively utilizing the available raw materials. Tax exemption incentives for such imports have been one of the solutions provided by the government to address this problem. However, delays in the imports due to some internal bureaucratic system (the problems of the trade regulation and customs clearance inefficiency as is also indicated in the World Bank's survey, 2012, of the Chinese investors in Ethiopia) and other external issues and that of the shortage of foreign currency are still bottlenecks to address this. With these issues at hand, this current problem has put to question the Industrial Strategy which mainly focused on the main sectors where the country was believed to have comparative advantage over; as mentioned above. And it will also be worth noting that there still are growing demands for the Ethiopian textile products.

4. Data Description and Methodology

4.1 Data Description

This paper is based on two main data sources. The first is the annual survey of manufacturing industries, conducted by the Ethiopian Statistical Agency. This large and medium scale manufacturing survey done by the CSA is confined to those establishments which engaged 10 persons and above and use power-driven machines and covers both public and private industries in all Regions of the country. The survey contains information on foreign ownership, *sales*, Total current paid-up capital, Total value of exported sales, total value of Imported raw Materials, inventories, employment, fixed assets, input costs, investment, and location for each category of industry based on the International Standard Industrial Classification (ISIC Revision-3.1) categorization. The Central Statistical Agency (CSA) has been providing statistical information on the country's manufacturing and electricity industries since 1976 (1968 E.C.) annually, to alert policy interventionists on the changes taking place in the sector. The survey is the principal

source of facts about the structure and function of the manufacturing industries in Ethiopia. Additional data include the 2005/06 Ethiopia's Input Output Table and Social Accounting Matrix conducted by the Ethiopian Development Research Institute in collaboration with the Institute of Development Studies at the University of Sussex in 2009.

The data is of an unbalanced panel structure based on 8615 observations over the years 2004 to 2010.

Manufacturing industry is my focus of analysis and the CSA survey follows the following category of industry based on the International Standard Industrial Classification (ISIC Revision-3.1) categorization.

4.2 Methodology

In order to assess the vertical and horizontal linkages in between the MNCs and Domestic firms and estimate the magnitude and direction of the effect, the paper employed pooled, Fixed and random Effect estimation techniques. A production function augmented for three basic spill over proxies: Horizontal, Backward and Forward; based on previous works on the area, like that of Javorcik (2004) and Blalock (2008,), is my baseline specification. Furthermore, in analyzing the inter- industry spill-over from the FDI I used a Panel framework with Levinsohn-Petrin approach developed by Levinsohn and Petrin (2003) for capturing the endogeneity problem residing in the standard OLS estimation of the production function. Different analytical testing, including unit root testing, co-integration testing, and Granger causality testing are applied in order to capture the causal backward and forward linkages.

4.3 Model Specification and Definition of Variables

Given, a log transformed Cobb–Douglas production function with the Backward and Forward spillover proxies in the form:

$$\ln Y_{it} = \alpha_1 + \alpha_2 \ln M_{it} + \alpha_3 \ln E_{it} + \alpha_4 \ln L_{it} + \alpha_5 \ln K_{it} + \alpha_6 FS_{it} + \alpha_7 \text{Backward}_{it} + \alpha_8 \text{Forward}_{it} + \alpha_t + \alpha_j + \alpha_r + \varepsilon_{it} \quad (1)$$

Here, Y_{it} stands for the real output of firm i at time t . I took the total value of production for the firm at a given year, to be the total output of that firm in that specific year. M_{it} is the real consumption of materials for the firm i , at time t ; representing the value of material inputs adjusted for changes in material inventories, deflated by an intermediate inputs deflator calculated for each sector based on the input-output matrix and deflators for the relevant industries. E_{it} is the real energy consumption of the firm i at time t . L_{it} (LABOR) stands for the number of workers in the given firm i , in the given year. K_{it} represents the real net tangible capital at the end of the year showing the value of fixed assets at the end of the year. FS_{it} stands for the foreign share. It is a share of foreign capital in the firm's equity and attains values from zero to one. Following Javorcik (2004), I took firms with a foreign share of less than 0.2 to be domestic firms and those with foreign share of equal and more than 0.2 to be international firms. I accounted for a dummy, where FS_{it} is one if a firm is international or foreign, and zero otherwise.

In addition are the three proxies for spillovers: Horizontal, Backward and Forward that have been widely used in the literature of productivity spillovers, augmenting the Cobb-Douglas Production function. One of these is the $Backward_{it}$ variable which is an industry-level measure of a backward linkage of a given industry and it proxies the extent of potential linkages between local suppliers and transnational customers. Mathematically, it measures the percentage of output sold to multinational firms given us:

$Backward_{jt}$ = the share of output that industry j sells to multinationals at time t .

$$Backward_{jt} = \sum_{k \text{ if } k \neq j} \alpha_{jk} \cdot Horizontal_{kt}$$

Where α_{jk} is the proportion of sector j 's output supplied to industry k .

For example, consider that the chemical manufacturing industry sells half of its output to the food producers and half to the beverage industry. If no foreign producers are producing food items but half of all the beverage production comes from foreign affiliates, the Backward variable will be calculated as follows: $1/2*(0) + 1/2*(1/2) = 0.25$

Horizontal_{it}: captures the presence of multinational firms in given industries; measured as a share of output produced by international and foreign firms in total output of industry j at time t.

$$Horizontal_{jt} = \frac{\sum_{i \text{ for all } i \in j} FS_{it} \cdot Y_{it}}{\sum_{i \text{ for all } i \in j} Y_{it}}$$

Another variable of interest is the Forward_{it}. It proxies the share of inputs a given industry sources from multinationals. It is equal to the weighted share of output in supplying industries produced by firms with foreign capital. It is given by:

$$Forward_{it} = \delta_{jm} \sum_{m \text{ if } m \neq j} \left[\frac{\sum_{i \text{ for all } i \in m} Foreign Share_{it} * (Y_{it} - X_{it})}{\sum_{i \text{ for all } i \in m} (Y_{it} - X_{it})} \right]$$

Where, δ_{jm} is the share of inputs purchased by industry j from industry m in total inputs purchased by industry j; excluding inputs purchased within the industry (X_{it}).

Note that, the proxies for horizontal and vertical linkages do change with time and the sector-specific variables; where the fixed one year coefficients from the Input-output matrix are combined with the varying foreign investment and output levels over years during their computation.

Hence, the production functions augmented for the proxies of the horizontal and vertical linkages following Javorcik (2004) follows:

$$\ln Y_{it} = \alpha_1 + \alpha_2 \ln M_{it} + \alpha_3 \ln E_{it} + \alpha_4 \ln L_{it} + \alpha_5 \ln K_{it} + \alpha_6 FS_{it} + \alpha_7 Horizontal_{it} + \alpha_8 Backward_{it} + \alpha_9 Forward_{it} + \alpha_t + \alpha_j + \alpha_r + \varepsilon_{it} \quad (2)$$

α_r , α_j and α_t Stand for the fixed effects of region, industry and time; represented by regional, industry and time dummies.

I estimated this model using simple pooled OLS, Fixed Effect and Random Effect estimation techniques in order to come up with a comparatively better result. The model has further been

augmented for “Demand”³ and “Herfindahl Index” (H)⁴ as will see it in the following chapter under the analysis. Lags, First, and higher differences has also been used with this specification as we can see it in the estimation part (Chapter 5) that follows. Lags are considered in order to capture for the time that takes before the spillover manifests. Furthermore, the industry, time and regional dummies are taken under consideration to capture the heterogeneity across the different groups of region, industry and time under consideration.

I have also used the extended production function with the interaction terms following Blalock (2008) stated as:

$$\begin{aligned} \ln Y_{it} = & \alpha_1 + \alpha_2 \ln M_{it} + \alpha_3 \ln E_{it} + \alpha_4 \ln L_{it} + \alpha_5 \ln K_{it} + \alpha_6 \ln^2 M_{it} + \alpha_7 \ln^2 E_{it} + \alpha_8 \ln^2 L_{it} + \\ & \alpha_9 \ln^2 K_{it} + \alpha_{10} \ln K_{it} \ln L_{it} + \alpha_{11} \ln K_{it} M_{it} + \alpha_{12} \ln K_{it} E_{it} + \alpha_{13} \ln L_{it} M_{it} + \alpha_{14} \ln L_{it} E_{it} + \\ & \alpha_{15} \ln M_{it} E_{it} + \alpha_{16} FS_{it} + \alpha_{17} Horizontal_{it} + \alpha_{18} Backward_{it} + \alpha_{19} Forward_{it} + \alpha_t + \\ & \alpha_j + \alpha_r + \varepsilon_{it} \quad (3) \end{aligned}$$

Moreover, following the critics against OLS in capturing the endogeneity problem of the production function, I applied the Levinsohn-Petrin (2003) estimator of production function that is robust with respect to the endogeneity of input choices; where the residuals are taken as measure of Total Factor Productivity in the baseline model as we will see in the section that follows.

5. Estimation Results and Main finding

As stated in the data description part of this paper, based on the CSA survey and the Input-output matrix of the country, taken from the Ethiopian Development Research Institute, I here will present the estimation result for the whole compiled data. The survey contains information on foreign ownership, sales, Total current paid-up capital, Total value of exported sales, total value of Imported raw Materials, inventories, employment, fixed assets, input costs, investment, and location for each category of industry based on the International Standard Industrial Classification (ISIC Revision-3.1) categorization.

³ Demand_{jt} = $\sum_k a_{jk} * Y_{kt}$ where a_{jk} is the input-output matrix coefficient indicating that in order to produce one unit of good k, a_{jk} units of good j are needed. Y_{kt} stands for industry k output.

⁴ Herfindahl index is a measure of market concentration, defined as the summation of the squared market shares of the four largest producers in a given sector, and its value may range from 0 to 10,000.

The data constitute an unbalanced Panel covering the period 2004 up to 2010. Out of the total number of manufacturing firms surveyed per year, a low of 716 in 2005 to a high of 1801 in 2009 is taken as a sample; where I deleted those observations with zero sales, zero employment, and output; having a total of 9091 observation for all the seven years. The industries under consideration are those with NACE ISIC codes ranging in between 1511 to 3610. As for the categorization purpose, I categorized the firms with foreign capital participation of 20% share of subscribed capital (equity) owned by foreign investors under foreign; and the remaining as being owned domestically. About eight percent of the total observations meet this definition.

In addition to the CSA's survey, I took a one year, 2006, EDRI Input-Output matrix in drawing some of my interest variables in combination to the survey. Yet, it would have been better if I could get more than one input-output matrix for the relationships between sectors may change over time. However, the input-output matrix I got is the very first and only one done on an aggregate level, for the time being, for the later years are unavailable. Plus, given the common trend of matrix computation, there is an inclusion of imports, and for this sake of analysis; it would have been better if this could be avoided; which is not. Hence, the estimation results that follow should be interpreted with these two limitations in mind.

Table 5.1.: Summary Statistics

Variable	All Firms		Domestic Firms	
	Mean	Std. Dev.	Mean	Std. Dev.
Current paid up capital_Foreign	1.38948e+007	6.79691e+007	26595.9	306300.
Total current paid up capital	1.82115e+007	9.64161e+007	1.70228e+007	9.67885e+007
Total sales value	1.48177e+007	6.42056e+007	1.34954e+007	6.09620e+007
Total value of exported sales	1.74296e+007	3.38722e+007	1.70500e+007	3.37729e+007
Total value of Imported raw materials	4.73741e+006	1.96722e+007	4.42976e+006	1.94339e+007
Energy	9.79724e+006	3.39974e+007	9.02391e+006	3.25335e+007
Labor	72.6445	214.866	68.2053	206.212
Capital	6.34206e+006	2.93330e+007	5.97531e+006	2.84919e+007
Material Input	6.88330e+006	2.32147e+007	6.44111e+006	2.28454e+007
output	1.48272e+007	6.38116e+007	1.35834e+007	6.12741e+007
Foreign Share	0.0652029	0.234830	0.000246135	0.00534941
Horizontal	0.116190	0.162428	0.109157	0.153020
Backward	0.0138201	0.0349822	0.0131209	0.0309475

Forward	0.0164196	0.0336916	0.0164022	0.0336196
Tax	3.01169e+006	1.49116e+007	2.92101e+006	1.48282e+007
Demand	8.25327e+008	1.07727e+010	7.37497e+008	9.86262e+009

As we can see from the summary statistics below (table 5.2), the proxy variables show some oscillatory trend since the years under consideration fall in those with the occurrence of the economic crisis that took place since 2007. For it is the case that the economic crisis affected the developing countries like that of Ethiopia lesser, yet; the spillover effect from the multinationals to contribute for the crisis's fast transmission is considerably high. The Horizontal variable increased from 7.8% in 2004 to about 12% in 2006 and then followed a decreasing trend in the years 2007; then revived back to 22% in 2010. Likewise, the backward variable stayed stable to about 2% level in the years 2004 and 2005 and showed a declining trend in the years that follow and revived back to 2% in 2010. The highest Backward variable record was from the food industry with a 4.6% in the year 2005, followed by manufacturing of metal products and Manufacturing of flour with 3.6% and 1.5% respectively. The Forward variable increased from 2% in 2004 to 3% in 2010; with a significant fall and oscillation in the years in between. The highest forward variable record was from the Food industry followed by Manufacturing of furniture with a 13.6% and 13.5% records respectively.

Table 5.2 Summary statistic for the Proxy variables over years

Year	No of industries (ISIC 1511 up to 3610)	Horizontal		Backward		Forward	
		Mean	St.dev.	Mean	St.dev.	Mean	St.Dev.
2004	21	0.078493	0.10847	0.021096	0.043946	0.024889	0.035787
2005	21	0.091774	0.15335	0.024655	0.056936	0.0050512	0.0088171
2006	21	0.12864	0.12547	0.015821	0.038991	0.0082333	0.010939
2007	21	0.063562	0.19679	0.0073755	0.012240	0.0074061	0.0098095
2008	21	0.067863	0.18642	0.0069596	0.032756	0.0061469	0.045404
2009	21	0.085246	0.023007	0.0049940	0.015743	0.023605	0.048876
2010	21	0.22376	0.11300	0.022300	0.010938	0.032298	0.010718

In the regression that follows, I estimated the specification which was stated in the model specification section above using pooled Ordinary least squares (OLS), Fixed Effects and Random Effect models for the panel data. A firm's output (Y_{it}) is the dependent variable. Capital (K_{it}), labor, Materials (M_{it}), Foreign Share (FS_{it}), and the proxies for FDI spillovers: Horizontal, Backward, and Forward are the explanatory variables. Furthermore, I also incorporated in the model, Six Time dummies, Twenty Industry Dummies and Fourteen Regional Dummies in order to take in to account for the heterogeneity across years, industries and regions. These is because, there might exist Industry-, time-, and region-specific factors unknown to us econometrically, and yet known to the firm that might affect productivity of the firm. For example, administrative performance in a particular firm or better infrastructure in a given region or attractiveness of a given region/industry can be some of such factors; and the operational dummies stated here will solve the problem to some extent. Based on the previous works and the existing reality that the knowledge externalities from the foreign presence may take time to manifest themselves, I employed both contemporaneous and with lagged spillover variables for my estimation. For the sake of comparison purpose, I run the regressions for both the domestic and all samples. Results for the respective estimation techniques are presented in the tables below.

Pooled OLS	All Firms			Domestic Firms		
	Model 1 (Baseline)	Model 2 (with HHI and demand)	Model 3 (with one lag)	Model 4 (Baseline)	Model 5 (with HHI and demand)	Model 6 (with one lag)
Constant	4.36528*** (0.988014)	3.4118*** (0.120843)	3.97085*** (0.0951238)	3.58952*** (0.0974539)	3.00861*** (0.115246)	3.97059*** (0.105389)
log(Energy)	0.450411*** (0.0417276)	0.416817*** (0.0368654)	0.393989*** (0.0422314)	0.41059*** (0.0415892)	0.375376*** (0.0369784)	0.403805*** (0.0467979)
log(labor)	0.2544*** (0.0123583)	0.259022*** (0.0110173)	0.289152*** (0.0136024)	0.230858*** (0.0124356)	0.218801*** (0.0106234)	0.273506*** (0.015128)
log(Capital)	0.134285*** (0.00630535)	0.14509*** (0.00565379)	0.154711*** (0.00694607)	0.13959*** (0.00636519)	0.151165*** (0.0058739)	0.152053*** (0.00769567)
log(material)	0.143053*** (0.0432084)	0.160305*** (0.0379313)	0.142413*** (0.0432815)	0.197509*** (0.0426984)	0.216472*** (0.0379804)	0.138954*** (0.0479068)
Foreign Share	0.187674*** (0.0515658)	0.171148*** (0.0470638)	0.193633*** (0.0568265)	1.0864** (2.2298)	1.25921 (2.09141)	4.96654** (2.37918)
Horizontal	0.0338789 (0.0878477)	-0.0819612 (0.0801889)	-0.0793176 (0.0830202)	-0.187669*** (0.0925696)	-0.238268*** (0.081009)	-0.113697 (0.0977372)
Backward	0.345473 (0.381755)	0.710691** (0.342668)	0.0561433 (0.369133)	0.288344 (0.42623)	0.511059 (0.398874)	0.321405 (0.46128)
Forward	-0.978073** (0.465506)	-1.56484*** (0.358201)	-0.702835* (0.381638)	-1.20264 (0.438914)	-1.36293*** (0.352686)	-0.661163 (0.425257)
R ²	0.789397	0.779067	0.734004	0.787833	0.771660	0.723354
No.Obs.	8655	8655	6722	7987	7987	5532

Table 5.3: Pooled OLS estimation both for all and domestic firms; Dependent variable: log (output)

(Robust standard errors in parenthesis)

***, ** and * denote significance level at 1%, 5% and 10% respectively.

Table 5.3 above presents pooled OLS estimation results both for the domestic and all firms with contemporaneous and lagged interest variables. The respective first columns (Model 1 and Model 4) for both groups present the estimation with the original model specification. And the remaining columns are derivations based on this baseline specification either with additional variables HHI and Demand, or lagged proxy variables.

As we can see from the result, I found a significant and negative coefficient on the Forward Variable for the whole sample in all the specifications (the baseline OLS, with HHI and demand and for the estimation with lagged spillover proxy variables), which is consistent with the previous findings. Yet, I have not found any significant effect from the Backward and Horizontal variables for the sample under consideration, except the estimation with additional variables HHI and Demand. On the other hand, the coefficient for the Horizontal variable is negative and significant for the domestic firms in both the baseline OLS and the estimation with additional variables HHI and demand. Likewise, there also appeared a negative significant forward effect for the estimation with HHI and demand of this same subsample.

As mentioned above, in order to avoid omitted variable bias from my work, I took in to account for some other factors that might affect the productivity of the firm; which will help me to isolate the net effects of the productivity spillovers. For example, provided the smooth entry to the market within the specified period; a multinational entry to the market will to some extent decrease the industry's concentration. This on the other hand will lead to a more competition; forcing domestic firms to improve their efficiency. Hence, we can recognize a spillover effect on the productivity which comes from such a situation. And we need to separate this effect from the gross effect, in order to identify the net effect from that of the knowledge transfer by separating the two. To this effect, following Javorcik (2004), I accounted for the Herfindahl index as a proxy for the level of market concentration (Model 2 in the table above).

Furthermore, foreign entry into downstream sectors may increase demand for intermediate products. And this results for the local suppliers to gain the benefits of economies of scale with an increase in the demand. And again, to separate this effect, I included the demand for intermediates in my specification. The Demand variable is drawn from the information on sourcing patterns in the IO matrix and the value of production in the input using sectors.

Following such specification (Model 2 in Table 5.3 above), I found, a positive and significant Backward variable, and a negative and significant Forward variable in line with the previous works. Hence, my analysis suggests that a one percentage point increase in the foreign presence in the downstream sectors is associated with a 0.7 percent rise in output of each supplying industries, *ceteris paribus*. And likewise, a one-standard deviation increase in the weighted share of output in the upstream (or supplying) sectors produced by firms with foreign capital participation is associated with a 1.6 percent decline in total output.

Overall, there is some sort of consistency for the declining forward variable's effect in all the specifications for the whole sample; despite the variation in the magnitude of the effect; and also the insignificant backward effect for the domestic firms in all the specifications. Moreover, the estimations in the table above describe the problem well, as can be seen from the Adjusted R^2 of more than 72% in all the cases.

5.1 Simultaneity Problem with the OLS estimation

Given the log-transformed Cobb–Douglas production function, as the one in our model, without the proxies; there happens a so called of the simultaneity problem in which the firm recognizes at least a part of the total factor productivity (TFP) at a point in time early enough allowing the firm to alter its factor input decision. In that case, then profit maximization motive of the firm implies that the existence of the error term of the production function is expected to affect the choice of its factor inputs, at the micro level. Consequently, this implies that the explanatory variables and the error term are correlated, accounting for the endogeneity problem in the estimate. Hence, this makes the OLS estimates for this case to be biased.

One of the remedies for such problem with the OLS is the usage of Fixed-effect estimation technique; which will solve the problem and deliver consistent estimates of the parameters. Therefore, in the analyses that follow, I present the fixed effect estimation results. In line with the OLS estimate, I found a negative and significant coefficient for the Forward variable in the estimation in all the specifications, except the estimation with interaction terms for the domestic firms. Hence, this depicts that there is a significant productivity loss for the manufacturing industry of the country resulting from the share of inputs domestic industries source from multinationals.

	All Firms				Domestic Firms			
	Model 1 (Fixed Effects)	Model 2 (FE with HHI and demand)	Model 3 (FE with one lag)	Model 4 (FE With Interaction Terms)	Model 5 (Fixed Effects)	Model 6 (FE with HHI and demand)	Model 7 (FE with one lag)	Model 8 (FE With Interaction Terms)
Constant	3.37927*** (0.0866316)	3.44289*** (0.126615)	3.60798*** (0.109453)	5.68689*** (0.434251)	3.73627*** (0.101874)	3.38366*** (0.138751)	3.53079*** (0.179121)	3.97891*** (0.564208)
log(Energy)	0.358302*** (0.0402238)	0.466644*** (0.0398183)	0.442432*** (0.0468991)	-0.124096 (0.220926)	0.471971*** (0.0438229)	0.463754*** (0.0438197)	0.51694*** (0.0544872)	-3.65328 *** (0.389043)
log(labor)	0.212575*** (0.0110699)	0.249713*** (0.0115731)	0.289266*** (0.015478)	0.223992*** (0.0685605)	0.245927*** (0.0130447)	0.246114*** (0.0130399)	0.266923*** (0.0173313)	0.220453** (0.0976374)
log(Capital)	0.142706*** (0.00629708)	0.145146*** (0.00592926)	0.134406*** (0.00773498)	0.125912*** (0.0383187)	0.131556*** (0.00667653)	0.129625*** (0.00668335)	0.122521*** (0.00873391)	0.0466126 (0.0497694)
log(material)	0.251793*** (0.0415185)	0.112051 *** (0.0410797)	0.143165*** (0.0482614)	0.404136* (0.228388)	0.129721*** (0.0453342)	0.136779*** (0.0453098)	0.0715502 (0.0562325)	4.27564*** (0.404843)
Foreign Share	0.20609*** (0.0519934)	1.21759 (2.07934)	-0.0404057 (0.0628459)	0.182399*** (0.0516333)	2.06807 (1.95463)	1.98086 (1.95209)	4.02429 (2.89149)	0.711195 (2.59775)
Horizontal	-0.0147596 (0.081621)	-0.198811** (0.0884109)	0.00924632 (0.0927037)	-0.0352651 (0.080987)	-0.137526 (0.0967681)	-0.126083 (0.0984887)	-0.104595 (0.119036)	-0.283378** (0.111224)
Backward	0.331439 (0.376402)	0.48064 (0.407516)	-0.666437 (0.413646)	0.359247 (0.373672)	-0.0115132 (0.462277)	-0.197796 (0.464167)	0.0825113 (0.541146)	0.824246 * (0.494002)
Forward	-1.14356*** (0.423792)	-1.68008*** (0.385061)	-2.60823*** (0.629438)	-0.792164* (0.427824)	-1.20099** (0.494505)	-1.57582*** (0.504521)	-2.52635*** (0.817911)	-0.537601 (0.54804)
R ²	0.766545	0.753051	0.744754	0.770683	0.766191	0.766916	0.746040	0.770077
No.Obs.	8655	7984	6702	8655	7987	7987	5532	4567

Table 5.4: Fixed-effects estimation both for all and domestic firms; Dependent variable: log (output)

(Robust standard errors in parenthesis) ***, ** and * denote significance level at 1%, 5% and 10% respectively.

The coefficient for the Horizontal variable is found to be negative and significant in some two specifications (See Model 2 and Model 8 in the table below). However, the Backward linkages were found almost insignificant in all the specifications, except the estimation with the interaction terms for the domestic firms.

More specifically, in order to capture the element of spillovers with flexibility to adjust for the changes in a previous year, since the knowledge externalities from the foreign presence may take time to manifest themselves, I employed estimation with lagged spillover variables. The coefficients on lagged values for the Forward variable appear to be larger (in the absolute value) and still consistently significant both for the whole sample and the sub sample. Yet the Horizontal and Backward variables do not appear to be statistically significant with the lagged spillover effects too.

Furthermore, using equation 3 from the model specification part as applied by Blalock (2008), in which I included the squares of the non-spillover proxy variables in order to capture extreme case like that of diminishing returns of inputs. I also added terms that can capture the variation by the interaction of capital with labor, real energy consumption, real consumption of materials; the interaction of labor with the real consumption of materials and real energy consumption; and the interaction of the real consumption of materials with the real energy consumption. The estimation following this specification is presented in Model 4 and Model 8 in table 5.4 above. In the estimation for the domestic firms, I found a positive and significant coefficient for the Backward variable; and a negative, strongly significant coefficient for the Horizontal variable; while there is a consistently significant and decreasing effect of the forward linkages for the whole sample.

In addition to considering the time, regional and industry dummies, differencing can also help reduce the influence of noises arising from the unobserved heterogeneity in the analysis. Differencing helps to take away any fixed firm-specific, industrial and regional unobservable variations; for example, infrastructure and technological opportunity in a given industry or region. Hence, the specification follows,

$$\begin{aligned}\Delta \ln Y_{it} = & \alpha_1 + \alpha_2 \Delta \ln M_{it} + \alpha_3 \Delta \ln E_{it} + \alpha_4 \Delta \ln L_{it} + \alpha_5 \Delta \ln K_{it} + \alpha_6 \Delta FS_{it} + \\ & \alpha_7 \Delta Horizontal_{it} + \alpha_8 \Delta Backward_{it} + \alpha_9 \Delta Forward_{it} + \alpha_{10} \Delta H\alpha_t + \alpha_9 \Delta \ln Demand + \\ & \alpha_t + \alpha_j + \alpha_r + \varepsilon_{it} \quad (4)\end{aligned}$$

The estimation based on equation (4) above is presented in the following table 5.5 in the first, second and third difference form. According to Javorcik (2004), the examination of higher differences gives relatively more weight to more persistent changes in the variables of interest, thereby reducing the effect of the noise. Yet, such a differencing reduces the sample size as can be observed in the estimations that follow. Here, I found a positive and significant coefficient for the Horizontal variable in the 2nd and 3rd difference estimations. And it is noticed that there is some sort of inconsistency in the effect of the horizontal linkages with the previously estimation techniques which pointed out an insignificant Horizontal spillover effects and negative in some other cases.

Therefore, it will be hard to conclude the net effect resulting from the Horizontal linkages to the domestic firms; which actually is common research gap in the previous empirical findings in the area too. As for the first difference estimation, both the Backward and forward variables are found to be statistically significant; where both attained a positive coefficient in the first differencing. And also, the coefficients attain higher magnitude with the differencing. Unlike the previous estimations, the R² of the model with the differencing have relatively increased. This implies that the model with the differencing better explains the percentage variation in the productivity of the firm; keeping other estimation biases that might arise in the model aside.

Table 5.5: Fixed Effect estimation for all firms: First, second and third Differences with additional variables: “Demand” and “H”

	1 st Difference	2 nd Difference	3 rd Difference
const	0.0927914*** (0.0231288)	-0.0058936 (0.0566048)	0.0678736 (0.196206)
log (Energy)	0.226725*** (0.0591531)	0.133669*** (0.0495415)	-0.0114183 (0.0975223)
log(labor)	0.197831*** (0.0173699)	0.236339*** (0.0159719)	0.221815*** (0.027667)
log (Capital)	0.118302*** (0.00937703)	0.0735107*** (0.00863297)	0.0579484*** (0.0132491)
log(Material)	0.436962*** (0.0618414)	0.589171*** (0.0520126)	0.77758 (0.101431)
log (Demand)	0.0227004** (0.00903953)	0.00213263 (0.00528266)	-0.00178442 (0.0112321)
HHI	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
Foreign Share	0.223473*** (0.0698986)	0.124522*** (0.0495792)	0.155345* (0.092624)
Horizontal	0.0851554 (0.11171)	0.290117*** (0.0948749)	0.389071** (0.174077)
Backward	1.1827** (0.46631)	0.441879 (0.351286)	0.23685 (0.58119)
Forward	2.58961*** (0.88394)	0.230284 (0.913482)	1.19651 (1.62853)
R ²	0.923609	0.905330	0.839072
No.Obs.	6366	4513	2981

(Robust standard errors in parenthesis)

***, ** and * denote significance level at 1%, 5% and 10% respectively.

The correlation between unobservable productivity shocks and input levels is one of the main problems in the estimating production functions. Positive productivity shocks result in expanding output of the firms; while negative productivity shocks lead firms to reduce output. This immediate effect on the production level of the firms manifests itself by the change in the level of consumption of the raw materials (inputs) of the firms. And hence, estimation of the

production functions should take in to account for the correlation between input levels and productivity; unlike the OLS and Fixed Effect estimation techniques which ignore such indogeneity problem. Consequently, such estimation techniques provide with inconsistent estimates of the parameters.

As a result, literatures on the area recommend for two seemingly similar (with basic underlying assumptions' difference) estimation techniques: the Olley and Pakes(1996) approach and the Levinsohn and Petrin approach(2003). The Olley and Pakes estimation technique uses Investment as a proxy for the unobservable shocks. It generates consistent estimate only if there is a strictly monotonous relationship between the proxy and output; while it is not real that for every firm to have strictly positive investment in each year. Unlike Olley and Pakes, Levinsohn and Petrin (2003) used intermediate inputs as a proxy for unobservable shocks. As a result, LP captures the conditions under which intermediate inputs can also solve the simultaneity problem residing in the estimation of the production function. Therefore, with this advantage of the LP over the OP and for the purpose of ease of operation in STATA, with the Stata extension called *levpet*; I here will be using the Levinsohn and Petrin approach.

$$\ln Y_{it} = \alpha_1 + \alpha_2 \ln L_{it} + \alpha_3 \ln K_{it} + \alpha_4 \ln M_{it} + \omega_{it} + \eta_{it} \quad (5)$$

The error term has two components: ω_t and η_t . ω_t is unobserved a state variable affects the firm's decision rules and the choices of inputs, resulting in a simultaneity problem of the estimation of the production. Hence, Demand for the intermediate input M_t is assumed to depend on the firm's state variables K_t and ω_t stated as:

$$M_t = M_t (K_t, \omega_t) \quad (6)$$

Making mild assumptions about the firm's production technology, Levinsohn and Petrin (2003) show that the demand function is monotonically increasing in ω_t ; allowing the inversion of the intermediate demand function. Therefore, ω_t can be written as a function of K_t and M_t as:

$$\omega_t = \omega_t (K_t, M_t) \quad (7)$$

Therefore, in the equation (5) above, the unobservable productivity term (ω_t) is expressed as a function of two observed inputs.

LP assume that productivity is governed by a first order Markov process.

$$\omega_t = E[\omega_t|\omega_{t-1}] + \epsilon_t \quad (8)$$

ϵ_t represents an innovation to productivity. It is uncorrelated with K_{it} , (not necessarily with L_{it}) and is part of the source of the simultaneity problem.

Based on the specification of equation (4), I estimated the OLS and estimation results are presented in the table 5.6, for the comparison purpose to that of the LP estimation technique.

Table 5.6 Pooled OLS, Dependent variable: log (output)

OLS with constant	Coefficient	Std. Error	t-ratio	p-value	
const	3.35865	0.0751545	44.6899	<0.00001	***
log(labor)	0.224422	0.0106162	21.1396	<0.00001	***
log (Capital)	0.159509	0.00578493	27.5733	<0.00001	***
log(Material)	0.597301	0.00714669	83.5773	<0.00001	***
Sum of Coefficients	4.339882				
R-squared	0.768209	Adjusted R-squared	0.768123		
OLS without constant	Coefficient	Std. Error	t-ratio	p-value	
log(labor)	0.0623914	0.0111513	5.5950	<0.00001	***
log (Capital)	0.23675	0.00616993	38.3716	<0.00001	***
log(Material)	0.80565	0.00605361	133.0860	<0.00001	***
Sum of Coefficients	1.1047914				
R-squared	0.993615	Adjusted R-squared	0.993613		

Using the levpet command from the STATA extension of LP, the LP estimation result is presented as in the table 5.7. I used the output (Gross revenue) as a dependent variable with a 250 bootstrap.

Table 5.7 Levinsohn-Petrin productivity estimator

Dependent variable represents revenue. Number of obs = 8915

Group variable (i): Firm Number of groups = 1801

Time variable (t): Year Obs per group: min = 1

avg = 5.0

max = 7

lnYirt	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
log(labor)	.1973301	.0119441	16.52	0.000	.1739201	.2207401
log(Capital)	.0946624	.0255111	3.71	0.000	.0446617	.1446632
log(Material)	.7337455	.0478269	15.34	0.000	.6400065	.8274844

Wald test of constant returns to scale: Chi2 = 1.09 (p = 0.2973).

Hence, from the Wald test of constant returns to scale; we reject the null that the sum of the coefficients equals one at a 5% significance level. The estimation is done on 250 bootstrap replications [reps (250)], provided that larger bootstrap gives me a better fitting result econometrically.

5.2 Comparison of OLS, fixed effects, and Levinsohn-Petrin estimators

Now, as a bridge to the work ahead, I will derive the expected directions of bias on the OLS estimates as compared to the LP's intermediate input approach when simultaneity exists and compare the estimates.

Table 5.8: Comparison of OLS, fixed effects, and Levinsohn-Petrin estimators

Variables	OLS with constant	OLS without constant	Fixed Effects	Levinsohn-Petrin
const	3.35865 (0.0751545)	-	3.38984 (0.0792556)	-
log(labor)	0.224422 (0.0106162)	0.0623914 (0.0111513)	0.224107 (0.0106199)	0.1973301 (0.0119441)
log(Capital)	0.159509 (0.00578493)	0.23675 (0.00616993)	0.157788 (0.00586734)	0.0946624 (0.0255111)
log(Material)	0.597301 (0.00714669)	0.80565 (0.00605361)	0.596698 (0.00724773)	0.7337455 (0.0478269)
Sum of Coefficients	4.339882	1.1047914	4.368433	1.025738

As can be seen from the sum of the coefficients, all the estimation techniques present an increasing returns to scale. For the estimates on the freely variable inputs, the OLS coefficients in all the three cases exceed the Levinsohn-Petrin coefficient, in line with the Levinsohn and Petrin's (2003) findings. Yet, for the proxy variable Material Inputs, the Levinsohn-Petrin coefficient is greater than both OLS with intercept and the fixed effect. Whether the OLS coefficient on capital will be biased upward or downward depends on the degree of correlation among the inputs and the productivity shocks. Here, LP estimate is less than all; and hence, the OLS and Fixed Effect estimates are biased upward as can be seen in the table below.

Table 5.9: The direction of Bias for the estimators

Variables	OLS with constant	OLS without constant	Fixed Effects	Levinsohn- Petrin
$\Delta \log(\text{labor})$	0.224422 +	0.0623914 +	0.224107 +	baseline (0.1973301)
$\Delta \log(\text{Capital})$	+	+	+	Baseline (0.0946624)
$\Delta \log(\text{Material})$	-	+	-	Baseline (0.7337455)

5.3 Levinsohn-Petrin Residuals as a Measure of Total Factor Productivity

After the LP estimation of the production function on equation (4), I recovered residuals and used these residuals as a measure of total factor productivity (TFP). Then, the TFP drawn is used in place of output as a dependent variable in the basic production function augmented for the spillover proxies as:

$$\ln TFP_{it} = \alpha_1 + \alpha_2 FS_{it} + \alpha_3 Horizontal_{it} + \alpha_4 Backward_{it} + \alpha_5 Forward_{it} + \varepsilon_{it} \quad (9)$$

And the model in first differences in the form:

$$\Delta \ln TFP_{it} = \alpha_1 + \alpha_2 \Delta FS_{it} + \alpha_3 \Delta Horizontal_{it} + \alpha_4 \Delta Backward_{it} + \alpha_5 \Delta Forward_{it} + \mu_{it} \quad (10)$$

In order to test for productivity spillovers, I estimated the model using both the fixed and random effects methods. Table 5.10 and 5.11 bellow present the estimation results. I found a negative and significant coefficient for the forward variable in the random effect estimation for both the domestic and whole sample groups. And, there appeared a positive and statistically significant coefficient of the backward variable to the whole sample in both cases; while statistically significant only for the baseline specification of the fixed effects for the domestic firms. My TFP analysis for all firms (from Table 5.11) suggests that a one percentage point increase in the foreign presence in the downstream sectors is associated with a 1.1 percent increase in the total factor productivity of each supplying industries. Likewise, a one percentage point increase in the weighted share of output in the upstream (or supplying) sectors produced by firms with foreign capital participation is associated with a 1.2 percent decline in the total factor productivity. The coefficient on of Horizontal variable is not statistically significant in both the Random and fixed effect analysis of the TFP; except for the estimation with differencing for the domestic firms. This actually is consistent with the existing studies that did not find significant horizontal spillovers in developing countries, like that of Javorcik(2004) and Konings(2001); and the same hold for the developing country like Ethiopia.

Table 5.10: Fixed-effects; Dependent variable: lnTFP

	All Firms		Domestic Firms	
	Baseline Model	1 st Difference	Baseline Model	1 st Difference
const	-1.29248***	-1.25924***	-1.37419***	-0.0473625
FSirt	0.00268061	-0.0500116	7.92313	-0.0896258
Horizontal	-0.115453	-0.0171907	0.0360192	-0.211749*
Backward	1.62979*	1.243298*	2.24246**	0.106416
Forward	0.38181	-0.189924	0.699874	-1.38817
R ²	0.395126	0.468573	0.418975	0.170562

Table 5.11: Random-effects (GLS); Dependent variable: ln TFP

		<i>Coefficient</i>	<i>Std. Error</i>	<i>t-ratio</i>	<i>p-value</i>
All Firms	constant	-1.23914***	0.0543274	-22.8088	<0.00001
	FSirt	0.0885554	0.086289	1.0263	0.30483
	Horizontal	-0.195057	0.147817	-1.3196	0.18705
	Backward	1.13372*	0.604281	1.8761	0.06071
	Forward	-1.20446*	0.646241	-1.8638	0.06242
	R ²	0.764867			
Domestic Firms	constant	-0.879116***	0.0582695	-15.0871	<0.00001
	FSirt	0.563723	2.34062	0.2408	0.80969
	Horizontal	0.0691056	0.143824	0.4805	0.63091
	Backward	0.118653	0.688907	0.1722	0.86326
	Forward	-2.82626***	0.641322	-4.4069	0.00001
	R ²	0.806556			

Summing up, almost all the sectors are competitive industries (less concentrated) with less than 1,800 Herfindahl index using the US department of justice definition of concentrated sectors. And hence, the estimation results presented in this paper hold without any differentiation based on their concentration.

6. Conclusion and Policy Implications

This paper focuses on the inter-industry productivity spillovers that result from the Vertical and Horizontal linkages between the multinational and domestic firms. Particularly, I analyze if there is productivity spillovers from foreign direct investment in Ethiopia. The study uses two main

data sources, namely the medium and large-scale manufacturing industries survey from Central Statistics Agency of Ethiopia (CSA) and country's Input-Output Matrix from Ethiopian Development Research Institute (EDRI). The survey from CSA is the principal source of facts about the structure and function of the manufacturing industries in the country. With the number of firms' difference in each year, the data is of an unbalanced panel over the years 2004 to 2010.

To come up with a concrete and unbiased result, I have taken in to account for the endogeneity/simultaneity of the production function, and other econometric problems underlying a panel data analysis. The results from the analysis are consistent with the presence of productivity spillovers in line with previous works, like that of Javorcik (2004). I found a significant and negative coefficient of the Forward spillovers variable for the Pooled, Fixed effect and the Levinsohn-Petrin estimates. In addition, there was evidence for the positive spillover effects from the Backward linkages as can be seen from the coefficient for the Backward variable. The TFP analysis for the whole sample, from the LP estimation, suggests that a one percentage point increase in the foreign presence in the downstream sectors is associated with a 1.1 percent rise in the total output of each supplying industries. Likewise, a one percentage point increase in the weighted share of output in the upstream (or supplying) sectors produced by firms with foreign capital participation is associated with a 1.2 percent decline in the total output.

The Horizontal variable was found to be indeterminate with positive and negative coefficients in different specifications and insignificant in most of the specifications for the whole sample. This actually is consistent with the existing literature that failed to find any significant horizontal spillovers in developing countries, like that of Javorcik(2004), and Konings(2001). However, there is some evidence for the negative Horizontal spillovers to the domestic subsample. This actually is a question of further research work for the underlying evidence for this hampering effect with a closer analysis of firm level data.

From the Forward variable, I noticed that the share of inputs a given domestic industry sources from multinationals has a decreasing effect on the productivity of the firm. Therefore, due consideration should be given for those sectors in which the effect is prominent and strict regulation in licensing such supplying MNCs should be taken in to account. More importantly, there should be measures and strategies towards advocating alternative sources of inputs for such domestic industries. As is mentioned in the chapter three of this text, there has been a recurrent

report of productivity decline and collapse in some manufacturing industries heavily relying on imported raw materials; added with problem of the local raw material shortages. The problem of foreign currency shortage and logistic complexity has also been some of the amplifying factors underneath.

According to the 2013 UNITAD report, the credit gap (the level of under-financing through loans and/or overdrafts from financial institutions) for the formal small and medium-sized enterprises (SMEs) in the Sub-Saharan countries is the largest in the world. Hence, improving the financial infrastructure for underserved SMEs and microenterprises is crucial one. In their Meta-analysis of the FDI spillovers, Havranek et.al (2011) argued that “greater spillovers are received by countries that have underdeveloped financial systems and are open to international trade”. To this effect, I recommend the current privatization strategies of the government to consider opening the financial market and Banks to foreign companies. Here, I also want to draw attention on the problems of the trade regulation and customs clearance inefficiency that is repetitively complained by the investors, as also indicated in the World Bank’s survey of the 2012.

As for the backward linkages, the investment authorities should emphasize in attracting those MNCs which take part in further processing of the locally produced items; widening the market for the domestic firms. And furthermore, measures that strengthen and develop the local supply network should be taken in to account in facilitating further processing of the domestic products. Knowledge and technological transfer, job creation, income generation and market creation for local products are some of the very few benefits of the FDI. Furthermore, being a developing country, the government should play a vital role in protecting infant industries from the big MNCs with enough economies of scale. More generally, incentive schemes, infrastructural and financial system development, strengthening the local productive capacity, laying foundation for a well-built environmental, social and governance framework and so forth are expected to harness the fruits of FDI well enough

To sum up, provided the financial and time constraint for this work, I based my work only on the industry level analysis. Yet, it would be better if there was also a consideration for the productivity spillovers analysis directly from the firm level. And hence, further research is needed on this regard to incorporate the interactions between individual firms, suppliers and buyers at the very micro level; which will help to identify the effect at the firm level.

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Appendix

Table 1: Summary of Licensed Foreign Investment Projects /Manufacturing/ :By Region of Investment and Status Since August 22, 1992 - February 24, 2014 G.C

Region of Investment	No of Projects	Capital in '000' birr	Permanent Employees	Temporary Employees
Addis Ababa	1,065	47,759,753	68,743	38,278
Afar	10	1,028,138	733	1,630
Amhara	80	45,708,566	18,933	13,572
B.Gumze	1	1,740	3	15
Dire Dawa	29	18,837,955	7,336	9,319
Gambella	3	3,051,023	2,069	5,112
Harari	5	745,900	590	25
Multiregional	134	7,488,631	8,468	7,454
Oromia	851	91,266,129	119,954	68,556
SNNPR	34	3,266,581	11,375	21,964
Somali	2	12,300	45	30
Tigray	26	2,248,228	4,197	1,343
Grand Total	2,240	221,414,944	242,446	167,298

Source: The Ethiopian Investment Agency

Table 2: Summary of Licensed Foreign Investment Projects /Manufacturing/: By Year and Status Since August 22, 1992 - February 24, 2014 G.C

Year	No of Projects	Capital in '000' birr	Permanent Employees	Temporary Employees
1992	2	8,976	213	0
1994	2	208,379	856	0
1995	4	162,235	331	300
1996	15	466,251	1,482	34
1997	17	613,539	2,304	50
1998	7	165,102	827	8
1999	7	357,773	891	120
2000	13	216,252	1,292	499
2001	12	1,354,996	2,533	283

2002	12	268,159	1,242	1,544
2003	53	1,217,844	4,303	1,845
2004	74	1,523,647	4,357	1,905
2005	84	2,053,958	5,495	3,924
2006	128	30,643,301	19,580	22,782
2007	153	3,125,134	8,758	9,001
2008	194	19,691,992	21,233	21,589
2009	188	25,868,075	30,302	14,362
2010	320	21,563,079	21,462	24,318
2011	212	23,197,979	18,926	18,483
2012	292	35,842,737	27,344	20,023
2013	430	51,678,538	62,687	22,925
2014	21	1,187,000	6,028	3,303
Grand Total	2,240	221,414,944	242,446	167,298

Source: The Ethiopian Investment Agency

Table 3: ISIC codes for the manufacturing industries

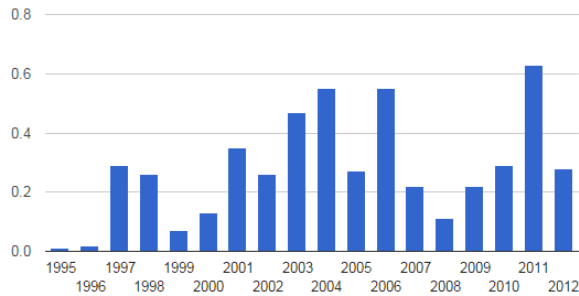
ID09	ID09
1511	Production, processing and preserving of meat, fruit and veg
1514	manufacture of edible oil
1520	Manufacture of dairy products
1531	Manufacture of flour
1533	Manufacture of animal feed
1541	manufacture of bakery
1542	Manufacture of sugar and confecionary
1544	manufacture of pasta and macaroni
1549	Manufacture of food NEC
1551	Distiling rectifying and blending of spirit
1552	Manufacture of wine
1553	Malt liquores and malt
1554	Manufacture of soft drinks
1600	Manufacture of tobacco
1710	spining , weaving and finishing

Table 3 continued....

1711	spining , weaving and finishing
1723	Manufacture of cordage rope and twine
1730	Kniting mills
1810	manufacture of wearing apparal except fur
1910	Tanning and dressing of leather
1920	manufacture of footwear
2000	Manufacture wood and wood products
2100	Manufacture of paper and paper products
2200	Publishing and printing services
2411	Manufacture of basic chemicals except fertilizers
2422	Manufacture of paints varnishes
2423	Manufacture of phrmaceuticals, medicinal
2424	Manufacture of soap detregents, perfumes..
2429	Manufacture of chemical productsNEC
2510	Manufacture of rubber
2520	Manufacture of plastics
2610	Manufacture of glass and glass products
2693	Manufacture of structural clay products
2694	Manufacture of cement ,lime and plaster
2695	Manufacture of articles of concrete, cement
2699	Manufacture of non-metalic NEC
2710	Manufacture of basic iron and steel
2811	Manufacture of structural metal products
2892	Manufacture of cuttlery hand tools....
2893	Manufacture of other fabricated metal products
2899	Manufacture of pumps,compressors, valves and taps
2914	Manufacture of ovens
2925	Manufacture of other general purpose machinery
3130	Manufacture of battries
3420	manufacture of bodies for mothor vechiles
3610	Manufacture of furniture

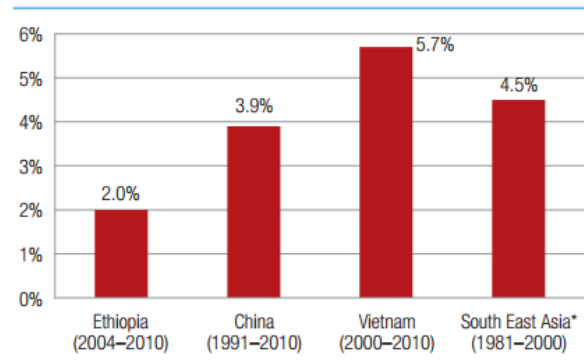
See the International Standard Industrial Classification (ISIC Revision-3.1)

Fig 1: Foreign Direct Investment in Ethiopia
(in billion USD)



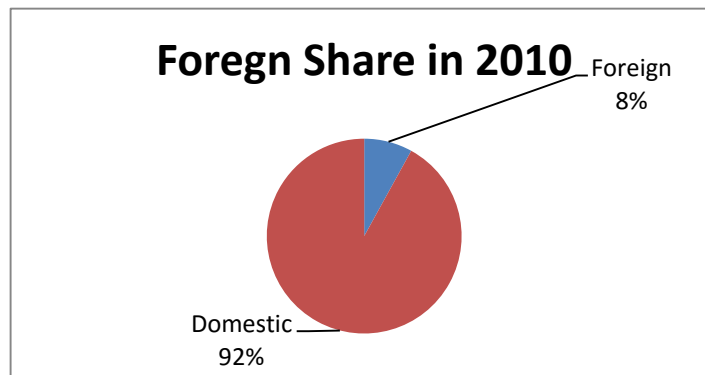
Source: TheGlobalEconomy.com, World Bank

Fig 2: FDI in Percent of GDP, Average per Year
in Selected Countries



Source: World Bank survey: Chinese FD in Ethiopia (2012)

Fig 3: Domestically owned by Ethiopian Investors Vs Foreign owned firms in 2010



Source: Own computation based on CSA's survey

Fig 3: Top 10 Business Environment Constraints Investment

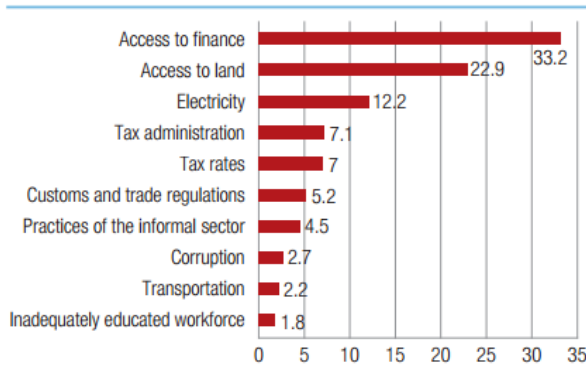
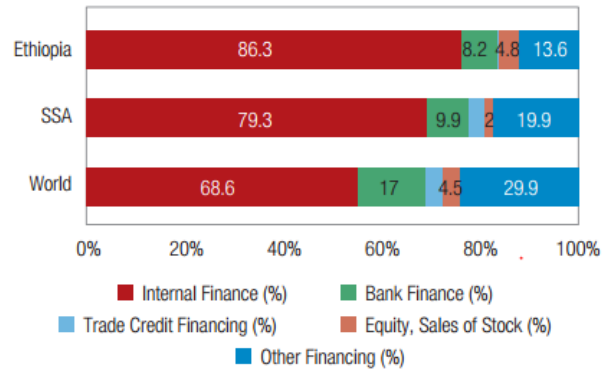
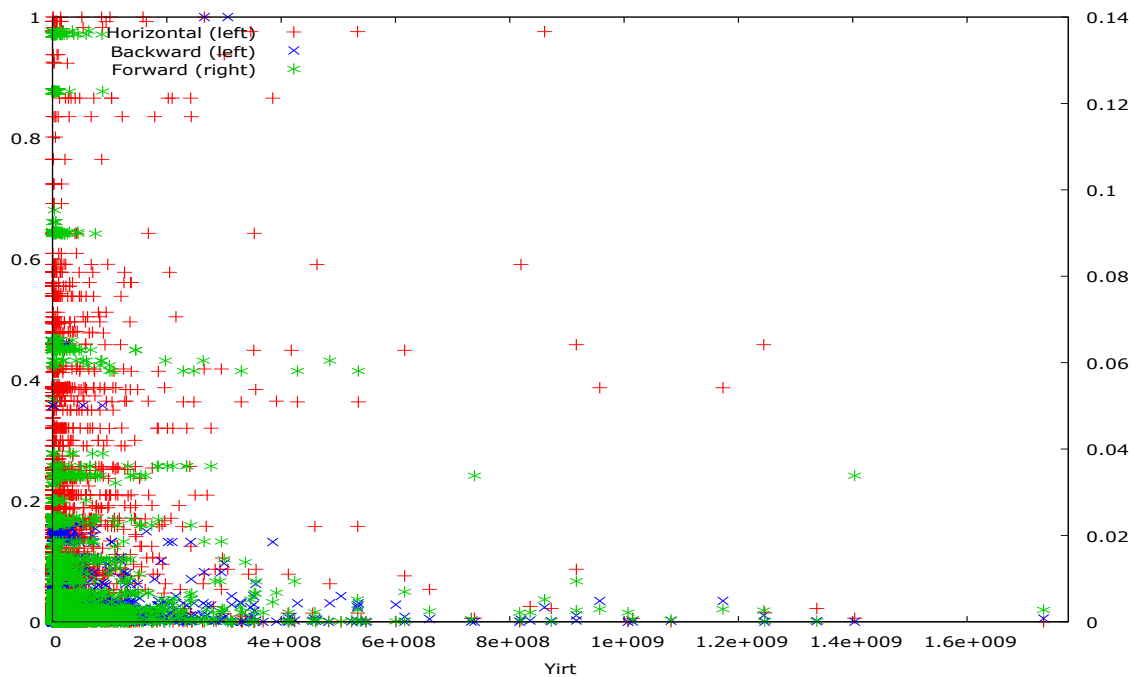


Fig 4: Enterprise Financing Sources for in Ethiopia



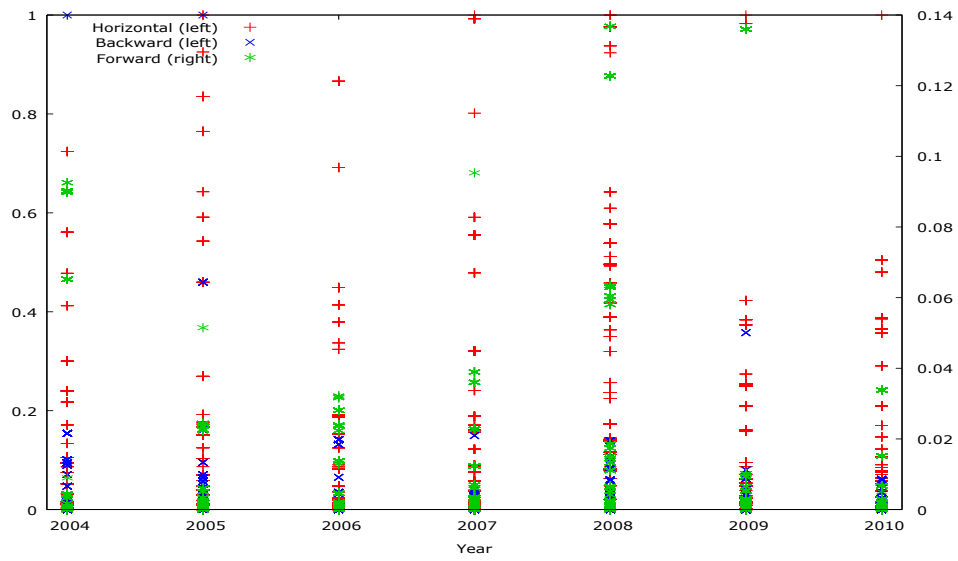
Source: World Bank survey: Chinese FD in Ethiopia (2012)

Fig 5: Scatter Plot for the Spillover Proxies and the total out put



Source: Own computation based on CSA's survey

Fig 6: Scatter Plot for the Spillover Proxies over years



Source: Own computation based on CSA's survey

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