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Bringing Rigour and Evidence to Economic Policy Making in Africa

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List of abbreviations and acronyms

CPI	Consumer Price Index
EPA	Economic Partnership Agreement
EU	European Union
FDI	Foreign Direct Investment
LDCs	Least Developed Countries
MNEs	Multinational Enterprises
NIS	National Institute of Statistics
NTBs	Non-Tariff Barriers
OHADA	Organization for the Harmonization of Corporate Law in Africa Treaty (in French, Organisation pour l'Harmonisation du Droit des Affaires en Afrique)
R&D	Research and Development
SAP	Structural Adjustment Programme
SSA	Sub-Saharan African
TFP	Total Factor Productivity

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Abstract

Using a panel data set on Cameroonian manufacturing firms from 1993 to 2005, this paper evaluates the direct and indirect effects of the presence of foreign ownership on the productivity growth of local firms. We investigate spillovers through horizontal and backward linkages, differentiated by the country of origin of foreign investors. The paper also investigates whether and how the absorptive capacity of Cameroonian indigenous firms moderates the effect of foreign presence on productivity. Controlling for the degree of competition, our results indicate that foreign firms perform better than Cameroonian indigenous firms. We find evidence of negative intra- and inter-industry spillovers. The analysis also produces evidence of negative spillovers from American, European and Asian affiliates through backward linkages. These negative horizontal and vertical productivity spillovers are mainly due to the limited absorptive capacity of Cameroonian firms, i.e., firms with the highest levels of absorptive capacity suffer the less from foreign presence. The results are robust to the use of different specifications.

Keywords: Productivity; Foreign ownership; Foreign origin; Spillovers; Backward linkages.

JEL Classification: O12, F23.

1.0 Introduction

By now, it is well documented that growth in productivity is associated with gains in economic welfare (Keller & Yeaple, 2009). Likewise, it is widely accepted that productivity differences explain a large part of the variation in incomes across countries, and technology plays a key role in determining productivity (Easterly & Levine, 2001). Developing economies (LDCs) carry out very little (if any) own research and development (R&D), so they rely on foreign technology to much greater extent than countries close to the frontier (e.g., developed economies). In LDCs, productivity growth therefore depends, among others, on the degree of technology diffusion from advanced economies. There are two modes of technology transfer across countries: international trade transfers technologies embodied in intermediate and capital goods, and knowledge externalities generated by the presence of foreign affiliates. The presumed higher productivity of foreign firms and resulting potential for spillovers to indigenous firms has led Cameroon to increase its integration into the international economy through extensive liberalization of trade and foreign direct investment (FDI) regimes. Indeed, since the early 1990s, increased openness to world economy via multinational enterprises (MNEs) is considered to be an important component of the Cameroonian development strategy. Accordingly, policies were designed to attract MNEs, e.g., tax holidays, subsidies, low tax rates, etc.

Foreign-owned firms have specific advantages linked to their production methods, organization of activities, marketing of products/services, etc. The benefits of these advantages spill over to indigenous firms through various channels, e.g., (i) demonstration/imitation, i.e., domestic firms learn by observing MNEs operating higher level of technology, (ii) skill enhancement, i.e., workers trained by foreign affiliates may move to jobs in domestic firms, taking with them their upgraded human capital, (iii) increased competitive pressure, i.e., indigenous firms may react to competitive pressures by using more efficiently the existing technology or by investing in new technology, but negative effects may arise if foreign affiliates produce at a lower marginal cost, (iv) export activities, i.e., exporting firms have the opportunity to learn from and imitate their competitors, and in such cases the spillover effects may be rather limited, while the reverse may be true for non-exporting firms.[1]

Other mechanisms that could give rise to the externality effects can arise through vertical linkages, the provision of specialized inputs, and the nationality of the foreign

1 See, Aitken and Harrisson (1999), Sjöholm (1999), among others, for further development.

firm. As Kee (2015) highlighted, local intermediate inputs may enhance domestic firms' performance through the shared supplier spillovers of foreign-owned firms. As argued by Blalock and Gertler (2008), foreign-owned firms have incentives to provide technology to suppliers. Therefore, technological benefits to local firms through vertical linkages are much more likely and could occur through both backward (from buyer to supplier) and forward (from supplier to buyer) linkages. Moreover, the country of origin of foreign investors may matter for spillovers to domestic producers in sectors supplying intermediate inputs (Javorcik & Spatareanu, 2011). In particular, the theoretical models of vertical linkages (see, e.g., Rodriguez-Clare, 1996; Markusen & Venables, 1999) predict a positive correlation between the foreign-owned firms' share of intermediate inputs sourced locally and the distance between the host economy and the source country, i.e., the foreign investors' origin may affect the extent of local sourcing. Also, the sourcing patterns of foreign-owned firms are likely to be affected by preferential trade agreements.[2]

Despite the importance of this issue, and the trend towards openness to foreign investment in Cameroon, very little research (to the best of our knowledge) has been carried out on the magnitude and significance of the association between productivity growth and foreign ownership, as well as on determining whether there have been any spillover effects from the presence of foreign firms. So, to date, there is no empirical evidence on this important issue which has significant policy implications. The objective of this paper is to analyse the performance effects of the presence of foreign firms in nine key Cameroonian manufacturing industries from 1993 to 2005. We try to answer four questions. First, are foreign firms more productive than Cameroonian firms? Second, are there any spillover effects of foreign presence within sectors and if so, are they negative or positive? Third, are there any spillover effects of foreign presence across sectors and if so, are they negative or positive? Finally, does the origin of foreign firms affect the extent of inter-sectoral spillovers from foreign presence?

Using firm-level panel data, and controlling for the level of competition and absorptive capacity of local firms, the main findings of the paper are threefold. First, we find that foreign firms perform better than indigenous firms. Second, evidence of negative intra-sectoral spillovers is found. Finally, there is an indication of negative backward linkages as well as negative spillovers from the presence of American, European and Asian affiliates in sectors supplying intermediate inputs. The main explanation of these negative horizontal and vertical productivity spillovers is that Cameroonian firms do not have the necessary absorptive capacity to benefit from foreign presence, i.e., Cameroonian firms with the highest levels of absorptive capacity suffer the less. These results are robust to alternative model specifications as well as the use of both balanced and unbalanced panel data set.

2 For example, within the framework of the Economic Partnership Agreement (EPA) between the European Union (EU) and Cameroon, the Cameroonian tariffs on imports from the EU are much lower than tariffs on imports from other continents.

The remainder of the paper is organized as follows. The next section outlines the main channels of productivity spillovers from foreign presence/the theoretical linkages between foreign ownership and productivity spillovers. Section 3 presents the review of literature. In section 4, we present the methodology. Section 5 presents the context and describes the data. Section 6 presents and discusses the empirical results. Section 7 performs some robustness checks. The last section concludes.

2.0 Foreign presence and productivity growth of domestic firms: Theory

This section elaborates on the theoretical linkages between foreign ownership and productivity spillovers. The presence of foreign ownership is associated with technology transfer simply because MNEs own technology, marketing techniques and management skills which can be transmitted to domestic firms thereby raising their productivity level (Liu et al., 2000). In theory, foreign ownership presence could boost productivity in the host country through several channels.

First, the demonstration by foreign-owned firms/imitation by locally-owned firms, i.e., if a technology is used successfully by a foreign-owned firm, it will encourage domestic firms to adopt it (Wang & Blomström, 1992). Second, the labour mobility, i.e., domestic firms may hire workers who, having previously worked for a foreign firm, know about the technology and are able to implement it in the domestic firm (Glass & Saggi, 2002).[3] The human capital acquisition is among the important channels for these knowledge spillovers. For example, Görg and Greenaway (2004) argue that the spillovers from the presence of foreign-owned firms may depend on the absorptive capacity of indigenous firms as proxied by the technology gap between domestic and foreign firms. In particular, the emerging consensus is that domestic firms can only benefit from the foreign presence if the technology gap is not too wide so that domestic firms can absorb the knowledge available from the foreign-owned firm. Third, the increased competition, i.e., the presence of foreign firms might increase competitive pressures on domestic firms, which might respond by reducing inefficiencies; it may also restrict the market power of domestic firms.[4] Last but not the least, firms may also learn about new technologies (e.g., techniques and methods) by exporting, i.e., through a type of 'learning by exporting' experience. This makes exporting firms more fit to face foreign competition (Crespi et al., 2008). In sum, spillovers may take

3 However, a possible negative impact arising through this channel is that, by offering higher wages, foreign firms may attract the best workers from domestic firms (see, e.g., Sinani & Meyer, 2004).

4 However, the efficiency of domestic firms may be negatively affected through this channel as the presence of foreign-owned firms may imply significant losses of their market shares, forcing them to operate on a less efficient scale, with a subsequent increase in their average costs (see, e.g., Harrison, 1994).

place when locally-owned firms improve their efficiency by copying technologies of foreign-owned firms operating in the local market either through observation or by hiring workers trained by the foreign firms. Through the multinationals' competitive force, locally-owned firms operating in imperfect markets may be induced to a higher level of technical or X-efficiency, i.e., the threat of competition may spur firms that might otherwise have been laggards to adopt best practice technology sooner.

The presence of foreign-owned firms may also help to increase the productivity of domestic suppliers or customers through vertical input-output linkages. Concerning the vertical spillovers of the presence of foreign-owned firms, productivity spillovers through backward linkages may take place through two channels: (i) provision of technical assistance by foreign-owned firms to enable suppliers to raise the quality of the intermediate product, and (ii) provision of high quality standards for local inputs which provide incentives for local suppliers to upgrade their technology. Moreover, the origin of foreign investors may affect the extent of vertical spillovers from the presence of foreign-owned firms for two reasons: (i) the distance between the host and the source country, and (ii) the preferential trade agreements.[5]

5 See, e.g., Javorcik and Spatareanu (2011) for more details.

30. Foreign presence and productivity growth of domestic firms: Empirical evidence

The presence of foreign firms can generate several benefits for the host country, e.g., (i) it can finance the expansion of industries in which the domestic country enjoys a comparative advantage, (ii) it can lead to the transfer of knowledge from foreign to local firms, (iii) it can finally provide local firms with the critical know-how to break into foreign markets (see, e.g., Görg & Greenaway, 2004). Furthermore, if foreign entrants possess a better technology, they can foster productivity improvements in the domestic industry, either directly by raising the productivity of the resources used in production, or indirectly through knowledge spillovers to local firms.

The existing evidence on foreign presence and productivity growth in local firms is mixed. There is some evidence that foreign presence causes productivity spillovers and other evidence that it does not. Using industry-level data, Blomström and Persson (1983) finds positive spillovers for Mexico, while Kokko (1994), Blomström and Wolff (1994), Kokko et al. (1996), Blomström and Kokko (1998) find that spillovers are only positive if the technology gap is sufficiently small and the initial stock of human capital is sufficiently high. Using firm-level data from Morocco, Venezuela and UK, respectively, Haddad and Harrison (1993), Aitken and Harrison (1999), Girma et al. (2001), among others, conclude that foreign presence has a negative effect on the local labour productivity, highlighting large technology gaps and severe competition in the host country market as inhibiting spillovers from the presence of foreign firms to local firms. Djankov and Hoekman (2000) find that the presence of foreign firms had the predicted positive impact on total factor productivity (TFP) growth of Czech recipient firms, whereas joint ventures and the presence of foreign firms have a negative spillover effects on firms that do not have foreign partnerships. In contrast with these results, Keller and Yeaple (2009) find that the presence of MNEs leads to substantial productivity gains for domestic firms in the United States. So, even for the studies using firm-level data, the empirical evidence about foreign ownership spillovers to domestic firms has provided mixed results.

As previously indicated, the theoretical models by Rodriguez-Clare (1996) and Markusen and Venables (1999) show that foreign-owned firms can have positive effects on the development of domestic firms through vertical input-output linkages.

A number of recent studies have empirically investigated vertical spillovers. For example, Javorcik (2004) worked with firm-level data from Lithuania and find strong evidence of vertical spillovers with low horizontal spillovers. Blalock and Gertler (2008) used a panel data set of Indonesian manufacturing establishments and find results suggesting positive productivity spillovers through backward linkages. However, they do not find evidence for horizontal spillovers. Another strand of literature examines the country origin dimension to vertical spillovers of the presence of foreign firms. For example, Javorcik and Spatareanu (2011) used a large panel data set of firms operating in Romania to examine whether the origin of foreign investors affects the degree of vertical spillovers from the presence of foreign firms. Their empirical analysis produces evidence consistent with this hypothesis.

Summarizing, the studies on both developed and developing countries find mixed evidence for spillovers associated with the presence of foreign firms. Unfortunately, within the sub-Saharan African (SSA) context in general, and particularly in Cameroon, very little is known on how the multinationals presence or specifically multinationals transfer of technology affects domestically owned firms' productivity. Njikam and Cockburn (2011) studied the effects of trade liberalization on the evolution of firm productivity in Cameroon. The main finding of this paper indicates a shift in the direction of higher productivity following trade liberalization. However, nothing has been said about the channels through which trade liberalization affects productivity such as the inflows of international technologies associated with openness to foreign ownership. In particular, this study does not investigate whether or not domestic firms benefit from inter-industry or vertical spillovers (e.g., backward linkages and forward linkages) and intra-industry or horizontal spillovers. It is this lack of evidence, in addition to the above-mentioned conflicting evidence, that motivates the present study. In this paper, we build on the previous studies and aim at identifying whether foreign firms perform better than their Cameroonian local counterparts, whether there are any spillover effects of the presence of foreign firms within sectors, and if so, are they positive or negative; and whether the origin of foreign firms affect the extent of inter-sectoral spillovers from foreign presence.

4.0 Methodological framework

To examine the productivity effect of foreign ownership on domestic firms, we proceed in two steps. First, we estimate a production function to obtain measures of the firm-level total factor productivity (TFP); in this stage, we include data for all firms, both domestic and foreign firms. Then, we relate the TFP of domestic firms to proxies for the presence of foreign-owned firms and other controls.

Firm-level productivity

Let firm i's technology at time t be described by the following Cobb-Douglas production function:

$$y_{it} = \beta_0 + \beta_1 l^s_{it} + \beta_2 l^u_{it} + \beta_3 m_{it} + \beta_4 k_{it} + \mu_{it}$$
$$\mu_{it} = \omega_{it} + \varepsilon_{it} \quad (1)$$

where, y_{it} is the logarithm of output of firm i at time t, l^s_{it} and l^u_{it} are the logarithm of skilled and unskilled labour, respectively, m_{it} and k_{it} are the firm's (log of) raw material expenditures and capital inputs, respectively. The firm i specific residual term μ_{it} is composed of firm-specific efficiency (or productivity level) ω_{it} that is known by the firm but not by the econometrician, and ε_{it} is an unexpected productivity shock that is not known either to the firm or the econometrician and with zero mean. A firm's private knowledge of its productivity ω_{it} affects its decision about exiting or staying in the market and its choice of hiring labour, purchasing materials, and investing into new capital. This information asymmetry introduces two biases in the estimation: simultaneity of input choice and selection biases.

The fact that ω_{it} is known by the firm when it takes the decision as to whether to stay in the market and produce, and, if deciding to produce, which input combination to use, makes the OLS estimate of the production function (1) biased. To correct for this bias, the alternative is to use fixed effects, assuming that the unobserved firm-specific efficiency is time-invariant.[6] As argued by Pavcnik (2002), although the fixed effects model partially solves the simultaneity problem, it only removes the effects of time-invariant firm's productivity component. During a period following immediately drastic trade and foreign investment liberalization programmes, the assumption of

6 For example, Harrison (1994) followed this approach.

unchanging productivity seems worrisome, and the fixed effects approach may lead to biased estimates of the input coefficients. More importantly, we are ultimately interested in how firm efficiency evolves over time in response to FDI inflows. This strategy is, therefore, ruled out in the current study.

Olley and Pakes (1996) gave the standard alternative to solve the simultaneity and the selection bias. In particular, to overcome the fact that ω_{it} is not known by the econometrician, they write down an investment function that depends on the unobserved efficiency variable and the capital stock. Providing that investment is always positive if the firm decides to continue in the market, it is possible to invert this function and write ω_{it} as a function of the observed capital stock and investment made by the firm in time t. However, we cannot follow the Olley and Pakes (1996) methodology. The reason is that in our data set, some firms do not have positive investment in most of the year. Levinsohn and Petrin (2003) (hereafter, LP) pointed out that observing lots of zero-investment observations is a common feature of developing country data sets. They propose to use other inputs (e.g., a firm's raw material inputs) as a proxy for the unobservable productivity shock to correct for the simultaneity in the firm's production function. Another change needed to be made to make sure that the proposed method is suitable for the Cameroonian data set is related to firm exit. In the context of Cameroonian manufacturing firms, an exit may imply one of the following: (i) an actual exit, i.e., the firm closed down, (ii) firms remaining in existence but not surveyed by the data collectors, (iii) a change in formality/informality, i.e., firms continue to operate but now informally, and last but not least (iv) merger/acquisition. However, the available information does not allow the distinction between the different forms of exit. In fact, some firms cease appearing in the sample without any information as to whether they exited or if it is a missing observation. So, we did not explicitly correct for the selection bias. LP argued that, by using an unbalanced panel of firms, the selection bias is significantly minimized.

The unobserved productivity level variable ω_{it} is assumed to follow a first-order Markov process. The expected value of ω_{it} is a function of an unexpected shock with zero mean and its value at time $t-1$,

$$\omega_{it} = \omega_{it-1} + \xi_{it} \Rightarrow \omega_{it} = E(\omega_{it} / \omega_{it-1}) + \xi_{it} \tag{2}$$

Beside labour and capital, the firm needs other inputs, e.g., materials to produce according to the production function (1). The demand for intermediate inputs is a function of the productivity variable ω_{it} and of labour. The usage of intermediate inputs is adjusted immediately to different states of the productivity variable. On the other hand, labour and capital take time to adjust due to adjustment costs,

$$m_{it} = f_t(\omega_{it}, l^v_{it}, l^s_{it}, k_{it}) \tag{3}$$

LP show that the demand function for raw materials (3) is monotonic in ω. That is, given the stock of labour and capital in time t, the higher the productivity or efficiency level, the higher the usage of raw materials, since the firm will produce more than

another firm that has the same stock of labour and capital but lower productivity. Thus, we can invert the demand function for intermediate inputs and write ω_{it} as a function of materials, labour and capital,

$$\omega_{it} = f_t(m_{it}, l^s_{it}, l^u_{it}, k_{it}) \tag{4}$$

Substituting Equation 4 in the production function (1), we have,

$$y_{it} = \phi_t(m_{it}, l^s_{it}, l^u_{it}, k_{it}) + \varepsilon_{it} \tag{5}$$

where, . $\phi_{it} = f_t(m_{it}, l^s_{it}, l^u_{it}, k_{it}) = \beta_0 + \beta_1 l^s_{it} + \beta_2 l^u_{it} + \beta_3 m_{it} + \beta_4 k_{it} + h_t(m_{it}, l^s_{it}, l^u_{it}, k_{it})$
Following previous studies (e.g., Olley & Pakes, 1996; Pavcnik, 2002), the function ϕ_t is approximated by a polynomial series of the observed variables, i.e., materials, labour and capital stock.

The first stage is to estimate . The assumption that the firm's efficiency follows a first-order Markov processϕ_t allows us to write its expected value as a function of its past value,

$$E(\omega_{it} / \omega_{it-1}) = g(\omega_{it-1}) \tag{6}$$

The $g(\cdot)$ function can then be expressed as a function of the past value of the observed variables by replacing ω_{it-1} with the functions h_{it-1} and φ_{it-1},

$$\begin{aligned} g(\omega_{it-1}) &= g[h_{t-1}(m_{it-1}, l^s_{it-1}, l^u_{it-1}, k_{it-1})] \\ &= g[\phi_{t-1}(m_{it-1}, l^s_{it-1}, l^u_{it-1}, k_{it-1}) - \beta_0 - \beta_1 l^s_{it-1} - \beta_2 l^u_{it-1} - \beta_3 m_{it-1} - \beta_4 k_{it-1}] \end{aligned} \tag{7}$$

Using the predicted value of φ_{it-1} estimated in the first stage, we can then estimate in the second stage the coefficients associated with the observed variables by nonlinear least squares (NLS) of the function below,

$$y_{it} = \beta_0 + \beta_1 l^s_{it} + \beta_2 l^u_{it} + \beta_3 m_{it} + \beta_4 k_{it} + g[\phi_{t-1}(m_{it-1}, l^s_{it-1}, l^u_{it-1}, k_{it-1}) - \beta_0 - \beta_1 l^s_{it-1} - \beta_2 l^u_{it-1} - \beta_3 m_{it-1} - \beta_4 k_{it-1}] + \xi_{it} + \varepsilon_{it} \tag{8}$$

To have a measure of firm productivity, we followed previous studies, e.g., Aw et al. (2001), Pavcnik (2002), Schor (2004) and constructed a productivity index that can best describe both the evolution of the productivity of the firm over time and its relative position compared to a reference firm in a reference year. In particular, we obtain such an index by simply subtracting a productivity of a reference firm in a base year (firm with mean output and mean input level in 1993) from an individual firm's productivity measure,

$$tfp_{it} = y_{it} - \hat{\beta}_1 l^s_{it} - \hat{\beta}_2 l^u_{it} - \hat{\beta}_3 m_{it} - \hat{\beta}_4 k_{it} - (\bar{y}_r - \bar{\hat{y}}_r) \tag{9}$$

where, $y_r = \bar{y}_{it}$, $\hat{y}_r = \hat{\beta}_1 \bar{l}_{it}^s + \hat{\beta}_2 \bar{l}_{it}^u + \hat{\beta}_3 \bar{m}_{it} + \hat{\beta}_4 \bar{k}_{it}$ and the bar over a variable indicates the mean over all firms in the base year. Therefore, y_r is the mean log output of firms in the base year, 1993 and $\hat{y}_r$ is the predicted mean log output in 1993. This productivity measure presents a logarithmic deviation of a firm from the mean industry practice in a base year. We also compute and analyse industry-level TFP calculated as the output-share weighted firm-level productivities, i.e., $TFP_{it} = \sum_i \theta_{it} tfp_{it}$ where θ_{it} is the output share of firm i in total industry output in year t. We also estimate TFP using an alternative approach, e.g., the Ackerberg et al. (2015) semi-parametric method (henceforth, ACF).[7]

Modelling the effects of foreign ownership on productivity growth

In the second step of the analysis, we relate firms' TFP growth in industry j, Δtfp_{ijt}, to the measures of the presence of foreign-owned firms. In particular, and as mentioned before, our primary interest is to answer four basic questions: (i) whether foreign ownership is associated with an increase in the firm's productivity, or to put it simply, do foreign firms perform better than local firms, and this is referred to as the direct effect of foreign ownership, (ii) whether there are spillover effects (positive or negative) to domestic firms, i.e., whether foreign ownership in an industry affects the productivity of domestically owned firms in the same industry, (iii) does the origin of foreign firms affect the extent of inter-sectoral spillovers from foreign presence, and (iv) whether and how the absorptive capacity of local Cameroonian firms moderate the effect of FDI on productivity.

To investigate how foreign ownership affects the productivity growth of firms in the Cameroonian manufacturing sector, we use a zero-one variable (FO) equal to one if the firm is foreign-owned and zero otherwise. We follow Javorcik (2004), and Javorcik and Spatareanu (2011) and define a firm as being foreign-owned if at least 10% of its capital is owned by foreign investors. If foreign ownership in a firm increases that firm's productivity, we should observe a positive coefficient on FO, i.e., a significant positive coefficient of this variable indicates that foreign firms grow faster in terms of productivity than domestic firms. We are also interested in determining whether there are any externality effects from the presence of foreign firms. There exist a number of spillover effects by which the presence of foreign firms affects other firms in the same sector or even in other sectors. The literature (see, e.g., Javorcik, 2004) identifies usually two types of productivity spillovers. First, local firms can benefit from the presence of foreign firms in their sector (horizontal spillovers).

7 The LP and ACF methodologies differ in the treatment of labour. In LP, materials are considered as a state variable and labour is automatically adjusted, whereas in ACF, labour is no longer a free variable because of constraints or rigidities in lay-off or hiring procedures on the labour market.

Here, productivity spillovers from foreign firms to local ones increase in line with the growing share of foreign-owned firm in total sector production. Also, domestic firms can benefit from interaction with foreign firms upstream or downstream in the production chain (vertical spillovers). In particular, the recent literature on productivity spillovers from the presence of foreign firms also argues that spillovers are most likely to occur through multinationals' backward linkages (i.e., the degree of integration of multinationals into the host economy) with domestic suppliers (e.g., Driffield et al., 2002; Jarvorcik, 2004; Haskel et al., 2007).

The first contribution of this paper is that we consider all the possible channels through which horizontal spillovers may occur since there is no consensus on the existence of strong spillovers. Hence, and for comprehensiveness, we use four measures of horizontal spillovers: employment, wage, output and capital. The horizontal spillover effects which capture the extent of foreign presence in sector j at time t (HOR_{jt}) are proxied in the following way: ; where, F_{jt} stands for foreign-owned firms' output, employment, wage and capital by industry j to which firm i belongs, while D_{jt} is domestic-owned firms' output, employment, wage and capital by industry j to which firm i belongs. The previous horizontal spillovers reflect the competitive pressures that encourage the indigenous firms to introduce new products to defend their market share and adopt new management methods to increase productivity (Damijan & Knell, 2005). Further, the use of the last proxy of horizontal spillovers is also to check whether the results change when physical capital is used instead of employment, wage and output. Indeed, as pointed out by Aitken and Harrison (1999), foreign firms tend to be more capital intensive than domestic ones and the share of foreign firms is significantly high if weighted by physical capital. In sum, if the productivity advantage of foreign firms spills over to domestic firms, the coefficient on HOR_{jt} should be positive.

It has been well established that MNEs are 'footloose', i.e., they are more likely to exit the host country following a negative shock. The second contribution of this paper is that we consider whether Cameroonian firms also gain from backward linkage, i.e., from a more integration of foreign firms into the $HOR_{jt} = \frac{F_j}{F_j + D_j}$ local economy. Further, we consider whether the origin of foreign firm affects the degree of vertical spillovers from foreign presence. Thus, turning to proxy for vertical spillovers, i.e., the proxy for the foreign presence in downstream sectors (sectors supplied by the industry j) intended to capture the effect of multinational customers on domestic suppliers (VER_{jt}), we follow Javorcik (2004) and Javorcik and Spatareanu (2011) and define the proxy for the foreign presence in downstream sectors in the following way: $VER_{jt} = \sum_{r \neq j} \alpha_{jrt} \times HOR_{rt}$; where, HOR_{rt} is the share of industry output produced by the foreign firms, α_{jrt} is the proportion of sector j's output used by sector r taken from the input-output matrix pertaining to year t. The calculation of α_{jkt} excludes the sector j's output sold for final consumption.[8] In addition, we capture

8 However, the results should be interpreted with the following two caveats in mind. First, it would be ideal to use multiple input-output matrices. Unfortunately, input-output matrices for all the years are not available. For the 1993-2000 period we use the α_{jkt} from the 1993 input-output matrix, whereas for

the effects of the presence of foreign firms from a particular region of origin on local suppliers in the following manner: $VERO_{jt} = \sum_{r \neq i} \alpha_{jrt} \times HORO_{rt}$; where, $HORO_{it}$ is the measurement of horizontal spillovers by the nationality of the foreign firm. We use three measure of $VERO_{jt}$ and $HORO_{it}$ for three regions of origin of foreign investors, (i) Europe (European Union member countries, accession countries and non-members) as well as Turkey, (ii) America (both North and South America as well as Canadian investors), and (iii) Asian foreign investment. Fortunately, the data set does not indicate any firm with foreign shareholders of multiple origins. In order to identify the spillovers from foreign presence, we rely on the variation in growth rates of indicators of horizontal and vertical spillovers in sectors. Hence, we make sure that all indicators are defined (i.e., non-missing) in all sectors studied.

Another novel feature of this paper is that we control for a number of other covariates in order to better isolate spillover effects. The absorptive capacity might influence the sector spillover effects of the presence of foreign-owned firms. In particular, enterprises with the necessary technological ability are able to assimilate the knowledge available from foreign firms. Hence, we assume that firms with higher levels of absorptive capacity (henceforth, ABC) are able to benefit more from foreign presence. Therefore, we try to verify whether the absorption could explain the sectoral spillover effects by interacting the ABC variable with the different variables of foreign presence. We follow Blalock and Simon (2009) and include the interaction of absorptive capacity with FDI but not the main effect of the absorptive capacity because this approach is consistent with one of our focus in this paper, which is not whether the absorptive capacity affects productivity, but rather if and how it moderates the effect of foreign presence on productivity.

A number of other variables are employed. As, we have noted above, it is important to control for changes in the degree of market competition that might be associated with changes in foreign activity. We follow Javorcik and Spatareanu (2011) and control for changes in the degree of competition in industry j with a Herfindhal index (HER_{jt}). As Schoors and van der Tol (2001) pointed out, it is possible that the estimates of sectoral spillovers are biased if openness is not taken into account. Further, another possibility for technologies to move from one country to another is through international trade in intermediate goods as predicted by the endogenous growth models of Grosmman and Helpman (1991), Rivera-Batiz and Romer (1991), and Eaton and Kortum (2002).[9] It is also largely accepted that imports of intermediates allow a

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the 2001-2005 period α_{jkt} is taken from the 2001 input-output matrix. Second, it would be preferable to use matrices excluding imports. But, such matrices are unavailable in the Cameroonian context.

9 In this case, foreign intermediate goods affect productivity through two main channels: the quality channel, i.e., imported inputs are better than their domestic counterparts, and then the complementarity channel where it is believed that combining different intermediate inputs create gains, which would come from imperfect substitution across goods or through learning spillovers between foreign and domestic goods (Hasan, 2002).

finer division of labour which increases firms' efficiency. Likewise, through imports of intermediates and capital goods, domestic firms can benefit from foreign innovations incorporated in these goods (Ethier, 1982). Hence, becoming an importer of foreign intermediates improves productivity. Last but not least, imports of intermediate inputs might increase competitive pressures on domestic firms, which might respond by reducing inefficiencies, which raises their productivity (Tybout, 2003). The degree of openness is measured by the import penetration ratio (MPR_{jt}) of the industry j to which the firm belongs for each period t. Our final estimating equation takes the following form:

$$\Delta tfp_{ijt} = \alpha + \beta_1 FO + \beta_2 \Delta HKR_{ijt} + \beta_3 \Delta VERO_{ijt} + \beta_4 ABC_{ijt} \times \Delta HKR_{ijt} + \beta_5 ABC_{ijt} \times \Delta VERO_{ijt} + \beta_6 \Delta HER_{ijt} + \beta_7 \Delta MPR_{jt} + \varepsilon_{ijt}$$

where, Δ indicates a one-year difference. By considering a time-differenced specification, we remove any time-invariant heterogeneity across firms. ε_{ijt} is an error term.

5.0 Context and data

Openness to foreign investment in Cameroon

One possibility for foreign investment to move from one country to another is through international trade. In Cameroon, the trend towards openness to world economy began in the late 1980s within the structural adjustment programme (SAP) framework. The SAP was put in place in July 1988, resulting in a wide range of reforms, with a strong emphasis on openness to international trade. Trade reforms proceeded in several stages. Between 1990 and 1992 and within the regional framework, i.e., 'Regional Fiscal Reform Programme' in the 'Communauté Economique et Monétaire de l'Afrique Centrale'-CEMAC zone,[10] the custom duty and the fiscal entry duty were replaced by a custom duty applicable to all imports and according to the category of goods: first necessity goods 5%, capital goods 10%, intermediate goods 20%, and current consumption goods 30% of the c.i.f. value, respectively. The import turnover tax and the complementary tax were replaced by a turnover tax applicable to all imports as well as to all domestic production at three different rates: a zero rate for exempted goods, a reduced rate of 5%, and a normal rate of 12.5%, respectively. The internal production tax was abolished while the unique tax was replaced by a 'Generalized Preferential Tariff' which was a proportion of the normal custom duty rate. At the domestic level, the tariff regime was simplified, as the number of lines facing specific tariffs was drastically reduced. In 1993, tariffs were reduced and rationalized. For example, the number of tariff bands was reduced from six to one, and the average tariff fell from 82% to 23%.

In the second stage, trade reforms took the form of eliminating Non-Tariff Barriers (NTBs) such as import licenses, special import programmes, and administrative barriers. For example, in 1990, approximately 105 commodities did not require import licenses. In 1991 trade liberalization moved ahead, 22 products were classified in the free import category. This number increased continuously through time and by 1992 all quantitative restrictions were removed. 'Sensitive' imports were steadily transferred to 'government-controlled' goods. Import licenses for 'government-controlled' goods had become virtually automatic and hence less restrictive. The price controls were first progressively removed from most goods and then abolished. The system of reference prices was abolished.

10 The CEMAC consists of the following seven countries: Cameroon, Central African Republic, Chad, Congo Republic, Equatorial Guinea, Gabon and Sao Tome & Principe.

Turning to foreign investment, the Cameroonian government operated a number of explicit policy programmes to attract foreign ownership. The situation changed dramatically in the early 1990s when substantial privatization efforts along with changes in the legislative framework provided new opportunities for foreign investors. For example, at the beginning of the 1990s, a considerable amount of the obstacles to foreigners investing in Cameroon were abolished. The 1990 Investment Code, which prohibited foreign ownership, was abolished and replaced by an Investment Charter that systematically cultivated foreign investment through, e.g., a zero corporate profit tax on manufactured exports, a tax system favouring multinational enterprises through tax holidays, duty exemptions, etc., attractive investment grants, and permission of 100% foreign equity ownership. Moreover, the Cameroonian 'business climate' improved in the 1990s as compared to the 1980s. Also, the government accepts binding international arbitration on investment disputes between foreign investors and the government. Cameroon is also a signatory to the Organization for the Harmonization of Corporate Law in Africa Treaty (OHADA in French). OHADA provides for common corporate law and arbitration procedures in the 16-member signatory states, among other things.

Data requirements and sources

This study is based on data on an unbalanced sample of manufacturing firms in Cameroon over the period 1993-2005.[11] This period is of particular interest because it immediately follows the 1992 trade and foreign investment openness in Cameroon. These manufacturing census data are collected by the National Institute of Statistics (NIS). The data initially covers 788 firms from different manufacturing sectors. We focus our attention on firms that employ five or more workers. Other sample selection criteria are the following. Firms with incomplete information on different categories of employees are eliminated. The ownership of the firm is a variable of primary interest. Hence, we restrict the analysis to manufacturing firms that reported ownership status. Still in the data cleaning process, we correct for missing values when calculating proxies for horizontal and vertical spillovers from foreign presence. Indeed, the earliest and latest years in which a firm reported were identified, and interpolation was used to fill-in gaps of up to two missing years within the reporting window.[12] If more than two continuous years of data were missing, the firm was dropped from the sample. Thus, the study covers an unbalanced panel sample of 584 manufacturing firms in nine key industries: food processing, textile-weaving, wood-furniture, paper-printing, chemicals, rubber-plastic, non-metallic mineral, basic metals and machinery-appliance.

From NIS, we obtain data on the firms' output, as well as labour, materials and capital inputs. Our output measure is the firm observed real production per year, i.e.,

11 Since the data set is not a balanced panel, the total number of firms varies across each year of the sample. See Appendix Table A1 for information associated with the panel.

12 We use the Stata procedure 'ipolate'.

output is measured in 2000 constant price using sector's output price index as deflator. Our materials measure is real expenditures on materials, i.e., firm expenditures on materials are also deflated by sector's output price index. The firms' capital stock is the value of property and equipment, net of depreciation. In particular, capital is proxied by the value of tangible fixed assets deflated using the GDP deflator. Our measure of labour is the number of employees. Moreover, the census distinguishes between production and nonproduction workers. We measure skilled (nonproduction) workers by the sum of (i) senior managers, (ii) senior technicians and middle level managers, and (iii) technicians, foremen and skilled workers in a firm per year. The unskilled or production employment is other workers (e.g., the sum of clerks, unskilled workers and apprentices) per year.[13] The data do not include information on hours worked in order to pick up the degree of capacity utilization of labour. The wages are divided by the consumer price index (CPI) to arrive at a real measure. They are defined as the total wage bill for each skill category divided by the number of employees in that skill category.

As previously stated, our primary interest is whether productivity is related to the importance of foreign-owned affiliates in the firm's relevant economic environment. The information on the ownership status is time-variant, i.e., the data base reports this information by year. Foreign affiliates are defined as firms having foreign equity share of at least 10%. The horizontal productivity spillovers to local producers are captured through four measures: (i) the share of an industry's output that is produced by foreign-owned firms, (ii) the share of an industry j's employment used by foreign-owned, (iii) the share of an industry j's wage of foreign firms, and (iv) the ratio of the capital of foreign-owned firms to the capital of all firms in each industry. As already stated, the productivity spillovers to local firms in the supplying sectors are calculated using technical coefficients from input-output tables (two-digit sector definition) and the calculated sectoral horizontal spillover effects. With respect to the nationality of the foreign firm, we calculate three measures of vertical spillovers for three regions of origin of foreign investors: Europe, America and Asia.

Turning finally to the control variables, the Herfindahl index (HER) is measured as the sum of squared firms' shares of the industry's total gross output, i.e., $HER_j = \sum_{i=1}^{n} \left(output_i / output_j\right)^2$. We follow past studies (e.g., Girma, 2005; Girma et al., 2008) and compute the absorptive capacity as $ABC_{it} = \ln(tfp_i / tfp_{\max})$, where $tfp_{\max}$ is the maximum TFP level in the industry of firm i. As mentioned before, the degree of openness of the sector is measured using the import penetration rate variable (MPR) expressed as follows: $MPR_{jt} = M_j \ (P_j + M_j - X_j)$, where P_{jt} , M_{jt} and X_{jt} are, respectively, output, imports of raw materials and exports of sectors j at time t. Table 1 panels A, B and C reports descriptive statistics.

The results in Panel A show that foreign firms are more productive (56.1%) and

13 The activities of unskilled workers mainly include machine operation, production supervision, repair, maintenance and cleaning.

employ a more skilled workforce (18%) than the indigenous firms. Moreover, foreign firms pay higher skilled wages (19.5%) than domestic firms. Also, foreign firms use more unskilled employment (52%) than domestically owned firms. The figures in Panel B show that foreign presence varies considerably among industries. It is worth noting that foreign firms have a much larger share of capital than they do for labour in five out of the nine sectors, i.e., food processing, textile-weaving, chemicals, non-metallic mineral, and basic metal industries. This suggests that foreign firms use more capital-intensive technologies than domestic firms in those industries. The most integrated industries into the international trade are paper-printing, non-metallic mineral and basic metal. In these industries, the import penetration rate averaged more than 50% between 1993 and 2005. The highest average value of the Herfindahl index (i.e., more than 50%) is registered in textile-weaving (63.3%) and chemicals (63%), while the lowest (7%) is in basic metal industry.

Table 1 Panel C finally lists the values of the proxy for vertical linkages. There is also significant variation across sectors. For example, the average value of backward linkages ranges from 76.2% in wood-furniture and 52.6% in chemicals to 21.6% in non-metallic mineral industry. The Asian affiliates tend to be less prevalent than American and European ones. The average value of the vertical linkages for Asia is 0.179. The extent of European and American presence in downstream sectors is higher than that of Asian foreign firms, i.e, 0.208 and 0.200, respectively. In addition, the vertical linkages vary significantly across sectors. The average value of the vertical linkage for America was particularly high in textile-weaving (38%) and food processing (28.3%), very small in chemicals (1.4%), and null in wood-furniture, non-metallic mineral, and machinery-appliance sectors. The average value of the vertical linkage for Europe was particularly high in chemicals (43.4%), basic metal (35.2%), wood-furniture (26.6%), machinery-appliance (26.5%), and non-metallic mineral (25.2%). In the remaining sectors, the vertical linkage for Europe was very small or null. The average value of the vertical linkage for Asia was particularly high in wood-furniture (49.5%) and very small or null in the remaining sectors.

Table 1: Summary statistics

Variable	All		Foreign firms		Domestic firms		Percentage difference in mean (%)[a]
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Panel A: Characteristics of firms[14]							
log(output)	6.674	1.969	6.844	2.041	6.284	1.731	56.07*
log(skilled labour)	3.344	1.422	3.399	1.434	3.219	1.388	18.03**
log(unskilled labour)	4.725	2.033	4.883	2.113	4.363	1.789	52.03*
log(skilled wage)	1.126	0.931	1.186	0.918	0.991	0.950	19.47*
log(unskilled wage)	-0.505	1.626	-0.546	1.711	-0.412	1.409	-13.42
log(materials)	6.820	2.021	6.778	2.168	6.918	1.636	-14.02
log(capital)	7.197	1.822	7.236	1.921	7.106	1.568	13.04
Foreign ownership	0.696	0.460					
# observations	3927		2736		1191		

14 Appendix Table A2 presents the descriptive statistics for the different variables not expressed in logarithm.

Table 1 (continued)

Variable	All		Foreign firms		Domestic firms		Percentage difference in mean (%)[a]
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Panel B: Horizontal spillovers variables							
Sector	Foreign share of output		Foreign share of employment		Foreign share of wage		Foreign share of capital
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean S.D.
Food processing	0.681	0.153	0.610	0.242	0.660	0.092	0.634 0.085
Textile-weaving	0.949	0.126	0.960	0.078	0.799	0.208	0.969 0.075
Wood-furniture	0.986	0.025	0.971	0.046	0.919	0.136	0.970 0.048
Paper-printing	0.403	0.122	0.578	0.287	0.394	0.158	0.394 0.143
Chemicals	0.936	0.036	0.662	0.276	0.738	0.107	0.780 0.225
Rubber-plastic	0.962	0.039	0.978	0.022	0.864	0.084	0.968 0.033
Non-metallic mineral	0.296	0.200	0.544	0.240	0.674	0.299	0.839 0.370
Basic metal	0.711	0.080	0.741	0.036	0.777	0.158	0.947 0.010
Machinery-appliance	0.758	0.308	0.839	0.206	0.897	0.065	0.755 0.129
Panel C: Absorptive capacity, competition and openness variables							
Sector	Absorptive capacity[b]		Import penetration rate		Herfindahl index		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Food processing	-2.569	1.330	0.387	4.005	0.169	0.054	
Textile-weaving	-2.534	1.266	0.137	0.146	0.633	0.122	
Wood-furniture	-1.584	0.847	0.040	0.079	0.123	0.067	
Paper-printing	-1.962	1.142	0.509	0.240	0.220	0.068	
Chemicals	-2.721	1.473	0.433	0.377	0.633	0.101	
Rubber-plastic	-1.661	0.893	0.155	2.400	0.404	0.181	
Non-metallic mineral	-0.683	0.552	0.800	0.283	0.214	0.346	
Basic metal	-2.180	1.226	0.646	0.066	0.070	0.113	
Machinery-appliance	-2.295	1.179	0.232	0.132	0.367	0.225	
Panel D: Vertical spillovers variables							
Sector	Backward linkages		Vertical European		Vertical American		Vertical Asian
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean S.D.
Food processing	0.360	0.082	0.051	0.020	0.283	0.090	0.024 0.023
Textile-weaving	0.381	0.061	0.000	0.000	0.380	0.061	0.000 0.000
Wood-furniture	0.762	0.040	0.266	0.104	0.000	0.000	0.495 0.113
Paper-printing	0.217	0.061	0.033	0.016	0.193	0.049	0.000 0.000
Chemicals	0.526	0.027	0.434	0.136	0.014	0.010	0.185 0.145
Rubber-plastic	0.269	0.081	0.000	0.000	0.172	0.085	0.097 0.039
Non-metallic mineral	0.216	0.146	0.252	0.121	0.000	0.000	0.000 0.000
Basic metal	0.482	0.054	0.352	0.055	0.130	0.017	0.000 0.000
Machinery-appliance	0.304	0.129	0.265	0.111	0.000	0.000	0.048 0.020

Notes: [a] A difference of means test between the group of foreign firms and domestic firms for the whole period. [b] Based on the TFP measures derived using the LP estimates; the absorptive capacity measures derived using the TFP from FE and ACF estimates are not reported but are available upon request. The symbols * and ** indicate 1% and 5% significance level, respectively.

In addition to the cross-sector variation, there were also large changes in the horizontal (Figure 1) and vertical (Figure 2) variables over the sample period. As

Figure 1a shows, the share of foreign firms in the total sample employment dropped from 81.2% in 1993 to 47.4% in 2005. At the same time, the share of foreign firms in capital stock also decreased from 84.1% in 1993 to 47.5% in 2005. Likewise, Figure 1b shows that in terms of output and wage, the foreign presence has been decreasing over time. The foreign output share decreased from 85.5% in 1993 to 56.3% in 2005, while the foreign wage share decreased by 25.2 percentage points on average, i.e., from 77.2% in 1993 to 52% in 2005. Figure 2a-b plots average values of the vertical linkages across time for all foreign firms (Figure 2a) and for foreign firms by origin (Figure 2b). Figure 2a indicates that the backward variable decreased over time, from 45.1% in 1993 to 32.1% in 2005. In the case of the nationality of foreign firms, Figure 2b shows that there was a considerable drop in the backward European and American measures of 18.6 and 22.7 percentage points, respectively, whereas the Asian backward variables experienced an increase of 24.1 percentage points, i.e., from 9.4% in 1993 to 33.4% in 2005.

Figure 1: Trends in horizontal spillover variables, 1993-2005

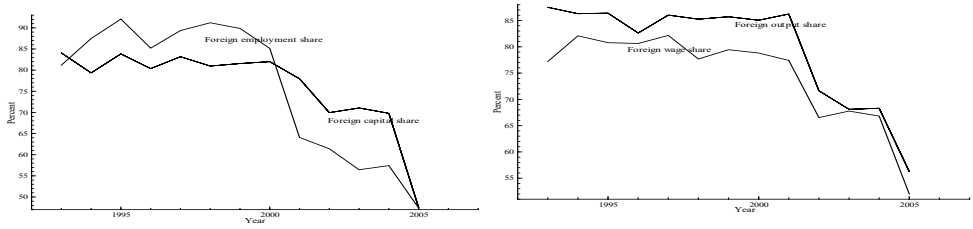
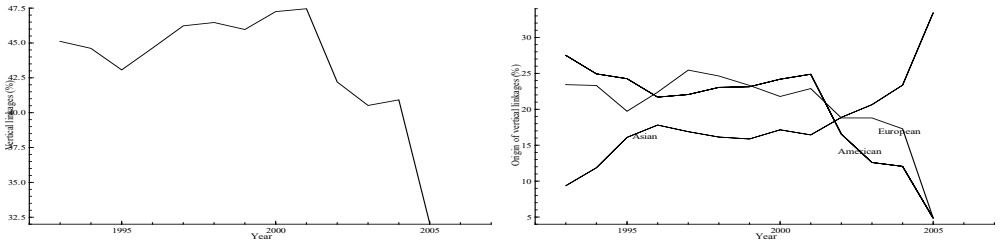


Figure 2: All foreign, American, Asian and European presence in downstream sectors, 1993-2005



6. 0 Results

Estimates of production function

As already indicated, we proceed in two steps. First, we estimate a production function for the whole manufacturing sector to obtain measures of TFP.[15] Then, we relate the TFP to proxies for direct and indirect effects of foreign presence. Table 2 presents the production function estimates for different inputs that we estimate using the OLS, FE, LP and ACF specifications, respectively. Relative to the FE and ACF estimates, we can see that – as expected – the OLS typically overestimate the (un)skilled labour and materials coefficients and underestimates the capital coefficient.

Table 2: Input elasticity estimates

Input	OLS [1]	FE [2]	LP [3]	ACF [4]
Skilled labour	0.215*** (0.049)	0.144*** (0.045)	0.184*** (0.012)	0.173*** (0.017)
Unskilled labour	0.136*** (0.027)	0.039** (0.020)	0.084** (0.042)	0.118*** (0.046)
Materials	0.173*** (0.030)	0.490*** (0.035)	0.079*** (0.013)	0.160*** (0.065)
Capital	0.358*** (0.039)	0.277*** (0.045)	0.497*** (0.219)	0.423** (0.248)
Scale elasticity	0.882	0.950	0.844	0.874

Notes: Standard errors are in parentheses. The symbols *** and ** indicate 1% and 5% significance level, respectively.

We use the FE, LP and ACF estimates to compute the firm-level TFP measures. To make meaningful comparisons between indigenous and foreign firms in different years and industries, we use the relative firm-level TFP measures which are computed as deviations from the yearly and two-digit industry mean.[16] Figure 3a-c displays the trends in estimated TFP over the sample period. The curves correspond to yearly

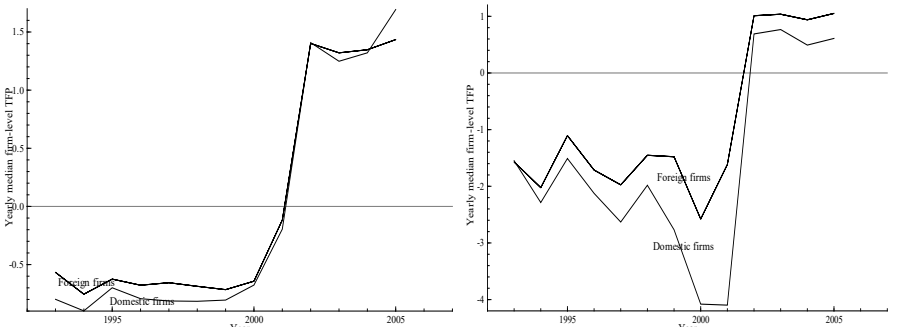
15 Because of the small number of firms in some industries, we use data for all manufacturing industries in estimating the production function. Hence, we do not take into account sectoral heterogeneity. However, the inclusion of sectoral dummies in the regressions mitigates this concern to a large extent.

16 Following Baldwin and Yan (2011), the relative TFP is constructed as follows: $dtfp_{it} = tfp_t - \overline{tfp_i} - \overline{tfp_t} + \overline{\overline{tfp}}$, where $dtfp_{it}$ is the demeaned tfp_{it}, $\overline{tfp_i}$ is the average for each two-digit industry i, $\overline{tfp_t}$ is the average for each time period, and $\overline{\overline{tfp}}$ is the average

medians of firm-level TFP. In all cases, the median foreign affiliate performs better than its indigenous counterpart. In order to further examine the distribution of firm-level TFP between foreign and domestic firms and the changes in the distribution of TFP across time, Figure 4 presents histograms of the estimated firm-level productivities by ownership status, i.e., for both foreign and domestic firms between 1993 and 2005. In all cases and for foreign firms, the histograms indicate higher levels of TFP for foreign firms as compared to their Cameroonian counterparts. Finally, Figure 5 presents the non-parametric kernel density plots of TFP from FE, LP and ACF estimates for both foreign and domestic firms. In each case, and for foreign firms, the kernel density plot moves progressively further right between 1993 and 2005 indicating an increase in TFP.

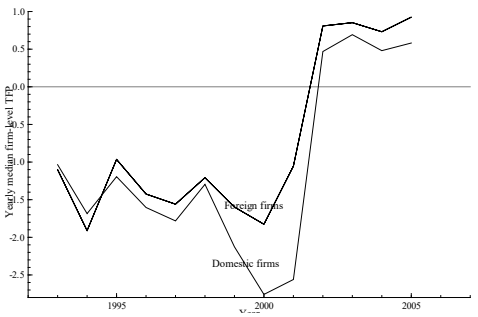
of $\overline{tfp_i}$ overall two-digit industries or the average of $\overline{tfp_t}$ overall time periods.

Figure 3a-c: Trends in firm-level TFP, foreign vs domestic firms



a- FE estimates

b- LP estimates



c- ACF estimates

Figure 4: Histograms of firm-level TFP by ownership status, 1993-2005

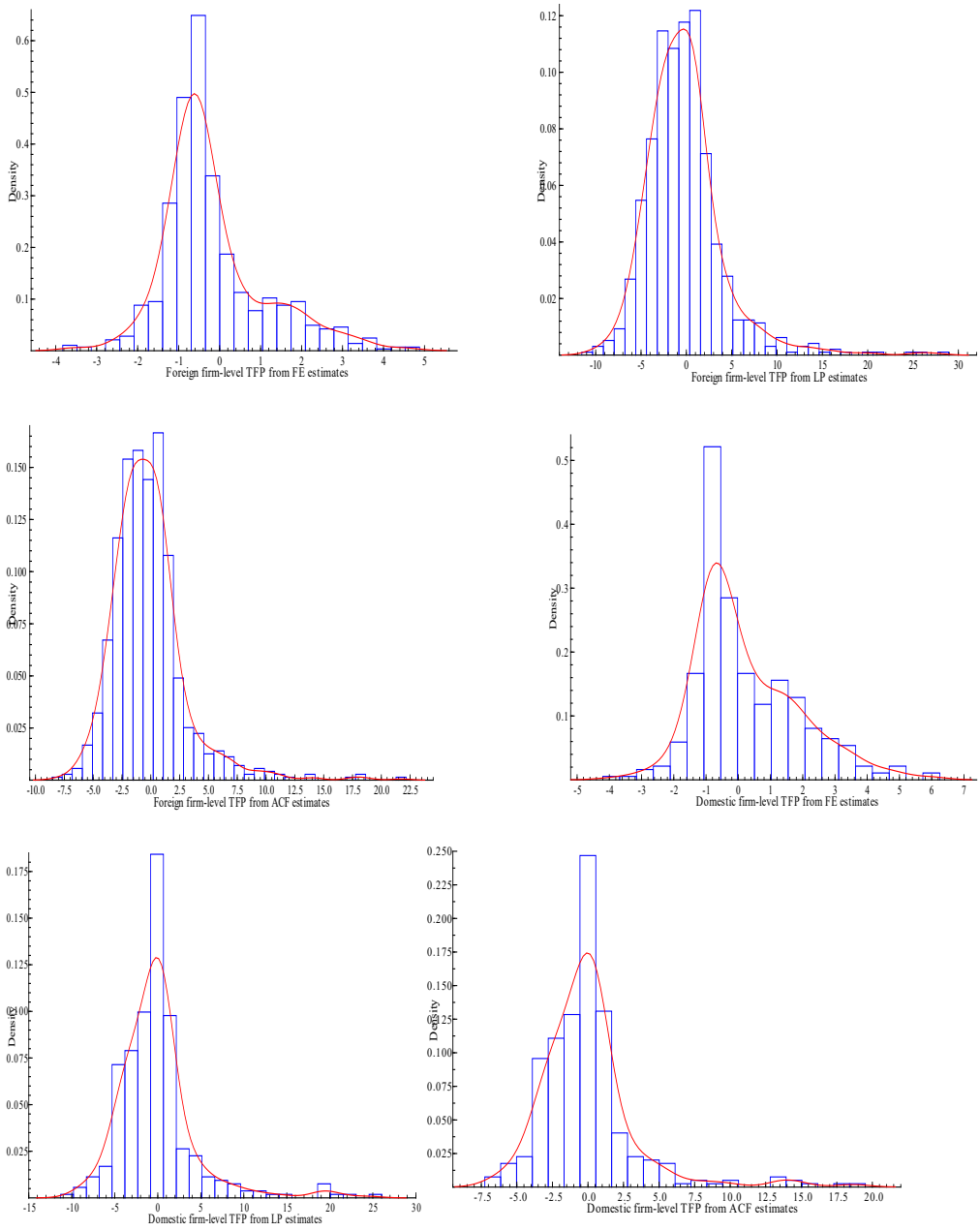
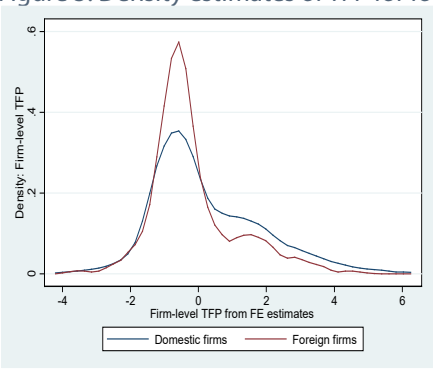
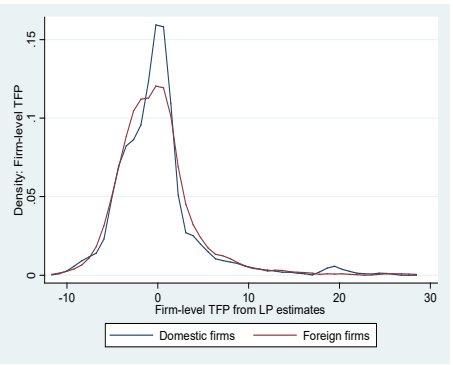
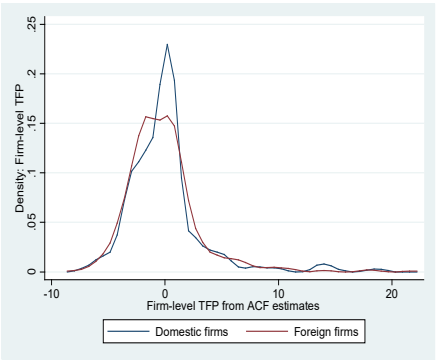


Figure 5: Density estimates of TFP for foreign and domestic firms







For each year, summary statistics for TFP are reported in Table 3 for foreign and domestic firms separately. As Table 3 indicates, foreign firms perform better, i.e., foreign firms have higher TFP than domestic firms. Furthermore, the difference between foreign and domestic firms is statistically significant in nearly all years. This difference in productivity is consistent with the argument that foreign firms have more advanced technology and management practices. Table 4 reports the computed aggregate productivity measures for each industry and for both groups of foreign and domestic firms in each sector. Evidence presented in Table 4 indicates a lot of heterogeneity of the weighted average TFP level between different manufacturing industries. It is also noteworthy that in most industries (six out of nine) foreign firms are more productive than the indigenous enterprises. Turning to the three industries where Cameroonian-owned firms have higher productivity than foreign firms, the weighted average TFP level of foreign firms is systematically and significantly higher than the weighted average TFP level of domestic firms in one sector, e.g., the non-metallic mineral sector. A further investigation of the characteristics of this sector reveals that domestic firms are two times smaller than foreign firms on average and this difference is strongly significant. Also, and in the machinery-appliance sector, domestic firms are on average nine years older and smaller than their foreign counterparts, but only the former difference is significant.

In sum, the assumption of superior productivity of foreign firms seems justified for our sample. This result is inconsistent with Söderbom and Teal (2004) who find

Table 3: Yearly mean comparison of firm-level TFP, foreign vs domestic firms

Year	FE estimates [1]			LP estimates [2]			ACF estimates [3]		
	Foreign	Domestic	Percentage difference in mean (%)[a]	Foreign	Domestic	Percentage difference in mean (%)[a]	Foreign	Domestic	Percentage difference in mean (%)[a]
1993	-0.638 (0.699)	-0.820 (0.582)	18.19**	-0.495 (5.043)	-1.183 (1.975)	68.77**	-0.372 (3.362)	-0.852 (1.269)	47.99**
1994	-0.758 (0.715)	-0.905 (0.537)	14.69***	-0.897 (4.318)	-2.304 (2.278)	123.69***	-0.871 (3.535)	-1.632 (1.658)	81.56**
1995	-0.678 (0.615)	-0.764 (0.397)	8.61**	-0.360 (3.440)	-1.024 (3.218)	88.41**	-0.377 (2.711)	-0.723 (2.481)	34.58***
1996	-0.773 (0.666)	-0.600 (0.545)	-17.23	-1.178 (3.368)	-0.388 (5.340)	-79.05**	-0.964 (0.423)	-0.211 (4.047)	-75.32**
1997	-0.748 (0.678)	-0.782 (0.515)	3.40	-1.162 (3.990)	-1.383 (5.326)	22.12*	-0.946 (2.778)	-0.950 (3.946)	0.30
1998	-0.766 (0.606)	-0.733 (0.518)	-3.31	-0.920 (3.588)	-0.848 (5.136)	-7.21	-0.827 (2.633)	-0.595 (3.907)	-23.23
1999	-0.696 (0.631)	-0.910 (0.526)	21.38***	-1.012 (4.065)	-1.688 (5.169)	67.57**	-0.890 (3.676)	-1.451 (3.831)	56.12**
2000	-0.660 (0.689)	-0.656 (0.457)	-0.35	-1.698 (5.209)	-2.753 (6.102)	105.50**	-1.259 (3.372)	-1.849 (4.393)	58.99**
2001	0.329 (0.860)	-0.609 (1.069)	27.98***	-0.620 (5.074)	-2.855 (6.803)	223.54**	-0.485 (3.454)	-1.927 (4.946)	144.21**
2002	1.355 (1.418)	1.521 (1.549)	-16.57**	1.820 (3.674)	1.764 (3.192)	5.53	1.348 (2.843)	1.327 (2.537)	2.13
2003	1.201 (1.278)	1.457 (1.589)	-25.55***	1.628 (2.356)	2.255 (3.954)	-62.72**	1.220 (1.615)	1.749 (3.212)	-52.92***
2004	1.286 (1.416)	1.294 (1.526)	-0.78	1.831 (4.825)	1.337 (3.073)	49.41	1.388 (3.578)	1.065 (2.159)	32.34**
2005	1.448 (1.347)	1.645 (1.819)	-19.71**	1.946 (4.947)	1.620 (3.041)	32.62	1.499 (3.285)	1.304 (2.140)	19.45**

Notes: [a] A difference of means test between the group of foreign firms and domestic firms for each year. Values in the table are deviations from industry (two-digit) and yearly mean. Standard deviations are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

that technical inefficiency is not lower in firms with foreign ownership in Ghana's manufacturing sector. Our result does not echo Teal (1999) who find no underlying growth in technical efficiency of firms in the Ghana's manufacturing sector following the removal of high levels of protection combined with substantial real devaluations.

Table 4: Main comparison of industry-level TFP, foreign vs domestic firms

Sector	FE estimates [1]			LP estimates [2]			ACF estimates [3]		
	Foreign	Domestic	Percentage difference in mean (%)[a]	Foreign	Domestic	Percentage difference in mean (%)[a]	Foreign	Domestic	Percentage difference in mean (%)[a]
Food processing	0.011 (0.060)	0.035 (0.091)	-2.31	0.099 (0.075)	0.049 (0.215)	5.06	0.070 (0.056)	0.037 (0.162)	3.30
Textile-weaving	0.284 (0.422)	0.108 (0.184)	17.55	1.019 (0.862)	0.157 (0.253)	86.19***	0.680 (0.511)	0.118 (0.187)	56.24***
Wood-furniture	0.036 (0.116)	0.026 (0.032)	00.99	0.066 (0.129)	0.035 (0.028)	30.98	0.051 (0.102)	0.027 (0.020)	24.17
Paper-printing	0.056 (0.165)	0.112 (0.317)	-5.58	0.152 (0.184)	0.246 (0.552)	-9.35	0.085 (0.148)	0.161 (0.384)	-7.60
Chemicals	0.144 (0.305)	-0.007 (0.020)	15.08**	1.046 (1.354)	-0.043 (0.046)	108.87***	0.743 (0.959)	-0.034 (0.039)	77.76***
Rubber-plastic	0.087 (0.268)	-0.002 (0.015)	8.96	0.173 (0.344)	-0.001 (0.026)	17.42*	0.115 (0.270)	-0.001 (0.021)	11.57
Non-metallic mineral	-0.077 (0.065)	1.930 (0.797)	-200.67***	-0.867 (0.375)	3.582 (1.822)	-444.90***	-0.641 (0.270)	2.700 (1.314)	-334.20***
Basic metals	0.262 (0.093)	0.364 (0.144)	-10.20	0.431 (0.219)	0.721 (0.482)	-29.03	0.361 (0.188)	0.508 (0.378)	14.75
Machinery appliance	-0.016 (0.056)	0.512 (1.127)	-52.81*	0.042 (0.226)	1.087 (2.359)	-104.46	0.015 (0.139)	0.731 (1.587)	-71.60
All	-0.171 (1.256)	0.241 (1.599)	-41.44***	-0.230 (4.290)	-0.089 (4.570)	-14.06	-0.230 (3.165)	-0.005 (3.412)	-22.45

Notes: [a] A difference of means test between the group of foreign firms and domestic firms for each year. Values in the table are deviations from industry (two-digit) and yearly mean. Standard deviations are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

Direct effect of foreign presence

We now turn to testing the hypothesis that the previous productivity advantages spill over to domestic Cameroonian firms. For that, we first look at the direct effect of foreign ownership and present two sets of estimates: a FE model for the unbalanced panel and the difference regressions with the balanced panel. There is significant correlation among any pair of the three variables measuring the vertical origin. For example, the correlation between vertical European and vertical American is negative (-0.753) and statistically significant at the 1% level. The vertical European tends to display a stronger positive correlation (0.269) with the vertical Asian variable, and the correlation coefficient between the vertical American and vertical Asian is negative (-0.660) and statistically significant at the 1% level. Therefore, jointly including these variables in the regression specification may lead to biased estimates.

Table 5 presents the results using the TFP measures derived using the LP estimates.[17] The coefficient on the dummy variable for the foreign presence is positive in all cases and significant in most specifications. This outcome suggests that foreign firms enjoy higher productivity than Cameroonian firms. This is in line with the findings in Djankov and Hoekman (2000) and Schoors and van der Tol (2001). The coefficient on the share of foreign employment is negative in all cases and statistically significant, except in column (2). Likewise, the coefficient associated with the share of foreign wage is negative and significant in all cases. Across all specifications and in column (1), the effect of backward linkages is negative and significant. In column (3) and for the specifications using the shares of foreign employment and capital, there seems to be positive spillovers from backward linkages. Coming to vertical spillovers by country of origin, the coefficient on vertical Asian is positive and significant at the 10% level in column (2) of the specification using the foreign wage share. Therefore, there seems to be a positive spillover effect from the presence of Asian firms in downstream sectors.[18]

The coefficient of the interaction between the absorptive capacity and the proxy for horizontal spillovers is positive and significant in all cases. This indicates that Cameroonian firms with the highest levels of absorptive capacity benefit the most from foreign presence within the same industry. Also, and in most specifications, the coefficients of the interactive terms of vertical American, Asian and European with Cameroonian firms' absorptive capacity are positive and statistically significant. These results indicate that Cameroonian firms with higher absorptive capacity are able to benefit from positive backward spillovers from the presence of American, Asian and European affiliates in downstream sectors. As regards the control variables, the coefficient on the Herfinhahl index variable is negative and significant in most

17 To save space, the results using the TFP measures from the FE and ACF estimates are not reported but are available upon request.

18 The coefficient on vertical Asian is 0.0043 with a standard error of 0.0026, a t-statistic of 1.63, and a p-value of 0.105. These estimates are obtained through a linear combination with the estimate on backward linkages using the Stata procedure 'lincom'.

specifications. This indicates that Cameroonian firm-level productivity decreases with increased competition.

However, foreign firms may choose to locate in highly productive sectors leading to an identification problem. We follow past studies and control this selection bias using the growth rates instead of levels of relative TFP. Table 6 shows the results for one-year differences.[19] Across all specifications, the estimated coefficient on the dummy for foreign presence is positive, statistically significant, and of bigger magnitude as compared to results in Table 5. This suggests that, as predicted, foreign firms perform better than Cameroonian indigenous firms. The results associated with the remaining variables are in line with the results provided in Table 5. In sum, the central message of tables 5 and 6 is that the data support the hypothesis of a positive direct effect of foreign presence. The question of particular interest is then whether this was at the benefit or detriment of Cameroonian firms. This issue is addressed in the next section.

19 For the differences to be consistent and easier to interpret, we use the balanced panel. Moreover, because of space constraint the results for the two- and three-years differences are not reported, but are available from the authors upon request.

Table 5: Direct effect of foreign presence, 1993-2005, full unbalanced sample

Regressor	Share of foreign Employment [1]	[2]	[3]	Output [1]	[2]	[3]
Foreign ownership dummy	0.213* (0.127)	0.123*** (0.024)	0.059** (0.032)	0.165 (0.114)	0.011*** (0.002)	0.037*** (0.015)
Horizontal spillovers	-0.002** (0.001)	-0.001*** (0.0001)	-0.006*** (0.001)	0.0004 (0.003)	0.001 (0.003)	0.0005 (0.005)
Backward linkages	-0.010*** (0.004)	0.002 (0.003)	0.009*** (0.004)	-0.010*** (0.005)	-0.001 (0.002)	0.004 (0.005)
Vertical American	0.005 (0.004)			0.006 (0.004)		
Vertical Asian		0.001 (0.004)			0.002 (0.002)	
Vertical European			-0.002 (0.003)			-0.009*** (0.002)
ABCHorizontal spillovers	0.003*** (0.001)	0.005*** (0.001)	0.007*** (0.001)	0.006*** (0.001)	0.012*** (0.001)	0.017*** (0.001)
ABC Backward linkages	0.015*** (0.001)	0.016*** (0.002)	0.010*** (0.002)	0.009*** (0.003)	0.001 (0.001)	-0.006*** (0.001)
ABC Vertical American	0.008*** (0.001)			0.009*** (0.001)	0.005*** (0.001)	
Absorptive capacityVertical Asian		0.012*** (0.002)				
ABCVertical European			-0.004*** (0.001)			-0.007***(0.001)
Herfindahl index	-0.525*** (0.156)	-0.240* (0.145)	-0.316 (0.468)	-0.324*** (0.121)	0.160 (0.115)	-0.676 (0.465)
Import penetration ratio	-0.001 (0.004)	0.002 (0.003)	-0.005 (0.005)	-0.002 (0.004)	-0.003 (0.003)	-0.013*** (0.005)
R^2 within	0.949	0.939	0.914	0.948	0.969	0.942
Observations	3232	3232	3232	3232	3232	3232
Regressor	Share of foreign Wage [1]	[2]	[3]	Capital [1]	[2]	[3]
Foreign ownership dummy	0.213* (0.127)	0.123*** (0.024)	0.059** (0.032)	0.165 (0.114)	0.011*** (0.002)	0.037*** (0.015)
Horizontal spillovers	-0.002** (0.001)	-0.001*** (0.0001)	-0.006*** (0.001)	0.0004 (0.003)	0.001 (0.003)	0.0005 (0.005)
Backward linkages	-0.010*** (0.004)	0.002 (0.003)	0.009*** (0.004)	-0.010*** (0.005)	-0.001 (0.002)	0.004 (0.005)
Vertical American	0.005 (0.004)			0.006 (0.004)		
Vertical Asian		0.001 (0.004)			0.002 (0.002)	
Vertical European			-0.002 (0.003)			-0.009*** (0.002)
ABCHorizontal spillovers	0.003*** (0.001)	0.005*** (0.001)	0.007*** (0.001)	0.006*** (0.001)	0.012*** (0.001)	0.017*** (0.001)
ABC Backward linkages	0.015*** (0.001)	0.016*** (0.002)	0.010*** (0.002)	0.009*** (0.003)	0.001 (0.001)	-0.006*** (0.001)
ABC Vertical American	0.008*** (0.001)			0.009*** (0.001)	0.005*** (0.001)	
Absorptive capacityVertical Asian		0.012*** (0.002)				
ABCVertical European			-0.004*** (0.001)			-0.007***(0.001)
Herfindahl index	-0.525*** (0.156)	-0.240* (0.145)	-0.316 (0.468)	-0.324*** (0.121)	0.160 (0.115)	-0.676 (0.465)
Import penetration ratio	-0.001 (0.004)	0.002 (0.003)	-0.005 (0.005)	-0.002 (0.004)	-0.003 (0.003)	-0.013*** (0.005)
R^2 within	0.949	0.939	0.914	0.948	0.969	0.942
Observations	3232	3232	3232	3232	3232	3232

Notes: Firm fixed effect model. Dependent variable: log firm-level relative TFP. The regression includes a constant and a full set of time and industry dummies. Firm-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

Table 6: OLS estimates of the direct effect of foreign presence, 1993-2005, full balanced sample

Regressor	Share of foreign					
	Employment			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
Foreign ownership dummy	0.062*** (0.106)	0.188*** (0.011)	0.161*** (0.083)	0.078*** (0.015)	0.131*** (0.012)	0.058*** (0.011)
Horizontal spillovers	-0.027 (0.008)	-0.027*** (0.011)	-0.026 (0.008)	-0.104*** (0.028)	-0.028 (0.026)	-0.057*** (0.028)
Backward linkages	-0.105*** (0.041)	-0.070*** (0.021)	-0.034 (0.028)	0.052 (0.058)	-0.026 (0.028)	0.075 (0.057)
Vertical American	0.026 (0.041)			0.008 (0.035)		
Vertical Asian		-0.004 (0.029)			0.012 (0.030)	
Vertical European			-0.032 (0.030)			-0.048 (0.031)
ABC× Horizontal spillovers	0.006 (0.004)	0.014*** (0.006)	-0.002 (0.004)	0.040*** (0.016)	-0.017 (0.012)	-0.030 (0.013)
ABC× Backward linkages	0.061*** (0.018)	0.052*** (0.010)	0.032*** (0.011)	0.002 (0.030)	-0.029 (0.019)	0.005 (0.029)
ABC× Vertical American	0.018 (0.018)			0.011 (0.014)		
Absorptive capacity × Vertical Asian		-0.004 (0.011)			0.006 (0.011)	
ABC× Vertical European			0.013 (0.010)			-0.018** (0.010)
Herfindahl index	-0.726 (0.581)	-1.730 (0.618)	2.034*** (0.667)	-1.671 (0.615)	-0.816 (0.58)	0.185*** (0.008)
Import penetration ratio	-0.022 (0.014)	-0.017 (0.015)	-0.015 (0.016)	-0.012 (0.014)	-0.008 (0.016)	-0.014 (0.015)
R^2 within	0.182	0.209	0.188	0.213	0.185	0.202
Observations	2014	2014	2014	2014	2014	2014
Regressor	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
Foreign ownership dummy	0.085*** (0.037)	0.108*** (0.017)	0.165*** (0.018)	0.075*** (0.015)	0.127*** (0.020)	0.081*** (0.020)
Horizontal spillovers	-0.008 (0.016)	-0.008 (0.013)	-0.006 (0.012)	-0.052*** (0.020)	-0.040** (0.020)	-0.039** (0.018)
Backward linkages	-0.106*** (0.041)	-0.054*** (0.023)	-0.026 (0.029)	-0.076** (0.038)	-0.048** (0.021)	-0.038 (0.027)
Vertical American	0.023 (0.041)			0.027 (0.038)		
Vertical Asian		0.012 (0.031)			-0.018 (0.033)	
Vertical European			-0.032 (0.031)			-0.015 (0.029)
ABC× Horizontal spillovers	-0.035 (0.007)	0.004 (0.006)	0.001 (0.004)	0.015*** (0.007)	0.020*** (0.009)	0.015** (0.007)
ABC× Backward linkages	0.060*** (0.018)	0.045*** (0.010)	0.030*** (0.011)	0.048*** (0.016)	0.037*** (0.011)	0.032*** (0.010)
ABC× Vertical American	0.016 (0.017)			0.013 (0.015)		
Absorptive capacity × Vertical Asian		0.007 (0.012)			-0.014 (0.014)	
ABC× Vertical European			-0.015 (0.010)			-0.006 (0.011)
Herfindahl index	-0.657 (0.616)	-1.167** (0.573)	1.845*** (0.678)	-0.660 (0.595)	-0.537 (0.584)	2.024*** (0.668)
Import penetration ratio	-0.022 (0.015)	-0.00 (0.015)	-0.011 (0.016)	-0.022 (0.014)	-0.018 (0.016)	-0.015 (0.016)
R^2 within	0.181	0.187	0.180	0.201	0.184	
Observations	2014	2014	2014	2014	2014	2014

Notes: The regression includes a constant and a full set of time and two-digit industry dummies. Firm-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

Indirect effect of foreign presence

Since we are interested in the productivity spillovers from foreign firms towards domestic firms, the following regressions consider only the subsample of the latter type of firms. The results (see Table 7) suggest the existence of negative horizontal spillovers taking place through output and wage bill. Indeed, the coefficients of the shares of foreign output and wages are negative across all specifications and significant in most cases. Therefore, foreign firms' output and wages exert negative effects on the productivity of Cameroonian firms and the magnitude of their economic impact is quiet important. A back-of-the-envelope calculation shows that, between 1993 and 2005, the share of foreign output explains almost 1.28-1.32% whereas the share of foreign wages explains nearly 0.35-1.21% drop in the Cameroonian firm-level productivity.[20] Hence, horizontal spillovers have the largest effect when measured as the share in output. Despite very different economic conditions and levels of development, this result is consistent with previous studies (e.g., Aitken & Harrison, 1999; Javorcik, 2004) which fail to find a positive intra-industry effect in developing countries, e.g., Venezuela and Lithuania, respectively. This result is in contrast with the firm-level studies of Djankov and Hoekman (2000) who find evidence of positive intra-sectoral spillovers in the Czech enterprises. No clear relationship could be established between the backward linkage variable and the Cameroonian firm-level TFP. The same goes for backward spillovers by country of origin, except in column (3) of the specification using the share of foreign output; here the coefficient of vertical European is positive and significant at the 5% level (estimate=0.015, standard-error=0.006, t-statistic=2.57 and p-value=0.043).

It has been argued that the ability of domestic firms to realize foreign presence spillovers might depend on their absorptive capacity. Hence, the extent to which the Cameroonian firms are able to exploit external knowledge depends on their level of absorptive capacity. The coefficient of the interaction between the absorptive capacity and the measures of horizontal spillovers is positive and statistically significant in all cases. This positive interaction term suggests that Cameroonian firms with greater absorptive capacity benefit more from foreign presence in the same industry. Specifically, using the results in column (3) in each specification, for example, if the absorptive capacity increases by 10%, the productivity benefit of foreign presence increases by almost 0.06 percentage points [$\exp(0.006 \times 0.1) - 1$] in the case of the share of foreign employment, 0.26 percentage points [$\exp(0.026 \times 0.1) - 1$] in the case of the share of foreign output, 0.12 percentage points [$\exp(0.012 \times 0.1) - 1$] in the case of the share of foreign wage, and 0.14 percentage points [$\exp(0.014 \times 0.1) - 1$] in the case of the share of foreign capital.[21] Likewise, the cross-effect of absorptive capacity

20 The computations simply involve taking the mean of the independent variable, multiplying it by its regression coefficient and taking that as a percentage of the mean of the dependent variable.

21 As Thornton and Innes (1989) and Blalock and Simon (2009) pointed out, in a semilog model, like ours, the marginal effect of coefficient $b = \exp(b\delta x) - 1$.

with the measures of vertical spillovers is positive and statistically significant in most cases. So, Cameroonian firms with the highest levels of absorptive capacity benefit more from downstream foreign presence. For example, the results using the share of foreign employment indicate that, if the absorptive capacity of Cameroonian firms increases by 10%, the productivity benefit of downstream foreign presence increases by about 0.14-0.2 percentage points. As regards backward linkages by the country of origin of foreign investors, the coefficient of the interactive term of absorptive capacity with the American vertical spillovers variable is positive across all specifications and significant only in two out of four cases; the cross-effect of absorptive capacity with Asian vertical FDI is positive in all cases but significant only in one out of four cases; and finally the interaction term of vertical European and local firms' absorptive capacity is positively signed and statistically significant in all cases. Statistical significance aside, these results provide support that the local Cameroonian firms with greater absorptive capacity will benefit more from the presence of American, Asian and European investors in downstream industries.

The exercise is also conducted on the balanced panel sample of domestic firms. The OLS estimates using one-and two-year differences are presented in Table 8 panels A and B. The effect of intra-industry spillovers is now negative for all measures of horizontal spillovers and significant in most cases. This result confirms that Cameroonian firms do not benefit from contact with foreign firms within the same sector. Also, the results indicate negative and significant backward spillovers coming from foreign affiliates in downstream sectors. This is not in line with the evidence of a positive and significant association between the presence of American firms in downstream sectors and the productivity of Romanian firms in the supplying industries by Javorcik and Spatareanu (2011). Likewise, the previous result is in contrast with Javorcik and Spatareanu (2011) who find no significant relationship between the presence of European affiliates and the TFP of Romania firms in the supplying industries. Several reasons may explain this negative effect of the presence of foreign affiliates in downstream sectors. First, foreign American, European and Asian firms may be operating in enclave sectors without significant integration in the national economy. Second, as pointed out by Rodriguez-Clare (1996), this may perhaps be due to the fact that Cameroonian firms do not fulfil the requirements of American, European and Asian affiliates, e.g., provide the variety of inputs these foreign firms require. Last and not the least, this result may be explained by the fact that the American, European and Asian foreign firms have greater bargaining power than their local suppliers (Girma et al., 2008).

As already indicated, the extent to which the local firm is able to benefit from foreign presence spillovers depends on its level of absorptive capacity among others. In almost all specifications, and consistent with the estimates presented in Table 7, the coefficients of the interaction between the absorptive capacity and horizontal spillover variables are positive and significant. The interaction terms of the absorptive capacity and measures of vertical spillovers (overall and by the country of origin) are positively signed and significant in most cases. These results again indicate

that Cameroonian firms with greater absorptive capacity benefit more from both horizontal and vertical spillovers.

All in all, the results from tables 5 and 6 lend support to the hypothesis that foreign firms do have higher productivity than Cameroonian-owned firms. The results from tables 7 and 8 on the test for spillovers from foreign presence to domestic enterprises reveal that foreign presence negatively affects the productivity of domestically owned firms within and across sectors. The empirical analysis also produces evidence showing a negative association between the presence of American, European and Asian affiliates in downstream sectors and the productivity of Cameroonian enterprises in the supplying industries. Moreover, the results indicate that Cameroonian manufacturers with the highest levels of absorptive capacity benefit the most from intra-industry and downstream foreign presence.

Table 7: Indirect impact of foreign ownership, 1993-2005, unbalanced sample of Cameroonian indigenous firms

Regressor	Share of foreign					
	Employment			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	0.002 (0.002)	0.006 (0.006)	-0.003 (0.003)	-0.008 (0.008)	-0.008* (0.005)	-0.012*** (0.004)
Backward linkages	-0.016*** (0.006)	-0.011 (0.008)	0.001 (0.006)	-0.009 (0.010)	-0.005 (0.006)	0.018*** (0.006)
Vertical American	0.004 (0.004)			0.009 (0.008)		
Vertical Asian		-0.002 (0.008)			-0.002 (0.002)	
Vertical European			-0.002 (0.004)			-0.005*** (0.001)
ABC Horizontal spillovers	0.004*** (0.001)	0.008*** (0.002)	0.005*** (0.001)	0.008*** (0.001)	0.013*** (0.003)	0.020*** (0.006)
ABC Backward linkages	0.015*** (0.001)	0.014*** (0.004)	0.020*** (0.004)	0.006 (0.004)	0.018 (0.018)	0.018 (0.015)
ABC Vertical American	0.010*** (0.001)			0.011*** (0.006)		
Absorptive capacityVertical Asian		0.002 (0.003)			0.004* (0.002)	
ABCVertical European			0.010*** (0.001)			0.006*** (0.002)
Herfindahl index	-0.012*** (0.185)	0.008 (0.188)	0.081 (0.280)	-0.163 (0.265)	0.711* (0.452)	0.240 (0.175)
Import penetration ratio	-0.006 (0.006)	-0.007* (0.004)	-0.002 (0.004)	-0.005 (0.006)	-0.005 (0.002)	-0.006*** (0.002)
R^2 within	0.855	0.950	0.947	0.853		0.946
Observations	1074	1074	1074	1074	1074	1074
Regressor	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.007*** (0.002)	-0.002 (0.003)	-0.004*** (0.001)	0.001 (0.002)	-0.008 (0.007)	-0.002 (0.003)
Backward linkages	-0.012*** (0.006)	-0.004 (0.003)	0.001 (0.004)	-0.011 (0.008)	0.004 (0.006)	0.002 (0.006)
Vertical American	0.010*** (0.003)			0.005 (0.003)		
Vertical Asian		0.004 (0.003)			-0.016*** (0.008)	
Vertical European			-0.003*** (0.001)			0.004 (0.005)
ABC Horizontal spillovers	0.009*** (0.001)	0.012*** (0.001)	0.012*** (0.001)	0.007*** (0.001)	0.012*** (0.003)	0.014*** (0.003)
ABC Backward linkages	0.008*** (0.001)	0.003 (0.002)	0.007*** (0.002)	0.009*** (0.004)	0.004 (0.005)	0.006 (0.007)
ABC Vertical American	0.008 (0.005)			0.008 (0.005)		
Absorptive capacityVertical Asian		0.007 (0.005)			0.005 (0.005)	
ABCVertical European			0.004*** (0.002)			0.006** (0.003)
Herfindahl index	-0.249 (0.267)	0.575*** (0.208)	-0.084 (0.145)	-0.313 (0.334)	0.178 (0.458)	0.487*** (0.216)
Import penetration ratio	-0.002 (0.007)	0.007*** (0.002)	0.005 (0.005)	-0.005 (0.006)	0.005 (0.007)	0.002 (0.006)
R^2 within	0.844	0.984	0.974	0.859	0.978	0.971
Observations	1074	1074	1074	530	530	530

Notes: Firm fixed effect model. Dependent variable: log firm-level relative TFP. The regression includes a constant and a full set of time and industry dummies. Industry-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

Table 8: Indirect impact of foreign ownership, 1993-2005, balanced sample of Cameroonian indigenous firms

Panel A: one-year differences	Share of foreign					
	Employment:			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.016 (0.018)	-0.014*** (0.007)	-0.011 (0.020)	-0.018*** (0.007)	-0.012*** (0.006)	-0.003 (0.020)
Backward linkages	-0.158*** (0.060)	-0.112*** (0.021)	-0.024 (0.083)	-0.145* (0.080)	-0.131*** (0.025)	-0.128 (0.108)
Vertical Americans	0.064 (0.092)			0.006 (0.116)		
Vertical Asian		-0.170* (0.101)			-0.069 (0.076)	
Vertical Europeans			-0.023 (0.096)			-0.085 (0.137)
ABCHorizontal spillovers	0.008 (0.008)	0.022*** (0.004)	0.006 (0.008)	0.006 (0.004)	0.018*** (0.001)	0.037 (0.051)
ABC Backward linkages	0.075*** (0.032)	0.071*** (0.009)	0.036 (0.028)	0.042 (0.047)	0.071*** (0.002)	0.041 (0.052)
ABC Vertical Americans	0.022 (0.025)			0.010 (0.042)		
Absorptive capacityVertical Asian		0.084*** (0.026)			0.011 (0.027)	
ABCVertical Europeans			0.004 (0.028)			0.022 (0.044)
Herfindahl index	-0.975 (1.818)	-0.085** (0.586)	2.680*** (0.028)	-0.581 (0.542)	0.806 (1.736)	2.267*** (0.788)
Import penetration ratio	-0.018 (0.020)	-0.017** (0.008)	0.004 (0.035)	-0.038 (0.067)	-0.168*** (0.065)	0.105 (0.086)
R^2 within	0.228	0.428	0.263	0.364	0.820	0.424
Observations	530	530	530	650	650	530
Panel A: one-year differences	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.105*** (0.047)	0.047*** (0.020)	-0.090* (0.055)	-0.039 (0.030)	0.011 (0.066)	-0.024 (0.050)
Backward linkages	0.016 (0.131)	-0.137*** (0.048)	0.196 (0.153)	-0.105*** (0.052)	-0.080 (0.090)	-0.005 (0.070)
Vertical Americans	0.024 (0.073)			0.038 (0.088)		
Vertical Asian		-0.136 (0.102)			-0.114 (0.080)	
Vertical Europeans			-0.080 (0.075)			-0.036 (0.096)
ABCHorizontal spillovers	0.045** (0.028)	0.031** (0.018)	0.024 (0.028)	0.011 (0.016)	0.008 (0.032)	0.006 (0.024)
ABC Backward linkages	0.014 (0.084)	0.121*** (0.036)	0.026 (0.071)	0.058*** (0.018)	0.061** (0.053)	0.031 (0.025)
ABC Vertical Americans	0.012 (0.018)			0.014 (0.025)		
Absorptive capacityVertical Asian		0.036 (0.027)			0.040*** (0.014)	
ABCVertical			-0.015 (0.020)			0.011 (0.053)

Table 8 (continued)

Panel B: two-year differences	Share of foreign					
	Employment			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.018*** (0.007)	-0.012*** (0.006)	-0.003 (0.020)	-0.125*** (0.034)	0.158 (0.098)	-0.026 (0.062)
Backward linkages	-0.145 (0.80)	-0.151*** (0.025)	-0.138 (0.108)	-0.038 (0.072)	-0.286** (0.155)	-0.081 (0.104)
Vertical American	0.005 (0.118)			0.048 (0.082)		
Vertical Asian		-0.089 (0.076)			-0.162*** (0.062)	
Vertical European			-0.085 (0.157)			-0.063 (0.108)
ABCHorizontal spillovers	0.005 (0.004)	0.018*** (0.001)	0.004 (0.012)	0.061*** (0.014)	0.128 (0.083)	0.018 (0.038)
ABC Backward linkages	0.042 (0.047)	0.071*** (0.002)	0.041 (0.032)	0.029 (0.041)	0.513** (0.168)	0.011 (0.094)
ABC Vertical American	0.010 (0.042)			0.013 (0.028)		
Absorptive capacityVertical Asian		0.011 (0.027)			0.052*** (0.018)	
ABCVertical European			0.022 (0.044)			0.013 (0.033)
Herfindahl index	0.581 (0.455)	0.886 (0.738)	0.287*** (0.078)	-1.011 (1.624)	4.652*** (1.281)	2.673*** (0.693)
Import penetration ratio	-0.038 (0.067)	-0.189*** (0.065)	0.103 (0.066)	0.007 (0.051)	0.088 (0.060)	0.100** (0.054)
R^2 within	0.164	0.820	0.424	0.595	0.691	0.458
Observations	480	480	480	480	480	480
Panel B: two-year differences	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	0.007 (0.040)	-0.071*** (0.017)	-0.034*** (0.004)	-0.067 (0.064)	-0.087*** (0.030)	-0.036*** (0.006)
Backward linkages	-0.190*** (0.088)	-0.127*** (0.021)	-0.122** (0.060)	-0.109 (0.098)	-0.153*** (0.037)	-0.111 (0.070)
Vertical American	0.029 (0.095)			0.023 (0.154)		
Vertical Asian		0.056 (0.108)			-0.088 (0.058)	
Vertical European			-0.090* (0.051)			-0.065 (0.060)
ABCHorizontal spillovers	0.001 (0.022)	0.048*** (0.003)	0.005 (0.015)	0.018 (0.022)	0.091*** (0.018)	0.008 (0.025)
ABC Backward linkages	0.053 (0.058)	0.080*** (0.003)	0.041*** (0.010)	0.043 (0.048)	0.018** (0.010)	0.041*** (0.016)
ABC Vertical American	0.001 (0.057)			0.007 (0.055)		
Absorptive capacityVertical Asian		0.046 (0.043)			0.048** (0.025)	
ABCVertical European			0.023 (0.020)			0.017 (0.014)
Herfindahl index	-0.004 (0.067)	0.102 (0.210)	0.234*** (0.088)	-1.635 (1.875)	0.118*** (0.025)	1.184*** (0.083)
Import penetration ratio	-0.051 (0.070)	-0.098 (0.113)	0.082 (0.065)	-0.008 (0.075)	-0.218*** (0.060)	0.100* (0.060)
R^2 within	0.345	0.812	0.428	0.377	0.608	0.452
Observations	480	480	480	480	480	480

Notes: The regression includes a constant and a full set of time and two-digit industry dummies. Industry-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

7.0 Robustness check

We conducted a number of robustness checks. First, as pointed out by Javorcik and Spatareanu (2011), a potential concern with the standard definition of foreign ownership (e.g., at least 10% of capital owned by foreign investors) is that a small ownership share gives a foreign investor little control over the firm and reduces incentives for technology transfer. Hence, we check the sensitivity of our results using a 50% cut-off to calculate the proxies for foreign presence spillovers.[22] The unreported results (to save space) on the direct impact of foreign presence show that using the majority of ownership does not substantially change the results. In all specifications, we find a positive and statistically significant coefficient on the dummy for foreign presence. Hence, robust results indicate that foreign firms perform better than Cameroonian firms.

Turning to spillovers, the presence of foreign firms has a negative spillover effect on TFP of Cameroonian firms in the same sector (Table 9). In particular, the coefficient on the proxies of foreign presence continues to be negative and significant in most cases. Likewise, we continue to find evidence of negative backward linkages on the productivity of Cameroonian-owned enterprises. These results corroborate the existence of negative spillovers from foreign presence to Cameroonian firms within and across industries. Across all specifications, the interactions of the absorptive capacity of local firms and the horizontal and vertical spillovers variables continue to bear positive and statistically significant coefficients. Hence, the Cameroonian firms with a greater absorptive capacity continue to benefit the most from foreign presence within and across industries. Summarizing, the results using a 50% cut-off support our earlier conclusions.

In a second check, we examine whether the intensity of foreign ownership matters for spillovers. Here, the extent of foreign presence in a sector is defined as the foreign ownership share, averaged over all firms in the sector, weighted by each firm's share in sector output, employment, wage or capital (see, e.g., Aitken & Harrison, 1999; Javorcik, 2004). The results (see Table 10) led to exactly the same conclusions as those presented previously. As reported in the different specifications, the point estimate of all measures of foreign presence is still significant and negative, confirming that the presence of foreign firms has a negative spillover effect on TFP of Cameroonian

22 This cut-off is comparable with the one in Barba Navaretti et al. (2003), Görg and Strobl (2003), and Görg et al. (2009).

firms within the same sector. That is, Cameroonian firms in sectors with more foreign presence (in terms of employment, output, wage and capital) are significantly less productive than those in sectors with a smaller measure of foreign presence. The presence of foreign investors in downstream industries, as well as the US, European and Asian affiliates' presence in downstream sectors still seems to depress the productivity performance of Cameroonian firms. The interactive term between all the spillover variables and the domestic firms' absorptive capacity yields identical results to those reported previously, i.e., positive and significant in most cases, corroborating the finding that Cameroonian firms with limited absorptive capacity benefit the less from foreign presence within and across industries. All in all, the findings of (i) negative intra-industry spillovers for almost all measures of foreign presence, (ii) negative productivity spillovers from American, European and Asian affiliates taking place through backward linkages, and (iii) the positive coefficients for the interaction terms between the proxies for horizontal and vertical spillovers and the absorptive capacity of domestic firms, are robust to the use of the intensity of foreign ownership.

The last robustness check is related to the likely endogeneity of variables in the model. The regressions thus far assume that the different regressors are strictly exogenous to the productivity of firms. This may be a strong assumption if foreign presence variables were correlated with other (un)observables that affect the productivity of firms and that are not controlled for in the regressions or whether foreign presence measures were functions of the productivity of firms rather than determinants of it. In order to take account of this potential endogeneity, we resort to using the generalized methods of moments (GMM) systems estimator developed by Blundell and Bond (1998). In the interest of space, the unreported results on the direct effect of foreign presence still indicate that domestically owned firms are less productive than their foreign-owned counterparts. That is, the dummy variable for foreign ownership continues to be positively related to the performance of firms, and the effect is statistically significant in all cases. Hence, robust results offer support that foreign firms are more productive than Cameroonian ones.

Coming to the spillover regressors, the system GMM estimations results are reported in Table 11. As can be seen, the test of second-order autocorrelation fails to reject the specifications at conventional levels. The Sargan-Hansen test of the validity of instruments does not reject the over-identifying restrictions at conventional levels of significance. The shares of foreign employment, output, wage and capital continue to be negatively and significantly correlated with the productivity of Cameroonian firms across all specifications, corroborating the evidence of negative horizontal spillovers. Our estimates of vertical spillovers, as well as of vertical origin are very robust to the use of a different estimation strategy: the results on vertical spillovers and vertical spillovers according to the country of origin of foreign firms are virtually unchanged in almost all cases. The estimates on the interactive variables between the measures of horizontal spillovers and the domestic firms' absorptive capacity are positive and significant across almost all specifications. The same goes for the interaction terms between the vertical spillovers and vertical spillovers according to the country of origin of foreign investors and the absorptive capacity of Cameroonian firms.

Table 9: Indirect impact of foreign ownership, 1993-2005, unbalanced sample of Cameroonian indigenous firms, 1993-2005 - robustness check using 50% cut-off

Regressor	Share of foreign					
	Employment			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	0.003 (0.006)	-0.004 (0.004)	0.002 (0.005)	0.002 (0.008)	0.006 (0.008)	-0.018 (0.016)
Backward linkages	0.008 (0.006)	-0.013 (0.017)	-0.005 (0.007)	0.007 (0.024)	-0.008 (0.060)	0.029 (0.028)
Vertical American	-0.013 (0.011)			-0.013 (0.026)		
Vertical Asian		0.021 (0.026)			0.068 (0.064)	
Vertical European			-0.108*** (0.027)			-0.114*** (0.029)
ABD Horizontal spillovers	0.006 (0.004)	0.006 (0.004)	0.003 (0.005)	0.006 (0.005)	-0.007 (0.015)	0.018 (0.014)
ABC Backward linkages	0.047*** (0.006)	0.038*** (0.013)	0.022*** (0.006)	0.045*** (0.006)	0.006 (0.065)	0.008 (0.024)
ABC Vertical American	0.024*** (0.007)			0.025*** (0.007)		
Absorptive capacity/Vertical Asian		-0.001 (0.016)			0.048 (0.065)	
ABD/Vertical European			0.054** (0.024)			0.068*** (0.023)
Herfindahl index	1.357 (1.256)	0.788 (0.885)	0.185 (0.936)	1.806 (1.884)	1.981 (2.422)	0.207 (0.940)
Import penetration ratio	-0.009 (0.010)	-0.028 (0.016)	0.002 (0.015)	-0.010 (0.016)	-0.054 (0.040)	-0.005 (0.015)
R^2 within	0.834	0.878	0.851	0.818	0.878	0.828
Observations	1074	1074	1074	1074	1074	1074
Regressor	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.010*** (0.002)	-0.017*** (0.005)	-0.010*** (0.002)	0.0003 (0.004)	-0.008 (0.011)	0.008 (0.008)
Backward linkages	-0.002 (0.006)	0.010 (0.006)	0.004*** (0.001)	0.008 (0.011)	-0.068* (0.034)	-0.007 (0.006)
Vertical American	0.018 (0.011)			-0.009 (0.020)		
Vertical Asian		-0.007 (0.007)			0.073** (0.028)	
Vertical European			-0.020 (0.018)			-0.101*** (0.041)
ABD Horizontal spillovers	0.015*** (0.002)	0.018*** (0.001)	0.017*** (0.001)	0.010* (0.006)	0.007 (0.008)	0.004 (0.009)
ABC Backward linkages	0.008 (0.006)	0.028*** (0.006)	-0.0006 (0.002)	0.048*** (0.006)	0.006** (0.064)	0.018 (0.016)
ABC Vertical American	0.003 (0.006)			0.038*** (0.015)		
Absorptive capacity/Vertical Asian		0.029*** (0.006)			0.066 (0.064)	
ABD/Vertical European			0.013 (0.016)			0.060** (0.029)
Herfindahl index	0.581 (0.485)	0.303 (0.485)	0.123 (0.188)	1.767 (1.470)	1.874 (2.110)	0.202 (0.805)

Notes: Firm fixed effect model. Dependent variable: log firm-level relative TFP. The regression includes a constant and a full set of time and industry dummies. Industry-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

Table 10: Indirect impact of foreign ownership, 1993-2005, unbalanced sample of Cameroonian indigenous firms, 1993-2005 - robustness check using intensity of foreign ownership

Regressor	Share of foreign					
	Employment			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.012** (0.007)	-0.016*** (0.007)	-0.013** (0.010)	-0.009** (0.004)	-0.463 (0.358)	-0.167* (0.063)
Backward linkages	-0.282*** (0.079)	-0.471 (0.282)	-0.658 (0.546)	-0.291 (0.613)	-2.883 (1.475)	-0.148 (0.976)
Vertical American	-2.255*** (0.632)			-2.324*** (0.662)		
Vertical Asian		-0.026 (0.056)			0.255 (0.559)	
Vertical European			-0.686*** (0.135)			-0.606** (0.347)
ABCHorizontal spillovers	0.006*** (0.001)	0.006*** (0.001)	0.007*** (0.001)	0.009*** (0.003)	0.025*** (0.010)	0.011** (0.005)
ABC Backward linkages	0.339*** (0.140)	-0.547 (0.426)	-0.482 (0.884)	-0.345 (0.713)	-2.636 (1.378)	0.071 (0.113)
ABC Vertical American	3.252*** (1.296)			3.358*** (1.335)		
Absorptive capacity/Vertical Asian		0.442 (0.512)			0.131 (0.107)	
ABCVertical European			0.734*** (0.034)			0.577** (0.121)
Herfindahl index	0.942 (0.570)	0.990 (0.606)	1.035** (0.573)	1.055** (0.576)	1.052** (0.606)	1.131** (0.546)
Import penetration ratio	0.010** (0.004)	0.010** (0.004)	0.011** (0.005)	0.010 (0.006)	0.010 (0.006)	0.011** (0.005)
R^2 within	0.654	0.654	0.654	0.651	0.652	0.651
Observations	1194	1194	1194	1194	1194	1194
Regressor	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
Horizontal spillovers	-0.045** (0.014)	-0.042*** (0.012)	-0.043*** (0.014)	-0.076*** (0.030)	-0.104*** (0.030)	-0.081*** (0.025)
Backward linkages	-0.263** (0.088)	-0.443 (0.264)	-0.694 (0.576)	-0.363*** (0.163)	-0.540** (0.272)	-0.835** (0.466)
Vertical American	-2.364*** (0.662)			-2.273*** (0.727)		
Vertical Asian		0.150 (0.543)			0.394 (0.399)	
Vertical European			-0.763*** (0.051)			-0.764** (0.894)
ABCHorizontal spillovers	0.004*** (0.005)	0.013*** (0.003)	0.012** (0.006)	0.015** (0.008)	0.012 (0.010)	0.013 (0.008)
ABC Backward linkages	0.297** (0.151)	0.490** (0.033)	0.544* (0.322)	0.455*** (0.156)	0.555** (0.305)	0.634** (0.052)
ABC Vertical American	3.328*** (1.259)			3.358*** (1.121)		
Absorptive capacity/Vertical Asian		0.012 (0.036)			0.220*** (0.054)	
ABCVertical European			0.535*** (0.171)			0.553*** (0.124)
Herfindahl index	1.209** (0.618)	1.238** (0.643)	1.292** (0.632)	0.784 (0.563)	0.788 (0.509)	0.839 (0.574)
Import penetration ratio	0.006 (0.007)	0.006 (0.007)	0.007 (0.007)	0.007 (0.005)	0.006 (0.005)	0.007 (0.005)
R^2 within	0.655	0.654	0.654	0.656	0.651	0.657
Observations	1194	1194	1194	1194	1194	1194

Notes: Firm fixed effect model. Dependent variable: log firm-level relative TFP. The regression includes a constant and a full set of time and industry dummies. Industry-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

Table 11: Indirect impact of foreign ownership, 1993-2005, unbalanced sample of Cameroonian indigenous firms, 1993-2005 - robustness check using system GMM estimator

Regressor	Share of foreign					
	Employment			Output		
	[1]	[2]	[3]	[1]	[2]	[3]
$\ln(TFP)_{it}$	0.228*** (0.040)	0.452*** (0.051)	0.638*** (0.039)	0.213*** (0.037)	0.622*** (0.048)	0.525*** (0.035)
Horizontal spillovers	-0.015*** (0.002)	-0.003*** (0.004)	0.057 (0.108)	-0.025*** (0.008)	-0.007** (0.004)	-0.025* (0.014)
Backward linkages	-0.049*** (0.019)	-0.008 (0.013)	-0.006 (0.006)	-0.014 (0.011)	-0.006 (0.013)	-0.017 (0.120)
Vertical American	-0.025** (0.012)			-0.025*** (0.011)		
Vertical Asian		-0.018*** (0.006)			-0.015*** (0.006)	
Vertical European			-0.010*** (0.004)			-0.014*** (0.006)
ABC Horizontal spillovers	0.021*** (0.001)	0.001 (0.121)	0.002*** (0.001)	0.014*** (0.001)	0.003*** (0.001)	0.077* (0.040)
ABC Backward linkages	0.009*** (0.003)	-0.071 (0.126)	0.002*** (0.001)	0.001 (0.002)	0.002*** (0.002)	0.125*** (0.018)
ABC Vertical American	0.254*** (0.053)			0.072*** (0.032)		
Absorptive capacityVertical Asian		0.001 (1.002)			0.001 (1.002)	
ABCVertical European			0.005*** (0.001)			0.035** (0.014)
Herfindahl index	-0.251 (0.429)	0.182 (0.288)	0.114*** (0.041)	-0.710 (0.586)	0.205 (0.337)	0.861 (1.081)
Import penetration ratio	0.011 (0.007)	0.014 (0.009)	0.019*** (0.008)	0.016*** (0.007)	0.016 (0.009)	0.026 (0.020)
R^2 within	0.417	0.768	0.186	0823	0.649	0.781
Observations	1074	1074	1074	1074	1074	1074
Regressor	Share of foreign					
	Wage			Capital		
	[1]	[2]	[3]	[1]	[2]	[3]
$\ln(TFP)_{it}$	0.615*** (0.033)	0.729*** (0.050)	0.316*** (0.045)	0.503*** (0.040)	0.429*** (0.051)	0.835*** (0.042)
Horizontal spillovers	-0.008* (0.004)	-0.016** (0.008)	-0.018** (0.010)	-0.002 (0.003)	-0.038*** (0.007)	-0.215*** (0.021)
Backward linkages	-0.035*** (0.015)	-0.008 (0.013)	-0.071 (0.102)	-0.037*** (0.015)	0.005 (0.012)	-0.085 (0.088)
Vertical American	-0.024** (0.011)			-0.020** (0.011)		
Vertical Asian		-0.013* (0.008)			-0.533*** (0.011)	
Vertical European			-0.014*** (0.006)			-0.018 (0.014)
ABC Horizontal spillovers	0.035*** (0.001)	0.004*** (0.000)	0.027*** (0.000)	0.002* (0.001)	0.001 (0.002)	0.145*** (0.002)
ABC Backward linkages	0.041*** (0.002)	0.001*** (0.012)	0.057*** (0.004)	0.004** (0.002)	-0.001 (0.003)	0.037*** (0.002)
ABC Vertical American	0.001 (0.002)			0.009*** (0.022)		
Absorptive capacityVertical Asian		0.001 (1.002)			0.002 (1.005)	
ABCVertical European			0.001*** (0.017)			0.074*** (0.023)
Herfindahl index	-0.530 (0.425)	0.002 (1.280)	1.147 (1.025)	-0.334 (0.407)	-0.185 (0.262)	-0.998 (0.758)
Import penetration ratio	0.012*** (0.007)	0.010 (1.011)	0.036 (1.018)	0.013** (0.007)	0.010** (0.010)	0.025*** (0.010)
R^2 within	0.574	0.835	0.639	0.514	0.751	0.236
Observations	1074	1074	1074	1074	1074	1074

Notes: The regression includes a constant and a full set of time and two-digit industry dummies. Industry-level clustered standard errors are in parentheses. The symbols ***, ** and * indicate 1%, 5% and 10% significance level, respectively.

8. 0 Conclusion

The presence of foreign ownership is widely believed to play an important role for international transmission of new technology from developed to developing economies, stimulating productivity in the host country. In the early 1990s, the Cameroonian Government initiated openness-friendly policies in order to attract foreign direct investment (FDI). The main motivation of this interest is largely based on the presumed higher productivity of multinationals and the resulting potential for spillovers to Cameroonian-owned firms. This paper aims at providing, empirically, the existence of such spillover effects. The analysis, based on a firm-level panel data set from Cameroon's manufacturing sector over the period 1993-2005, tried achieving three specific objectives. First, test for the direct effect of foreign presence, i.e., whether foreign firms perform better than Cameroonian indigenous firms. Second, determine whether there are any spillover effects from the presence of foreign firms within and across industries, with the downstream FDI spillovers differentiated by the country of origin of foreign investors. Finally, examine whether and how the local firms' absorptive capacity moderates the degree of horizontal and vertical productivity spillovers.

First, as expected, we find that foreign firms perform better than Cameroonian firms. Second, consistent with the earlier firm-level studies of developing countries, evidence of negative intra-sectoral spillovers is found. Specifically, the increases in the shares of foreign employment, output, wage bill and capital negatively affect the productivity of domestically owned enterprises within the same industry. Third, there is an indication of negative backward linkages as well as negative spillovers from the presence of American, European and Asian affiliates in sectors supplying intermediate inputs. The main explanation of these negative horizontal and vertical productivity spillovers is that Cameroonian firms do not have the necessary absorptive capacity to benefit from foreign presence, i.e., Cameroonian firms with the highest levels of absorptive capacity benefit the most from foreign presence. These results are robust to alternative model specifications as well as the use of both balanced and unbalanced panel data set.

The policy implications of these results are clear. Our empirical results demonstrate that the substantial impact that foreign firms have on the productivity of domestic firms is through both horizontal and vertical linkages, hence providing some justification for the policy of openness to foreign investments. However, to benefit

from foreign presence within and across industries, Cameroonian firms themselves need to enhance their ability to learn from foreign firms. This is especially important for indigenous firms as their technological capabilities are relatively low. High absorptive capacities make it easier for local firms to learn from foreign firms, enable them to be in a better position to compete and collaborate with foreign affiliates in the same industries, and could possibly turn the negative spillover effects around to be positive. The Cameroonian Government needs to make every effort to provide a more favourable business environment to encourage local firms to conduct more R&D and improve their technological capabilities.

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Appendix

Table A1: Panel information

Year	1803	1804	1805	1806	1807	1808	1809	2000	2001	2002	2003	2004	2005	Balanced panel[a]
	45 (9.2%)													59
		47 (8.8%)												43
			55 (3.6%)											47
				55 (10.9%)										45
					52 (13.5%)									45
						40 (12%)								43
							60 (10.9%)							45
								45 (7.7%)						40
									41 (4.8%)					39
										45 (11.1%)				40
											44 (2.4%)			40
												43 (12.2%)		35
													20 (15%)	17
Average size	281	807	470	524	1942	1250	2532	1787	1818	3305	3385	1585	3401	
Average foreign ownership share	0.720	0.722	0.762	0.749	0.764	0.780	0.752	0.785	0.788	0.789	0.784	0.772	0.781	

Notes: [a] The balanced panel consists of continuous firms, i.e., firms that never exited. The figures in parentheses are the exit rate for each year.

Table A2: Summary statistics of characteristics of firms (variables not in logarithm)

Variable	All		Foreign firms		Domestic firms		Difference in mean[a]
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Output	4378.980	13815.630	5355.409	16160.050	2146.359	4825.270	3209.050***
Skilled labour	85	228	86	225	81	235	5
Unskilled labour	1678	9912	1946	11227	1063	5856	884
Skilled wage	4.607	5.230	4.799	5.097	4.167	5.502	0.632**
Unskilled wage	1.731	8.948	1.875	10.484	1.401	3.431	0.474
Materials	4799.072	16529.600	5721.228	19588.560	2690.546	3816.498	3030.682***
Capital	6773.068	17480.500	7380.170	18754.420	5384.920	14069.030	1995.250**
# observations	3927		2736		1191		

Notes: a A difference of means test between the group of foreign firms and domestic firms for the whole period. The symbols *** and ** indicate 1% and 5% significance level, respectively.

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