Curse or blessing? multinational corporations and labor market outcomes in Africa

Curse or Blessing? Multinational Corporations and Labor Market Outcomes in Africa*

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March 2023

Abstract

Do multinational enterprises create local job opportunities in developing countries? We address this question in the context of Sub-Saharan Africa by combining information on domestic and foreign multinationals' affiliates over more than a decade with geolocalised individual-level data on labor supply. Having a multinational's affiliate within walking distance correlates with an increase in employment of about +4% with respect to the sample mean. Multinationals' activity is correlated with higher off–farm and lower on–farm employment (+13% and -7%, respectively), a result driven by affiliates of foreign companies. Female employment and "good jobs" increase around affiliates, but only when they are part of foreign groups. A battery of robustness checks and a retrospective analysis exploiting time variation in the individual labor market entry deliver qualitatively similar results, suggesting our findings do not suffer major identification issues.

Keywords: multinational enterprises, labor supply, job quality, spatial analysis, Africa
JEL Codes: F23, F66, F16, O12, J01

*We thank Oriana Bandiera, Jann Lay, Roberto Nistico', Marco Sanfilippo, Vincenzo Scrutinio, Alessandro Sforza and participants at the WIP seminar series at the University of Bologna, the 12th International Conference on Economics of Global Interactions in Bari, and the IDOS Conference Africas Regional and Global Integration in Bonn for helpful comments and discussions. We are grateful to Paul-Emile Bernard and Giacomo Opocher for excellent research assistance. None of the authors declare any conflict of interest. The usual disclaimer applies.

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1 Introduction

Job creation is one of the greatest development challenges in Sub-Saharan Africa. A booming population, coupled with sluggish structural transformation, makes productive employment growth the most pressing policy issue if the region is to achieve economic progress and stability (WDR, 2013; Gollin, 2018; Diao et al., 2019; WB, 2017). A weak industrialization process has been hampering Africa's capacity to increase wage-payment employment and "good jobs" through labor market reform and supply–side labor market policies (Rodrik, 2016; Diao et al., 2021).[1] Thus, attention has shifted to the role of global economic integration and in particular the impact of multinational enterprises (MNEs) in creating (or offsetting) job opportunities in Africa. On the one hand, some foreign companies have been criticised for their extractive activities and monopsony power in development settings, which may curb local employment and growth (Aitken and Harrison, 1999; Borensztein and Lee, 1995; Dell and Olken, 2017). On the other hand, the capital injections, international practices and higher productivity associated with these firms can benefit the local economy (Hirschman, 1957; Gorg and Strobl, 2001; Javorcik, 2004a). Despite this issue has hit, and sometimes polarized, public opinion, there is no global evidence on the impact of large labor-demand shocks, such as those embodied by the arrival of MNEs, on employment outcomes in Africa. The main reason for this lacuna is the lack of granular geo–localized data on MNEs and individual locations for a sizeable group of countries in a panel setting.

This paper provides new systematic evidence on this controversial topic by employing novel data on the universe of affiliates of multinational firms, both domestic and foreign, in Sub-Saharan Africa. We document the consequences of the MNE presence for labor supply of the working-age population in Africa by matching detailed data on affiliates between 2007 and 2018 with geo–located individual-level data from the Demographic and Health Surveys (DHS).[2] Exploiting very granular information on individuals living fairly close (at different radii, up to 50 km) to MNE affiliates, we can see how the local labor market conditions created by the arrival of affiliates influence labor market participation on– and off–farm. Importantly, we exploit the geographical location of MNEs to test whether the labor supply effect varies depending on the enterprise– *vs* individual–level characteristics.[3]

[1] The majority of African workers are employed in low-productivity jobs, such as subsistence agriculture and low value-added services. Self-employment has continued to be predominant, especially in urban areas (Diao et al., 2019; IMF, 2018).

[2] See for example Mamo et al. (2019) for the use of the geolocalized component of DHS.

[3] It is worth noting that, while our analysis focuses on the ability to generate employment opportunities, we cannot distinguish between direct MNEs' employment from spillover effects in other sectors/industries/firms.

Results show that MNEs significantly affect labor market participation (+4% with respect to sample mean) and the effect is highly localized, vanishing when distance from the affiliate(s) is higher than 5 km. This result supports the idea that proximity may foster, through local interactions, positive productive spillovers from foreign MNEs on the local economy – while the same does not hold for regions and people located further away.

Interestingly, we find heterogenous effects across on and off-farm employment: Being close to MNEs significantly increases the average number of off-farm jobs (+13% with respect to sample mean) while decreasing on–farm labor supply (-7%). Since economic development typically comes when the more productive sectors absorb resources from the less dynamic ones, this result would appear to indicate a positive contribution of MNEs to employment and structural change.

Moreover, distinguishing between domestic and foreign affiliates (those with the headquarter located within country and abroad respectively), we find the effects to be asymmetric: only foreign affiliates increase off–farm jobs, while reducing employment in agriculture. Domestic affiliates turn out to have a positive effect on agricultural employment but no significant impact on off-farm jobs. We obtain the same results while running a retrospective analysis with a quasi–experimental sample, i.e those individuals that experienced the arrival of an affiliate just before and after their labor market entry. This is reassuring and suggests that the main analysis does not suffer severe identification issues.

Overall, our findings suggest that foreign affiliates may generate positive spillovers in the local economy in a way that is radically different from multinational affiliates with headquarters located in the same country. This is consistent with the argument that MNEs, especially from advanced countries, can foster technological spillovers and improve working conditions (e.g., Javorcik, 2004b; Keller and Yeaple, 2009).[4] From an identification perspective, significant asymmetric effects across domestic and foreign affiliates wipe out potential concerns about reverse causality bias, since if firms locate in areas with higher labor supply, this would in principle hold for any firm, regardless their nationality of ownership. We go deeper into this issue, which is related to the mechanisms through which MNEs affect the local economy, by distinguishing foreign affiliates between those with headquarters in OECD and non–OECD countries, and between countries with and without a bilateral colonial history. We expect that if spillovers flow through international practices and technology diffusion as well as positive externalities, these will be greater the wealthier and the less tied to colonial legacy the headquarter's country is (Michalopoulos and Pa-

[4] Evidence indicates that MNEs frequently opt to acquire inputs from autonomous entities via non-equity alliances such as franchising, contractual agreements, and strategic collaborations. However, they predominantly rely on their overseas subsidiaries for transferring competencies (Atalay et al., 2014; Ramondo et al., 2016) or for the production of inputs critical to technology (Berlingieri et al., 2018).

paioannou, 2020; Bruhn and Gallego, 2012). Indeed, we find supportive evidence on this issue, since the positive local employment effect of foreign affiliates is driven entirely by those whose headquarter is in an OECD or non-colonial country. We argue that these asymmetric effects offer significant support to the fact that foreign multinational companies in Africa may boost capital and technology transfers, international business practices and productivity externalities that spill over the local host economy. The same does not hold for domestic affiliates. Spillovers from foreign affiliates may derive from increased competition, productivity and technological change across local firms and activities, which in turn boost labor turnover and employment.

Our results are obtained at the within-region-and-year level and excluding migrants, where the latter could introduce biased results if people choose to relocate owing to the arrival of MNEs. More specifically, we estimate the effect of exposure to MNEs by comparing non-migrant individuals living nearby an affiliate with others in the same region and year not exposed to any affiliate, conditional on individual controls. Heterogeneous effects by workers' gender and age (youth employment) show that young and male individuals are more likely to be employed if a domestic affiliate is nearby, while this is true for women only if the local affiliate is foreign. We test all of these findings for robustness to bias from the exclusion of migrants or bias for differential effects across (primary/secondary/tertiary) sectors.

Finally, we explore the degree to which MNEs may stimulate the creation of "good jobs" by distinguishing between permanent, temporary and seasonal employment. The stability of jobs is arguably an instance of job quality (Rodrik and Stantcheva, 2021). We find that, on average, MNEs significantly increase permanent jobs, while decreasing both occasional and seasonal employment. The effect on permanent employment is again driven mostly by foreign affiliates, suggesting that local "good jobs" are more likely to be created by foreign MNE affiliates.

All in all, our findings resonate with recent observations that global integration and exposure to major labor-demand shocks may create jobs and reallocate workers to more productive occupations in Africa. According to our findings, this holds especially for the foreign affiliates of multinational firms. Many developing countries have experienced rapid global integration over the last few years, and in Africa, in particular, the number of multinational affiliates increased by more than 250% from 2007 to 2018.

Substantial literature has shown that foreign MNEs may foster productivity and knowledge spillovers in local firms in the host economy, mainly through ownership advantages and mechanisms of interaction (Blomstrom, 1986; Blomstrom and Wolff, 1989; Xu, 2000). However, there is less evidence on spillovers *among individuals* in host regions, especially in terms of labor market outcomes and job quality. The extent to which multinational enterprises are a source of growth

or instead of "exploitation" of local workers is a contentious question. Study of the issue has suffered a lack of comprehensive data and large-scale geolocalised information, in that the precise location of MNEs' affiliates is rarely available, especially in developing countries in Africa. A series of recent papers have provided some country–level or cross-regional evidence using FDI aggregates or specific MNE/country settings. In an influential paper Heath and Mobarak (2015) consider the development of the garment sector in Bangladesh as an exogenous intervention across time and villages, and show its impact on women's wellbeing, in terms of educational attainment, marriage, childbirth and work of young women (see also Jensen, 2012 and Majlesi, 2016 on female employment in India and Mexico respectively). Toews and Vezina (2020), instead, study FDI bonanzas due to giant resource discoveries and focus on the job creation effects triggered by non–extraction FDIs in Mozambique. Using both household surveys and firm censuses, they estimate a large local job multiplier effect: every additional FDI job resulted in 4.4 to 6.5 additional local jobs (half in the formal and half in the informal sector). Hoekman et al. (2023) find suggestive evidence of a positive effect of FDI on structural transformation using data aggregated at the sub-national level for a subset of African countries.[5]

Our paper advances the state of this literature by leveraging both spatial and temporal location of MNEs throughout Sub-Saharan Africa over more than a decade to document employment patterns at the individual level in the host region. Importantly, our study provides the first systematic empirical evidence of the relationship between MNEs and labor market outcomes with continent-wide geo-localized data and we do so by disaggregating the analysis according to a number of factors, including geographical proximity, job sectors, firm nationality, time of exposure to MNEs, job quality, and individuals' age and gender.

The rest of the paper is organized as follows. Section 2 presents the data, in particular the DHS and the original data on MNEs. Section 3.2 reports the methods used in the empirical analysis and the results. Section 4 presents the analysis only among treated individuals, while Section 5 concludes.

2 Data

The setting of the study is Sub-Saharan Africa. We combine two sources of data for the period 2007–2018, namely geolocalized DHS survey data and information about MNEs in the vicinity

[5] Our analysis is also related to the literature on the effects of the rise of an export-oriented manufacturing sector in developing countries (e.g. Méndez-Chacón and Van Patten, 2022; Atkin and Gonzalez-Navarro, 2018; McCaig and Pavcnik, 2018; Verhoogen, 2008; Atkin, 2016; Atkin and Gonzalez-Navarro, 2018).

neighbourhood.

Multinational Enterprises. For MNEs, we use the database developed in Sonno (2020), which combines information on the ownership of all firms connected through an ownership link (from the Bureau Van Djik *Historical Ownership Database*), for the entire world. Starting from these data, the procedure elaborates an algorithm that retrieves the network of ownership for each business group, based on the definition of direct or indirect majority of the voting rights ($\geqslant 50.01\%$).[6] The final dataset maps the hierarchical structure of business groups by ascending the ownership structure, constructing the network of groups for more than 200 countries, from 2007 to 2018, and then geolocates by zipcode.[7] More than 6.3 million business groups, with 12.8 million affiliates for 2007-2018 are covered. For the scope of this paper, we focus on African affiliates of multinational enterprises (i.e. business groups with at least one affiliate located in a country different from the headquarters'). This dataset is rather unique in the literature as for the vast majority of developing countries, particularly in Africa, this is the first global data source with firm-level information on multinationals' hierarchies, ownership and activities in a panel setting (see Sonno, 2020, for a detailed description of the data). The bulk majority of MNE affiliates in Africa are greenfield investments, so our data nicely pick the arrival of a productive facility rather than an acquisition of something already existing.[8]

The nationality of affiliates and headquarters is central to our analysis. We distinguish between *Domestic Affiliates*, namely those located in the headquarters' country, and *Foreign Affiliates*, those located in a different country. This allows us to distinguish between organizational forms and strategic practices of multinational companies (of any origin) from the nationality of ownership, which may entail the exposure to different strategies of international activity.

DHS Data. The Demographic and Health Suveys are nationally-representative household surveys that gather a wide range of indicators on health, demographics and education. Our data cover Sub-Saharan countries, using DHS survey phases 5 to 7. The timeline runs from 2003 to 2019 with a total of more than 4,4 million observations on households in 32 African countries (i.e. household members interviewed).[9] From DHS, we use individual data for men and women

[6] This definition of control follows the international standards for multinational corporations (OECD, 2005; Eurostat, 2007; UNCTAD, 2009).

[7] The validity of this data is extensively tested in the Appendix of Sonno (2020). Among other exercises, the data are compared with official statistics such as the Outwards FATS from OECD Countries, showing that the representativeness and the coverage is very high, and the locations obtained from the *Bureau van Dijk* data are compared with locations directly obtained from Google Maps for each MNE, with a correlation of the locations higher than 95% (both in terms of latitude and longitude).

[8] Using a comprehensive new dataset of MNEs' FDIs in Africa, Lakemann et al. (2022) compute that around 87% of such FDIs are greenfield.

[9] See Appendix A for the complete list of country-years covered.

aged 15–64 on labor supply and working conditions.[10] The data gives the geographic coordinates of the households interviewed. Our main outcome variables of interest focus on labor market participation and job quality. First, we construct the dummy variable *Job*, equal to 1 if the individual has worked in the past 12 months. Then we study the type of job in greater detail. *On–Farm Job* takes value 1 if the respondent works on farm and 0 otherwise (including not working in the last 12 months); *Off–Farm Job* takes value 1 when the person works in a sector other than agriculture and 0 otherwise.[11] DHS directly also contains information on one aspect of quality, namely whether the job is *Occasional*, *Permanent*, or *Seasonal*. From the latter information we build an indicator of 'good jobs', which is a dummy equal to 1 when the job is permanent. DHS control variables include age, gender, education, household size, rural/urban residential location.

Descriptive statistics. Here we provide some essential descriptive statistics on the DHS and MNE data. Our final dataset covers 32 Sub-Saharan countries. Figure 1 shows the DHS interview locations (green) and MNE locations (red) across the region. In yellow, we display DHS locations that have at least one MNE within a radius of 50 km.[12]

Table 1 reports some DHS descriptive statistics. Panel (a) shows that we have more than 550,000 non-migrant adults interviewed in the period 2003–2018. 67% are female and 32% live in urban locations. The interviews are with people aged 15 and up (younger children are counted as observations without being directly interviewed) and the average age of those interviewed is 29. Around 57% of the individuals have more than five years of schooling (we define them as *Secondary Education plus*) while the average number of children per household is 1.18. Most of sample individuals (70%) has a job, 33% of them on-farm and 38% off-farm. 40% of the sample report a permanent job, while occasional and seasonal jobs are reported by 22% and 7% of the sample respectively.

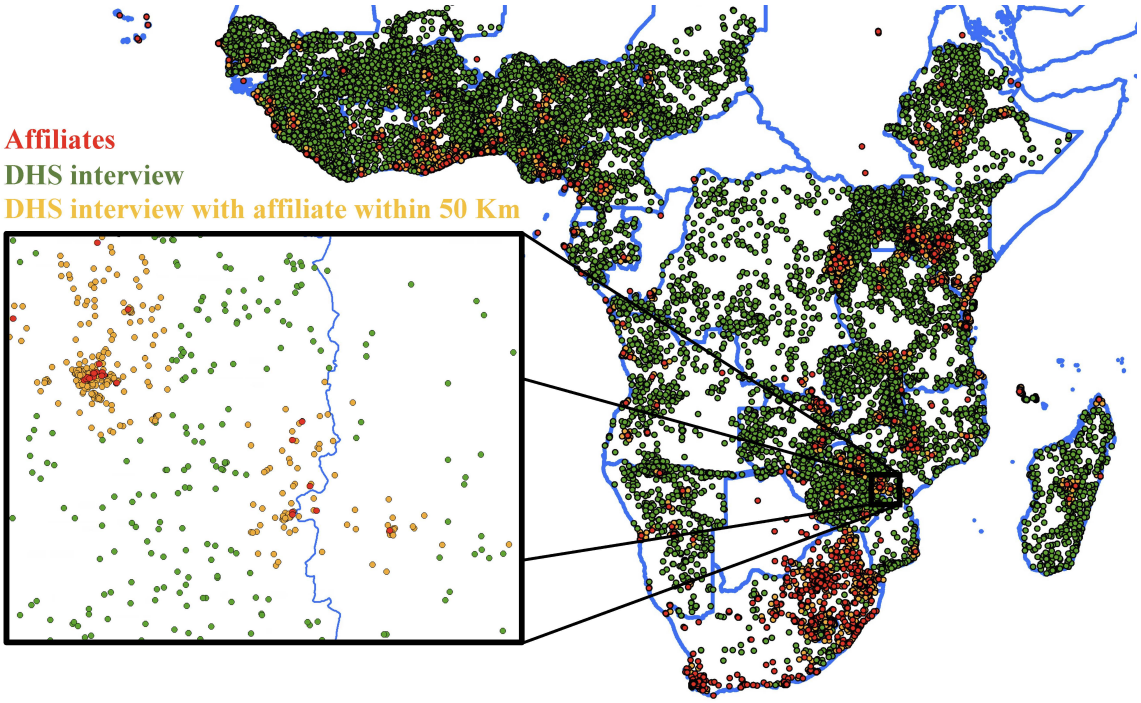
In Panel (b) we report the number of individuals having at least one MNE within 0-5 km, 5-10 km, and so on up to 25 km in at least one year. In the second row, we show the average num-

[10] We use DHS Personal Recode (PR) file, which includes all members of the household. While this database gathers information about family characteristics, we have to rely on the Individual Recode (IR) and the Male Recode (MR) for information on working conditions. The IR covers the same women (over 15 years old) as the PR database, but with more information about work. The same goes for MR, which includes the same men (over 15) as the PR, but with more details.

[11] The latter two variables are built from the standardized occupation groups provided by the DHS: not working, professional / technical / managerial, clerical, sales, agriculture-self employed, agriculture-employee, household and domestic, services, skilled manual, unskilled manual, army, agricultural, agriculture / breeding / fishing / forest. *On–Farm Job* is equal to 1 for agricultural jobs (namely, agriculture-self employed, agriculture-employee, agricultural, agriculture / breeding / fishing / forest) and 0 otherwise; conversely for *Off–Farm Job*.

[12] We vary the size of this radius from 0 to 50 km, by 5-km steps (0-5 km, 0-10 km, . . . , 0-50 km). Figure 1 shows only the largest radius.

Figure 1: DHS and MNE in Sub-Saharan countries



Notes: The map shows the locations of affiliates (in red) and of DHS households, in orange those closer than 50 km from the nearest affiliate, in green those further than 50 km away.

Table 1: Descriptive Statistic - Settled

Panel (a): Individual level data	*Obs.*	*Mean*	*St. Dev*	*Min*	*Max*
Female	532,645	0.670	0.470	0	1
Urban	532,645	0.317	0.465	0	1
Numb. Kids	532,645	1.182	1.165	0	16
Secondary Education +	532,645	0.572	0.495	0	1
Age	532,645	29.46	10.35	15	64
Job	532,645	0.728	0.445	0	1
On Farm Job	532,645	0.335	0.472	0	1
Off Farm Job	532,645	0.387	0.487	0	1
Permanent Job	532,645	0.423	0.494	0	1
Occasional Job	532,645	0.070	0.255	0	1
Seasonal Job	532,645	0.234	0.423	0	1
Panel (b): Exposure to MNE	*0-5 km*	*5-10 km*	*10-15 km*	*15-20 km*	*20-25 km*
Number of individuals	7,883	35,973	26,857	25,405	26,898
Average years of MNE exposure	5.17	6.79	6.64	6.36	6.26

Notes: Sample used in the main regressions. Authors' computation from DHS datasets, all available observations for individuals settled at the time of the arrival of the affiliate(s).

ber of years of exposure to an MNE affiliate, which is on average around 6 years. In particular, there are around 50,000 individuals with at least one MNE affiliate within 5 km distance from their location, and these individuals are exposed on average for 6.7 years (possibly to different affiliates and without continuity) to MNE activity. In Appendix B, in Table A2 we report the full sample characteristics, including those who have migrate to the MNE location after its arrival. As far as descriptive statistics are concerned, the two samples are largely comparable both from a demographic point of view and in terms of employment characteristics.[13]

3 Empirical Analysis

Assessing the impact of MNEs' activities on job-related outcomes poses a series of methodological difficulties, due above all to the fact that both affiliates and individuals may decide where to locate. That is, MNEs may sort into specific locations depending on their local characteristics (infrastructure, access to inputs, labor supply, etc.) so that residence near these large firms is near-negligible compared with other local factors potentially driving the results. Likewise, people may decide to move close to (or far away from) them for reasons related to employment, so that the correlations we estimate would be spurious. We address both problems in the following way. First, from the DHS data we know when people moved to their current location, so we can directly test whether our results are robust to the inclusion of migrants (results are reported in the Appendix). The non-migrant sample is used as the benchmark estimation sample throughout. Moreover, all specifications in our analysis include region$\times$year fixed effects, which control for time-varying locational and socio-economic drivers behind the behavior of both firms and individuals, such as the availability of infrastructures, aggregate wage and employment dynamics, conflicts, weather, and the like. Lastly, we indirectly test whether the arrival of MNEs is responsible for the generation of employment opportunities by checking whether people living different distances away from them experience the same effect. We find that this is not the case; that is, the estimated effects vanish quite quickly and monotonically with distance, suggesting that the presence of multinational affiliates is indeed responsible for a change in employment patterns at the local level. We report the empirical models below.

[13] In the same Appendix B, we present descriptive statistics for (i) individuals living more than 50 km away from a MNE, (ii) individuals living within 5 km from a MNE, and (iii) individuals living within a radius of 5-50 km from a MNE. Reassuringly, the individual-level characteristics are comparable but for the employment outcomes, which are the focus of this study. The only characteristic showing a difference between the samples is the urban/rural share of people in the different samples, something we control for in our empirical strategy including the rural dummy and region$\times$year fixed effects.

3.1 Empirical strategy

We model the impact of MNE exposure on job participation. For a generic individual *i*, located in region *r*, interviewed in year *t*, our first regression model is:

$$y_{irt} = \beta \, Affiliates_{irt} + \gamma \, X_{irt} + f_{rt} + u_{irt} \tag{1}$$

where y_{irt} denotes our outcome variable of interest, depending on the specification, $Affiliates_{irt}$ is our "proximity" variable, i.e. a dummy equal to 1 if individual *i* in year *t* has at least one MNE affiliate active within 5 km of home.[14] X_{irt} is a set of individual controls standard in the literature, namely whether the respondent lives in an urban area, has completed primary education (proxied by more than 5 years of schooling), gender, age (and age squared), and the number of children (truncated at 5). Importantly, f_{rt} are region×year fixed effects, implying that β estimates the effect of being exposed to an MNE affiliate, comparing an individual near an affiliate with other people in the same region in a given year not exposed to any affiliate, conditional on individual controls.[15] We further validate this identification strategy with respect to our proximity hypothesis by varying distance bonds from 5 to 50 km (see next Section).

A second regression model focuses on potential asymmetric effects of being in the neighborhood of a domestic as opposed to a foreign MNE affiliate. This is important, since the two groups of firms differ significantly. *Domestic Affiliates* are firms located in the same country as their headquarters, *Foreign Affiliates* in a different country from the headquarter.[16] Therefore, we can distinguish the organizational form of an MNE of any origin from its own nationality of ownership, and hence whether local (in the same location of the MNE) firms and workers are exposed to either national or international practices. Most importantly, the majority of the headquarters in the foreign group are located in richer countries outside Africa, so foreign affiliates may have (innovative) characteristics that are different from domestic affiliates, generating important spillover effects. Specifically, we estimate the following model:

$$y_{irt} = \delta \, Domestic\,Affiliates_{irt} + \sigma \, Foreign\,Affiliates_{irt} + \tau \, X_{irt} + f_{rt} + e_{irt} \tag{2}$$

[14] The use of a dummy also mitigates one limitation of the MNE data, i.e. the poor coverage of affiliates' financial information. Indeed, we have rich balance-sheet data for the headquarters, but for most affiliates it is difficult to deduce useful information (e.g. size). Therefore, recording precisely where and when they are active, presence serves as a proxy for MNE activity. Being the focus of this paper on the extensive margin of MNEs' activity, this specification better serves our purpose.

[15] There are 487 regions (NUTS1 level, according to www.gadm.org) in our dataset. Country-level number (average size) of regions varies, from 2 of Togo (1.5K sqKm of Burundi) to 57 of Uganda (44K sqKm of Mali) but in general regions are quite large, i.e. 95% of regions are larger than 668 sqKm.

[16] Note that the dummies for Domestic and Foreign Affiliates are not mutually exclusive, as they only indicate the presence of at least one of the specified type of affiliates.

As mentioned above, an important concern with these models is that people may migrate to locations where MNEs open affiliates. In order to tackle this issue, we restrict our analysis to individuals who already lived in the interview location *before* the arrival of MNE affiliates. Yet, it is worth noting that workers' relocation may be an outcome itself of MNEs proximity and abstracting from that could bias the impact of MNEs. In Appendix B we show that our results are robust to the inclusion of migrants, suggesting there is little role of (selective) migration in significantly driving our results. The results of models (1) and (2) are reported in the Section that follows.

3.2 Main results: MNE and local labour supply

Table 2 presents results on labor supply where in odd columns our main variable of interest is the presence of an affiliate within 5 km radius, while in the even columns we split the presence of MNE by their headquarters' nationality. Results in columns 3 to 6 are further broken down by labor supply sectors, namely on and off-farm.

In columns 1 and 2 the dependent variable is *Job*, a dummy variable equal to 1 if the individual worked in the previous 12 months. From column 1 we can observe that being located within a radius of 5 km from an MNE affiliate is associated with an increase in the probability of being employed by 2.8 percentage points (p.p.), or about 4% of the sample mean (0.0278/0.727), and this effect turns out to be higher for what domestic affiliates are concerned (column 2).

This effect is identified by spatial and time sources of arguably exogenous variations in MNEs proximity within the same region and year. This strategy, though, does not allow us to catch upstream or downstream linkages separately. If, for example, some MNEs are placing orders from local producers (beyond 5 km) and selling to local consumers (beyond 5 km), both these impacts will be absorbed by the region$\times$year fixed effects. Hence, here we further test the hypothesis that the effects are localized, i.e. the 0-5 km is a plausible "proximity" radius and longer–distance spillovers (at least in terms of labor supply) are limited. To do this, we simply augment model (2) with a series of dummies indicating whether domestic or foreign affiliates are present within successive bands of 5 km from the DHS location.[17] The results, reported in Figure 2, show that after the first domestic and foreign dummies (the latter borderline significant at 10% level), all remaining longer-distance effects are indistinguishable from zero. This is to say that the employment effect of MNEs vanishes the longer the distance between people and affiliates. This is reassuring in terms of the identification of local spillover effects and their sensitivity to distance.

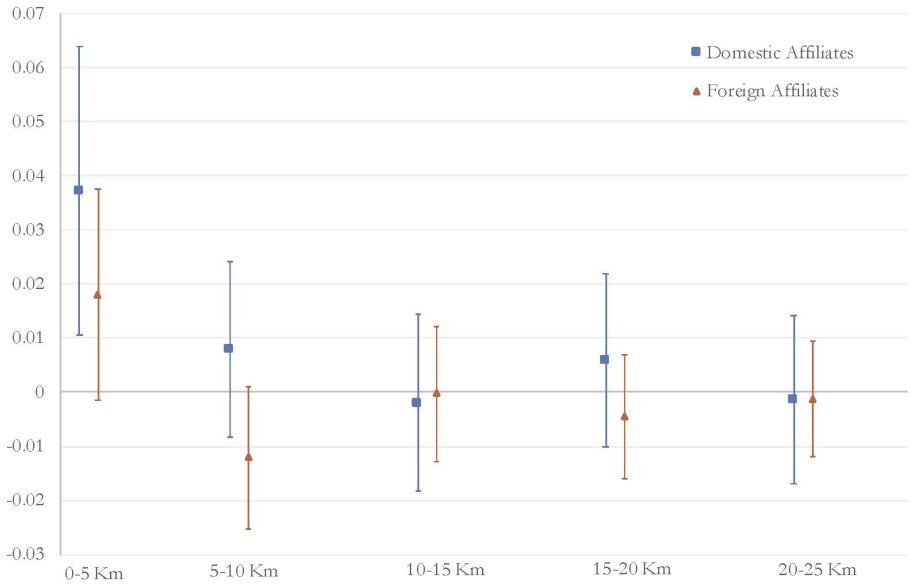
[17] Technically, we rewrite the regression including dummies of the form *Domestic Affiliates* $(0-5)_{irt}$, *Foreign Affiliates* $(0-5)_{irt}$, ..., *Domestic Affiliates* $(45-50)_{irt}$, *Foreign Affiliates* $(45-50)_{irt}$.

Table 2: MNE and local labor supply

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates	0.0278***		-0.0241***		0.0531***	
	(0.00825)		(0.00815)		(0.00937)	
Domestic Affiliates		0.0351**		0.0536***		-0.0212
		(0.0137)		(0.0115)		(0.0136)
Foreign Affiliates		0.0190*		-0.0453***		0.0671***
		(0.00980)		(0.00931)		(0.0110)
Urban	-0.0446***	-0.0445***	-0.267***	-0.267***	0.221***	0.221***
	(0.00255)	(0.00255)	(0.00378)	(0.00378)	(0.00331)	(0.00331)
Secondary Education	-0.0157***	-0.0157***	-0.115***	-0.115***	0.0952***	0.0951***
	(0.00173)	(0.00173)	(0.00222)	(0.00222)	(0.00202)	(0.00202)
Female	-0.159***	-0.159***	-0.136***	-0.136***	-0.0190***	-0.0190***
	(0.00215)	(0.00215)	(0.00261)	(0.00261)	(0.00253)	(0.00253)
Age	0.0564***	0.0564***	0.0105***	0.0105***	0.0469***	0.0469***
	(0.000422)	(0.000422)	(0.000407)	(0.000408)	(0.000474)	(0.000474)
Age Squared	-0.000697***	-0.000697***	-8.60e-05***	-8.60e-05***	-0.000624***	-0.000624***
	(5.85e-06)	(5.86e-06)	(6.12e-06)	(6.12e-06)	(6.85e-06)	(6.85e-06)
Numb. Kids	-0.000510	-0.000513	0.0152***	0.0152***	-0.0153***	-0.0153***
	(0.000635)	(0.000635)	(0.000752)	(0.000752)	(0.000731)	(0.000731)
Obs	532,645	532,645	532,645	532,645	532,645	532,645
R2	0.269	0.269	0.297	0.297	0.234	0.234
Region×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.727	0.727	0.335	0.335	0.387	0.387

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm Job* (dummy for working in the farming sector), columns 3 and 4; *Off-Farm Job* (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: *Affiliates* (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; *Domestic Affiliates* and *Foreign Affiliates* (even columns), two dummies flagging those individuals having at least one domestic and/or one foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate.

Figure 2: MNE and Labor Participation: Geographic decay



Notes: The plot represents the results of the model 2 augmented with dummies for domestic and foreign affiliates within different radii, from 0-5 km to 45-50 km (only the coefficients up to 25 are shown), as explained in footnote 17. The dependent variable is *Jobs*. Coefficients for domestic (foreign) affiliates are represented with blue squares (red triangles), together with the 95% confidence intervals. See main text and the note of Table 2 for further details.

In the remaining columns of Table 2, we distinguish agricultural from non–agricultural employment (the latter being all sectors other than agriculture, forestry, and fishery), which we define as *On–Farm* and *Off–Farm Jobs*.

Looking at all covariates a clear pattern emerges as expected: people living in urban areas and those who are more educated (with at least 5 years of schooling) are more likely to be employed in off-farm jobs, while the opposite holds for their counterparts living in rural areas and with less education. As expected, the influence of age on labor supply is not constant but changes with age. Females are significantly less likely to be employed than males (both on– and off–farm), while the number of children decreases off-farm labor supply (and increases on–farm employment).

Turning to our variables of interest, Column 3 shows that the impact of MNE affiliates is associated with a 2.4 p.p. decrease in the probability of having an on–farm job, a 7% drop with respect to the sample mean (-0.0241/0.335). Distinguishing among types of MNE activities (column 4), we observe that domestic and foreign affiliates have opposite effects. Specifically, being within 5 km of an affiliate of a domestic MNE is associated with an increase of 5.4 p.p in the likelihood of on–farm employment, while the effect is negative in sign and 15% smaller in magnitude (4.5 p.p) if the individual is close to the affiliate of a foreign MNE. Interestingly, these effects are reversed for off–farm jobs. Columns 5 and 6 show that on average being close to an MNE affiliate

is positively correlated with an increase of 5.3 p.p (over 13% of the sample mean) in the likelihood of being employed in an off–farm job, and that this effect is driven by foreign affiliates. Indeed, having a foreign affiliate of an MNE nearby increases the likelihood of off-farm employment by 6.7 p.p.. These results point to a significant role of the affiliates of foreign MNEs in generating positive labor demand spillovers in terms of reallocation of local workers from on–farm to off–farm jobs, which is not the case for domestic MNEs.

We argue that these asymmetric effects between domestic and foreign MNE affiliates offer significant support for the argument that, unlike domestic (multinational) firms in Africa, foreign ones may boost capital and technology transfers, international business practices and productivity externalities that spill over the local host economy. Spillovers, in particular, may derive from increased competition, productivity and technological change across local firms and activities (see e.g., Javorcik, 2004b; Keller and Yeaple, 2009; Alfaro, 2017), which in turn might boost labor turnover and employment. In order to double check this mechanism with our data, we distinguish between foreign affiliates where headquarters is located in former colonial power and in an OECD country.[18] Our prior is that the wealthier and less tied to colonial legacy the headquarters' country is, the greater the scope for positive spillovers in Africa. This is so since MNEs can contribute positively to local economies by creating jobs, transferring technology, and fostering economic development. However, the colonial model of development in Africa focused mainly on the extraction of natural resources and primary commodities from resource-rich countries (Acemoglu et al., 2001, 2012; Nunn and Wantchekon, 2011). The continuation of resource exploitation or the lingering effects of such a historical pattern of extractivism may lead foreign affiliates in former colonies to generate fewer economic spillovers in local markets, e.g. by exporting primary commodities at the expense of local incomes and jobs (e.g., Sall, 2020; Greco, 2020; Nunn, 2020).

The results, reported in Table 3, are in line with the thesis just set out. Column 1 shows that the positive effect of foreign affiliates on local labor supply is driven entirely by those affiliates whose headquarters is located in a former *non-colonial* country, while the opposite holds for affiliates with headquarters in the former colonial power. In particular, columns 3 and 5 indicate that non-colonial countries having MNE affiliates in Africa seem to boost *Off–Farm Jobs* in particular (+6 p.p.), while foreign affiliates with headquarters in the former colonial power contribute more to the decline in *On–Farm jobs* (-10.4 p.p.). A similar pattern emerges when foreign affiliates are broken down according to headquarters located in OECD vs non-OECD countries (even

[18] Like the Domestic *vs* Foreign Affiliate dummies, the OECD *vs* Non-OECD and Colonial *vs* Non-Colonial dummies are not mutually exclusive. Colonial linkages come from the widely used CEPII data (Head et al., 2010).

columns in the same table). MNE affiliates whose headquarters are in OECD countries are the only ones that contribute significantly to a rise in off-farm labor supply and a decline in on-farm employment. Taken together, these results seem to indicate a positive role of international productive linkages with wealthier countries, especially when these are not tied to colonial legacy in increasing local (off-farm) employment and structural change in Africa.

In the next subsection, we investigate the quality of the jobs created or fostered by global business groups and test for heterogeneous effects across different individual sub–samples.

Table 3: Colonial and OECD affiliates

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Domestic Affiliates	0.0394***	0.0367***	0.0609***	0.0542***	-0.0242*	-0.0202
	(0.0144)	(0.0138)	(0.0118)	(0.0118)	(0.0138)	(0.0136)
Foreign Colonial Affiliates	-0.0562***		-0.104***		0.0483**	
	(0.0207)		(0.0197)		(0.0222)	
Foreign Non-Colonial Affiliates	0.0405***		-0.0159*		0.0593***	
	(0.0100)		(0.00947)		(0.0118)	
Foreign OECD Affiliates		0.0102		-0.0579***		0.0712***
		(0.0117)		(0.0105)		(0.0124)
Foreign Non-OECD Affiliates		0.0120		-0.0114		0.0243
		(0.0147)		(0.0148)		(0.0183)
Obs	532,645	532,645	532,645	532,645	532,645	532,645
R2	0.269	0.269	0.297	0.297	0.234	0.234
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.727	0.727	0.335	0.335	0.387	0.387

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm Job* (dummy for working in the farming sector), columns 3 and 4; *Off-Farm Job* (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: *Domestic Affiliates*, a dummy flagging those individuals having at least one domestic affiliate within a 5 kilometer radius; *Foreign Colonial Affiliates* and *Foreign Non-Colonial Affiliates* (odd columns), two dummies flagging those individuals having at least one foreign affiliate from a former colonial power and non-colonial country within a 5 kilometer radius, respectively; *Foreign OECD Affiliates* and *Foreign Non-OECD Affiliates* (even columns), two dummies flagging those individuals having at least one foreign affiliate from an OECD and a non-OECD country within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate.

3.3 Job Quality and Heterogeneous Effects

This section takes two departures from the main analysis: (i) examining a sub–samples of population and (ii) exploring information about "job quality". With respect to the former, we focus on three sub–samples of settled individuals, namely Youth only (18-25 years of age), Men and Women separately, and we replicate specifications (1) and (2) in Table 2. The results are reported in Table 4. Domestic affiliates are the only responsible for a significant increase in youth employment, according to columns 1 and 2. With respect to the gender sub–samples (columns 3 to 6),

the overall effect of affiliates is positive on both (marginally significant for men), but strongly driven by by foreign affiliates for what female employment is concerned. That is, domestic affiliates are positively (not statistically significant) associated with both male and female employment, while foreign affiliates play a positive and significant role in boosting female labor supply. In particular, having a foreign affiliate within 5 km from home significantly increases female employment by almost 3 p.p. (4% at the mean), while the same does not hold for men.

Table 4: Heterogeneity

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
	Job					
Sample	Youth		Men		Women	
Affiliates	0.0266*		0.0168*		0.0274**	
	(0.0146)		(0.00918)		(0.0109)	
Domestic Affiliates		0.0678***		0.0298		0.0168
		(0.0214)		(0.0188)		(0.0174)
Foreign Affiliates		0.00536		0.00625		0.0278**
		(0.0174)		(0.0102)		(0.0130)
Obs	158,380	158,380	127,718	127,718	246,547	246,547
R2	0.213	0.213	0.358	0.358	0.293	0.293
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.648	0.648	0.870	0.870	0.704	0.704

Notes: LPM estimations. Dependent variable is *Job* (dummy for having worked in the last 12 months). ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables in both panels are: *Affiliates* (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; *Domestic Affiliates* and *Foreign Affiliates* (odd columns), two dummies flagging those individuals having at least one domestic and/or foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). The sample is these are restricted to individuals aged 18-25 (columns 1 and 2), men above 25 (columns 3 and 4) and women above 25 (columns 5 and 6).

In Table 5 we employ again the full sample of settled population and test the impact of MNEs on the quality of the jobs, characterized by the self-reported contract duration. While domestic affiliates are associated with employment in occasional jobs (columns 1 and 2), the contribution of MNEs to permanent employment is driven entirely by foreign affiliates (columns 3 and 4). This is consistent with Javorcik (2015), showing a positive impact on working conditions as measured by training and wages. Our individual-level data allows us to add further evidence on the impact of foreign affiliates on the quality of jobs, as indicated by positions with greater stability. Similar results are obtained by Méndez-Chacón and Van Patten (2022), where multinational firms' monopsony power drives higher wages and better labor conditions. The small overall negative effect on seasonal jobs (column 5) stems from opposite effects due to domestic affiliates (significantly positive) and foreign affiliates (strongly negative) (column 6), which could be driven by

the fact that domestic affiliates displace workers from "worst" but more stable jobs in traditional sectors to less stable occupations.

Table 5: Job Quality

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Occasional Job		Permanent Job		Seasonal Job	
Affiliates	0.00008		0.0428***		-0.0150**	
	(0.00472)		(0.00855)		(0.00723)	
Domestic Affiliates		0.0178**		-0.0281**		0.0453***
		(0.00740)		(0.0141)		(0.00906)
Foreign Affiliates		-0.00873		0.0606***		-0.0328***
		(0.00549)		(0.00962)		(0.00858)
Obs	532,645	532,645	532,645	532,645	532,645	532,645
R2	0.046	0.046	0.206	0.206	0.137	0.137
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean	0.070	0.070	0.423	0.423	0.234	0.234

Notes: LPM estimations. Dependent variables are *Occasional Job* (dummy for having an occasional job), columns 1 and 2; *Permanent Job* (dummy for having a permanent job), columns 3 and 4; *Seasonal Job* (dummy for having a seasonal job), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables in both panels are: *Affiliates* (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; *Domestic Affiliates* and *Foreign Affiliates* (odd columns), two dummies flagging those individuals having at least one domestic and/or foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate.

All in all, by leveraging granular data on both domestic and foreign MNE affiliates in Africa, we find strong and significant evidence that living close to a foreign multinational firm (especially those of advanced and non–colonial countries) generates positive spillovers on local employment, especially for women and particularly in permanent jobs (one aspect of good quality).

3.4 Robustness

Results in the former section suggest a tight link between geographical proximity to foreign MNEs and local labor supply. We now subject these findings to a number of robustness checks to ensure that they are not biased due to the way data is geo-referenced, the different industries in which MNE affiliates operate, and the different time individuals are exposed to MNE affiliates.

Excluding borders. In order to ensure privacy, the DHS data add some random noise around the precise location of households (up to 2 km for urban and 5 km for rural clusters).[19] To avoid attributing regional fixed effects to (potentially) wrong families, in Table 6 we replicate the main

[19] Figure A1, in Appendix B, shows a sample of our DHS data, with the color intensity representing the distance from regional borders.

analysis excluding all those families close to regional borders (i.e. below 2 km for DHS in urban areas and below 5 km for those in rural areas). While the sample drops by 20%, results on the impact of MNEs on labor supply are unaffected.

Table 6: MNE and local labor supply: borders excluded

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates	0.0273***		-0.0183*		0.0455***	
	(0.00937)		(0.00949)		(0.0105)	
Domestic Affiliates		0.0422***		0.0575***		-0.0184
		(0.0150)		(0.0128)		(0.0147)
Foreign Affiliates		0.0135		-0.0425***		0.0578***
		(0.0114)		(0.0112)		(0.0126)
Obs	419,317	419,317	419,317	419,317	419,317	419,317
R2	0.269	0.269	0.303	0.303	0.238	0.238
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.725	0.725	0.327	0.327	0.393	0.393

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm Job* (dummy for working in the farming sector), columns 3 and 4; *Off-Farm Job* (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: *Affiliates* (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; *Domestic Affiliates* and *Foreign Affiliates* (even columns), two dummies flagging those individuals having at least one domestic and/or one foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate and 5 Km (or 2 Km if individuals come from urban areas) away from the closer regional border.

Industries. One may argue whether our results are biased by the industry composition across the two groups of affiliates, i.e. domestic and foreign. If, for example, all domestic affiliates operate in *On–Farm* activities, while foreign affiliates mainly operate in *Off–Farm* activities, that could explain the subsequent spillover effects across local labor supply in *On–Farm* and *Off–Farm* jobs respectively. However, this does not seem to be the case in our MNE data: out of 103,000 affiliate-year observations we have, 1.74% of them are *Domestic Affiliates* active in *On–Farm* industries and likewise 1.76% are *Foreign Affiliates* active in *On–Farm* industries.

Moreover, we further check this argument in our analysis and in Table 7 we split our estimates by industry, i.e. primary/secondary/tertiary.[20] Results are consistent throughout, that is

[20] We follow the standard three-sector model, where *Primary* industries include: Agriculture, Forestry, Fishing; Mining and Quarrying. *Secondary* industries include: Industry; Manufacturing; Construction. *Tertiary* industries include all the rest. The industry aggregation proposed is mainly based on the High-level ISIC/NACE sector aggregation, which is the most aggregated classification identified by national accountants to be used for reporting Systems of National Accounts data from a wide range of countries (Eurostat, 2008).

foreign MNEs affiliates systematically and significantly increase *Off–Farm* labor supply (Col.6) while they significantly decrease *On–Farm* jobs especially when operating in the secondary and tertiary sectors (Col.4, Panel (a) and (b)). Domestic affiliates, instead, mainly contribute to spur *On–Farm* jobs while they have no impact on *Off–Farm* employment. Remarkably, overall our benchmark results seem not to be driven by any specificity of different industries MNEs operate in.

Short Term Impact. We leverage now on the time dimension of the individual exposure to an MNE affiliate. Indeed, in our main specification the key treatment variables are dummies equal to one if in the year of the survey the individual is located close enough to an affiliate (of possibly different types), regardless of the length of exposure (average years of exposure is about 6). Yet, one concern is that our results may be driven by (a few) well-established MNEs, arrived in a location grid–cell since relatively long time, and which may absorb or spur the bulk of the local employment.

In order to estimate the short-term effect, here we exclude from the sample all individuals being close to an affiliate for more than two years (about 10% of the sample). Results are reported in Table 8 and are qualitatively similar to our benchmark findings above. In particular, while using this sample of people exposed to MNEs in the short-run, the employment effect of foreign MNEs on off-farm jobs is even bigger in magnitude and strongly significant, while the same does not hold for on-farm jobs. This points to the fact that MNEs affiliates do create local externalities and spillover effects in terms of employment even in the short-run. In the Appendix B, we run the same regression while the length of exposure to MNEs is one year at most, and results are consistent in showing a tight link between foreign affiliates and the local labor supply (more off-farm and less on-farm jobs).

4 Retrospective Analysis of Individual Exposure to MNEs

The analysis above establishes a strong association between the presence of (different types of) multinationals and characteristics of individuals' working status, and it does so controlling for a battery of individual and contextual variables, in particular regions-by-year fixed effects. While very robust, these results might still suffer from possible omitted variables issues, such as some unobservables driving the location of affiliates in specific within-region and within-time areas.

In this section, we take a different approach by focusing only on those individuals who at some point are 'treated' by the arrival of a (domestic and/or foreign) affiliate and exploit the timing of the arrival of such affiliate, leveraging on individual-level and affiliate-level temporal infor-

Table 7: Heterogeneity across industries

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Panel (a): Primary sector						
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates (primary)	0.0226**		-0.00568		0.0301***	
	(0.00893)		(0.00636)		(0.00779)	
Domestic Affiliates (primary)		0.0804***		0.0478**		0.0315
		(0.0255)		(0.0224)		(0.0242)
Foreign Affiliates (primary)		0.0183**		-0.00959		0.0300***
		(0.00928)		(0.00663)		(0.00816)
Panel (a): Secondary sector						
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates (secondary)	0.0108		-0.00670		0.0173*	
	(0.00870)		(0.00885)		(0.00942)	
Domestic Affiliates (secondary)		0.0294***		0.0338***		-0.00651
		(0.0109)		(0.00901)		(0.0107)
Foreign Affiliates (secondary)		-0.00726		-0.0461***		0.0405**
		(0.0136)		(0.0148)		(0.0173)
Panel (a): Tertiary sector						
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates (tertiary)	0.00956		-0.0115		0.0214**	
	(0.00765)		(0.00702)		(0.00873)	
Domestic Affiliates (tertiary)		0.0208		0.0213***		-0.00113
		(0.0127)		(0.00621)		(0.0127)
Foreign Affiliates (tertiary)		0.00404		-0.0276***		0.0324***
		(0.0106)		(0.00860)		(0.0108)
Obs	532,645	532,645	532,645	532,645	532,645	532,645
R2	0.269	0.269	0.297	0.297	0.234	0.234
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.727	0.727	0.335	0.335	0.387	0.387

Notes: LPM estimations. The three panels replicate specifications of Table 2 restricting the main explanatory variables to be affiliates in the Primary (panel a), Secondary (panel b) and Tertiary (panel c) sector. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Dependent variable is *Job* in columns 1 and 2, *On farm* job in columns 3 and 4, and *Off farm* job in columns 5 and 6. Sample is all those individuals already living in the place before the arrival of the first affiliate for all panels. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively.

Table 8: Short Term Impact

	(1)	(2)	(3)	(4)	(5)	(6)
Estimation	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates	0.0568***		-0.0161		0.0740***	
	(0.0123)		(0.0134)		(0.0155)	
Domestic Affiliates		0.0193		0.0375*		-0.0169
		(0.0265)		(0.0197)		(0.0253)
Foreign Affiliates		0.0614***		-0.0277*		0.0910***
		(0.0130)		(0.0160)		(0.0180)
Obs	527,550	527,550	527,550	527,550	527,550	527,550
R2	0.270	0.270	0.296	0.296	0.232	0.233
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.728	0.728	0.338	0.338	0.385	0.385

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm* job (dummy for working in the farming sector), columns 3 and 4; *Off-Farm* job (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: *Affiliates* (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; *Domestic Affiliates* and *Foreign Affiliates* (even columns), two dummies flagging those individuals having at least one domestic and/or one foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate, and it is restricted to DHS observations hosting an affiliate maximum two years before the interview.

mation.

The sample used in this analysis is therefore all the individuals that (i) are close (<5 Km) to (at least) an affiliate in the year of the interview, (ii) live in areas where the first affiliate established after the individual located there (as in the main analysis), and (iii) completed their education within a 6 years interval centered around the arrival of the affiliate. Thanks to this data structure, we aim to identify the causal impact of the arrival of an affiliate by exploiting the fact that those still in education at the time of arrival are not yet part of the labour force, while once education is just (within three years) completed, they can exploit, if existing, better/more job opportunities caused by the presence of the affiliate. The identifying assumption is that, while the location of affiliates in particular areas might be non-random, the distribution of age of potential workers in locations where affiliates arrive is.[21]

Let us define T_{is} the year in which the survey to individual i is administrated, T_{ie} the year in which education is completed for individual i, and T_{ip} the year in which a multinational locates in the area where i lives. Formally, our treatment is defined as $\mathbb{1}_{it} = 1$ whenever $0 \leq T_{ip} - T_{ie} \leq 2$

[21] This is essentially a simplified Regression Discontinuity Design in time, where we cannot assume continuity of time. We therefore zoom in around the moment individuals become available in the labor market.

(i.e. the affiliate arrives just after education is completed for individual i) and $T_{ie} < T_{is}$ (i.e. the survey is administered only when education of individual i is completed). It is instead $\mathbb{1}_{it} = 0$ whenever $-3 \leq T_{ip} - T_{ie} \leq -1$ (i.e. the affiliate arrives just before education is completed for individual i) and, again, $T_{ie} < T_{is}$.[22] The econometric specification we set up is therefore

$$y_{irt} = \vartheta \, \mathbb{1}_{it} + \tau \, X_{irt} + f_{rt} + e_{irt} \tag{3}$$

or the following, that considers two treatments, one for domestic and the other for foreign affiliates:

$$y_{irt} = \vartheta_d \, \mathbb{1}^d_{it} + \vartheta_f \, \mathbb{1}^f_{it} + \tau \, X_{irt} + f_{rt} + e_{irt} \tag{4}$$

Thus, by estimating Equations 3 and 4 using indicators for *Job*, *On–Farm Job*, and *Off–Farm Job* as dependent variables, we can mimic the structure of the results reported in Table 2. Note that individual controls and region-year fixed effects are still included, while the sample drops dramatically due to the restricted quasi–experimental setting we focus on. Table 9 reports LPM estimations of Equations 3 (odd columns) and 4 (even columns), for the three dependent variables *Job* (columns 1 and 2), *On–Farm Job* (columns 3 and 4), and *Off–Farm Job* (columns 5 and 6).

While the sample used is much smaller and employment variables are observed with some lag with respect to the arrival of the affiliate, results are remarkably in line with that obtained in the main analysis in Table 2, that is foreign affiliates seems those responsible for facilitating a shift of occupations from on-farm to off-farm jobs. Comparing the results with the main ones, one could conjecture that the domestic affiliates cluster around (in time and space) the foreign ones, on the one hand boosting employment (see results in column 2 about jobs, which is significant only in the main analysis), and on the other hand serving as employers (directly or indirectly) in on-farm jobs.

Interestingly, running the same analysis considering the treated individuals those already in the labor market since a while, i.e. $3 \leq T_{ip} - T_{ie} \leq 5$, delivers no significant results (see Appendix Table A8). This points to the possibility of a "window of opportunities" for potential workers that opens only as soon as they are available in the labor market, then their working status become an absorbing state.

[22] As an example, suppose an affiliate locates in a given area in 2010 (T_p). The only individuals considered in the sample are those interviewed after 2010 (and, in any case, after their education is completed) and who completed their education between 2008 and 2013. Those completing education between 2008 and 2010 are the treated ones, while those completing education between 2011 and 2013 are the control group.

Table 9: Retrospective Analysis (based on time variation in labor market entry)

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates post-education	0.0524**		-0.00653		0.0567**	
	(0.0241)		(0.00795)		(0.0247)	
Domestic Affiliates post-education		0.0590		0.0108		0.0297
		(0.0359)		(0.0221)		(0.0340)
Foreign Affiliates post-education		0.0445*		-0.0145*		0.0627**
		(0.0269)		(0.00808)		(0.0273)
Obs	1,801	1,801	1,801	1,801	1,801	1,801
R2	0.339	0.339	0.195	0.196	0.329	0.329
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region×Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.472	0.472	0.040	0.040	0.425	0.425

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm Job* (dummy for working in the farming sector), columns 3 and 4; *Off-Farm Job* (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: $\mathbb{1}_{it}$ (odd columns), a dummy flagging those individuals experiencing the arrival of an affiliate in the three years following the completion of their education, the counterfactual being those individuals experiencing the arrival of an affiliate in the three years before the completion of their education; $\mathbb{1}_{it}^{d}$ and $\mathbb{1}_{it}^{f}$ (even columns), two dummies defined as before, one for domestic and the other for foreign affiliates, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate, that completed education within a window of three years with respect to the arrival of the first affiliate, and that have been interviewed after they completed education.

5 Conclusion and Future Research

Our research provides novel results on the relationship between the presence of multinational enterprises and labor market outcomes in Sub-Saharan Africa, exploiting the universe of domestic and foreign MNE affiliates and multiple country-level representative samples of individuals. Living in the vicinity of a multinational affiliate turns out to generate positive effects in terms of job creation, and the effect is very localized, since it fades away to zero beyond 5 kilometers' distance.

Importantly, the presence of MNE affiliates, specifically foreign ones (with their headquarters abroad), is associated with more *Off–Farm* and fewer *On–Farm* jobs. This is true especially for those headquarters located in an OECD country or not the former colonial power. This seems to suggest that foreign affiliates, through technology and knowledge transfers that do not stem from colonial linkages, are likely to spur positive spillovers on the local economy and accelerate the transition from agricultural to *Off–Farm* employment. The positive employment effects of the foreign MNE affiliates are particularly significant for women and for permanent employment, and hence of higher quality than seasonal or temporary jobs.

While this first set of results is certainly significant, we consider even more important to investigate this empirical setting further in future research, exploiting in more detailed fashion the time structure of the two main datasets (as we have preliminarily done in Section 4), the industry characteristics of the affiliates (hence, for example, their differentiating capital intensity), and interactions with local socio-economic conditions (cultural, institutional, and political).

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Appendix

A DHS Coverage

Table A1 present the country-year coverage of DHS data, specifying for each country the specific DHS survey(s) used and the total number of interviews.

Table A1: African Countries Descriptive Statistics

Country	Survey	Year of the survey	Number of clusters	Number of observations
Angola	7	2015, 2016	627	74.902
Burkina Faso	6	2010	574	82.095
Benin	6	2011, 2012	750	88.174
	7	2017, 2018	555	74.673
Burundi	6	2010, 2011	376	4.242
	7	2016, 2017	554	78.367
Congo	5	2007	300	48.291
	6	2013, 2014	540	95.949
Cote d'Ivoire	6	2011, 2012	352	51.187
Cameroon	6	2011	580	72.622
	7	2018, 2019	469	60.699
Egypt	5	2005, 2008	2.626	20.483
	6	2014	884	120.276
Ethiopia	6	2003	650	77.744
	7	2008	645	75.224
Gabon	6	2012	336	41.675
Ghana	5	2008	412	46.536
	7	2014	427	43.945
Guinea	5	2005	297	38.182
	6	2012	300	45.049
	7	2018	401	49.543
Kenya	5	2008, 2009	400	38.515
	7	2014	1.594	15.384
Comoros	6	2012	252	24.499
Lesotho	6	2009, 2010	400	44.546
	7	2014	400	40.197
Madagascar	5	2008, 2009	600	85.858
Mali	5	2006	408	73.685
	6	2012, 2013	585	5.833
	7	2018	379	54.571
Malawi	6	2010	849	11.885
	7	2015, 2016	850	120.492
Mozambique	6	2011	611	6.275
Nigeria	5	2008	888	156.809
	6	2013	904	178.894
	7	2018	1.389	18.801
Botswana	5	2006, 2007	500	42.633
	6	2013	554	41.646
Rwanda	5	2005, 2007, 2008	712	80.476
	6	2010, 2011	492	56.505
	7	2014, 2015	492	54.905
Sierra Leone	5	2008	353	41.985
	6	2013	435	75.299
Senegal	6	2010, 2011, 2012, 2013	792	159.585
	7	2014, 2015, 2016	628	124.257
Swaziland	5	2006, 2007	275	22.143
Tchad	7	2014, 2015	626	9.962
Togo	6	2013, 2014	330	46.577
Tanzania	6	2009, 2010	608	6.488
	7	2015, 2016	475	50.414
Uganda	5	2006	368	45.439
	6	2011	712	44.977
	7	2016	697	91.167
South Africa	7	2016	750	3.885
Zambia	5	2007	320	35.562
	6	2013, 2014	722	83.058
	7	2018, 2019	545	65.454
Zimbabwe	5	2005, 2006	398	42.698
	6	2010, 2011	406	41.946
	7	2015	400	43.706
Total		2003-2019		4,745,539

Notes: Coverage of DHS by countries and years, indicating the wave number.

B Additional Tables and Figures

In Table A2 we present descriptive statistics for the full sample including migrants and non-migrants, where the latter are those who lived in the interview's location *before* the arrival of MNEs. Tables A3, A4, and A5 present descriptive statistics of the sample of (i) individuals living more than 50 km away from a MNE, (ii) individuals living within 5 km from a MNE, and (iii) individuals living within a radius of 5-50 km from a MNE, respectively. Table A6 presents the results of our models 1 and 2 considering the full estimation sample. Table A7 replicates the analysis on the contemporaneous correlation between affiliates and working status but for a shorter time period (up to one year only), while Table A8 establishes that once the window of opportunity (i.e. few years after the affiliate locates) is closed, no additional effects on labor status of individual changes.

Table A2: Descriptive Statistic

Panel (a): Individual level data	*Obs.*	*Mean*	*St. Dev*	*Min*	*Max*
Female	1,193,224	0.699	0.459	0	1
Urban	1,193,224	0.366	0.482	0	1
Number of Kids	1,193,224	1.227	1.265	0	24
Secondary Education	1,193,224	0.532	0.499	0	1
Age	1,193,224	29.36	10.27	15	64
Job	1,193,224	0.687	0.464	0	1
On Farm Job	1,193,224	0.308	0.461	0	1
Off Farm Job	1,193,224	0.370	0.483	0	1
Permanent Job	1,193,224	0.409	0.492	0	1
Occasional Job	1,193,224	0.0745	0.263	0	1
Seasonal Job	1,193,224	0.204	0.403	0	1
Panel (b): Exposure to MNE	*0-5 km*	*5-10 km*	*10-15 km*	*15-20 km*	*20-25 km*
Number of individuals	97,016	95,261	67,171	56,067	58,320
Average years of MNE exposure	6.17	6.37	6.01	5.90	5.92

Notes: Authors' computation from DHS and the multinational enterprises (MNE) datasets, full sample. Additional information on the coverage of DHS dataset can be found in Appendix A.

Table A3: Descriptive Statistic - No MNE

Individual level data	*Obs.*	*Mean*	*St. Dev*	*Min*	*Max*
Female	400,031	0.669	0.471	0	1
Urban	400,031	0.270	0.444	0	1
Numb. Kids	400,031	1.253	1.199	0	16
Secondary Education +	400,031	0.525	0.499	0	1
Age	400,031	29.38	10.41	15	64
Job	400,031	0.739	0.439	0	1
On Farm Job	400,031	0.378	0.485	0	1
Off Farm Job	400,031	0.358	0.479	0	1
Permanent Job	400,031	0.414	0.493	0	1
Occasional Job	400,031	0.0697	0.255	0	1
Seasonal Job	400,031	0.256	0.436	0	1

Notes: Authors' computation from DHS and the multinational enterprises (MNE) datasets, sample of individuals located more than 50 km away from a MNE. Additional information on the coverage of DHS dataset can be found in Appendix A.

Table A4: Descriptive Statistic - MNE within 0-5 km

Individual level data	*Obs.*	*Mean*	*St. Dev*	*Min*	*Max*
Female	6,409	0.621	0.485	0	1
Urban	6,409	0.924	0.265	0	1
Numb. Kids	6,409	0.848	0.952	0	5
Secondary Education +	6,409	0.877	0.328	0	1
Age	6,409	30.60	10.13	15	63
Job	6,409	0.695	0.460	0	1
On Farm Job	6,409	0.0399	0.196	0	1
Off Farm Job	6,409	0.648	0.478	0	1
Permanent Job	6,409	0.535	0.499	0	1
Occasional Job	6,409	0.0682	0.252	0	1
Seasonal Job	6,409	0.0919	0.289	0	1

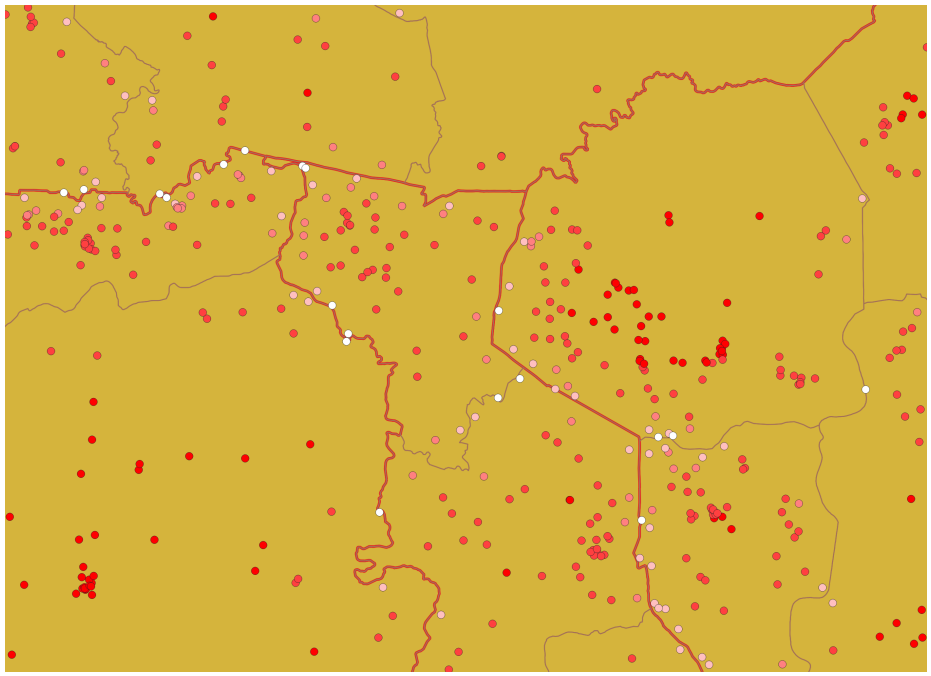
Notes: Authors' computation from DHS and the multinational enterprises (MNE) datasets, sample of individuals located in a radius of 5 km from a MNE. Additional information on the coverage of DHS dataset can be found in Appendix A.

Table A5: Descriptive Statistic - MNE within 5-55 km

Individual level data	*Obs.*	*Mean*	*St. Dev*	*Min*	*Max*
Female	129,172	0.674	0.469	0	1
Urban	129,172	0.446	0.497	0	1
Numb. Kids	129,172	0.971	1.026	0	9
Secondary Education +	129,172	0.712	0.453	0	1
Age	129,172	29.69	10.18	15	64
Job	129,172	0.691	0.462	0	1
On Farm Job	129,172	0.211	0.408	0	1
Off Farm Job	129,172	0.473	0.499	0	1
Permanent Job	129,172	0.449	0.497	0	1
Occasional Job	129,172	0.0712	0.257	0	1
Seasonal Job	129,172	0.171	0.376	0	1

Notes: Authors' computation from DHS and the multinational enterprises (MNE) datasets, sample of individuals located in a radius from 5 to 50 km from a MNE. Additional information on the coverage of DHS dataset can be found in Appendix A.

Figure A1: DHS and distance from regional borders



Notes: The map shows a sample of the locations of DHS households, with five shades representing 0 to 2, 2 to 5, 5 to 10, 10 to 30 and above 30 km from the regional borders. Darker shades correspond to longer distances.

Table A6: MNE and Local Labor Supply - Settled and Non-Settled

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates	0.00858***		-0.0282***		0.0351***	
	(0.00294)		(0.00308)		(0.00343)	
Domestic Affiliates		0.0196***		0.0240***		-0.00354
		(0.00458)		(0.00459)		(0.00530)
Foreign Affiliates		0.000235		-0.0382***		0.0363***
		(0.00348)		(0.00357)		(0.00407)
Urban	-0.0430***	-0.0430***	-0.260***	-0.261***	0.215***	0.215***
	(0.00184)	(0.00183)	(0.00267)	(0.00266)	(0.00237)	(0.00237)
Secondary Education	-0.0272***	-0.0272***	-0.113***	-0.113***	0.0771***	0.0771***
	(0.00122)	(0.00122)	(0.00146)	(0.00146)	(0.00144)	(0.00144)
Female	-0.165***	-0.165***	-0.125***	-0.125***	-0.0357***	-0.0357***
	(0.00158)	(0.00158)	(0.00182)	(0.00182)	(0.00167)	(0.00167)
Age	0.0568***	0.0568***	0.0109***	0.0109***	0.0470***	0.0471***
	(0.000295)	(0.000295)	(0.000273)	(0.000273)	(0.000326)	(0.000326)
Age Squared	-0.000702***	-0.000702***	-0.00009***	-0.00009***	-0.000622***	-0.000622***
	(0.0000041)	(0.0000041)	(0.0000041)	(0.0000041)	(0.0000047)	(0.0000047)
Numb. Kids	-0.00148***	-0.00148***	0.0135***	0.0135***	-0.0141***	-0.0141***
	(0.000430)	(0.000430)	(0.000482)	(0.000482)	(0.000483)	(0.000483)
Constant	-0.155***	-0.154***	0.306***	0.306***	-0.490***	-0.490***
	(0.00519)	(0.00519)	(0.00447)	(0.00447)	(0.00504)	(0.00504)
Obs	1,193,243	1,193,243	1,193,243	1,193,243	1,193,243	1,193,243
R2	0.283	0.283	0.330	0.330	0.222	0.222
Region × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.687	0.687	0.307	0.307	0.370	0.370

Notes: LPM estimations. Dependent variables: "Job" (dummy for having worked in the last 12 months), columns 1 and 2; "On–Farm Jobs" (dummy for working in the farming sector), columns 3 and 4; "Off-Farm Job" (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: "Affiliates" (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; "Domestic Affiliates" and "Foreign Affiliates" (odd columns), two dummies flagging those individuals having at least one domestic and foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years ("Secondary Education"), dummy for female, age and age squared, number of children (capped at 5), region Ã interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, that can be a village, a neighborhood in urban area, etc). Sample is all geolocated individuals.

Table A7: Short Term Impact - Simultaneous

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates	0.0428*		-0.0301**		0.0753***	
	(0.0222)		(0.0142)		(0.0253)	
Domestic Affiliates		-0.0521*		-0.00559		-0.0436
		(0.0314)		(0.0238)		(0.0326)
Foreign Affiliates		0.0888***		-0.0420**		0.133***
		(0.0213)		(0.0182)		(0.0272)
Obs	525,454	525,454	525,454	525,454	525,454	525,454
R2	0.269	0.269	0.295	0.295	0.232	0.232
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.728	0.728	0.339	0.339	0.384	0.384

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm Job* (dummy for working in the farming sector), columns 3 and 4; *Off-Farm Job* (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: *Affiliates* (odd columns), a dummy flagging those individuals having at least one affiliate within a 5 kilometer radius; *Domestic Affiliates* and *Foreign Affiliates* (even columns), two dummies flagging those individuals having at least one domestic and/or one foreign affiliate within a 5 kilometer radius, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate, and it is restricted to DHS observations hosting an affiliate not earlier than the same year of the interview.

Table A8: Retrospective Analysis, 3-5 years

Estimation	(1)	(2)	(3)	(4)	(5)	(6)
	LPM					
Dep. Variable	Job		On–Farm Job		Off–Farm Job	
Affiliates post-education	0.0350		0.00748		0.0273	
	(0.0278)		(0.0101)		(0.0280)	
Domestic Affiliates post-education		0.0457		0.00325		0.0497
		(0.0345)		(0.0149)		(0.0359)
Foreign Affiliates post-education		0.0331		0.00786		0.0230
		(0.0292)		(0.0105)		(0.0295)
Obs	2,670	2,670	2,670	2,670	2,670	2,670
R2	0.333	0.333	0.158	0.158	0.321	0.321
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Dep. Variable	0.452	0.452	0.030	0.030	0.416	0.416

Notes: LPM estimations. Dependent variables: *Job* (dummy for having worked in the last 12 months), columns 1 and 2; *On–Farm Job* (dummy for working in the farming sector), columns 3 and 4; *Off-Farm Job* (dummy for working in the non-farming sector), columns 5 and 6. ***,**,* = indicate significance at the 1%, 5%, and 10% level, respectively. Main explanatory variables are: $\mathbb{1}_{it}$ (odd columns), a dummy flagging those individuals experiencing the arrival of an affiliate between three and five years following the completion of their education, the counterfactual being those individuals experiencing the arrival of an affiliate in the three years before the completion of their education; $\mathbb{1}_{it}^{d}$ and $\mathbb{1}_{it}^{f}$ (even columns), two dummies defined as before, one for domestic and the other for foreign affiliates, respectively. Controls are: dummy for household living in urban area, dummy for education level above 5 years (*Secondary Education*), dummy for female, age and age squared, number of children (capped at 5), region × interview year fixed effects. Errors are clustered at the level of DHS cluster (i.e. the geographic unit for which coordinates have been coded, which can be a village, a neighborhood in urban area, etc). Sample is all those individuals already living in the place before the arrival of the first affiliate, that completed education within a window of three years with respect to the arrival of the first affiliate, and that have been interviewed after they completed education.