▶ Employment impact assessments in Africa:

Application of and suitability of local multiplier analysis

STRENGTHEN2: Employment impact assessment to maximise job creation in Africa

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▶ Acknowledgements

▶ Non-technical summary

STRENGTHEN2 is a joint initiative of the European Union and the ILO that focuses on job creation through investments. An important component of the STRENGTHEN2 project is to assist national and international decision-makers in identifying sectors with high employment potential. Historically, productive employment creation in a country seems to come through the development of the manufacturing sector, which is often equated with international trade. Given this, it is generally agreed among economists that there is a prominent role for the manufacturing sector and therefore for trade in achieving full and decent job creation for all.

To estimate the long-term effect of changes in manufacturing employment on employment in other sectors, researchers have developed many tools. Among them is the local multiplier (LM) method, which estimates the additional or indirect jobs occurring in the tradable and non-tradable sectors owing to a new job (directly) created in the tradable sector. In the literature on the LM method, the terms "manufacturing sector" and "trade sector" are used interchangeably, as are "service sector" and "non-tradable sector". The main objective of this paper is to discuss how and to what extent the LM method is a suitable and applicable method for employment impact assessment at local level in the African context.

After a critical review and analysis, this paper argues that Africa's socio-economic characteristics – especially the low official unemployment rate characterized by high levels of unskilled and informal employment as well as high levels of informal cross-border trade − need to be fully considered in order for LM to generate reliable estimates for policy developments in Africa.

▶ Contents

▶ 1. Introduction

Over the past ten years the African economy has grown by 3.9 per cent per year.[1] Without the global pandemic caused by COVID-19, the growth rate was expected to be 3.8 per cent for 2020 (ILO 2020). Already before the COVID-19 outbreak the African labour market had not benefited from the positive economic outlook for the continent. Economic growth had not generated a corresponding increase in employment. Most importantly, the effects of COVID-19 are expected to have worsened the situation.

Africa's economic growth relies heavily on low value-added sectors, such as oil and mining (the main sources of revenue for most African governments) and commodity exports (ILO 2019a), with relatively low pay and hence little positive impact on domestic demand. Moreover, this economic growth has been derived from a consistently high growth in population numbers and an expansion in traditional economic activities and not necessarily through a process of structural transformation and enhanced productivity (ILO 2020). For example, each year since 2015 and until 2035, a new cohort of half a million 15-year-olds is added to the continent's labour market (WEF 2015, 14).

Economic growth has so far not entailed sufficient growth in employment; in 2019 it left 10.8 per cent of African youth unemployed, especially young women. Among other reasons, this "jobless growth" can be explained by the small contribution of the manufacturing sector to GDP and by the fact that the sectors driving economic growth – namely, oil, mining and gas – are not labour intensive. By way of comparison, for every US$ million of greenfield investment in Africa, the extractive sector creates only 0.6 jobs whereas for the same amount of investment, the manufacturing and services sectors[2] create 2.75 and 61 jobs, respectively (ILO 2019b).

These differences in employment outcomes between types of investment, sectors and national/local characteristics make the identification of investment opportunities with high employment potential a worthwhile aim. More precisely, identifying those sectors and value chains with promising decent employment potential as well as shifting the investment from low to high value-added sectors coupled with industrial and value-chain upgrading, are key to transforming the economic growth into more and better job creation, especially for young men and women in Africa.

For this purpose, the European Union (EU) has recently joined forces with the International Labour Organization (ILO) in the STRENGTHEN2 project: "Employment impact assessment to maximize job creation in Africa". In addition to employment impact assessments of existing investments, one important work stream of the project is to support the EU and its African partners in assessing economic sectors, value chains, investment projects or other initiatives with respect to promising employment potential and impacts. This would be a contribution to translating African economic growth into jobs and getting closer to the aim of full, productive, and decent employment for all.

There are several methods for employment impact assessments. The current paper focuses on an econometrics-based method called local multipliers (LM). The main objective of this paper is to assess the suitability and applicability of the LM method as an employment impact assessment tool at local level in the African context. We focus on LM as developed by Moretti (2010) to assess how a change in the number of tradeable jobs in a given locality affects the change in the number of non-tradeable jobs in that locality in the long run. This paper does not discuss the weaknesses and strengths of LM in general. After all, the LM method is based on OLS regressions – one of the most popular econometric models used to estimate the impact or relationship between one or more independent variables and one dependent variable. OLS limitations are widely known and not discussed here. The focus of the paper is on the extent to which LM can be applied to Africa where the labour market is largely informal and data availability is strongly constrained.

Section 2 presents the theoretical and empirical framework of LM as well as the data structure. Section 3 discusses the suitability and application of LM in Africa and in the context of the STRENGTHEN2 project. Section 4 concludes.

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[1] Author's calculation, based on IMF, World Economic Outlook Database, October 2019.

[2] Customer contact centres

▶ 2. Local multipliers: What is the theoretical and empirical framework?

2.1 The theory behind local multipliers

In the wake of decentralization, local economic development has become a co-responsibility between institutions of governance at the national and local levels. Knowing that each local economy is unique, and has its own challenges and opportunities, local authorities are expected to design and implement the right employment policies aimed at generating more and better jobs in their respective localities. To assist decision-makers, researchers have developed many tools – among them LM – to analyse local economies and then assist local authorities in decent job-based policymaking.

LM suggests that there is a positive employment externality due to the attraction of investment or the implantation of a new firm in a given locality. This is to say that every time a local economy generates a new job in a given sector by attracting new investment or business, additional jobs might also be created in other sectors, mainly through increased demand for local goods and services (Moretti 2010, 1). LM estimates the additional or indirect jobs occurring in an area from money being spent to create jobs by expanding existing firms or establish new firms in the local economy. In other words, whenever investment is used to create a new job directly in a given city, there is a chance that additional indirect jobs are also created in the same city via increased demand for local goods and services.

Overall, for a given locality and sector, LM estimates the long-term effect of labour shocks on employment in all sectors. More precisely, whenever a local economy attracts new investment, such as a new manufacturing firm or an existing manufacturing firm expanding, this increases the number of jobs in the tradable sector. This is a direct increase in the number of jobs in the city. These extra workers will spend part of their income on local goods and services including non-traded ones (Moretti 2010, 2011; Van Dijk 2017, 3). Therefore, the application of LM can help to identify industries where investment has high potential for both direct (short term) and indirect (long term) employment creation. This is highly relevant for policymakers at both local/national and international level, hence the growing interest in estimating employment multipliers.

2.2 Empirical framework: Local multipliers as an application of OLS to local data

As its name indicates, LM is aimed at estimating employment impact at the local level. Developed and applied in the context of a few developed countries (Sweden, the United Kingdom, and the United States), LM assumes that the local economy can be grouped into two broad sectors – tradable and non-tradable. Due to the implicit assumption that tradable sectors create highly skilled and well-paid employment, trade sector employment is expected to have a high and positive impact on non-tradable sector job creation.

To differentiate trade from non-tradable sector, Van (2017) suggested that goods and services that are priced and traded outside the city, so nationally or internationally, are all defined as being produced by the tradable sector while non-traded goods and services are priced locally (Van Dijk, 2017). To understand better local multipliers let us follow the same conceptual framework as Moretti (2010, 374):

Employment outcomes differ between investment opportunities and city characteristics. Therefore, more competitive cities will likely attract more investment and workers than their counterparts. Let's assume each city uses labour to produce goods and services that belong to either the tradable or non-tradable sector. Traded goods and services are those whose prices are set (nationally and/or internationally) and nontraded goods and services are those whose prices are determined locally. Workers' wages in both sectors are locally determined so that labour is highly mobile across sectors and cities.

Let's also assume that tradable sector workers earn higher wages and have a higher preference for nontraded goods and services, and the technology in place in the non-tradable sector effectively responds to the additional demand coming from new workers in the tradable sector. The increased demand for labour in the non-tradable sector will increase employment and wages in the tradable sector and – especially – in the non-tradable sector.

In situations of high mobility and high existing unemployment, the multiplier effect on employment can be greater and the effect on wages smaller. On the other hand, low mobility and/or a low unemployment rate will have a dampening effect on the employment multiplier but will increase the effect on wages. Increased wages will also influence people living in the city that are currently not participating in the labour market. Higher wages will convince some of them to join the labour market (Moretti, 2010)

Econometrically speaking, employment in the non-tradable sector is established as a function of employment in the tradable sector. In the same way, the long-term employment effects in the tradable sector of initial direct employment in this very same sector can be estimated.

$$\Delta N_{c,t}^{NT} = \alpha + \beta \Delta N_{c,t}^{T} + \gamma' d_t + \Delta \varepsilon_{c,t}.$$

Where $\Delta N_{c,t}^{NT}$ and $\Delta N_{c,t}^{T}$ are log of the changes over time of employment in the tradable and non-tradable sectors in city C, respectively. All unobservable city-specific fixed effects are cancelled out due to the differencing and only the truly random component (ε) remains (Van Dijk 2017, 7). Using OLS regression, the intercept (α) and the time dummy (dt) variables will capture any general booms and recessions that occur in specific years. All other co-movements between jobs in the tradable and non-tradable sectors are captured by β. For the results interpretation, we focus on the sign and significance of β. Below are the possible interpretations:

- β is statistically insignificant: this would suggest that a one per cent increase in direct jobs in the tradable sector has no employment impact on the non-tradable sector.
- β is positive and statistically significant: this would suggest that a one per cent increase in direct jobs in the tradable sector increases non-tradable sector employment by β per cent.
- β is negative and statistically significant: this would suggest that a one per cent increase in direct jobs in the tradable sector decreases non-tradable sector employment by β per cent. This may happen under different hypotheses.

To consider an example of the last case, let's assume that the tradable and non-tradable sectors are not well specified so that there is substitution of goods and services between them. This is to say that instead of part of the wage generated by the new jobs in the tradable sector being spent on non-traded goods and services, demand was created for more traded goods and services, which in turn generate additional new jobs in the traded sector itself. Because of the high labour mobility coupled with the high wage offered by the tradable compared to the non-tradable sector there may be workers moving from the non-tradable to the tradable sector, explaining the negative local multiplier effect; i.e. the negative β.

A second possible explanation may be that since trade firms are competitive and price takers, when wages and other production factor prices go up, less efficient firms might close down and move to a city where the production factor labour is cheaper. In this case, the situation is neither new establishing firms nor expansion of existing firms as the result of a dynamic local economy with unsatisfied demand for goods and services. Rather, less competitive firms seek to survive in a less dynamic economy, as they cannot survive in their original locality. Since there is not an unsatisfied demand in the city, every new job in such firms probably means they have gained what other firms have lost in terms of market share. Consequently, the increase in jobs in some tradable subsectors has a negative effect on the rest of the tradable as well as on the non-tradable sectors.

2.3 Local multiplier data requirement

The application of LM requires data from at least two censuses – ideally, panel or balanced panel data with the same industries over time. Census data provides a national random sample of the population and the city the households live in. For each individual in a given city, census data also contains information on the worker's socio-economic status, especially employment and industry.

However, the number of cities and industries included between two censuses may increase over time. This is a problem because cities and industries surveyed in the period (T) may not also be found in the period (T-1). As a result, the relative

changes in the dependent variable ($\Delta N_{c,t}^{NT}$) is infinite. To prevent this from happening, researchers choose to remove all industries that do not have at least one employed worker observed in each period (T and T-1). Sometimes this results in the removal of all traded industries – making LM non-applicable. This will probably be the case for many cities in Africa because it is well known that manufacturing industries – which are the bulk of the tradable sector – are scarce at both continental and country level. Therefore, what might it be at the level of some city?

▶ 3. Data suitability and applicability of the local multiplier methodology in the African context and at project level

3.1 Can local multipliers generate credible results in the African socio-economic context?

Moretti's framework described above shows that the magnitude of the local multiplier effect and its validity significantly depend on factors such as:

A high unemployment rate;

High inter-city labor mobility and consumer preferences for non-traded goods and services as well as the technology in place in the non-tradable sector to respond to new demand; and

The type of new jobs created in the tradable sector. For example, skilled jobs should have a larger multiplier than unskilled jobs, because they pay higher salaries and wages and therefore are likely to generate a larger increase in the demand for local services (Van Dijk 2017; Moretti 2010, 2011).

These very factors present significant difficulties in applying LM to Africa, due to the high informality and its associated characteristics such as unskilled jobs and low pay as well as high informal trade.

First, Africa's unemployment rate is relatively low (6.8 per cent). This is mainly owing to more people taking up any employment, including informal employment – as they simply cannot afford not to work. The association between high informality and low unemployment rates is an important feature of African labour markets in general (ILO 2020). The proportion of informal employment and its components in total employment ranges from 40 per cent in Southern Africa to over 90 per cent in Central, Eastern and Western Africa. A high prevalence of informal employment is typically associated with low wages, unskilled workers, and inferior working conditions. The massive presence of informal employment and the resulting insensitivity of aggregate employment to economic fluctuations (including those induced by investment "shocks") pose crucial challenges for the application of LM in Africa.

The second African economic characteristic that can constrain the application of LM is the magnitude of informal cross-border trade on the continent. Several studies suggest that for some products and countries, the value of informal trade may equal or even exceed the value of formal trade (Bouet, Pace and Glauber 2018). Despite being a source of income to about 43 per cent of Africa's population, informal cross-border trade (ICBT) is mostly regarded as illegal commercialization of cross-border activities. In West Africa for example, informal cross-border trade is estimated to range from 20 per cent of GDP in Nigeria to 75 per cent in Benin (Afrika and Ajumbo 2012, 8). This partially explains the low (11 per cent) contribution of the manufacturing sector to GDP in sub-Saharan Africa because ICBT traders compete unfairly with formal traders. Contrary to informal firms, formal firms are likely to pay high salaries to workers and tax to the government. As a result, formal firms offer their goods and services at higher prices than informal firms do. The division between the tradable and non-tradable sectors therefore has very different characteristics in Africa, compared to the United States, where LM has been mostly tested. Moreover, LM assumes that the prices of traded goods and services are set nationally or internationally. This may not be the case with ICBT.

Most importantly, the biggest challenge to conducting research on employment in Africa – as for many other areas of research – is a paucity of frequent and up-to-date data. Many African countries lack the most vital data on employment and other labour market indicators. Therefore, data at local level may simply not exist, and even if they do, they may still not be sufficient for comprehensive employment impact assessments at local level. The sectoral, gender and skills breakdowns that are possible beyond the traded / non-traded breakdown are nonetheless quite limited in census and at local level in Africa.

An additional factor is the production technology in place in Africa across sectors, but particularly in the non-traded sector, which is frequently considered unsuitable to quickly respond to increases in demand.

3.2 Do local multipliers help to meet the objectives of the STRENGTHEN2 project?

Given these constraints for the meaningful application of LM, we discuss here if and how LM could be used to support the STRENGTHEN2 project. Launched in August 2020 "the project is a strategic partnership with the overall goal of leveraging employment impact assessments to promote the creation of more and better jobs for all, especially for African young men and women in sub-Saharan African countries.

A particular area of attention will be on European Union (EU)-sponsored actions, more specifically, the European Fund for Sustainable Development Plus (EFSD+), which aims, among others, to ensure an integrated approach to boosting the investment climate and business environment to promote decent job creation and inclusive and sustainable development in Africa."[3]

As far as EFSD+ sponsored interventions are concerned, their level of intervention is largely national, sub-regional or even continental; but they are not intervening at the local level, which is the focus of the LM method.

In the case of infrastructure projects, a crucial question is whether infrastructure (particularly transport and energy) sectors can be classified as either traded or non-traded goods or services. In which category do they belong? This question is important in determining the overall applicability of the LM method. Since traded sectors are defined in the LM framework as competitive and price takers, public infrastructure sectors should not be classified as traded – at least not in Africa.

Building roads and/or providing access to electricity are among the basic needs in Africa. Frequently, governments provide such services at lower prices than their production cost – often for free (road services for example). In any case, it is well established that infrastructure development has a positive and strong impact on socio-economic development – meaning that both tradable and non-tradable industries benefit from the infrastructure's economic and financial outcomes. In addition, infrastructure investment may not produce goods and services that should be considered 'traded' as defined by the LM approach.

3.3 Existing local multiplier research in Africa

It is rare to see empirical research which applies the LM method to Africa, reflecting the constraints described above. One notable empirical contribution is Charpe (2019) which applied the method to selected African countries (Rwanda, Ghana and South Africa), with a range of modifications, which aim to improve its applicability.

Overall, the estimates of this paper show large multiplier effects, much larger than normally reported in the studies which focus on advanced countries. For instance, tradable sector employment multipliers in Ghana and Rwanda, between 5 and 6, by far exceed the multipliers previously estimated in high-income countries. The multipliers become 10 in Rwanda and 33 in Ghana for salaried tradable jobs as well as 12 and 32 for skilled tradable jobs – explaining the difference in the multipliers between low- and high-income countries, where jobs created tend to be high-skilled and well paid in both tradable and non-tradable sectors.

While these large estimates can have significant implications for policy discussions, it is important to note that they are related to the ways in which LM was adapted to produce meaningful estimates. First, the paper considers that tradable goods are produced locally and consumed nationally, while non-tradable goods are produced and consumed locally. Conceptually, this definition does not reflect the characteristic of a competitive economy as suggested by the LM framework. In addition, the assumption of the paper that tradable goods production can be relocated geographically if cost inflation is too strong does not always hold true in Africa, especially considering high ICBT as discussed above.

Second, given the limitation of official unemployment in explaining employment impacts in Africa, underemployment is used as a key dependent variable for estimation. While this estimation strategy is innovative, the results should be interpreted slightly differently from Moretti's results. For instance, under high underemployment, there is a higher likelihood that a new job created is filled by someone who is already employed in some way than by someone who has no

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[3] https://www.ilo.org/employment/Whatwedo/Projects/strengthen2/lang--en/index.htm.

job at all – as assumed by the LM framework. If true, the use of underemployment can potentially lead to overestimation of local multipliers.

Finally, probably due to data limitations at local levels, the paper assumes that multipliers are the same for all cities (i.e., national averages). This is a non-trivial constraint, as one analytical advantage of LM could be an inter-locality comparison of employment potential within the same country.

▶ 4. Conclusion

LM analysis was developed by Moretti (2010) to assess how a change in the number of tradeable jobs in a given locality affects the change in the number of tradable and non-tradeable jobs in that locality in the long run. However, its applicability to Africa is constrained due to the structure of the labour market (e.g., high informality) and data limitation as well as large informal cross-border trade. Despite latest attempts to overcome these constraints through innovative empirical strategies, much needs to be done for LM methods to produce reliable estimates for policy discussion.

In light of the focus of the STRENGTHEN2 project on infrastructure investment projects, it needs to be considered that infrastructure (particularly transport and energy) sectors cannot be easily classified as either traded or non-traded goods or services, the core assumption of the LM method. In addition, the paucity of empirical research on Africa adds another uncertainty and difficulty, especially when LM estimates are provided to inform policy development.

Data constraints are a serious challenge for most of empirical research on African labor markets. LM analysis is potentially useful in overcoming the data constraints in SSA, as it is based on the use of census data that is typically available every ten years or so in many SSA countries. However, these data constraints can be tackled in many different ways, including: a) By matching employment data from the ILO Statistics Department's Microdata Repository with GTAP IO data, enabling detailed employment assessments at the sectoral level for most SSA countries through IO-based modelling; and b) through the use of geographic information system (GIS) data, enabling even more detailed employment assessments at the sectoral, occupational, and local level, when GIS data are matched with labour force survey data.

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