

Greening the African Continental Free Trade Area

Topic: Input-Output Modelling: Sustainable Production and Consumption Policies - II

Author: Simon Mevel

Co-Authors: Lionel G. FONTAGNE, Stephen Njuguna Karingi, Yu Zheng

(1) Research question

The African Continental Free Trade Area (AfCFTA) Agreement entered into force on 30 May 2019. It establishes a liberalized market through multiple rounds of negotiations. Phase I focuses on trade in goods and trade in services. Phase II covers investment, IPRs, competition policy, digital trade, and women and youth in trade.

While environmental considerations are largely outside the scope of current AfCFTA Agreement, they are becoming increasingly important. Establishing national carbon markets is also on the agenda of many African countries. Africa has the lowest share of global CO₂ emissions but is expected to be one of main affected regions by climate change. On the other hand, the high economic growth of Africa and its trade expansion are expected to increase GHG emissions considerably. Up to COP27, many African countries have updated their Nationally Determined Contributions (NDCs). In most cases, the NDCs are constructed with an unconditional target to be met through national funds, and a conditional target subject to international support.

The objective of the paper is to assess the economic and environmental impacts of AfCFTA under the possibility of establishing African carbon markets. We try to answer the following question: how industrial transformation and economic development led by the trade reform can be made consistent with climate ambition?

Few studies address the environmental effects of AfCFTA. Bengoa et al. (2021) show that AfCFTA enhances production reallocation, increases CO₂ emission marginally, and non-CO₂ GHG significantly.

(2) Method used

We use the MIRAGE-Power to perform the policy assessment. It is a multi-regional, multi-sector, dynamic computable general equilibrium model, featuring a detailed representation of energy use. MIRAGE-Power is an extension of MIRAGE-e, incorporating a detailed representation of electricity power generation. In MIRAGE-Power, electricity is generated from multiple sources including renewables, nuclear, coal, oil, and gas. The regional/national electricity producer provides aggregate electricity for intermediate consumption and households. Electricity can also be traded. As renewables are large sources of African electricity generation, this feature is of particular interest to the African electricity market.

Beyond power, further features of MIRAGE-Power help analyzing trade policy with a focus on energy. First, energy is not considered as an intermediate consumption but directly substitutes with capital in the production function. In addition, energy is subject to independent productivity improvements. Second, CO₂ emissions are incorporated from the production process (intermediates) and household consumption. Climate policy is implemented in the model by two mechanisms: either a cap-and-trade mechanism or a carbon tax.

(3) Data used

The model also accounts for trade policies, based on highly disaggregated databases of the equivalents of tariff (MAcMap-HS6) and non-tariff protection (UNCTAD NTMs). We use GTAP-POWER 10.1 database for the 2014 base year calibration.

As climate policy always has a long-term objective, we first define a business as usual (BAU) social-economic projection to reflect economic growth until 2045. We use the macroeconomic projection (GDP, labor participation rate and skills, current account targets, investment and saving rates) from updated estimates of the MaGE model. We include in the baseline, policies such as tariffs (reflecting current existing RTAs/FTAs) and updated NDCs. We assume that up to 2030, climate policy covers nations that have an existing carbon market and submitted unconditional NDCs. From 2030 to 2045, the emissions of these countries are capped at the level of 2030.

(4) Novelty of the research

We first implement the AfCFTA Agreement, including liberalization of trade in goods in line with agreed AfCFTA modalities, along with a 50% reduction of actionable restrictions to trade in the five AfCFTA priority services sectors plus health and education, as well as a 50% cut of actionable NTMs, all within the African continent only.

We implement, along with the AfCFTA, African carbon markets under 3 scenarios:

- a) African countries impose an exogenous carbon tax of US\$ 25/ton.
- b) African countries reach 50% of their unconditional targets by 2030. We assume that African NDCs would be reached through national African carbon markets. As a result, the carbon tax is endogenous in this scenario.
- c) We assume that African countries fulfill 50% and 25% of their conditional and unconditional commitments, respectively, by 2030.

The paper provides detailed results about: i) Impact on trade, GDP, and emissions; ii) Level of abatement with the exogenous carbon tax and the level of carbon price required to meet the targets as set in NDCs; iii) Change in primary energy mix and electricity mix with renewables to meet the requirement of African NDCs.