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Potential environmental impact of a trade agreement:

The case of EU-MERCOSUR

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Abstract

Trade policies have been extensively scrutinized with respect to their welfare implications as well as their effect on employment and their potential to reduce poverty in developing countries facing tariff barriers. However, sustainable development cannot be achieved if economic and social developments are not accompanied by environmental stewardship. Indeed, expansion of some export sectors in a trade partner country can lead to negative externalities if some environmental safeguards are not in place. We provide an illustration of this problem by focusing on a possible trade agreement between MERCOSUR and the European Union. We take a climate change perspective and investigate the potential consequences of such agreement on emissions from the agricultural activities and land use change. We base our analysis on a combination of two economic models: a computable general equilibrium model, MIRAGE, is used to study the impact of change in tariff on trade flows at a detailed level, in particular agricultural goods. We then look at the land reallocation patterns resulting from trade changes using a bottom-up partial equilibrium model, GLOBIOM. We distinguish different intensification assumptions associated to the trade agreement and compare cost of emissions with expected economic benefits for the two blocks of countries.

Keywords: trade policy, land use change, greenhouse gases emissions.

1. Introduction

Trade policies have been extensively scrutinized with respect to their welfare implications as well as their effect on employment and their potential to reduce poverty in developing countries facing tariff barriers (Bouët et al., 2005). However, sustainable development cannot be achieved if economic and social developments are not accompanied by environmental stewardship (Rockstrom et al., 2009). The trade and environment debate has long been a thorn in the world trade regulation body. On the one hand, environment has risen on the agenda of international negotiations and expansion of some export sectors has attracted attention from some trade partners because of their environmental consequences on some natural resources or other negative externalities associated to their production processes. On the other hand, there has been, since its creation, much concern under the General Agreement on Tariffs and Trade (GATT) to ensure environmental domestic measures are not used as protection against international trade. Within the World Trade Organization (WTO) regulations, the Agreement on Technical Barriers to Trade (TBT) and the agreement on Sanitary and Phitosanitary measures (SPS) aims at strictly monitoring the way domestic environmental policies develop can infringe trade on a discriminatory basis (WTO, 2004).

Many cases have been brought to Dispute Settlement Body, most of the time with the purpose of protecting endangered species (salmon in 1988, dolphin in 1991, sea turtle in 1998). When countries could demonstrate that their complaint was falling under the General Exceptions of article XX of the GATT (necessary to protection of human, animal or plant life or health, XX(b); or related to conservation of natural exhaustible resources, XX(g)) and was not constituting "a mean of arbitrary or unjustifiable discrimination between countries" or "disguised restriction on international trade" (chapeau of article XX, GATT, 1947), the WTO ruling was favorable to environmental measures. However, one of the most pressing issues on the current environmental agenda is climate change and reduction of greenhouse gases (GHG) emissions. Environmental measures taken to mitigate GHGs have never been screened by any official WTO panel, and in spite of the potential impact of trade on level of GHG, it is still unclear how trade should be regulated under climate change policy criteria. In the introduction of the UNEP and WTO report of 2009 on this topic, the two directors of these institution declare that "there is considerable scope and flexibility under WTO rules for addressing climate change at the national level, and that mitigation measures should be designed and implemented in a manner that ensures that trade and climate policies are mutually supportive".

However, there is much evidence that the current patterns of trade are not at all optimal from a GHG emission perspective. Some exporters of industrial goods use very GHG intensive production processes that undermine the efforts of some countries to limit their domestic emissions (Davis and Caldeira, 2010; Davis et al., 2011). Trade in agriculture is also a significant source of additional GHG emissions as illustrated by the assessment of biofuel policies and their impact on land use change (Searchinger et al., 2008; Hertel et al., 2010; Laborde and Valin, 2012). Some usually proposed remedies consist in deploying border tax adjustments (BTA) that would complement domestic taxations on GHG emissions and avoid leakages. Such measures are in debate in the literature (McKibbin and Wilcoxen, 2009; Lockwood and Whalley, 2010; Burniaux et al., 2013) but could be considered as compatible with WTO rules (UNEP-WTO, 2009). At the same time, such ex-post "correction" measures should not divert from more preventive action. Surprisingly, ex-ante assessments of impact of trade policies on greenhouse agreements are rarely conducted, for example when new trade agreements are under negotiation. The European Union usually investigate adverse effect of its trade agreement with specific Sustainable Impact Assessment (SIA) but these do not include a quantification of greenhouse gases emissions associated to the policy.

In this paper, we provide an illustration of this problem by focusing on a possible trade agreement between MERCOSUR and the European Union. We take a climate change perspective and investigate in particular the potential consequences of such agreement on emissions from the agricultural sectors. activities. Such an agreement would indeed give further boost to agricultural development in Latin America with a high risk of increasing non-CO2 emissions and driving more land conversion into forest or other natural land. Some countries such as Brazil have already experienced dramatic loss of the Amazon and carbon stocks due to cropland and pasture expansion. Our work aims at confronting the potential economic benefits from this trade agreement with the expectable changes in greenhouse emissions. To our knowledge, this is the first assessment of a bilateral assessment investigating GHG emissions impact with consideration of land use change effects.

For our analysis, we use a combination of two economic models. First, the MIRAGE CGE model, developed at CEPII, is used to represent the implications from the potential agreement on trade flows and economic welfare. We take a particular care to the representation of agricultural goods, subject to a complex system of tariff-rate quotas on the EU side. Second, we look at the land reallocation patterns using a detailed bottom-up partial equilibrium model, GLOBIOM. The detailed description of the supply side at grid-cell level in this second model allows for a precise representation of the magnitude of land use changes and associated emissions. We distinguish different intensification assumptions associated to the trade agreement and compare cost of emissions with expected economic benefits for the two blocks of countries.

The paper is organized as follows: in section 2, we provide a description of the main aspects of the EU-MERCOSUR trade agreement and its expected impacts. We introduce in section 3 the modeling framework and present the data and the two models used for the analysis. The scenarios and their results are discussed in section 4 as well as their implications for trade policies. Section 5 concludes.

2. Opportunity and challenges of a potential EU-MERCOSUR trade agreement

2.1. Current trade situation and market access opportunities

The current trade flow between the European Union and the current 5 countries member of the Mercado Comun del Sur (MERCOSUR) – namely Argentina, Brazil, Paraguay, Uruguay and Venezuela – remain limited today at the scale of the world trade. In 2011, the bilateral trade flow accounted for 52 billion euros from MERCOSUR to Europe and 46 billion from Europe to the South America trade zone, which represents only 3% of the EU trade but 20% of all MERCOSUR exports and imports. Exports from MERCOSUR to Europe are mainly based on primary products - agricultural and raw materials (48.3%) and minerals (25.2%). And for food products alone, MERCOSUR weights in fact 20% of all its extra EU imports in 2011. On the other side, EU export to MERCOSUR mainly chemical (19.3%) and manufactured products such as machinery (33%) and vehicules (16.1%), some goods which are little represented in the EU imports from that region.

The European Union did not wait the creation of MERCOSUR in 1991 to develop a trade policy towards countries in Latin America. MERCOSUR countries have benefited from the European Generalized System of Preferences for several decades until its reform in 2012. Negotiation for a EU-MERCOSUR bilateral trade agreement started in the decade 2000. As the European Union still maintain trade barriers to protect the European agricultural markets, the negotiation have been focusing a lot, on MERCOSUR side, on requesting improved market access for agricultural goods, in particular from Brazil and Argentina, whereas these emerging economies were asked to decrease their protection on manufactured goods.

2.2. Challenges of agricultural production in MERCOSUR with respect to environment

Among agricultural exports from MERCOSUR, the most strategic products are soya products (24% to EU), bovine meat (35% to EU), pig and poultry products (37% and 7% to EU, respectively). However, the mode of production of these products raise particular concern due to their impact on greenhouse gases in Brazil.

2.3. Analysis of tariff and tariff rate quotas structure and current negotiations

To be completed.

3. Modeling framework for assessing the trade agreement

3.1. MIRAGE, a CGE model for trade policy analysis

We use for the evaluation of the economic impact of EU MERCOSUR trade liberalization scenarios a trade computable general equilibrium (CGE), MIRAGE. This model, developed at CEPII, has been used in multiple assessment exercises for trade liberalization (Bouet et al., 2005; Decreux and Fontagné, 2006, Gouel et al., 2010) and analysis of agricultural policies, in particular in the context of biofuels (Laborde and Valin, 2012).

The model follows standard CGE specifications, with a representation of all productive sectors of the economy through nested CES production supply function. Agricultural sectors for this analysis are fully decomposed at the most refined level. Land substitution is managed through nested CES according to Laborde and Valin (2012). However, the land use patterns presented in this paper are based on the linkage with the optimization land use model GLOBIOM (see next section).

The model calibrated on the GTAP8 database (Narayanan et al., 2012), with a base year in 2007. For the tariff information, we rely on the MAcMap-HS6 database (Guimbard et al., 2011) and TRQ information from the TARIQ database. MIRAGE is used in a dynamic recursive setting with one year time steps, which allows to harmonize data, drivers and output on the same years as GLOBIOM, which runs with time periods of 10 years.

3.2. GLOBIOM land use optimization model

GLOBIOM is linear programming model with a spatial equilibrium approach a la Takayama and Judge (1971). The model follows a bottom-up structure starting from a detailed dataset on land use at the grid-cell level (0.5 x 0.5 degrees), and representing main activities associated to land: crops cultivation, livestock farming and forestry. The model represents various forms of demand for agricultural and wood products, as well as bioenergy. It incorporate detailed GHG emission accounts from agriculture and land use change in a geographically explicit setting. For the purpose of this paper, as the representation of land use change in Brazil, the largest emitted of land use change emissions of MERCOSUR, is of critical importance, internal transportation costs are additional implemented in that country.

4. Results of different trade liberalization scenarios

To be completed

5. Discussion and conclusion

References

Bouët, A., Bureau, J.-C., Decreux, Y. & Jean, S. (2005). Multilateral Agricultural Trade Liberalisation: The Contrasting Fortunes of Developing Countries in the Doha Round. *The World Economy* **28** (9), 1329--1354.

Bouët, A., Decreux, Y., Fontagné, L., Jean, S. & Laborde, D. (2008). Assessing Applied Protection across the World. *Review of International Economics* **16** (5), 850--863.

Burniaux, J.-M., Chateau, J. & Duval, R. (2013). Is there a case for carbon-based border tax adjustment? An applied general equilibrium analysis. *Applied Economics* **45** (16), 2231-2240.

Davis, S. J. & Caldeira, K. (2010). Consumption-based accounting of CO2 emissions. *Proceedings of the National Academy of Science*.

Davis, S. J., Peters, G. P. & Caldeira, K. (2011). The supply chain of CO2 emissions. *Proceedings of the National Academy of Sciences*

Decreux, Y. & Valin, H. (2007). *MIRAGE, Updated Version of the Model for Trade Policy Analysis Focus on Agriculture and Dynamics* (Working Papers 2007-15). CEPII

Gouel, C., Mitaritonna, C. & Ramos, M. P. (2011). Sensitive products in the Doha negotiations: The case of European and Japanese market access. *Economic Modelling* **28** (6), 2395--2403.

Havlík, P., *et al.* (2011). Global land-use implications of first and second generation biofuel targets. *Energy Policy* **39** (10), 5690 - 5702.

Hertel, T., Tyner, W. & Birur, D. (2010). The global impacts of biofuel mandates. *Energy Journal* **31** (1), 75-100.

Laborde, D. & Valin, H. (2012). Modeling land-use changes in a global CGE: Assessing the EU biofuel mandates with the Mirage-BioF Model. *Climate Change Economics* **03** (03), 1250017.

Lockwood, B. & Whalley, J. (2010). Carbon-motivated Border Tax Adjustments: Old Wine in Green Bottles?. *World Economy* **33** (6), 810--819.

McKibbin, W. & Wilcoxen, P. (2009). The Economic and Environmental Effects of Border Tax Adjustments for Climate Policy. In *Brookings Global Economy and Development Conference, Brookings Institution, Washington, DC.* .

Narayanan, B. G., Aguiar, A. & McDougall, R. (2012). *Global Trade, Assistance, and Production: The GTAP 8 Data Base*. Center for Global Trade Analysis, Purdue University..

Ramos, M. P., Bureau, J.-C. & Salvatici, L. (2010). Trade composition effects of the EU tariff structure: beef imports from Mercosur. *European Review of Agricultural Economics* **37** (1), 1--26.

Rockstrom, J. *et al* (2009). A safe operating space for humanity. *Nature* **461** (7263), 472--475.

Takayama, T. & Judge, G. (1971). *Spatial and temporal price and allocation models.* North-Holland Amsterdam.

WTO (2004). *Trade and the Environment*. World Trade Organization.

UNEP and WTO (2009). *Trade and Climate Change*. World Trade Organization.