



## Analysis

## Trade, Ecologically Unequal Exchange and Colonial Legacy: The Case of France and its Former Colonies (1962–2015)

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## ABSTRACT

The role of trade in global environmental change is receiving increasing attention and there is a lively debate about Ecologically Unequal Exchange (EUE). Little is known, however, about the role of colonial legacy for the evolution of physical trade patterns. This study provides empirical evidence on the basis of a systematic evaluation of global trade data. We quantify, in physical and monetary terms, the development of trade relations between France, its former colonies and the rest of the world from the immediate post-colonial period until 2015. We use a set of physical trade indicators including physical trade balance and terms of trade to analyse differences in trade patterns and EUE. The results indicate that colonial ties were very strong in the 1960s, but thereafter quickly diminished. We find strong evidence for EUE between France and its former colonies in the post-colonial period and that the colonial factor explains EUE between centre and peripheries better than income differences until the 1970s. In recent decades colonial legacy increasingly vanished. Our findings corroborate that socio-political factors, and in particular colonial legacy, play an important role for EUE relations and that they deserve more attention in quantitative empirical research on trade.

## 1. Introduction

Worldwide consumption of natural resources has seen unprecedented growth in the second half of the 20th century, driving the most pervasive environmental transformation process ever to be induced by humanity (Steffen et al., 2007). In this period not only the extraction of material resources and energy carriers multiplied, also physical trade flows surged. Between 1950 and 2010 global exports of raw materials and manufactures have grown from 0.9 Gt/yr to 11 Gt/yr and the share of exports in extracted materials more than doubled from 7% to 16%, for fossil energy carriers and ores it is as high as 50%–60% (Dittrich and Bringezu, 2010; Schaffartzik et al., 2014).

The expansion of global trade has played a vital role for economic growth and development. Since resources are not distributed equally, trade provides countries and people access to resources which they do not have domestically, allowing to overcome local biophysical constraints to growth (Wrigley, 2016; Kander et al., 2017). But trade has also facilitated shifting environmental burden between countries. There is growing concern related to the displacement of environmental loads

from rich to poor countries via trade. In consequence, issues of equity and sustainability in relation to these exchange processes have become an object of interest also within Ecological Economics (e.g., Andersson and Lindroth, 2001; Martinez-Alier, 2002). In this context, the concept of Ecologically Unequal Exchange (EUE) has gained significance in the debate, becoming a prestigious theory in Political Ecology and Ecological Economics (Hornborg, 1998, 2012; York et al., 2003; Foster and Holleman, 2014).

It is grounded in the premise that, against a background of unprecedented global environmental change, “the disparities in environmental damages are uneven within and especially between nations. Rich nations place more stress on the global environment, while poorer nations disproportionately contend with the effects and consequences of degraded and/or stressed ecosystems” (Jorgenson, 2016:2). Although there is no precise definition for which general consensus has been gained, most authors identify the following characteristics of EUE: (i) an asymmetric flow of biophysical resources between nations; (ii) an outsourcing of environmental impact that is associated with extraction and production activities of the imported goods; and (iii) unequal

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monetary retribution in the trading of materials, or in the opposite direction, in the intensity of impacts per monetary unit traded (Rice, 2007:47; Moran et al., 2013:177).<sup>1</sup>

EUE theory is rooted in Dependence Theory and World System Theory (e.g., Prebisch, 1950; Emmanuel, 1972; Wallerstein, 1974), which identify historic structural factors to explain global inequalities. EUE theory partly emerged to include the environmental perspective in such theories, which originally paid little attention to global change and its impacts (Bunker, 1985; Perez-Rincon, 2006). Many theoreticians note that EUE is not limited to documenting empirically the existence of asymmetric trade relations, but that the theory also: (i) indicates as underlying causes the existence of asymmetrical power structures rooted in history, and (ii) argues that the existence of such asymmetric relations perpetuates the underdevelopment of countries that suffer from of unequal exchange (e.g. Rice, 2007; Hornborg, 2012). Even so, most research so far has limited its scope to highlighting unequal relations by means of short-term studies, and distinguishing between different groups of countries by income, ahistorically assuming that high-income countries always have a parasitic relationship with low-income countries. Only very few quantitative studies have tackled power relations over time as an explanatory factor. Quite strikingly, colonial legacy has not yet been investigated in this context. This is surprising for two reasons in particular: on the one hand, because in recent years, the colonial factor has emerged as one of the star variables to explain current levels of economic and political development (Acemoglu et al., 2000); and on the other hand, because from a historical perspective, colonialism has stood out as the most blatant factor of unequal exchange of resources (Hornborg and Jorgensen, 2010; Ax et al., 2011; Ross, 2017); in fact, the original postulates of World Systems Theory referred to colonialism as a key factor in unequal exchange.

With this study we aim to shed some light on this aspect and to provide empirical evidence for the significance of the colonial factor for the evolution of asymmetric trade patterns in the second half of the 20th century. We investigate changing trade relations between a colonial power and its former colonies in comparison to the rest of the world in the post-colonial period. We seek to find out how colonial relations influence patterns of physical trade, to provide insights on how far colonialism can explain patterns of EUE, and how such relations have evolved after the end of formal colonial domination. We use France as a case study of a former colonial metropole and investigate trade relations between France, its former colonies (FC), a total of 27 current countries, and the rest of the world (ROW), between 1962 and 2015. The French colonial empire began to disintegrate rapidly during and after WWII. The peak of decolonization was between 1960 and 1962 when 15 countries were left into independence. The last former colony to leave the empire was Vanuatu in 1980. Our analysis, thus, covers the years immediately following the colonial period. To analyse the trade relations between France and its former colonies we have developed a detailed database on bilateral trade flows in monetary and physical units. Based on these data we can trace physical trade flows between countries and calculate the indicators Physical Trade Balance (PTB) and Terms of Trade (TOT) which are widely applied to assess EUE relations (e.g. Giljum & Eisenmenger, 2004; Muñoz et al., 2011; Samaniego et al., 2017).

This is the first study to provide this type of detailed quantitative evidence based on a systematic analysis of physical trade data for such a long time period; its main objectives are:

- (i) To quantify and analyse changes in the influence of colonial ties on trade flows in the post-colonial period. So far this has been studied

only from a monetary (Head et al., 2010), but not from a biophysical perspective.

- (ii) To estimate Physical Trade Balances (PTB) between France, its FC and ROW in order to identify any potential colonial bias in French foreign trade. We distinguish three colonial regions (Maghreb, Sub-Saharan Africa and Asia) as well as four types of raw materials (food, fossil fuels, other crude materials and manufactured products) in order to identify trade relation patterns by product and region.
- (iii) To estimate the terms of trade (TOT) between France and its FC and the ROW. TOT is calculated based on the average price of exported tonnage compared to the average price of imported tonnage.
- (iv) To establish a link between colonial legacy and EUE. We calculate PTB and TOT for France in relation to 165 countries (including all former colonies) and conduct a panel regression to test the effect of income (GDP per capita) and colonial legacy based on these EUE-explaining indicators.

In the following section we briefly describe the data methods, indicators and data sources used to evaluate trade relationships; in the next section we present the results of the analysis of trade flows in aggregate terms and by colonial regions and commodity types and for EUE indicators. We then use statistical analysis to test whether the colonial factor can explain unequal exchange relations between France and all other countries in the world including its former colonies. Finally, we discuss the evolution of trade relations between France and its former colonies and the changing significance of the colonial factor in EUE patterns. We conclude with new insights on the role of colonial ties on physical trade in the immediate post-colonial era.

## 2. Methods and Sources

### 2.1. Quantitative Methods and Indicators to Investigate EUE

Two major methodological strategies have been used for quantitative assessments of EUE. A number of studies applied econometric methods and an indicator referred to as ‘weighted export flows’ (Givens and Jorgenson, 2013). This measure quantifies the relative extent to which a nation's exports are sent to more-developed countries. In combination with indicators for environmental impacts or pressures (e.g., deforestation, ecological footprint), this index can be used to analyse the unequal environmental effects of trade relations between countries of different development status (e.g., Jorgenson, 2016). To evaluate the evolution of the trade flows between France and its former colonies and to assess the significance of the colonial factor for trade patterns we follow another approach that is rooted in material flow analysis and is based on the systematic evaluation of physical and monetary data on bilateral trade flows (Giljum and Eisenmenger 2004; Hornborg, 2012). This approach has been widely applied in EUE studies, in particular for South American countries (e.g. Perez-Rincon, 2006; Muñoz et al., 2011; Samaniego et al., 2017). The main indicators used, and on which our analysis relies on, are the Physical Trade Balance (PTB), that provides a measure of direct exchange of materials among countries, and the Terms of Trade (TOT), that informs on the average monetary value per unit of mass flow of traded goods. More recently, studies also began to include indirect (embodied) flows in addition to direct trade flows in this type of analysis (e.g., Muñoz et al., 2011; Moran et al., 2013; Dorninger and Hornborg, 2015).

PTB is defined as the difference between direct imports ( $M_i$ ) and exports ( $X_i$ ) of country  $i$  (Fischer-Kowalski et al., 2011), as shown in Eq. (1).

$$PTB_i = M_i - X_i \quad (1)$$

A negative PTB indicates net exports and positive PTB net imports. PTB is the most frequently used indicator to assess the asymmetric

<sup>1</sup> Explicit definitions of this concept can be found in Oulu (2016:447), Dorninger and Hornborg (2015), Jorgenson (2016:7); see also a critical discussion in Warlenius (2016).

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