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Ecological transition and structural change: A new-developmentalist analysis

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Highlights

- The article investigates the ecological transition and the structural change according to the Structuralist-New Developmentalist perspective.
- Dutch disease had a clear environmental side which is not considered in the new-developmentalist literature.
- An increase in the share of green activities in output had the potential to reduce the size of Dutch disease.

Abstract

The article aims to analyze the ecological transition and the structural change by considering the role of Medium-Income Trap (MIT) with respect to exchange rate overvaluation and (re)industrialization, according to the structuralist-New Developmentalist Approach. The ecological challenges can be faced by an ecological transition based on Ecological Technological Progress and Ecological Structural Change (ESC). The ESC can be represented by the increase of the share of green activities in output for increasing the environmental efficiency of the economy. The theoretical core of the new developmentalism is the tendency of overvaluation of real exchange rate for middle income countries whose sources are the Dutch disease (and the growth with external saving strategy). This fact generates the MIT concerning the negative impact of overvaluation real exchange rate on the industrial development. Thus, we analyze how the ESC interact with the drivers of overvaluation exchange rate by carrying out a post-Keynesian model based the Structuralist-New Developmentalist features. In this perspective, we integrate the issue of the achievement of the environmental targets as indicated by the Climate International Conferences and by the UN initiative of the Sustainable Developments Goals, to the structural change necessary for the economic catching-up of the middle income (and/or developing) countries.

Introduction

The beginning of Industrial Revolution in Great Britain in the second half of XVIII century had two long-term effects over the world. The fist effect was the occurrence of the so-called "great divergence", defined as a cumulative process of international dispersion of per-capita incomes [1]. According to Prichett [2] [3] the ratio of GDP per-capita of the richest to poorest countries rose from 8.7 in 1870 to 51.6 in 1985. In 2008, for a sample of 87 countries, Ros [4] showed that the ratio of the richest country (Norway) to the poor country (Zimbabwe) was 274:1.

The second long-term effect was the cumulative increasing of CO_2 levels in the atmosphere. According to Aghion et al. [5], p. 173) until the beginning of the nineteenth century the concentration of carbon dioxide in the atmosphere was stable, at levels of 280 parts per million (ppm). In 2018 the atmospheric concentration of carbon dioxide had reached 410 p.m. This rapid increase in the CO_2 levels created the *greenhouse effect*, which is the source of global warming and climate change that will have devastating economic effects in the next decades if it was not controlled in time.

After the end of Second World War many countries that had fallen behind in economic development relative to European countries and the United States had started a process of state-led industrialization by import substitution. Countries as Brazil, Mexico and South Korea industrialized at a very fast rate reaching the status of middle-income countries at the end of 1970′s and the beginning of the 1980′s. From that time on, however, Latin American Countries become stuck in a Middle-Income Trap (MIT hereafter) while East Asian countries continued its development path, reducing their income gap to the developed economies aqs we can see in Fig. 1 below.

According to New-Developmentalist Theory (NDT hereafter), that is a Keynesian-structuralist approach followed in this article based on the dynamic interactions across aggregate demand, structural changes and finance stability [6,7], the main reason for the stagnation of Latin American Economies compared to the East-Asian countries is that the former experienced a process of *premature deindustrialization*,[1] i.e., a reduction of the share of manufacturing industry in output and employment before the "Lewis's point" is reached [8], that is, before all labor force is transferred from the traditional or subsistence sector to the modern sector of the economy [9]. In other words, the MIT was a result of *an incomplete structural change* of Latin American economies.

One of the causes of premature deindustrialization for NDT is the overvaluation of real exchange rate caused by the Dutch-Disease (DD hereafter), that means the exchange rate overvaluation caused by the production and export of commodity goods that are intensive in the use of natural resources. Exchange rate overvaluation reduced the price competitiveness of Latin-American manufacturing firms in both external and domestic markets thus reducing the profitability of investment in manufacturing sector and hence increasing the technological gap[2] with manufacturing firms of developed economies since new technologies are, in general, embedded in new machines and equipment [10]. Over time the combined effects of real exchange rate overvaluation and increasing technological gap reduced the share of Latin-American manufacturing firms both on world exports of manufacturing goods and in GDP.

If industrialization was the cause of climate change and premature deindustrialization was the cause of stagnation of Latin-American countries how it is possible for then to resume growth without converting into "pollution havens"? East Asian economies would have to stop their development process based in structural change toward the manufacturing sector to contribute to the global fight against climate change?

The first objective of this article is to show that the necessary transition from a fossil fuel-based economy to a low-carbon economy - which the European Commission [11] denominates as *ecological transition* - is compatible with reindustrialization of the countries that get stuck in the MIT due to DD. Economic development is structural change, and what is needed now is an *Ecological Structural Change* defined by the increase of the share of green activities in output to reduce the emissions of CO_2 into the atmosphere by each unit of output produced, that is to increase the environmental efficiency of the economic system.

Until recently New-Developmentalism had nothing to say about the problem of climate change and ecological transition. The first step in order to fulfill this gap was made by Guarini and Oreiro [12] whom argued that the real exchange rate overvaluation due to DD can act as a barrier for Ecological Structural Change (ESC hereafter) due to the possibility that "green industries" can be the most damaged ones, because they have a higher technological intensity the brown industries, requiring more trained and educated workforce (that is relatively scarce in middle-income countries) which demand high real wages. In this context, exchange rate overvaluation will act as an additional pressure for increasing unit labor costs for these industries, thereby reducing their price competitiveness" (p.248). In other words, DD can act in order to make developing economies in "pollution havens".

Despite this initial effort, these ideas are not yet integrated in a formal new-developmentalist model, as the one made by Oreiro et al [6]. The second objective of this article is precisely to develop a formal new-developmentalist model, based in the original model of Oreiro et al [6], that incorporates the ESC in its basic structure to analyze the relation of DD with ecological transition as well as the relation of the former with the manufacturing share. This analysis is required for answering some important questions as what is the effect of ecological transition for the manufacturing share in developing economies? What are the mechanisms by which DD can hamper ecological structural change? Neutralization of DD is the only way to achieve the goals of ecological transition and reindustrialization for developing economies or there are other policies that can be used to accomplish these goals? New developmentalism can also be useful for developed economies to make the ecological transition?

The article is organized as follows. Section 2 analyzes the main elements characterizing the relationship between structural change and ecological issues within the developmentalism approach by introducing a macroeconomic interpretation of *inclusive and sustainable industrial development*, and by specifying the concepts of "structural complementarity" and "twin structural change". Moreover, it introduces the issue of green activities and Dutch disease within the developmentalist structural change analysis. Section 3 show relevant theoretical results by carrying out the dynamic of the relationship between the ecological standard structural change and by pointing out the effects of devaluation, an improvement of technological gap and a stringency of green targets. Section 5 contains discussion and conclusion.

Section snippets

Structural change and environmental sustainability: a general view

We can consider that the ecological transition is a combination of Ecological Technical Progress and Ecological Structural Change. The former is based on a general reduction of the environmental pression in terms of impact (for instance pollution intensity) and/or use of natural resources (for instance, raw material intensity, ecological footprint), while the latter is represented by the shift of labor/value added from economic activities with high environmental pressure intensity, that we can…

The steady state values

Let us to study the dynamic relationship between rate of change of manufacturing share $\widehat{\gamma}$ and ecological structural change represented by $\hat{\varepsilon}$.

To this end, we introduce equation (12) of q^{IND} in equation (18) and we obtain:
$$\hat{\varepsilon} = \frac{\dot{\varepsilon}}{\varepsilon} = \dot{\varepsilon} = \left\{-\theta_0\left(-\frac{\overline{\beta}}{\beta_5} - \frac{\beta_1}{\beta_5}(\gamma - \gamma^\circ) + \frac{\beta_2}{\beta_5}\left(\gamma^2 - \gamma^{\circ 2}\right) + \frac{\beta_3}{\beta_5}G^T - \frac{\beta_4}{\beta_5}\varepsilon - q^{CAB}\right) - \theta_1 G^T + \theta_2\left(\overline{\varepsilon} - \varepsilon\right)\right\}\varepsilon$$

The dynamics of the manufacturing share is given by equation (11)
$$\widehat{\gamma} = \frac{\dot{\gamma}}{\gamma} = \dot{\gamma} = \left\{\overline{\beta} + \beta_1\left(\gamma - \gamma^\circ\right) - \beta_2\left(\gamma^2 - \gamma^{\circ 2}\right) - \beta_3 G^T + \beta_4\varepsilon + \beta_5 q\right\}\,\gamma$$

The system of non-linear differential equations composed by equations (11), (19) had 4…

Discussion and conclusion

Throughout this article we developed a Post-Keynesian/Structuralist-New Developmentalist model to illustrate the relationship between ecological transition and structural change and to analyze the effects of ecological structural change (ESC) over Middle Income Trap (MIT) caused by Dutch disease. As show in the article an increase in the share of green activities in output had the potential to reduce the size of Dutch disease since it can produce an appreciation of industrial equilibrium…

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Author Statement

We confirm that this work is original and has not been published elsewhere nor it is currently under consideration for publication elsewhere.

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Thank you for your consideration of our revised manuscript.…

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