

FROM EXTRACTIVISM TO NEO-EXTRACTIVISM IN ARGENTINA: ANALYSIS OF THE EVOLUTION OF ENVIRONMENTAL IMPACT AND EXTERNAL DEPENDENCE (1990-2017)

ALONSO-FERNANDEZ, Pablo
REGUEIRO-FERREIRA Rosa-Maria*

Summary: this paper analyses the evolution of Argentina's environmental impact in the period 1990-2017, which allows us to study the differences between the extractivist and neo-extractivist phases of the Argentinean economy. To do so, we use material consumption indicators obtained through the Material Flow Analysis methodology, combined with monetary indicators, which allows for a secondary analysis of external dependence. The results show that the environmental impact has not stopped growing throughout the period, so that the differences between the two models are not significant in environmental terms. Furthermore, Argentina has problems balancing its monetary trade balance when commodity prices are not favourable, while maintaining a net export position in physical terms. This makes inter-sectoral economic diversification difficult and forces Argentina to maintain an economic model that leads to the absorption of a significant environmental impact from the rest of the world.

(There is also an Spanish versión of the article: Summary in Spanish: En este trabajo se analiza la evolución del impacto ambiental de Argentina en el período 1990-2017, lo que permite estudiar las diferencias entre la fase extractivista y la neoextractivista de la economía argentina. Para ello, se utilizan indicadores de consumo de materiales obtenidos a través de la metodología del Análisis de Flujos Materiales, combinados con indicadores monetarios, lo que permite analizar de forma secundaria la dependencia externa. Los resultados muestran que tanto el impacto ambiental no ha dejado de crecer en todo el período, por lo que las diferencias entre ambos modelos no son significativas en términos ambientales. Además, Argentina presenta problemas para equilibrar su balance comercial monetario cuando los precios de las commodities no son favorables, al tiempo que mantiene una posición netamente exportadora en términos físicos. Esto dificulta la diversificación económica intersectorial y obliga a mantener un modelo económico que lleva a la absorción de un importante impacto ambiental del resto del mundo.)

JEL codes: Q17, Q27, Q37, Q56

Palabras clave: extractivismo, neoextractivismo, impacto ambiental, Análisis de Flujos Materiales, Argentina

Keywords: extractivism, neoextractivism, environmental impact, Material Flows Analysis, Argentina

* Departamento de Economía Aplicada, Universidade de Santiago de Compostela (USC). Pablo Alonso-Fernández (pablo.alonso.fernandez@rai.usc.es), Rosa María Regueiro Ferreira (rosamaria.regueiro@usc.es).

1. Introduction

Extractivism is the extraction of large quantities of natural resources for export in raw or low-processed form (Acosta, 2013; Gudynas, 2012). The significant investment required to extract these resources allows multinational companies to gain access to exploit the resources in countries that do not have the technical or financial capacity to do so themselves (Gudynas, 2011). Thus, in extractivist countries, the State frequently adopts a marginal role as guarantor and facilitator of the conditions conducive to the exploitation of resources by multinationals, with the aim of ensuring that these activities generate economic growth that has a spill-over effect on the rest of the economy (Gudynas, 2011; Portillo, 2014), an approach derived from the principles of the Washington Consensus (Slipak, 2014; Svampa, 2012). Many South American countries rich in natural resources have implemented extractivist strategies in recent decades. Thus, in the last years of the 20th century, the Argentinean economy underwent important transformations, mainly through deregulation and the stimulation of foreign investment, the deregulation of the agricultural sector and the promotion of the exploitation of national resources by foreign companies, especially in the fossil resource sector (Gómez-Lende, 2019).

The results of extractivist policies were not very positive, leading to a period of economic crisis in the early years of the 21st century in Argentina and other South American economies (Gómez-Lende, 2019). Therefore, there was a change in the government's orientation that implied variations in the extractivist model. The main difference was the adoption of a much more active role for the state, both through regulation and taxation, as well as direct participation in the exploitation of natural resources (Gómez-Lende, 2019; Gudynas, 2009). However, this variation of extractivism, known as neo-extractivism, has more similarities than differences with traditional extractivism. Thus, with the shift towards neo-extractivism, not only did Argentina not reduce its dependence on the extraction and export of natural resources, but it also increased and spread to more sectors (Frechero, 2013; Gudynas, 2009, 2011; Oviedo, 2015). Favourable commodity prices during the 2000s favoured the expansion of agribusiness and monocultures, largely thanks to Chinese demand for products such as soybeans (Baletti, 2014; Jaramillo et al., 2009; Roache, 2012; Svampa, 2012). In this way, a process of reprimarisation continues in the Argentine economic structure, exacerbated by the debt problems resulting from the 2001 crisis (Mora et al., 2021).

On the other hand, China's growing influence in the international commodities market has led to Argentina being integrated into its global production chain as a supplier of agricultural products and importer of manufactured goods. This implies the reproduction of the centre-periphery relations that had been produced in the extractivist phase with the USA and Europe (Oviedo, 2015; Svampa, 2012; Villafañe, 2012). In addition, it hinders industrialisation and, therefore, the reduction of external dependence for the supply of different manufacturing goods. This situation is reflected in the fact that both Argentina and other South American countries find it difficult to maintain a positive trade balance, despite the enormous quantities of raw materials they export (Muñoz et al., 2009, 2011; Samaniego et al., 2017).

This paper analyses the evolution of environmental impact in Argentina in the period 1990-2017, with the aim of verifying the differences between the different phases of extractivism. To measure environmental impact, indicators derived from Material Flow Analysis are used, which provide information about the consumption of materials in a given territory. Although the consumption of materials is an approximation of environmental impact that does not include the real damage caused to the environment, it provides harmonised and complete data that allow the evolution of the pressure exerted on nature to be analysed (Krausmann et al., 2017). At the same time, by complementing the Material Flow Analysis data with monetary data, the progression of external dependency is studied.

2. Methodology and data

The methodology of this work is based on the Material Flow Analysis (MFA), a tool developed by Ayres and Kneese. (1969) for the study of economic externalities. The MFA has been revised and improved on several times, as part of a process that is still ongoing today (Ayres & Ayres, 1998; Daniels, 2002; Daniels & Moore, 2001; EUROSTAT, 2018; Fischer-Kowalski et al., 2011; Fischer-Kowalski & Haberl, 1998). This tool provides an accounting of the material flows generated by the economic activity of a given territory, which are the physical link between societies and the environment (Ayres & Simonis, 1994; Eisenmenger et al., 2016; Fischer-Kowalski & Weisz, 1999).

The AFM can be used through alternative methods, which differ in the way in which responsibility for material consumption linked to trade flows is allocated. The most widespread method is the territorial or production method (EUROSTAT, 2018; UNEP, 2011), which attributes to each territory the materials used in domestic production, deducting the exported goods and adding the imported ones (EUROSTAT, 2018; Krausmann et al., 2017; Piñero et al., 2019; Schandl et al., 2016, 2018).

The other most commonly used method is the consumption method, which imputes to each territory the materials used to produce the goods consumed by its final demand, whether or not they form part of the final good and independently of where the production took place (Arto et al., 2012; Carpintero, 2015; Schandl et al., 2018). Thus, the physical trade flows obtained using the production method correspond to the monetary ones (Schaffartzik et al., 2015), allowing simple comparisons to be made between physical and monetary quantities.

In contrast, physical trade flows derived from the consumption method include all materials used in traded goods. The monetary value of a traded good is determined not only by the final quantity of materials in the traded good, but by all the materials used throughout the production chain. Thus, although more complex to compile, the material flows obtained using the consumption method more adequately approximate the environmental impact caused by each territory (Alonso-Fernández & Regueiro-Ferreira, 2021). Therefore, this paper uses indicators obtained through the consumption method.

The basic MFA indicator, common to all approaches, is Domestic Extraction (DE),

which represents the sum of all materials, biotic and abiotic, extracted from nature and used in some economic activity (Carpintero, 2015; EUROSTAT, 2018; Krausmann et al., 2017; Schandl et al., 2018). The DE represents the impact that actually occurs in a territory, regardless of who is responsible for that environmental impact. This responsibility is determined by the Material Footprint (MF), which results from subtracting exports from the DE and adding imports.

The Material Footprint indicates all materials consumed in the production of goods consumed by a territory's domestic demand, regardless of where the production took place (Arto et al., 2012; Carpintero, 2015; Schaffartzik et al., 2015; Schandl et al., 2018; Wiedmann et al., 2015).

In order to assess the trajectory of a country or territory's material use, a comparison of its growth with that of GDP is usually used. In this way, it can be checked whether there is a decoupling between the material consumption indicator series and GDP, in which case there would be dematerialisation, i.e. the amount of resources used for each unit of GDP produced would be reduced (Fischer-Kowalski & Haberl, 2015; Ruffing, 2007; UNEP, 2011).

When this occurs because material consumption grows less than GDP, dematerialisation is relative or weak, while if it occurs because material consumption decreases, dematerialisation is absolute or strong (Giljum et al., 2005; Krausmann et al., 2017; UNEP, 2011; Wiedmann et al., 2015).

The difference between physical imports and physical exports is called the Raw Trade Balance (RTB). It is constructed and interpreted inversely to the monetary trade balance because imports increase the Material Footprint and exports reduce it (EUROSTAT, 2018; Krausmann et al., 2017; UNEP, 2010). RTB makes it possible to determine whether a territory has a physical trade deficit or surplus.

Extractivist countries have an unequal relationship with the rest of the world, especially with the richer countries, from which the companies that exploit their resources generally originate (Emmanuel, 1972; Prebisch, 1950; Wallerstein, 2011).

This asymmetrical relationship implies that extractivist countries support the activity of more developed countries with their own resources, which implies an ecologically unequal exchange that negatively affects their sustainability (Bunker, 1984). RTB makes it possible to determine whether a country benefits or suffers from ecologically unequal exchange (Dorninger & Eisenmenger, 2016; Infante-Amate & Krausmann, 2019; Samaniego et al., 2017).

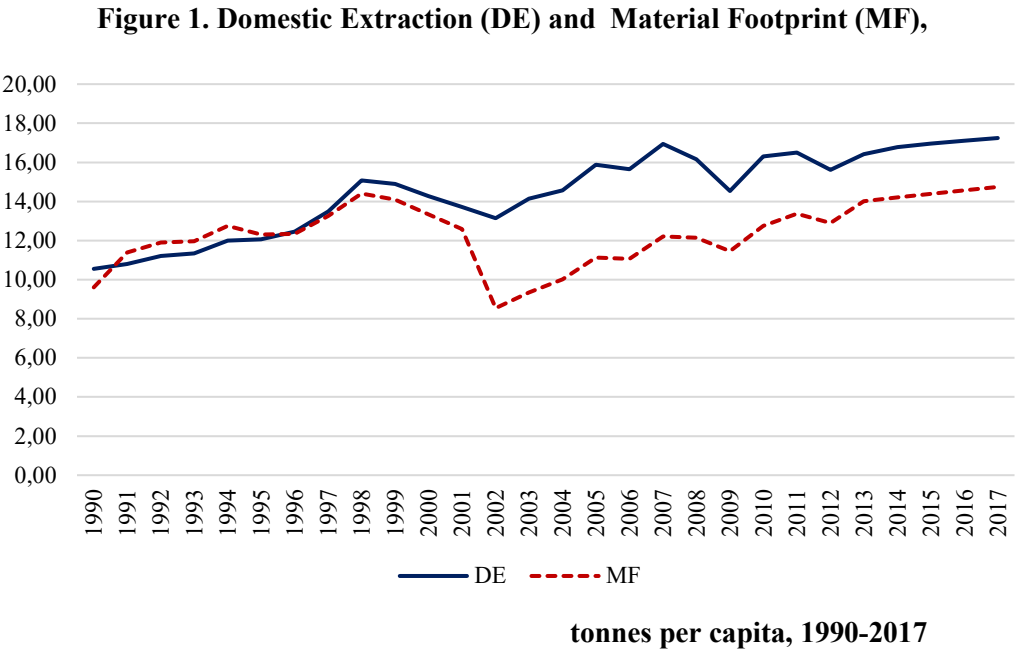
This paper uses data from: the World Bank's World Development Indicators database, from which 2010-based GDP in USD and population are extracted; the World Trade Organization, from which data on monetary trade are extracted; the Global Material Flows Database (2018) of the United Nations Environment Programme, from which the indicators of material consumption are extracted.

3. Results and discussion

The indicators used in this paper to quantify environmental impact are the DE and the MF. As indicated in the previous section, the DE corresponds to the impact that actually occurs in the country, while the MF indicates the environmental impact for which the country is responsible. Figure 1 shows the evolution of both variables.

It is easy to see the effects of the crisis period at the beginning of the 21st century, especially on MF, as it affects consumption capacity more than production capacity. Since then, a difference between the two series has been established that never amounts to less than 2 tonnes per capita.

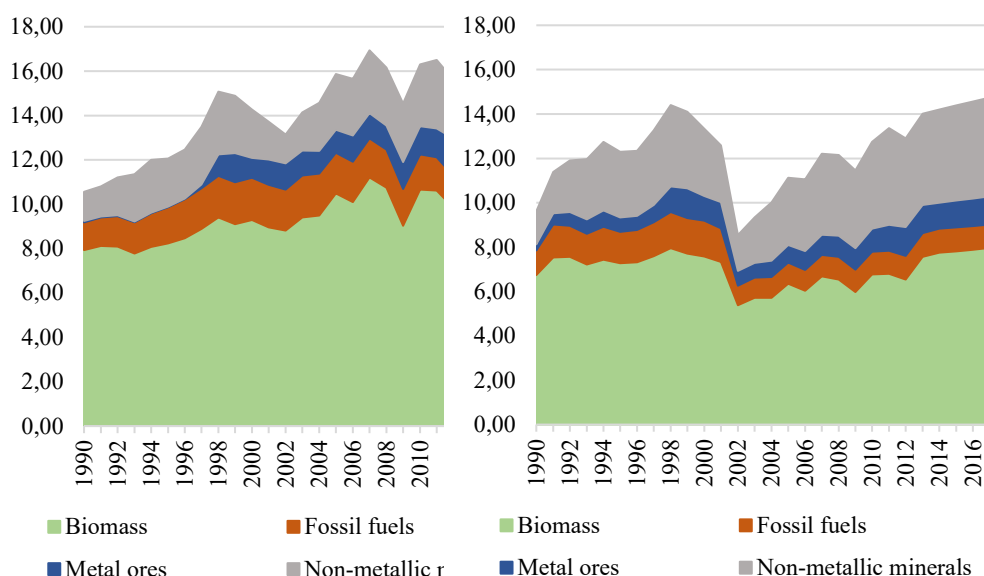
Argentina's environmental impact on its own territory is therefore clearly higher than the environmental impact it is responsible for in terms of domestic consumption. This impact maintains an increasing trend throughout most of the series, so that it is not possible to find differences between the extractivist and neo-extractivist stages.



Source: own elaboration based on data from Global Material Flows Database and World Bank.

Figure 2 shows the breakdown of both indicators in the four categories of materials used in this work.

Figure 2. DE and MF by material category, tonnes per capita, 1990-2017



Source: own elaboration based on data from Global Material Flows Database and World Bank.

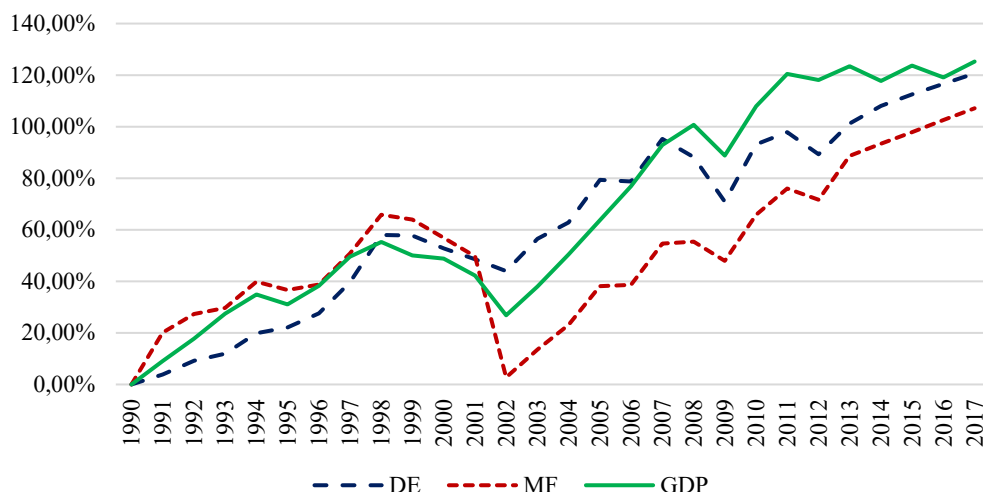
In terms of DE, the crisis at the beginning of the century is hardly noticeable beyond non-metallic minerals. This is a good indication of the close relationship between DE and external demand, as the extraction of metallic minerals is the most closely linked to domestic consumption, since it is mainly composed of construction materials. Similarly, the fall in global consumption capacity brought about by the 2008 Crisis is much more identifiable in all categories of DE.

The opposite is true for MF, with the 2001 crisis being much more marked. So much so that only in non-metallic minerals have the previous levels of consumption been recovered. The difference between DE and MF is particularly marked in biomass, in line with the growth of extractivism in the Argentinean agricultural sector. Even so, the share of biomass in the total of both indicators contrasts with the share of gross value added represented by agricultural activities, which do not exceed 10% at any time during the period analysed. The significant growth of this category, together with the emergence of metallic mineral extraction, is in line with the diversification of commodities that characterises extractivism.

Figure 3 plots the cumulative growth rates of DE and MF compared to GDP, which allows us to see whether dematerialisation is taking place.

Figure 3. Cumulative growth rate of GDP, DE and MF, 1990-2017.

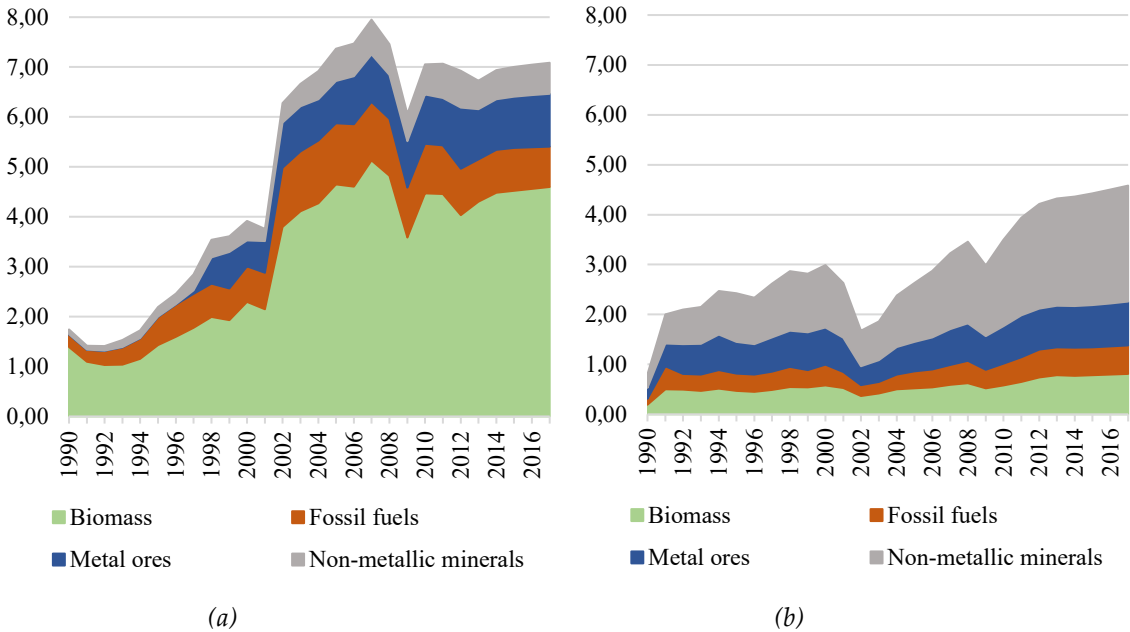
Source: own elaboration based on data from Global Material Flows Database.



The 2001 crisis marks a turning point from which the growth of MF falls below both DE and GDP. On the other hand, DE remains above GDP throughout the period between the 2001 and 2008 crises. Thus, during this period Argentina reaches relative dematerialisation in its MF, while maintaining a situation of rematerialisation in its DE. In the last years of the analysis period, the three series come closer to each other again, with the DE at relative dematerialisation values. However, it is important to note that both the DE and the MF maintain clearly increasing trends, not very far from that of GDP, so that, as Martínez-Alier (2004) indicates, the term dematerialisation is not quite adequate to describe this situation.

Figure 4 shows exports and imports in physical terms, broken down by material category. While in imports the effect of the crisis periods, especially the 2001 crisis, is easily observable, in exports only the moment of the 2008 crisis can be identified. This is because the 2001 Crisis coincides with a period of significant growth in demand for commodities, originating mainly from China, which generates a large increase in exports. The growth in demand leads to an increase in prices, stimulating the development of the sector in Argentina. This situation explains the tendency of Argentina's neo-extractivism towards the industrialisation of agriculture, with the production of monocultures bursting onto the scene. One of the most important of these was soya destined for China, to the extent that the evolution of the Argentine economy during this period came to be known as "soya reprimarisation"(Oviedo, 2015).

Figure 4. Physical exports (a) and imports (b) by categories, tonnes per capita, 1990-2017.



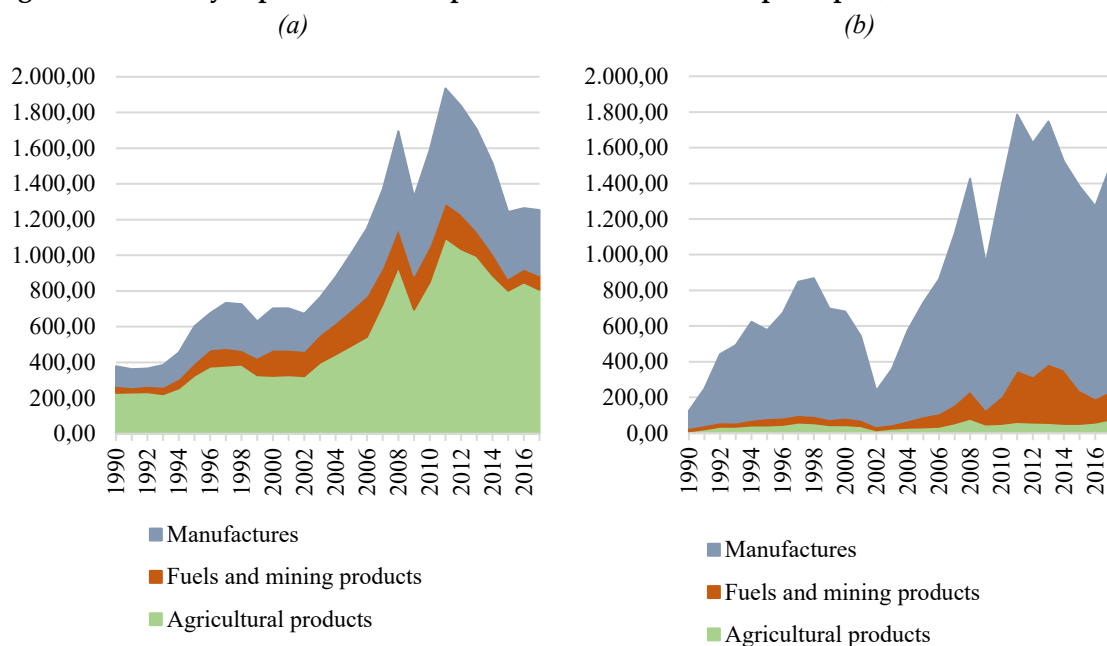
Source: own elaboration based on data from Global Material Flows Database and World Bank.

In the area of imports, non-metallic minerals stand out, mostly linked to construction. Metallic minerals include a large part of the manufactured goods that Argentina needs to bring in from other countries. The growing trend in both biomass and fossil fuels is noteworthy. In biomass, this is due to the fact that the generalisation of monocultures for export has reduced cultivation for self-sufficiency to the point that foodstuffs that were previously produced in the country are frequently imported (Guerreiro & Wahren, 2016; Nieto & Reyes, 2019).

Regarding fossil fuels, the freezing of energy prices to alleviate the effects of the 2001 crisis led, in a context of rising fossil fuel prices, to a drastic fall in investment in extraction, especially for natural gas. Subsequently, the recovery of domestic demand led to production and processing capacity being exceeded, forcing the importation of both natural gas and crude oil and certain derivatives (Perrone & Santarcangelo, 2018).

Figure 5 shows exports and imports in monetary terms divided into 3 broad economic categories.

Figure 5. Monetary exports (a) and imports (b), US 2010 dollars per capita, 1990-2017

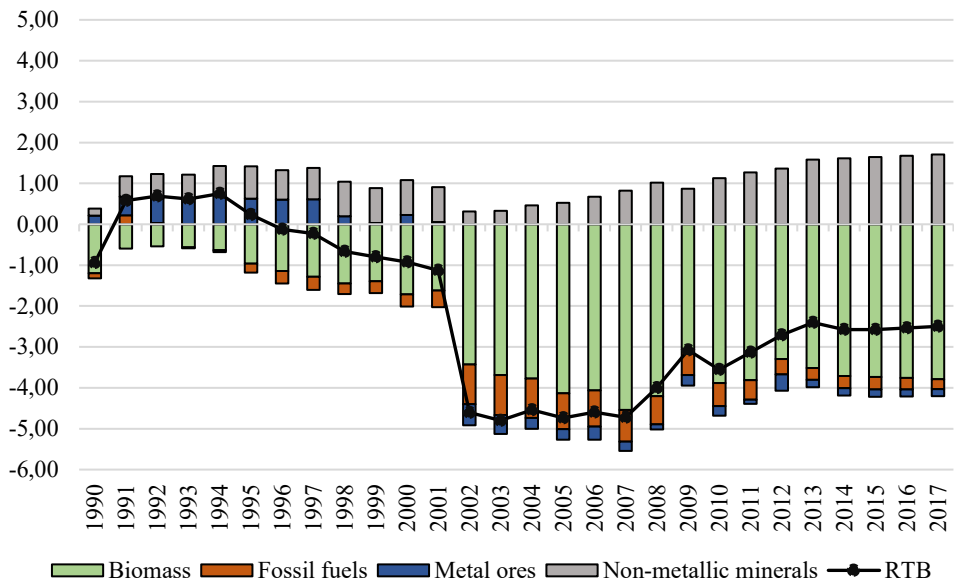


Source: own elaboration based on World Trade Organization data.

The situation described through physical trade flows is complemented by the information provided by monetary trade flows. One of the first issues that can be observed is the decline in exports of agricultural products, which does not correspond to an equivalent fall in physical terms but is due to a fall in the price of commodities.

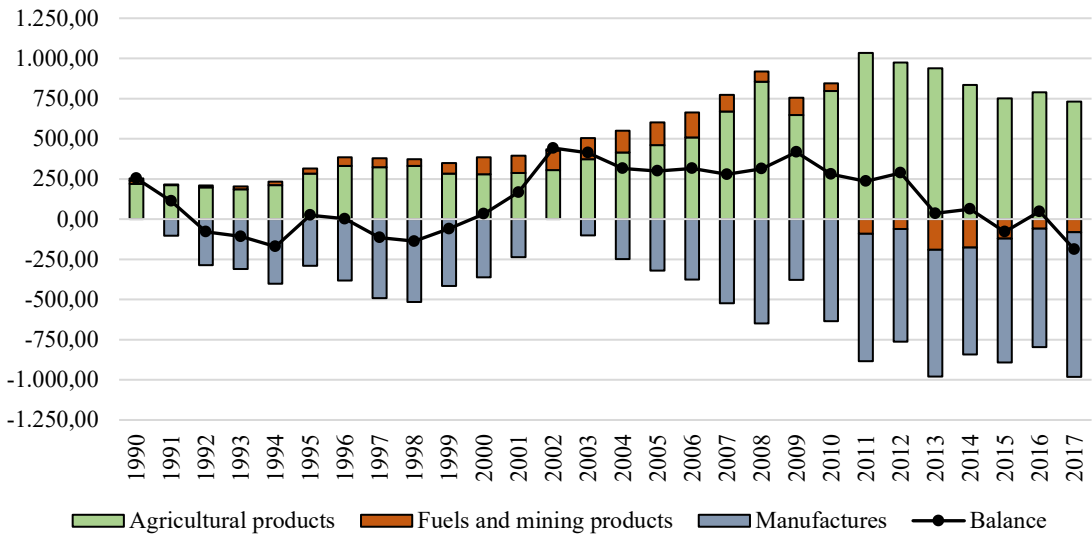
This also affects fossil fuels, especially on the import side, where growth is more pronounced than in physical terms. But, without a doubt, what stands out most is Argentina's enormous external dependence for the supply of manufactured goods, whose monetary value exceeds that of exported agricultural products, despite the fact that they represent little more than half in physical terms. This means that, despite being a purely exporting country, Argentina finds it difficult to maintain positive balances in its monetary trade balance, as can be seen in Figures 6 and 7.

Figure 6. RTB broken down by material category, tonnes per capita, 1990-2017.



Source: own elaboration based on data from Global Material Flows Database and World Bank.

Figure 7. Monetary trade balance, US 2010 dollars per capita, 1990-2017.



Source: own elaboration based on World Trade Organization data.

Argentina's RTB is in deficit during practically the whole series, especially after the 2001 Crisis. In recent years, the hydrocarbon situation and some recovery of consumption capacity have reduced the deficit, but it continues to be very large thanks to biomass.

The negative sign of the RTB means that Argentina maintains an EUE with the rest of the world, which entails the assumption of part of the environmental impact that corresponds to other countries. On the other hand, in the years following the 2001 crisis, the country's situation led to a decline in consumption which, together with high commodity prices and increased exports of primary goods, meant that Argentina maintained a surplus. However, this surplus can be considered a temporary situation, as it declines as the economy recovers and the need to import manufactured goods increases, while fossil fuels gain presence among imports.

The low capacity for self-sufficiency in manufacturing is a major burden on Argentina's monetary trade balance, which is compensated for by an increase in the export of agricultural goods. As a result, the diversification of the Argentinean economy is mainly intra-sectoral, as diversification of the primary sector, especially in the agricultural sector, while there is hardly any inter-sectoral diversification. In this way, Argentina is increasingly dependent on the extractivist model, assuming a growing environmental impact and with hardly any options for obtaining a sufficient economic return to improve its position in global value chains.

4. Conclusiones

In this paper, an analysis of the environmental impact in Argentina, measured through the consumption of materials, has been carried out to determine whether there are differences between the extractivist and the neo-extractivist phases. For this purpose, indicators derived from the Material Flow Analysis have been used for the period 1990-2017.

In the analysis of environmental impact, a distinction has been made between the impact that occurs in the Argentine territory, measured through Domestic Extraction, and the impact for which it is responsible, measured through the Material Footprint. Domestic Extraction maintains a practically continuous growth throughout the entire period studied, except for two brief lapses corresponding to the 2001 and 2008 crises.

This means that the environmental impact in Argentina has grown throughout practically the entire period. On the other hand, the Material Footprint follows a similar trend, although with a much sharper drop in the 2001 Crisis, which leads to it being no less than 2 tonnes per capita below Domestic Extraction for the rest of the series. The difference in the behaviour of the two indicators in periods of crisis is because an important part of Extraction is dedicated to exports, and therefore depends more on the economic situation of Argentina's trading partners than on the situation in the country itself. For its part, the Material Footprint reflects the behaviour of domestic demand in Argentina, which explains a sharper fall in 2001 than in 2008.

As far as dematerialisation is concerned, Domestic Extraction remains in a rematerialised situation during a time interval that goes from a few years before the 2001 Crisis to the 2008 Crisis. The rest of the series is in the zone of relative dematerialisation, in the same way as the Material Footprint for most of the period.

Nevertheless, both series maintain fairly high growth and a high correlation with GDP, so that the reduction in material needs is quite distant.

In the area of physical trade flows, we can see how exports grow strongly in the inter-crisis period, because of an increase in the demand for commodities in international markets. A significant drop in 2008 led to a softening of the trend, which continued to grow. The diversification inherent to neo-extractivism can be seen in the significant growth of biomass, where Chinese demand for soya has a strong influence, and in the appearance and growth of exports of metal ores.

On the import side, the turning point is in 2001, and the growth of fossil fuels and biomass in recent years is remarkable. This is a consequence of the industrialisation of agriculture and the increase in monocultures, which are displacing crops for domestic consumption. Regarding fossil fuels, measures to mitigate the effects of the 2001 crisis led to a drastic reduction in investment, especially in gas, which meant that, with the recovery in demand, it became necessary to import gas as well as crude oil and its derivatives.

Trade flows in monetary terms confirm the situation of fossil fuels, as their share of imports has increased significantly in recent years. Similarly, the recovery after the recessionary periods has led to a large increase in imports of manufactured goods. At the same time, the high price of commodities in the first decade of the 21st century is clearly reflected in exports. Taken together, both situations lead to a period of monetary trade surplus that is cyclical.

Under normal conditions, the trend leads to a monetary trade deficit that contrasts with the purely export-oriented position in the physical sector. In this way, Argentina maintains a complex situation in which the assumption of an important environmental impact from the rest of the world is not enough to maintain a balanced monetary trade balance, especially when commodity prices are not favourable.

Therefore, if in economic terms the boundary between extractivism and neo-extractivism is blurred, in terms of environmental impact it is practically non-existent. The extractivist model has an implicitly high environmental impact, which, with the diversification that occurs in neo-extractivism, increases and extends to other sectors, giving continuity to the main characteristics of extractivism.

Moreover, this environmental impact does not translate into an economic return that would allow Argentina to develop other sectors, as economic diversification is mostly intrasectoral. In this way, a situation is maintained that exerts great pressure on the extraction and export of natural resources, characterised by a double external dependence: on the one hand, dependence on the demand for commodities and the evolution of prices; on the other hand, dependence for the supply of manufactured goods; and on the other, dependence on the supply of natural resources.

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