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Structural change, productive development and capital flows: Does financial "bonanza" cause premature de-industrialization?

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Abstract
The outbreak of Covid-19 brought back to the forefront the crucial importance of structural change and productive development for economic resilience to economic shocks. Several recent contributions have already stressed the perverse relation that may exist between productive backwardness and the intensity of the Covid-19 socio-economic crisis. In this paper, we analyze the factors that may have hindered productive development for over four decades before the pandemic. We investigate the role of (non-FDI) net capital inflows as a potential source of premature de-industrialization. We consider a sample of 36 developed and developing countries from 1980 to 2017, with major emphasis on the case of emerging and developing (EDE) economies in the context of increasing financial integration. We show that periods of abundant capital inflows may have caused the significant contraction of manufacturing share to employment and GDP, as well as the decrease of the economic complexity index. We also show that phenomena of "perverse" structural change are significantly more relevant in EDE countries than advanced ones. Based on such evidence, we conclude with some policy suggestions highlighting capital controls and external macroprudential measures taming international capital mobility as useful policy tools for promoting long-run productive development on top of strengthening (short-term) financial and macroeconomic stability.

Keywords: Structural change; premature de-industrialization; capital Inflows; macroprudential policies
JEL Codes: O14; O30; F32; F38

1. Introduction

The Covid-19 pandemic has taken a heavy toll on our economies and societies. Such negative implications show significant degrees of heterogeneity among countries, not only between developed, and emerging and developing economies (EDE henceforth), but also within the EDE themselves. Some Asian countries, such as China and Vietnam, have experienced significant slowdowns in their growth path, but they have managed to keep on with positive rates of growth of their real GDP, while other economies have experienced a significantly negative growth. The economic effects of Covid-19 seem to be the hardest in Latin America and South Asia (IMF, 2020a; UN, 2021). The prospects of recovery are also much brighter for the advanced economies than for most of the EDEs (World Bank, 2021)[1].

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[1] https://www.worldbank.org/en/news/feature/2021/06/08/the-global-economy-on-track-for-strong-but-uneven-growth-as-covid-19-still-weighs.

Such heterogeneity may be explained making reference to many factors. First, the countries managed the spread of the pandemic in different ways and with different outcomes. Second, also their "fiscal spaces" for the implementation of counter-cyclical fiscal policies[2] were considerably different. Third, the level of productive diversification and development characterizing an economy may have played a role both in taming and exacerbating the economic consequences of Covid (Hevia and Neumeyer, 2020; IMF, 2020c). Indeed, the regions that have been hit the most by (the economic effects of) the pandemic seem to share some common "structural" aspects, which are usually attributed to relatively weakly productive economic structures: (i) a larger share of the informal sector over GDP; (ii) stronger reliance on services, "contact-intense" and relatively unskilled services in particular (i.e., hospitality, tourism, transport, and retail commerce), and/or energy-related primary commodities; (iii) lack of diversification towards some high-tech manufacturing industries (i.e., electronics and ICT technologies) and/or high-value added tradable services such as finance, education and business technology/managerial consultancy. It is perhaps for this reason that economic studies and policy making increasingly put emphasis on the leading importance of structural change and productive development towards environment-friendly and digital economies to achieve sustained and sustainable recovery.

The pandemic unveiled the negative consequences of productive backwardness and made it more urgent to promote structural transformation as part of the response to the crisis. The pursuit of sound economic recovery in the context of higher resilience to possible future shocks requires to identify the sources of such backwardness. An expanding body of literature has recently tackled this issue by presenting evidence of "premature" de-industrialization, particularly in the case of EDE countries (Palma, 2005; Tregenna, 2009; Rodrik, 2016; Castillo and Neto, 2016; Tregenna and Andreoni, 2020; Dosi et al., 2021). According to Rodrik (2016), in the last three decades most EDE economies - with the noteworthy exception of East Asian countries - have been experiencing a remarkable contraction in the contribution of manufacturing to both total employment and real and nominal GDP. This contraction has started much earlier (in terms of both economy-wide development and manufacturing development specifically) than what one would have expected by looking at the historical experience of advanced economies[3].

Despite detecting widespread phenomena of "premature" de-industrialization, the literature does not go deeper in exploring the possible sources of such structural transformation. Our contribution aims at filling this gap by empirically identifying some possible causes of premature de-industrialization[4]. More specifically, our work brings together two streams of analysis that have

[2] See IMF (2020) for an overview of the considerable differences in fiscal policy responses to Covid-19 between developed countries and EDE economies, and among EDE economies themselves.

[3] The central role of manufacturing for a broader development process of advanced economies can be certainly reconducted to the theoretical contributions of Nicholas Kaldor (1967), among many others. In line with a Kaldorian perspective, albeit manufacturing might have partially exhausted its pro-growth properties in developed countries, it seems to still play a strategic role in EDE countries (see Szirmai, 2012). On top of this, it is also worth stressing the relevant synergies and complementarities that seem to exist between manufacturing and the development of high-value added and high-skill intensive business services (see Meliciani and Savona, 2015). In a way, manufacturing development can be considered as a pre- or concurrent condition for the development of those tradable services that may have enabled a few EDE countries to cushion / mitigate the economic effects of the Covid-19 pandemic. In this sense, our prime (but not exclusive) attention to manufacturing is motivated by the far-reaching consequences that premature de-industrialization can have on productive development.

[4] To be fair, some authors have identified different modalities of the Dutch Disease as a key source of premature de-industrialization (see, for instance, Palma, 2014; Ocampo, 2011; Guzman *et al.*, 2018; Cimoli *et al.*, 2020, among others). In some cases, capital account liberalization and international capital flows are indicated as possible causes for such regressive structural change. However, this hypothesis has not been tested rigorously. This paper tries to expand this argument by measuring the impact of different periods of financial bonanza on the productive structure of the host economies. We go beyond the implications for (relative importance of) the manufacturing sector as such, and we also

rarely been connected so far. On the one hand, we make reference to above-mentioned literature on structural change, productive development, and premature de-industrialization. On the other hand, we look at the literature about the macroeconomic effects of large capital inflows over the recipient economies. In doing this, we try to analyze whether periods of large net capital inflows (portfolio investment and international credit in particular), i.e., periods of financial "bonanza", contribute to explain episodes of premature de-industrialization and setbacks in the broader process of productive development, here measured by the economic complexity index (ECI). Our study covers a wide range of countries. We consider both developed and EDE economies for which enough data are available, in particular BoP financial data. **Our attention, however, is primarily on the second group of countries. Indeed, one corollary of our analysis is the attempt to detect possibly different long-term productive effects of periods of financial bonanza over EDE countries with respect to the developed ones.**

The purposes of this paper are manifold. First, we empirically show that periods of large net capital inflows, surges in portfolio investments, and international credit more specifically may have potentially detrimental effects on the productive development of the recipient economies. Second, we show that such effects are considerably stronger in EDE countries than in the advanced economies. Third, we illustrate that this finding holds true for various measures of industrialization and productive development, being them captured by either manufacturing contribution to employment and economic activity, or by the ECI index. The term "manufacturing" hides a significant degree of heterogeneity[5], which we attempted to correct by including the ECI as an alternative proxy for capabilities.

The paper is structured as follows. Section 2 reviews the literature and scrutinizes the several mechanisms through which, from a theoretical point of view, periods of large capital inflows may affect the long-run productive development of the host economies. It also discusses the few empirical works that, so far, have investigated the possible relation between surges in capital flows and long-run productive developments. Section 3 consists of our empirical analysis. It explains the methodology used in this work by defining periods of "large" capital inflows, the sample of countries under analysis, and the estimation strategy adopted. Finally, it describes the results of our study. Based on our empirical results, Section 4 proposes some policy suggestions, arguing that external macro-prudential policies aimed at restraining capital inflows and improving macroeconomic stability may also foster long-run productive development. Section 5 summarizes and concludes.

2. Financial bonanza, structural change and premature de-industrialization: A review of theoretical and empirical literature.

2.1 Capital inflows, structural change and productive development: A theoretical framework

The literature on the causal relation between capital flows and growth in EDE countries is quite abundant. Moreover, economists seem to agree that surges in capital inflows, perhaps stimulated by financial liberalization reforms, tend to heighten macroeconomic instability (Taylor, 1998; Kaminsky and Reinhart, 1999; Ocampo *et al.*, 2008; Perez Caldentey and Vernengo, 2021), with rather little benefits in terms of faster growth (Ostry *et al.*, 2016). Finance-led short-run fluctuations

look at the effects on the economic complexity index as a proxy for changes in the technological capabilities of the economy (see more on this below).

[5] See Dosi *et al.*, (2020), who use the traditional Pavitt typology to highlight the differences in the behavior of the various branches of the manufacturing sector all along the overall development process, and Tregenna and Andreoni (2020), who show that the greater the technological intensity of manufacturing, the less concave its pattern of development will be, with a seemingly less pronounced de-industrialization dynamics.

may well extend to medium/long-run dynamics if financial and currency turbulences (or full-fledged crises) emerge from enduring balance-sheet imbalances. Frequently, the outcomes are permanent output losses and slack economic recoveries (Cera and Saxena, 2008, Koo, 2014).

Relatively less attention has been paid to whether capital inflows, short-term volatile portfolio investment and international credit in particular "shape" long-run macroeconomic dynamics by changing the productive structure of the recipient economies. Whilst some contributions already shed some light of this point (see Palma, 2014; Ocampo, 2011; Guzman *et al.*, 2018; Cimoli *et al.*, 2020), very few works have formally modeled or, more importantly, econometrically analyzed what Benigno and Fornaro (2014) have labelled as the "financial" resource curse, and Botta (2017, 2021) defines as the financial Dutch disease.

For instance, Lartey (2008) and Benigno and Fornaro (2014) present supply-side growth models where large access to foreign capitals may give rise to consumption booms and Dutch disease-like phenomena by increasing the (relative) price of non-tradable goods versus tradable ones. In Lartey (2008), capital inflows *de facto* boil down to foreign-made investment goods used as productive inputs in the production of domestic manufactured products. Because of this, Lartey (2008) largely ignores the financial and monetary aspects of international capital movements (i.e., the determination of domestic and international interest rates and of the spread between them, as well as the connected determination of the *nominal* and hence *real* exchange rates) that may also bear significant consequences in terms of productive development. Benigno and Fornaro (2014) model episodes of large capital inflows as reductions in the exogenously given interest rate characterizing small open economies. This will in turn encourage larger international borrowing, widening current account deficits and consumption booms in the home economy. Adjustments in the economy mainly take place via changes in relative prices in the context of an optimizing inter-temporal traverse towards the long-run equilibrium. Once again, the model does not pay attention to real-economy implications of the financial mechanisms related to (short-term) speculation in different sectors, financial instability, and the determination of financial variables in domestic and international financial markets.

Botta (2017, 2021) complements these two papers by focusing on the financial mechanisms at the basis of (or, at least contributing to) finance-led processes of de-industrialization, measured by reductions in the relative importance of manufacturing. Botta (2017) shows how surges in portfolio investment and international credit, as originally induced by natural resource booms, may fuel Dutch disease by causing a stronger (temporary) appreciation of the nominal and real exchange rate, heightening exchange rate volatility, and depressing long-term investment in the tradable sectors in particular. Botta (2021) describes how periods of financial euphoria may affect the relative incentives to invest in speculative sectors, say real estate, rather than in manufacturing by boosting expected returns of the former with respect to the latter. When cumulative causation and path-dependence characterize the dynamics of labor productivity in manufacturing, a temporary (relative) squeeze of manufacturing may become permanent and throw (EDE) economies in a low-growth trap[6].

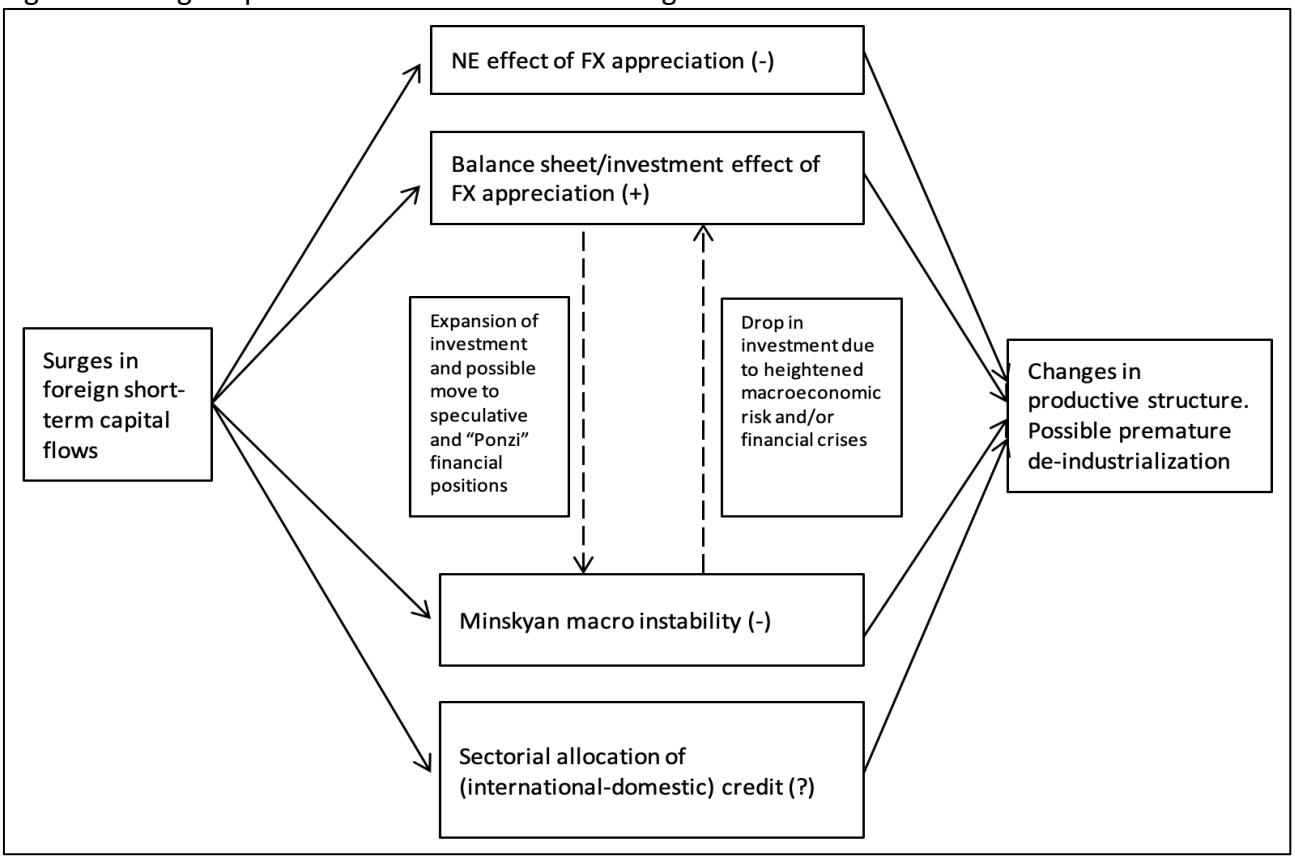
Figure 1 below gives a comprehensive overview of the many different channels through which periods of large capital inflows may influence the structural productive dynamics of an economy.

[6] Taylor (1991, ch.6) presents a structuralist model capturing the economic consequences of financial bubbles and speculative waves in countries such as Kuwait in the 1980s and Chile in the second half of the 1970s. He states that financial booms have a very poor connection, if any, with the development of the non-traditional non-commodity tradable sector, say manufacturing, but stronger linkages with the (over-) expansion of the financial industry and/or the real estate. Taylor (1991) does not place foreign capitals at the center of his analysis, as for him financial booms unfold via internal mechanisms. Nevertheless, he explicitly admits that foreign capitals can play a relevant role in triggering or feeding financial booms.

Some of these mechanisms have been highlighted in the works just mentioned. Some others appear as side effects of broader (finance-led) phenomena of credit booms, exchange rate cycles and, eventually, Minskyan instability that have usually attracted the attention of a wider audience of economists.

The first channel portrayed in the upper part of Figure 1 captures the "Dutch disease-like" effect of large capital inflows. It consists in the evolution of the sectorial composition of an economy, away from manufacturing and towards non-tradable services, that surges in portfolio inflows and international credit may bring about. These surges affect the nominal and real exchange rate and, therefore, the price competitiveness of home-made goods and services. At least in the short-medium term, say in the expansionary phase of a financial cycle, abundant international capitals may feed domestic credit booms and the expansion of the economy. Relative prices move in favor of non-tradable goods and services[7]. The *real* exchange rate appreciates and productive factors find more profitable to move away from "non-traditional" tradable sectors (read manufacturing) towards non-tradable ones. Although financial booms may not last long and even be followed by a reversal, "perverse" structural changes may become permanent in cases of widening – sometimes irreversibly - technological and productivity gap (Botta, 2021).

Figure 1 – Large capital inflows and structural change: a theoretical overview



The nominal exchange rate is not only a component of the real exchange rate and of relative prices between imported and home-made goods. It is also the "financial price" that determines the domestic currency equivalent of foreign currency-denominated assets and liabilities. The "financial side" of the nominal exchange rate plays a fundamental role in causing changes in the balance

[7] The asymmetric effects of (international) credit-led domestic expansions over prices in different sectors may be due to the fact that, in small open economies, prices of tradable goods and services are at least partially determined in the international markets rather than by internal/domestic economic mechanisms.

sheets of firms with a currency mismatch between foreign currency-denominated liabilities and domestic currency-denominated assets. Since 2010, this is increasingly the case of companies in EDE economies (Chui *et al.*, 2016; Perez-Caldentey *et al.*, 2019). Against this backdrop, the appreciation of the nominal exchange rate caused by booming capital inflows makes the balance sheet of domestic firms more solid. This, in turn, may induce them to raise investment, not only because the price of imported capital goods declines, but because a stronger balance sheet may allow them to scale up purchases of new vintage capital equipment. This is the second channel reported in Figure 1. This channel is potentially beneficial for long-run productive development, if higher investment helps to fill the technology gap and to introduce process and product innovation that may support the strategic integration of the economy in the international goods market.

Albeit potentially positive, channel 2 may be the consequence of the booming phase of a Minskyan financial cycle, in the case of EDE countries in particular (Frenkel and Rapetti, 2009). A perverse destabilizing feedback between surges in capital inflows, the accumulation of foreign debt, and the exchange rate dynamics should be mentioned. During periods of financial "bonanza", relatively cheap and abundant international liquidity may induce domestic companies to issue large amounts of *corporate bonds* in international markets (see again Chui *et al.*, 2016; Perez-Caldentey *et al.*, 2019). From a balance sheet point of view, the increase in the external liabilities of domestic companies is mirrored in the rise of capital inflows[8]. These may cause a (temporary) appreciation of the exchange rate, which reduces the burden of foreign debt and may encourage domestic companies to get even more indebted in international financial markets. Very frequently, this positive feedback does not last long. Most likely, it sets the stage for an abrupt reversal. When conditions in international financial markets become less favorable or "intolerance" against allegedly excessive external debt mounts (Reinhart *et al*., 2003), international capitals stop flowing in. As a consequence, the exchange rate depreciates and the debt burden becomes unsustainable. Financial turmoil, exchange rate crises and economic recession may eventually "knock at the door" of the economy all together. In this context, the above-mentioned increase in (productive?) investment may be short-lived. It may actually concur in generating "speculative" or "Ponzi" positions at the micro level. At the macro level, perverse externalities can be observed in cases of fragile financial positions, as the latter pave the way for the burst of the bubble and cause an enduring drop in investment (when firms try to deleverage from accumulated debt) that more than compensates for the initial increase (see the central block of Figure 1). Over the medium-to-long run, what initially appeared as a positive contribution to productive development may turn into a negative shock, as higher macroeconomic instability and uncertainty reduce the investment rate. Path dependence and hysteresis phenomena give rise to persistent effects in terms of productive and technological backwardness (Cimoli *et al.*, 2013).

Surges in foreign capital inflows have frequently fueled credit booms in developing and emerging economies. Credit booms may in turn affect the productive dynamics of the economy according to the different industries that benefit the most from the expansion of credit opportunities. Easy credit that prevalently finances investment in the non-traditional tradable good sector can likely lead to different long-term development implications with respect to credit bubbles inflating the non-tradable sector, say real estate. We hereby stress the importance of the sectorial pattern of (foreign capital-led) increases in credit to the private sector through channel 4 at the bottom part of Figure 1.

[8] Portfolio capital inflows may also take the form of investment in equities. This type of capital inflows may contribute to temporary appreciations of the domestic currency, with possible consequences for the structural (sectorial) evolution of the home economy, as much as foreign investment in debt instruments. However, the implications in terms of financial solidity and debt sustainability are different, as equity purchases do not provide foreign investors with the "privileges" accorded to creditors.

Sectoral patterns of investment may play a relevant role not only because of its direct effect on the evolution of the productive structure of the economy, but also because it may feed back onto the financial position of domestic firms by increasing (or not) currency and/or maturity mismatches in their balance sheets. On the one hand, we can associate a reduction in the currency mismatch and a more solid financial position of domestic companies to foreign capital-financed investment by companies in the tradable sector that may increase their external competitiveness and lead to a rise in export. On the other hand, if foreign capital mainly fuels companies in the non-tradable sector, the currency mismatch will increase, as well as the exposure to external shocks. Which sector(s) get(s) most of the funds made available in the economy is a vital aspect for the short-medium-term stability and long-term development implications of financial integration and foreign capital booms. Since surges of capital inflow appreciate the real exchange rate and tend to favor non-tradable over tradable sectors, they are more likely to aggravated currency mismatches.

2.2 Capital inflows, structural change and productive development: The empirical literature

There are very few empirical works that rigorously test the theoretical contributions mentioned in section 2.1. In some cases, these works regard country case studies that provide an anecdotal, often implicit, description of how surges in international capital inflows may have affected the sectorial composition of recipient economies. A few other works present more elaborated empirical or econometric analyses.

Taylor (1998), for instance, describes the unstable macroeconomic dynamics characterizing several EDE economies in the aftermath of the wave of financial liberalization between the end of the 1980s and the beginning of the 1990s. In doing so, he identifies the significant connection between large capital (speculative) inflows, episodes of financial euphoria and hypertrophic real estate sectors in Mexico and Thailand. In the case of Mexico, he notes that easy access to international finance enabled credit to housing to increase by 1000 percent in a few years, whilst productive investment barely recovered above 20 percent of GDP from the slump of the lost decade in the 1980s. In a similar vein, Moreno-Brid and Ros (2004) observe that short-term capital inflows were combined with rapid trade liberalization by the end of the 1980s, leading to a major external crisis in 1994. The initial investment spur could not be sustained, and growth and investment remained at low levels since the 2000s.

Gallagher and Prates (2014) analyze the growing importance of financial investors (via speculation in the derivative market) to determine commodity prices and exchange rate dynamics in Brazil in the first decade of the 2000s. In their view, the interplay between large inflows of (speculative) capitals and the commodity boom may have exacerbated the resource curse and the process of premature de-industrialization undergone by the country. Botta *et al.* (2016), in turn, provide empirical evidence of finance-led structural changes in Colombia. In this case, initial increases of FDIs in natural resources attracted booming portfolio inflows that caused even stronger appreciations of the Colombian peso and a statistically significant squeeze in the contribution of manufacturing to domestic GDP. Cimoli *et al.*, (2020) look at Brazil and Argentina in a comparative perspective with respect to South Korea and China. They show that periods of RER appreciation, particularly those associated with capital inflows in the 1970s and 1990s, led to a process of structural change in which technology-intensive sectors lose ground in the productive structure. With a broader focus on the whole Latin American region, Perez Caldentey and Vernengo (2021) argue that premature de-industrialization in Latin America intertwines with premature financialization, as booming returns in the financial sectors have characterized the region since the mid-1990s, while the rates of exports, GDP and capital accumulation have steadily declined.

Benigno *et al*. (2015) and Bortz (2018) provide more general empirical evidence about the effects of large capital inflows on the productive structure of recipient economies[9]. Bortz (2018) shows that there is a positive correlation between the increase in *gross* capital inflows towards some EDE countries and the variation in the contribution to GDP of the financial, real estate and commerce sectors. Benigno *et al.* (2015) consider a sample of 70 high-middle income countries and analyze the sectorial reallocation of productive inputs (i.e., sectorial employment and investment shares) during periods of large capital inflows, as proxied by historically large current account deficits. They find that periods of net capital inflows bonanza are associated to the squeeze - at least in relative terms - of manufacturing.

The empirical findings of Benigno *et al.* (2015) may implicitly complement the evidence about premature de-industrialization put forward by Rodrik (2016). In the economies with a higher degree of financial integration, an early and/or more intense (than expected) contraction of the manufacturing shares might be partially due to the long-term structural effects of large capital inflows. The present paper tries to explicitly integrate and expand these streams of literature. On the one hand, we aim at verifying whether large capital inflows may be considered statistically relevant causes of cases of premature industrialization that Rodrik (2016) identifies but leaves unexplained. On the other hand, with respect to Benigno *et al.* (2015), we take into account more direct measures of capital inflows and we look at the specific role played by portfolio investment and international credit, instead of considering "undistinguished" capital inflows, which also include FDIs. We present the details and novel contributions of our empirical analysis in section 3 below.

3. Financial bonanza, structural change and premature de-industrialization: An empirical investigation

3.1 Rationale of the study

Following Rowthorn and Ramaswamy (1997) and Palma (2005), the productive structure of an economy usually changes throughout the broader development process. In the early stages of development, an increasing share of the labor force relocates from agriculture to industry, in particular manufacturing. The share of manufacturing increases both in terms of total employment and GDP. At more advanced stages, however, the service sector expands both in absolute and in relative terms. The share of manufacturing contracts giving rise to an inverted U-shaped trajectory. This is the (expected) de-industrialization phase of the whole development process, which Tregenna (2009) identifies with the *joint* reduction in the contribution of manufacturing to total employment and (nominal) GDP[10]. Given such "fundamental" forces, *premature* de-industrialization takes place in developed countries if the decline in the economy-wide importance of manufacturing is more pronounced than expected. In a similar vein, premature de-industrialization can be observed in EDE countries when the share of manufacturing starts to contract earlier than expected, i.e., at a lower

[9] Other studies have focused their attention on the effects of international resource *transfers* on productive development. Acosta *et al.* (2009), for instance, analyze the possible Dutch disease-like effects of international remittances. Rajan and Subramanian (2011) study the role of international aid. All these studies and this paper agree that transfers of international resources and/or capital movements may affect the long-run productive development of recipient economies beyond the short- and medium-run macroeconomic dynamics. Nonetheless, with the exception of more traditional Dutch disease argument, the mechanisms investigated in this work are different with respect those studied in other contributions.

[10] Statistical evidence about de-industrialization is far less evident if one takes data about manufacturing GDP share in *real terms*. The contribution of manufacturing to real GDP is more stable through time once it reaches the peak, and the subsequent decline is far smaller. This stylized fact could be possibly explained by the difficulties in the computation of sectoral deflators, as well as the different dynamics in the prices of tradable and non-tradable goods.

level of per-capita GDP (or at a lower "peak" of the manufacturing share itself) with respect to the historical experience of the advanced economies.

In an influential paper published in 2016, Rodrik (2016) finds evidence of premature de-industrialization for a wide sample of developed and EDE countries between 1980 and 2010. He introduces period-specific dummy variables in a regression analysis featuring per-capita GDP and the size of population, both in squared terms, as "fundamental" variables that capture manufacturing share's inverted U-shaped trajectory over time. Rodrik's analysis is certainly useful to detect cases of premature de-industrialization, yet it does not provide any explanation or does not identify any specific cause behind such phenomenon. Benigno *et al.* (2015) discuss some of these causes when they found a statistically significant positive relationship between periods of large capital inflows and the allocation of productive inputs, labor and capital investment, *away* from manufacturing.

We merge and develop further these two lines of analysis. First, we develop Rodrik's study by expanding his econometric model and including some additional factors that may explain premature de-industrialization. Periods of large capital inflows (see more about this below) are at the core of our analysis. In addition to this, we also verify if our findings are robust to alternative measures of productive development. Rodrik (2016) focuses on the dynamics of the manufacturing shares to GDP and employment over time, whereas we extent the set of possible dependent variables to the ECI index, which to some extent may provide a broader measure of productive (and technological) development. Second, unlike Benigno *et al.*,(2015) we look at *direct* data about (some types of) capital inflows. Benigno *et al.*, (2015) use data about current account deficits - adjusted for variations in foreign reserves - as *indirect* measures of net *total* capital inflows, i.e., both portfolio investment, international credit and FDI. We use direct data about private sectors' portfolio investment and international credit only, thus excluding FDIs and foreign reserves from our analysis. The reasons are threefold. First, our purpose is to investigate whether the supposedly most volatile components of capital flows can also bear long-term effects for productive development in addition to their most acknowledged short/medium term implications for macroeconomic stability. Hence our focus on portfolio investment and international credit. Second, we do not consider FDIs, since they are likely to follow different motives and behave in a different fashion with respect to more speculative capital inflows (see Krugman (2000), for instance)[11]. On top of this, the study of the long-run effects of speculative capitals is a largely unknown "territory" that may deserve more attention, whilst it is rather straightforward to expect FDI to play a role in the structural dynamics of recipient economies. Third, we do not consider changes in foreign reserves, as they may be the result of discretional policy measures taken by domestic monetary institutions rather than of the behavior of the "private" actors we are primarily interested in (although economic actors' decisions can certainly be influenced by the accumulation of foreign reserves and/or sterilization measures).

[11] While the distinction between portfolio investment and greenfield FDI is somehow clear, the case of brownfield FDI is more complicated. In theory, similar speculative motives may in fact drive some brownfield FDIs as they do with portfolio capital inflows, so that our notion of volatile and speculative capital inflows might be extended to also include brownfield FDI. On the one hand, lack of disaggregated data about FDI largely impede to distinguish brownfield FDI from greenfield FDI and to merge the former with portfolio investment and international credit. On the other hand, Krugman (2000) coined the expression "fire-sale" FDI in order to describe FDI behaving in a somehow counter-cyclical fashion and in opposite way with respect to portfolio capital inflows and international credit. According to Krugman (2000), FDI inflows are more stable and may actually increase during crises, in order to take advantage of the possibility of purchasing and taking control of domestic companies at lower prices than in periods of economic booms. This is particularly the case of brownfield FDI. The more recent empirical evidence about countercyclical FDI is not undisputed, with some contributions confirming Krugman's hypothesis (Aguiar *et al.*, 2005; Acharya *et al.*, 2011), whilst others go in the opposite direction (Stoddard and Noy, 2015). For all these reasons, we preferred to exclude all types of FDI from the set of volatile capital inflows and thus from our definition of periods of financial bonanza.

3.2 Methodology

From a technical point of view, our analysis is based on a sample of 36 countries, including both developed, emerging and developing economies. Our sample significantly overlaps with Rodrik's with the exception of six countries (Ethiopia, Malawi, Morocco, Taiwan, West Germany and Zambia), for which updated data are not available either for the dependent variables or the financial explanatory ones. Our dataset covers the period from 1980 to 2017. Table A.1 in the Appendix presents the full list of countries included in our study. Table A.2provides the sources of our data and descriptive statistics. We take most of data from the updated Groningen Growth and Development Center (GGDC) dataset or international institutions such as the IMF, the World Bank (WB) and ECLAC. Data about the Economic Complexity Index (ECI) are taken from the Atlas of Economic Complexity[12].

Before implementing our estimations, we run a battery of tests about the presence of heteroskedasticity, autocorrelation and cross-sectional dependence in our data. The results of our tests are reported in Table A.3. Pearson test suggests that our data are not characterized by cross-sectional dependence, while heteroskedasticity and auto-correlation are observed. For this reason, we implement our analysis by using an Ordinary Least Square Panel Corrected Standard Error (OLS-PCSE) estimator in order to properly take into account these features.

As discussed, we try to capture the possible relation between periods of large capital inflows and cases of premature de-industrialization by expanding Rodrik's (2016) regression model (without period-specific dummies) and including additional explanatory variables, finance-related variables first and foremost, beyond those "structural" factors (i.e., GDP per capital and population) capturing the "fundamental" inverted U-shaped dynamics of manufacturing shares. This is formally stated in Equation (1) below:

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t} + \beta_2 x_{i,t}^2 + \beta_3 pop_{i,t} + \beta_4 pop_{i,t}^2 + \beta_5 d_{i,t}^{FIN} + \beta_6 topen_{i,t} + \beta_7 g_{i,t}^{ROW} + \beta_8 r_{i,t}^{NR} + \epsilon_{i,t} \quad (1)$$

In Equation (1), $y_{i,t}$ stands for the various dependent variables we use to measure industrial development and, more broadly, the degree of technological and productive complexity characterizing an economy. In line with Rodrik (2016), we first consider the share of manufacturing over total employment (*manemp*) and over GDP, both in nominal (*nommanva*) and real terms (*realmanva*). We then use the ECI index as originally computed by Hidalgo and Hausmann (2009) as an alternative proxy for productive and technological development.

On the right-hand side of equation (1), $x_{i,t}$ is the level of real per-capita GDP. $pop_{i,t}$ is the level of population. Unlike Rodrik (2016), we do not take natural log transformations of these variables, in order to maintain consistency with the other explanatory factors included in our analysis.

$d_{i,t}^{FIN}$ stands for "our" financial variable. We construct $d_{i,t}^{FIN}$ as a *dummy* variable that takes value 1 during periods of large capital inflows (and 0 otherwise). Following Benigno *et al.*, (2015), we identify episodes of large capital inflows as periods characterized by "unusually" high *levels* of net non-FDI capital inflows rather than by marked *changes* in their dynamics (see Reinhart and Reinhart (2008)). More specifically, we define periods of large capital inflows according to the following definition:

[12] The ECI index depends - among other factors - on the degree of sectorial diversification characterizing the economy. This influences the extent by which the economy may develop comparative advantages in a wide range of industries or not. Following Imbs and Warzciag (2003), countries tend to follow an inverted U-shaped pattern of diversification along the overall development process. The ECI index may display a similar evolution and to some extent mimic the process of industrial development described by Rowthorn and Ramaswamy (1997).

Definition: episodes of large capital inflows are periods during which: (i) net non-FDI capital inflows are not negative or equal to zero; (ii) they show positive values for at least three years consecutively; (iii) the sub-period average is higher than the full-period country-specific average adjusted (increased) by ten percent of one standard deviation.

As in any "event identification-based" analysis, our definition of large capital inflows is somehow discretional. Yet, the three criteria just mentioned present some useful properties. First, they emphasize periods of large capital inflows that extend beyond the very short run and that may be long enough to generate enduring consequences for the productive economic structure. In a way, our definition may help exclude isolated spikes in international capital inflows that may hardly have any structural economic implication. Second, it tends to select periods of time characterized by "internal" patterns or consistency with financial markets' "conventions" about recipient economies, i.e., capital flows are relatively stable and do not abruptly switch from positive to negative values. Third, it may take in due account countries' peculiarities by paying attention to country-specific averages and variability. Forth, our definition seems to be able to capture all the major episodes of large capital inflows already tracked by the economic literature for the set of countries at stake (e.g., financial booms in Latin America and Asia in the 1980s or 1990s, as well as pre-2007 large capital inflows to peripheral eurozone countries).

We construct the financial dummy variable $d_{i,t}^{FIN}$ based on *net* rather than gross capital inflows. Empirical data suggest in fact that net capital inflows have been more volatile than gross figures[13] from 1980 to 2017. This can be explained by the pro-cyclical nature of international financial transactions involving domestic capitals, particularly in EDE countries. At the start of a financial boom, positive foreign capital inflows are amplified by the (at least partial) repatriation of domestic capitals that were previously invested abroad. Symmetrically, the outbreak of financial turmoil may reduce gross foreign capital inflows and encourage domestic capitals to leave the country in search for safer foreign assets. Within the theoretical framework portrayed in Figure 1, heightened financial volatility is one way through which international capital movements can affect the productive development of an economy. We try to capture this aspect by taking the most volatile measure of capital inflows.

Along with the financial variable and those set forth by Rodrik in his regression analysis, equation (1) also includes a series of additional control explanatory variables. $topen_{i,t} = (exp + imp)/GDP$ measures the degree of trade openness characterizing an economy. It is defined as the ratio of exports (*exp*) plus imports (*imp*) over GDP. $g_{i,t}^{ROW}$, in turn, is the rate of growth of the Rest of the World (ROW). Finally, $r_{i,t}^{NR}$ is the share of natural resource rents over GDP as measured by Lange *et al.,* (2018). By using these control variables, we seek to capture the effects of other forces that contribute to shape the pattern of specialization, besides liquidity cycles in the international financial system.

3.3 Results

Based on the methodology described in the previous section, we identify 60 episodes of large capital inflows from 1980 to 2017. They are listed in Table A.4 in the Appendix. We also include periods of time that fall shorter than a three-year span, but are part of well-known episodes of large capital inflows that started before 1980 and that would conform to our definition if considered in their entirety (see Argentina 1980-1981, for instance). Tables 1 – 4 below report the results of our

[13] If we take standard deviation (SD) as a synthetic measure of volatility in capital flows, SD characterizing net non-FDI capital inflows towards EDE countries is equal to 7.82 for data from 1980 to 2017. It is considerably higher than the corresponding statistics for *gross* non-FDI capital inflows, which is equal to 3.64.

regression analysis. Table 1 looks at manufacturing employment share. Tables 2 and 3 pay attention to nominal and real manufacturing GDP share, respectively. Table 4 puts emphasis on the ECI index. We estimate equation (1) for the full sample, as well as for developed and EDE countries considered separately.

Our results replicate Rodrik's findings on structural factors (GDP per capita and population) that account for the "natural" process of de-industrialization. More relevantly, Tables 1 – 4 show a *negative causal relation* between periods of large capital inflows and our measures of productive development. When net non-FDI capital inflows are particularly abundant, the manufacturing share tends to contract and the economic complexity index decreases. Large net non-FDI capital inflows may become a source of premature de-industrialization or declining productive complexity, in the sense of a lower degree of diversification and a loss of comparative advantages in high-skill intensive productive sectors.

The negative correlation between periods of large capital inflows and productive development is statistically significant in all our "full sample" regressions (column (1) in Tables 1 – 4), with the exception of the estimations related to the real manufacturing GDP share (*realmanva*). In this case, the coefficient associated to the financial dummy variable remains negative as expected, but is statistically insignificant. This result is consistent with Rodrik's findings and the general acknowledgement of far less solid evidence for de-industrialization when the focus is on the *real* manufacturing GDP share.

When we do a separate analysis for the advanced and EDE economies, clear evidence is found that the long-term detrimental effects of large capital inflows are more serious in the latter than in the former. EDE countries always experience statistically significant *contractions* (at least at 10% confidence level) in the manufacturing employment share, in the manufacturing *nominal* GDP share and in the economic complexity index when net non-FDI capital inflows stand at "higher than normal" levels (column (2) in Tables 1, 2 and 4). Such a negative effect seems to be particularly strong in the case of the economic complexity index. Consistent with the economic theory outlined in Figure 1, large net non-FDI capital inflows may fuel and feed the expansion of non-tradable sectors rather than (non-traditional) tradable ones. They may also lead to protracted periods of appreciation of the nominal and real exchange rate. These facts may in turn harm EDE countries' capabilities to compete in international goods market for manufactured products and cause a premature decline in the degree of complexity (and diversification) characterizing their economies.

As for developed countries, the coefficient associated to the financial dummy variable becomes statistically insignificant in the case of the manufacturing employment share (see column (3) in Table 1). It turns into positive, albeit statistically insignificant, in the case of manufacturing nominal GDP share (column (3) in Table 2). The financial dummy variable continues to display a statistically significant (at 10% confidence level) negative correlation with the economic complexity index even in the advanced economies (column (3) in Table 4). Nonetheless, the size of this effect is approximately half of reduction observed in EDE economies[14].

Among the other explanatory factors included in our analysis, the coefficient associated to the natural resource variable is always negative, as expected. However, it is statistically insignificant in most of the estimations. Remarkable exceptions are the negative correlation with the manufacturing employment share when we consider the full set of countries and, more importantly, with the ECI index. In this last case, such a negative correlation becomes statistically significant (and

[14] This may be explained by the fact that developed countries are specialized in sectors characterised by a less concave or, in some cases, even convex pattern of evolution of the manufacturing share over time, as shown by Tregenna and Andreoni (2020) and Dosi et al. (2021). Being these sectors more technologically advanced, they would represent a pull factor for foreign investors, as their liabilities (even the short-term ones) would be deemed as safe assets and/or a benchmark for more complex financial products (i.e., ETFs).

larger in size with respect to the full sample regression) in the specific case of EDE economies. The results thus show the relevance of having a measure of capabilities that goes beyond the share of manufacturing in GDP or employment.

We also run an additional battery of regressions considering alternative measures of the "natural resource curse" variable for the EDE economies. We consider the share of natural resource sectors over GDP and the weighted price index of exported commodities[15]. In both cases, results (not presented here but available on request) are in line with and reinforce those already discussed. Larger dependence on natural resources, whatever measure we take, always gives rise to sizable and statistically significant negative effects over our indicators of productive development. The only exception is the coefficient associated to the exported commodity price index in the regressions for the real manufacturing GDP share. In this case, the estimated coefficient is statistically insignificant and gets very small counter-intuitive positive values[16].

The main econometric analysis of this work is based upon the construction of a financial *dummy* capturing periods of financial bonanza. We can measure the economic relevance of our statistical results by computing the *semi*-elasticity of the four different dependent variables reported in Tables 1 – 4 with respect to the financial dummy itself. In the case of the full sample, semi-elasticity values range from a minimum of -0.0035 for manufacturing contribution to real GDP to a maximum of -0.021 for the economic complexity index. In the specific case of EDE economies, all values increase, ranging from -0.0081 (for the manufacturing real GDP share) to -0.03 (for manufacturing nominal GDP). Semi-elasticity values associated to EDE countries' manufacturing employment share and ECI index are equal to -0.021 and -0.022, respectively. During periods of financial bonanza, EDE economies experience a 2-3 percent *extra* reduction in the contribution of the manufacturing sector to either employment or nominal GDP with respect to its expected trend dynamics. The reduction in the degree of economic complexity is in the order of 2.2 percent. Perhaps more importantly, such economic outcomes may become even more relevant over the long run, since that finance-led (relative) contractions in manufacturing or in the degree of economic complexity may become irreversible and can hardly be reverted during periods of "modest" capital inflows (Cimoli *et al*., 2020). Regressive structural changes due to recurrent episodes of surges in capital inflows can thus *cumulate* through time.

[15] Weights are given by the share of each single commodity over total commodity exports.

[16] In line with channel 2 in Figure 1, this result somehow reflects the positive (but transitory) influence of an improvement in EDE countries' terms of trade over imports of critical capital goods for the expansion of manufacturing.

Table 1 – Econometric estimations for manufacturing employment share (*manemp*), 1980 – 2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000616***	0.000876***	-0.000641***
	(5.29e-05)	(6.51e-05)	(8.92e-05)
GDP per capita, squared	-1.00e-08***	-2.01e-08***	4.40e-09***
	(1.09e-09)	(1.81e-09)	(1.17e-09)
Population	-4.82e-06*	3.37e-07	2.43e-05***
	(2.46e-06)	(2.65e-06)	(8.24e-06)
Population, squared	0***	0	-9.43e-11***
	(0)	(0)	(0)
Financial boom dummy	**-0.253****	**-0.235***	-0.0667
	(0.114)	(0.122)	(0.184)
Trade Openness	0.00657*	0.00381	0.0166***
	(0.00366)	(0.00490)	(0.00305)
ROW GDP growth rate	0.00126	0.00121	0.00226
	(0.0102)	(0.00873)	(0.00917)
Total natural resources rents (% of GDP)	-0.0183	-0.00124	-0.000676
	(0.0186)	(0.0197)	(0.189)
Constant	8.218***	6.430***	31.92***
	(0.566)	(0.475)	(1.706)
Observations	896	647	249
R-squared	0.789	0.763	0.941
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 2 – Econometric estimations for manufacturing nominal value-added share (*nommanva*), 1980 – 2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000215***	0.000584***	-0.000587***
	(5.85e-05)	(0.000124)	(0.000134)
GDP per capita, squared	-4.87e-09***	-1.82e-08***	4.70e-09***
	(1.07e-09)	(3.85e-09)	(1.74e-09)
Population	4.92e-06	1.25e-05**	2.11e-05*
	(4.80e-06)	(5.11e-06)	(1.12e-05)
Population, squared	0	-0	-1.30e-10***
	(0)	(0)	(0)
Financial boom dummy	**-0.392*** **	**-0.576*** **	0.227
	(0.142)	(0.167)	(0.258)
Trade Openness	0.00923**	0.00980	0.0104**
	(0.00465)	(0.00724)	(0.00421)
ROW GDP growth rate	0.0195*	0.0186	0.0280**
	(0.0106)	(0.0126)	(0.0138)
Total natural resources rents (% of GDP)	**-0.0554***	-0.0492	-0.0648
	(0.0292)	(0.0316)	(0.226)
Constant	18.19***	15.75***	34.28***
	(0.900)	(0.969)	(2.552)
Observations	888	639	249
R-squared	0.748	0.737	0.920
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 3 – Econometric estimations for manufacturing real value-added share (*realmanva*), 1980 – 2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000192***	0.000764***	-0.000334***
	(5.43e-05)	(0.000108)	(0.000107)
GDP per capita, squared	-2.84e-09***	-1.92e-08***	3.65e-09***
	(1.09e-09)	(3.59e-09)	(1.39e-09)
Population	-1.40e-06	5.58e-06	3.22e-05***
	(4.73e-06)	(4.49e-06)	(1.09e-05)
Population, squared	0*	0	-1.73e-10***
	(0)	(0)	(0)
Financial boom dummy	-0.0644	-0.142	-0.0480
	(0.101)	(0.134)	(0.255)
Trade Openness	0.00382	-0.00129	0.0115***
	(0.00467)	(0.00594)	(0.00321)
ROW GDP growth rate	0.0140**	0.0144	0.0267**
	(0.00715)	(0.00879)	(0.0127)
Total natural resources rents (% of GDP)	-0.00427	-0.00721	-0.272
	(0.0156)	(0.0202)	(0.190)
Constant	15.90***	13.09***	24.55***
	(0.733)	(0.801)	(2.029)
Observations	894	648	246
R-squared	0.756	0.764	0.898
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 4 – Econometric estimations for Economic Complexity Index (ECI), 1980-2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.00221***	0.00219***	0.000583**
	(8.63e-05)	(0.000199)	(0.000268)
GDP per capita, squared	-2.28e-08***	-3.62e-08***	-4.17e-09
	(1.60e-09)	(6.04e-09)	(3.30e-09)
Population	1.85e-05***	3.10e-05***	0.000110***
	(6.47e-06)	(6.24e-06)	(3.03e-05)
Population, squared	-0	-0***	-3.80e-10***
	(0)	(0)	(9.53e-11)
Financial boom dummy	**-1.135*** **	**-1.032*** **	**-0.489***
	(0.305)	(0.354)	(0.281)
Trade Openness	-0.0159**	0.0404***	-0.0225**
	(0.00663)	(0.0135)	(0.00897)
ROW GDP growth rate	0.00150	0.000841	-0.00600
	(0.0263)	(0.0282)	(0.0199)
Total natural resources rents (% of GDP)	**-0.256*** **	**-0.307*** **	-0.138
	(0.0894)	(0.0882)	(0.297)
Constant	33.89***	30.24***	66.68***
	(1.232)	(1.465)	(5.234)
Observations	896	648	248
R-squared	0.904	0.846	0.972
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

In order to verify the robustness of our findings, we re-run the regression model specified in Equation (1) by directly using data on non-FDI capital inflows (as a percentage of GDP) instead of our "constructed" financial dummy variable. Our goal is to ascertain that the construction of the financial dummy variable does not generate any bias in the results reported in Tables 1 – 4. Tables 5 – 8 below present the outcomes of the robustness check. They provide further support to our analysis and confirm the hypothesis that large capital inflows may bear negative structural consequences in terms of productive development and economic complexity.

In Tables 5 – 8, the regression coefficients of the net non-FDI capital inflows are always negative. If we restrict our focus to the regressions for the full sample of countries and for EDE economies, such negative correlation is statistically significant in all cases except for the manufacturing employment share. Differently from the previous findings, it turns weakly significant (at 10% percent confidence level) even in the case of the *real* manufacturing GDP share. In the case of developed economies, the coefficient for net non-FDI capital inflows is always insignificant (albeit negative). Importantly, these results are also obtained when the ECI index is used as dependent variable. This is an important difference with respects to estimations including the financial dummy variable.

Tables 5 – 8 also confirm our findings related to the role of natural resources for whichever "natural resource curse" variable we use. The higher the rents "extracted" from the exploitation of natural resources, the lower is the contribution of manufacturing to either GDP or total employment, as well as the economic complexity index. This negative relation is statistically significant for nominal manufacturing GDP share and for complexity index in the "full sample" regression and in the case of EDE economies.

The economic implications of the regression coefficients reported in Tables 5 – 9 are broadly similar and consistent with those described before. If we only focus on EDE countries, the estimated elasticity with respect to non-FDI net capital inflows range from -0.0013 in the case of the manufacturing employment share to -0.0064 for manufacturing nominal GDP share. Elasticity related to both manufacturing real GDP share and ECI index is similar and equal to -0.0050 and -0.0057, respectively. Whilst these values may seem quite small and irrelevant, they have to be combined with sizable increases in international capital inflows during periods of financial bonanza. The same can be said when considering the significantly smaller order of magnitude of changes in the productive structure and/or in the technological level of an economy, usually in the order of a few percentage points over a relatively long-time span. For example, periods of financial bonanza in EDE countries could lead net non-FDI capital inflows to increase by almost 7 times with respect to periods of "financial tranquility" (from 0.7 percent of GDP to 5.6 percent). Accordingly, surges in capital inflows could lead EDE countries' manufacturing contribution to nominal GDP to decrease by about 4.4 percent (= -0.0064*6.89). Their level of economic complexity can decline by almost 4 percent (= -0.0057*6.89). Estimated changes in EDE countries' manufacturing employment and real GDP shares are equal to -0.8 percent and -3.4 percent, respectively.

Table 5 – Robustness check for manufacturing employment share (*manemp*) using net non-FDI capital inflows, 1980 – 2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000604***	0.000804***	-0.000614***
	(5.28e-05)	(7.10e-05)	(7.86e-05)
GDP per capita, squared	-9.76e-09***	-1.80e-08***	4.07e-09***
	(1.09e-09)	(1.88e-09)	(1.02e-09)
Population	-5.62e-06**	-9.46e-07	2.46e-05***
	(2.71e-06)	(3.63e-06)	(7.23e-06)
Population, squared	0***	0	-9.29e-11***
	(0)	(0)	(0)
Net non-FDI capital inflows (% of GDP)	-0.0150	-0.00468	-0.0199
	(0.00992)	(0.00656)	(0.0125)
Trade Openness	0.00658*	0.00176	0.0174***
	(0.00371)	(0.00488)	(0.00252)
ROW GDP growth rate	0.000288	0.000418	0.00141
	(0.00934)	(0.00662)	(0.0107)
Total natural resources rents (% of GDP)	-0.0166	-0.00187	-0.115
	(0.0176)	(0.0163)	(0.214)
Constant	8.300***	6.939***	31.50***
	(0.583)	(0.535)	(1.480)
Observations	896	647	249
R-squared	0.786	0.728	0.936
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 6 – Robustness check for manufacturing nominal value-added share (*nommanva*) using net non-FDI capital inflows, 1980 – 2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000242***	0.000451***	-0.000548***
	(5.55e-05)	(0.000125)	(0.000131)
GDP per capita, squared	-5.13e-09***	-1.57e-08***	4.39e-09***
	(1.02e-09)	(3.64e-09)	(1.70e-09)
Population	3.06e-06	1.41e-05**	2.12e-05*
	(4.61e-06)	(5.89e-06)	(1.11e-05)
Population, squared	0	-0	-1.32e-10***
	(0)	(0)	(0)
Net non-FDI capital inflows (% of GDP)	**-0.0386*** **	**-0.0337*** **	-0.0207
	(0.0128)	(0.0126)	(0.0152)
Trade Openness	0.00836*	0.0183**	0.0108***
	(0.00450)	(0.00772)	(0.00411)
ROW GDP growth rate	0.0193*	0.0161	0.0267*
	(0.0114)	(0.0108)	(0.0142)
Total natural resources rents (% of GDP)	**-0.0552***	**-0.0557***	-0.124
	(0.0304)	(0.0297)	(0.228)
Constant	18.06***	15.81***	33.66***
	(0.888)	(1.043)	(2.492)
Observations	888	639	249
R-squared	0.761	0.703	0.920
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 7 – Robustness check for manufacturing real value added share (*realmanva*) using net non-FDI capital inflows, 1980 – 2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000234***	0.000758***	-0.000328***
	(4.83e-05)	(0.000102)	(0.000113)
GDP per capita, squared	-3.67e-09***	-1.88e-08***	3.63e-09***
	(9.85e-10)	(3.40e-09)	(1.46e-09)
Population	-2.87e-06	5.40e-06	3.17e-05***
	(3.94e-06)	(4.72e-06)	(1.12e-05)
Population, squared	0**	0	-1.73e-10***
	(0)	(0)	(0)
Net non-FDI capital inflows (% of GDP)	**-0.0246****	**-0.0246***	-0.00765
	(0.120)	(0.0133)	(0.0137)
Trade Openness	0.00296	-5.87e-05	0.0117***
	(0.00431)	(0.00592)	(0.00343)
ROW GDP growth rate	0.0152*	0.0141*	0.0239*
	(0.00816)	(0.00856)	(0.0122)
Total natural resources rents (% of GDP)	-0.0108	-0.00726	-0.201
	(0.0181)	(0.0195)	(0.176)
Constant	15.87***	13.05***	24.43***
	(0.689)	(0.795)	(2.133)
Observations	894	648	245
R-squared	0.775	0.764	0.903
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 8 – Robustness check for Economic Complexity Index (ECI) using net non-FDI capital inflows, 1980-2017.

VARIABLES	(1) All Countries	(2) EDE Economies	(3) Developed Economies
GDP per capita	0.000121***	0.000117***	3.36e-05**
	(4.51e-06)	(9.81e-06)	(1.24e-05)
GDP per capita, squared	-1.24e-09***	-1.87e-09***	-2.04e-10
	(8.23e-11)	(2.86e-10)	(1.53e-10)
Population	8.80e-07**	1.55e-06***	5.77e-06***
	(4.05e-07)	(4.28e-07)	(1.31e-06)
Population, squared	-0	-0*	-0***
	(0)	(0)	(0)
Net non-FDI capital inflows (% of GDP)	**-0.00489*** **	**-0.00526*** **	-0.00163
	(0.00146)	(0.00165)	(0.00127)
Trade Openness	-0.000728*	0.00237***	-0.00146***
	(0.000375)	(0.000718)	(0.000396)
ROW GDP growth rate	-3.36e-05	-6.82e-05	-0.000667
	(0.00144)	(0.00153)	(0.00124)
Total natural resources rents (% of GDP)	**-0.0137*** **	**-0.0154*** **	-0.00957
	(0.00488)	(0.00468)	(0.0176)
Constant	-0.979***	-1.168***	0.777***
	(0.0691)	(0.0776)	(0.250)
Observations	895	648	247
R-squared	0.651	0.432	0.872
Number of c_id	36	26	10

Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

The figures relative to developed countries are generally smaller. This is both due to somehow smaller values of estimated elasticity, as well as to relatively more stable net non-FDI capital inflows[17]. Surges in capital inflows could lead economic complexity to decrease by about 1.3 percent (= -0.0033*4.35), about one-third of that observed in EDE economies. If we look at the manufacturing real GDP share, the estimated *extra* decline is about 1.5 percent (= -0.0036*4.35), less than one-half of the same estimated change for developing and emerging economies.

4. Large capital inflows and productive development: implications for capital control and external macroprudential policy

The previous analysis brings strong support to the claim that controls on capital movements (in particular capital inflows in periods of bonanza) might be an important tool not only in the quest for macroeconomic stability, but also to promote structural change and resilience in laggard economies. These findings reinforced the growing consensus on the importance of management policies on capital flows (Ostry *et al.*, 2012; Klein, 2012), especially when such flows are dominated by volatile portfolio investment and international credits (Ostry *et al.*, 2016). Financial bonanza is a critical factor in spurring premature de-industrialization and compromising any progress towards a more sophisticated productive structure, thereby heightening the vulnerability of the economy to exogenous shocks, such as those recently experienced with the pandemic.

The empirical evidence about the effectiveness of these measures gives mixed results. Klein (2012) tends to downgrade the role of capital flows management (CFM) policies, i.e., the broad policy category to which capital controls and external macroprudential regulation pertain[18]. Other contributions present different findings. Ostry *et al.*, (2012) argue that CFM policies do not change the overall amount of gross capital inflows. Yet, they modify their composition away from debt instruments, reduce the relevance of FX-denominated credit in domestic lending, and ultimately strengthen domestic financial solidity. Forbes *et al.*, (2015) reach similar conclusions by stressing that CFM policies may not prevent surges in capital inflows and exchange rate appreciations, but they can tame domestic credit booms and reduce domestic financial fragility. Ahnert et al., (2021) note that CFM tends to reduce financial sector and aggregate economy-wide exposure to exchange rate risk, even though this is partially moved to the non-financial corporate sector. Erten and Ocampo (2016) present empirical evidence according to which CFM policies can effectively restrain booms in capital inflows and mitigate macroeconomic instability once the problem of endogeneity is duly considered[19].

It is not possible to discuss all the empirical evidence about the relation between CFM policies and macroeconomic and financial instability. Yet, the empirical evidence showcased in this study possibly suggests two ways for CFM policies to generate long-term sectorial consequences. They

[17] In the case of developed countries, net non-FDI capital inflows tend to increase by about 4 times (from 2.68 percent to 14.34 percent of GDP) during periods of financial bonanza with respect to "tranquil" times.

[18] Following Ostry *et al.*, (2012), capital control measures look at the residency of economic actors as "discrimination" criteria for limiting financial transactions between them. On the contrary, external FX-related macroprudential regulation may restrict the accumulation of certain financial assets or liabilities depending on the currency in which they are denominated, regardless of the residency of the actors involved. Although the two set of policies are conceptually different, they *de facto* overlap with each other in relation to the goals they pursue (ex: reducing financial instability caused by external borrowing in foreign currency); the variables they influence (ex: the exchange rate and foreign indebtedness); the phenomena they attempt to control (ex: domestic credit booms fueled by foreign capitals). This explains why they are both included in the general CFM toolkit.

[19] While CFMs policies may influence capital inflows, they often emerge as *endogenous* policy responses to surges in foreign capitals themselves. Overlooking this issue of endogeneity might generate a downward bias in the estimated effects of the former over the latter.

are shown in Table 9 below, a list of specific CFM measures along with their targeted variables and goals.

First, it is crucial to look at the link between surges in capital inflows, the accumulation of foreign reserves and monetary policy independence. Since the beginning of the 2000s, increasing concern about foreign capital-led appreciations in the nominal and real exchange rate has pushed many countries, especially EDE economies, to accumulate large amounts of foreign reserves (Levy Yeyati, 2010; Akyüz, 2014). Such accumulation of foreign reserves may enable countries to better control the exchange rate and prevent exchange rate crises. However, this comes with a cost. Following Akyüz (2021), recycling foreign reserves by investing them in "safe" assets in the centers of the global financial system may give rise to a negative income transfer from EDE countries to developed economies due to differences in the yields on their foreign investments. Furthermore, when accumulating foreign reserves, domestic monetary authorities expand domestic liquidity. This may avoid the appreciation of the *nominal* exchange rate, but domestic inflation may accelerate and lead to an uncompetitive *real* exchange rate. In this case, the accumulation of foreign reserves may prove rather ineffective to avoid the crowding-out of non-traditional tradable sectors resulting from real exchange rate appreciations. Alternatively, domestic monetary institutions may sterilize excess liquidity by selling domestic bonds in open market operations. However, yields on domestic public bonds will increase, and the space for expansionary fiscal policy will narrow, reducing public investment and the possibility to crowd-in private investment and feed structural change.

Following Erten and Ocampo (2016), CFM policies may discourage external borrowing in foreign currency and weaken the pressure on the appreciation of the nominal and real exchange rate. Domestic monetary authorities would therefore be able to take milder positions in the FX market, reduce average holding of foreign reserves, and avoid the adoption of sterilization measures. Following Rey (2018), this makes domestic monetary policy more independent from global financial cycles. On top of this, a CFM-led reduction in the scale of international capital inflows may facilitate the adoption and implementation of *managed* exchange rate regimes (Obstfeld *et al.*, 2018), which seem to perform better than fixed and free-floating regimes in reducing the sensitivity of domestic credit and housing prices to global financial shocks (see Obstfeld *et al.*, 2018). They may also soften the "original sin redux" and dwindle foreign investors' reactions to swings in the exchange rate (Hofmann *et al.*, 2021) by dampening exchange rate volatility itself. More relevantly, domestic monetary authorities may gain wider margins of maneuver to pursue "developmentalist" objectives, once the exposure to global financial shocks has been reduced. National strategies for post-Covid sustainable recovery might benefit of more independent monetary policies that can *accommodate* the implementation of publicly financed recovery plans, prioritizing public investment, public (social and physical) infrastructures and, eventually, structural change[20].

Second, the design of CFM measures should explicitly take onboard the sectorial effects of large capital inflows by paying attention to the sectors that are mostly affected by inflows of foreign funds, either directly via foreign investors' purchases of home securities or intermediated by the domestic financial system. For the sake of productive development, the effects of foreign funds are considerably different depending on their destination: they can fuel housing booms in the domestic real estate sector; finance the expansion of the domestic service sector or support productive investment in the non-traditional (e.g., non-natural resource) tradable sector. As a consequence, CFM policies should impose different restrictions to foreign capitals depending on the sector. Let us take the example of (non-interest bearing) deposit requirements or direct taxes levied on foreign borrowing. On the one hand, these measures should become tighter when foreign debt is

[20] In this sense, our policy recommendations take inspiration from Ocampo (2011), when he stresses how macroeconomic policies should adopt a broader perspective by aiming at smoothing economic cycles and counter-acting crisis with the final goal of promoting productive development.

denominated in foreign currency. On the other hand, they should foresee and apply tougher "penalty" rates on foreign borrowing by corporations in the non-tradable sector with respect to companies operating in the non-traditional tradable sector. Similarly, given the foreign currency-denominated debt of the domestic banking system, macroprudential policy should discriminate against credit to non-tradable industries and favor bank' loans to those activities that have the potential to generate "hard currency" revenues.

The purpose of sector-specific CFM measures is twofold. First, additional restrictions imposed at sectorial level may further concur to reduce economy-wide currency mismatches and mitigate financial instability. Second, they go beyond the general claim to avoid excessive external borrowing and focus more on the *allocation* of collected funds, with the aim of creating a more diversified technologically advanced productive system with stronger export capacity. Industry-specific CFM measures explicitly try to counteract the decline in tradable activities that large capital inflows may prompt via Dutch disease-like mechanisms. Moreover, they acknowledge the fact that the accumulation of technological knowledge and the diversification of the productive system may be the ultimate necessary conditions for macroeconomic stability (Chang and Lebdioui, 2020), translating these considerations into policy agenda. From an historical point of view, it is not by chance that stronger export orientation and more advanced industrialization in East Asia than in Latin American made the former mostly immune to the external debt crisis of the 1980s (Sachs, 1985), and/or quicker in post-crisis recoveries thereafter. The latter, instead, was at the epicenter of the crash in 1982 and has continued to suffer from more acute recurrent financial and economic instability since then.

Table 9 – Economy-wide and sector-specific CFM policy measures

ECONOMY-WIDE HORIZONTAL MEASUES		
MEASURE	TARGET VARIABLE	MAIN PURPOSE
Quantitative limits to external borrowing	External debt/own fund ratio Debt service ratio	1. Tame Minskyan cycles 2. Reduce "foreign currency pressure" 3. Create more leeway for FX control and autonomous monetary policy
SECTOR-SPECIFIC MEASURES		
MEASURE	TARGET VARIABLE	MAIN PURPOSE
Sector-specific reserve requirements on foreign borrowing	Relative costs of foreign borrowing	1. Contrast Dutch disease effects of capital inflows 2. Direct external funding towards non-traditional tradable sectors 3. Discourage overexpansion of non-tradable sectors 4. Reduce currency mismatch
Sector-specific taxation of portfolio capital inflows	Financial returns/capital gains	1. Squeeze returns/capital gains on short-term investment 2. Tame stock exchange/real estate bubbles

5. Conclusion

The economic effects of Covid-19 have been particularly harsh in those EDE countries, characterized by poorly diversified productive structures, large informal sectors, high dependence on exports of natural resources or participation in the low-skill stages of global value chains, and where countries have failed to develop a skill-intensive service sector. Any national strategy for post-Covid sustained and sustainable recovery should put structural change and productive development at the core of its agenda. For the successful implementation of such plans, it is therefore necessary to identify sources of productive and technological backwardness.

In this paper, we document the perverse effects that non-FDI net capital inflows may have on the prospect of structural change towards more technology-intensive sectors. Based on a previous study by Rodrik (2016), we provide empirical evidence suggesting that large capital inflows may cause premature de-industrialization and technological backwardness. Periods of high financial liquidity in the international economy have a negative impact on the technological intensity of a country, measured either by the share of the manufacturing sector to GDP or employment or by the degree of economic complexity of the domestic productive systems. Moreover, these negative impacts are particularly acute in the case of emerging and developing (EDE) economies with respect to developed countries.

The findings of our study provide further support to the widening consensus that CFM measures, i.e., capital controls and external macroprudential policies, can contribute to improve the economic performance and financial stability of an economy, particularly in EDE countries. The positive effects of CFM policies go beyond an increased short-term resilience to global financial shocks. They also help counteract Dutch disease-like phenomena triggered off by large non-FDI net capital inflows, as they help reduce the implicit costs of large foreign reserves' holdings, facilitate the adoption of managed exchange rate regimes (allowing to keep it more stable at a competitive level), and increase the degree of independence of domestic monetary policy from global financial cycles. By limiting excessive external borrowing and, at the same time, favoring a "virtuous" allocation of funds towards new export activities and away from the non-tradable sectors (imposing industry-specific restrictions to foreign borrowing), they open space to combine key macroeconomic prices (the interest rate and the real exchange rate) with industrial and technological policies, with dedicated attention to the acceleration of economic diversification in laggard economies.

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Appendix

Table A.1 – List of countries included in the regression analysis

COUNTRY	COUNTRY CODE	SUB-SAMPLE
Argentina	ARG	Emerging and developing (EDE)
Bolivia	BOL	Emerging and developing (EDE)
Botswana	BWA	Emerging and developing (EDE)
Brazil	BRA	Emerging and developing (EDE)
Chile	CHL	Emerging and developing (EDE)
China	CHN	Emerging and developing (EDE)
Colombia	COL	Emerging and developing (EDE)
Costa Rica	CRI	Emerging and developing (EDE)
Denmark	DNK	Developed
Egypt	EGY	Emerging and developing (EDE)
France	FRA	Developed
Ghana	GHA	Emerging and developing (EDE)
Honk Kong	HKG	Emerging and developing (EDE)
India	IND	Emerging and developing (EDE)
Indonesia	IDN	Emerging and developing (EDE)
Italy	ITA	Developed
Japan	JPN	Developed
Kenya	KEN	Emerging and developing (EDE)
Malaysia	MYS	Emerging and developing (EDE)
Mauritius	MUS	Emerging and developing (EDE)
Mexico	MEX	Emerging and developing (EDE)
Nigeria	NGA	Emerging and developing (EDE)
Netherlands	NLD	Developed
Philippines	PHL	Emerging and developing (EDE)
Peru	PER	Emerging and developing (EDE)
Senegal	SEN	Emerging and developing (EDE)
Singapore	SGP	Developed
South Korea	KOR	Emerging and developing (EDE)
South Africa	ZAF	Emerging and developing (EDE)
Spain	ESP	Developed
Sweden	SWE	Developed
Tanzania	TZA	Emerging and developing (EDE)
Thailand	THA	Emerging and developing (EDE)
Venezuela, RB	VEN	Emerging and developing (EDE)
United Kingdom	GBR	Developed
United States	USA	Developed

Table A.2 – Data source and descriptive statistics, full country sample

SOURCE	LABELS	(1) N	(2) mean	(3) sd	(4) max	(5) min
IMF (IFS) and Cepalstat	Non-FDI net capital inflows	940	4.602	8.630	146.4	-19.64
IMF (IFS) and Cepalstat	Financial dummy	940				
GGDC	Manufacturing Employment Share	1,296	13.62	6.019	41.20	1.231
GGDC	Manufacturing Nominal Value Added	1,287	19.78	6.948	38.00	1.070
GGDC	Manufacturing Real Value Added	1,283	17.52	6.439	32.49	1.087
Atlas of Economic Complexity	Economic Complexity Index (ECI)	1,290	56.01	19.42	100	0.501
GGDC	Population	1,296	116,657	256,320	1.380e+06	1,340
GGDC	Population, squared	1,296	7.926e+10	3.074e+11	1.905e+12	1.795e+06
GGDC	GDP per capita	1,296	14,757	13,097	67,331	699.2
GGDC	GDP per capita, squared	1,296	3.892e+08	6.058e+08	4.533e+09	488,919
WB	Trade openness index	1,255	71.90	71.70	442.6	6.320
WB	ROW GDP growth rate	1,252	5.769	5.409	24.66	-6.990
WB	Total natural resources rents (% of GDP)	1,287	5.050	6.252	37.29	0.000311
Number of years		1980-2017	1980-2017	1980-2017	1980-2017	1980-2017
Number of countries		36	36	36	36	36

Table A.3 – Econometric tests for autocorrelation, heteroskedaticity and panel data cross-sectional dependence.

	HYPOTHESIS TEST	(1) Manufacturing Employment Share	(2) Manufacturing Nominal Value Added	(3) Manufacturing Real Value Added	(3) Economic Complexity Index (ECI)
Woolridge test for serial correlation	H0: no first-order autocorrelation	Prob > F = 0.0000 (rejected)	Prob > F = 0.0000 (rejected)	Prob > F = 0.0000 (rejected)	Prob > F = 0.0000 (rejected)
LR Maximum likelihood Test for Heteroskedasticity	H0: no heteroskedasticity	Prob > chi2 = 0.0000 (rejected)	Prob > chi2 = 0.0000 (rejected)	Prob > chi2 = 0.0000 (rejected)	Prob > chi2 = 1.0000 (not rejected)
Modified Wald statistic for groupwise heteroskedasticity	H0: no groupwise heteroskedasticity	Prob>chi2 = 0.0000 (rejected)	Prob>chi2 = 0.0000 (rejected)	Prob>chi2 = 0.0000 (rejected)	Prob>chi2 = 0.0000 (rejected)
Pearson test for Cross-sectional dependence	H0: no cross-sectional dependence	Pr = 0.475 (not rejected)	Pr = 0.466 (not rejected)	Pr = 0.466 (not rejected)	Pr = 0.485 (not rejected)

Note: Test interpretation in parentheses

Table A.4 – Periods of large capital inflows

EPISODE NUMBER	CODE	COUNTRY	TIME SPAN	EPISODE NUMBER	CODE	COUNTRY	TIME SPAN
1	ARG	Argentina	1980 - 1981	31	JPN	Japan	2014 - 2017
2	ARG	Argentina	1991 - 1998	32	KEN	Kenya	2012 - 2016
3	ARG	Argentina	2006 - 2012	33	MEX	Mexico	1990 - 1994
4	BOL	Bolivia	1992 - 1994	34	MEX	Mexico	2007 - 2017
5	BOL	Bolivia	1996 - 1998	35	MYS	Malaysia	2009 - 2013
6	BOL	Bolivia	2001 - 2005	36	NLD	Netherlands	1997 - 2006
7	BOL	Bolivia	2008 - 2017	37	NGA	Nigeria	2005 - 2015
8	BWA	Botswana	2001 - 2003	38	PER	Peru	1994 - 1997
9	BWA	Botswana	2006 - 2009	39	PER	Peru	2002 - 2007
10	BRA	Brazil	1991 - 1998	40	PER	Peru	2010 - 2017
11	BRA	Brazil	2005 - 2015	41	PHL	Philippines	1992 - 1995
12	CHL	Chile	1980 - 1982	42	PHL	Philippines	2002 - 2006
13	CHL	Chile	1992 - 1994	43	SEN	Senegal	2013 - 2015
14	CHL	Chile	1997 - 2014	44	SGP	Singapore	1993 - 1996
15	CHN	China	2000 - 2002	45	SGP	Singapore	2001 - 2007
16	CHN	China	2005 - 2007	46	KOR	South Korea	1994 - 1996
17	COL	Colombia	1980 - 1985	47	KOR	South Korea	2001 - 2007
18	COL	Colombia	1994 - 2001	48	KOR	South Korea	2010 - 2014
19	COL	Colombia	2009 - 2017	49	SWE	Sweden	1995 - 2011
20	CRI	Costa Rica	2002 - 2008	50	ZAF	South Africa	1994 - 2000
21	CRI	Costa Rica	2010 - 2017	51	ZAF	South Africa	2004 - 2007
22	DNK	Denmark	1999 - 2010	52	ZAF	South Africa	2009 - 2014
23	FRA	France	1998 - 2009	53	ESP	Spain	1998 - 2007
24	IDN	Indonesia	1993 - 1996	54	THA	Thailand	1993 - 1997
25	IDN	Indonesia	2005 - 2013	55	THA	Thailand	2005 - 2007
26	IND	India	2001 - 2005	56	GBR	United Kingdom	1995 - 2001
27	IND	India	2009 - 2014	57	GBR	United Kingdom	2003 - 2007
28	ITA	Italy	1994 - 2000	58	USA	United States	1995 - 2007
29	ITA	Italy	2003 - 2006	59	VEN	Venezuela	1990 - 1994
30	JPN	Japan	2004 - 2007	60	VEN	Venezuela	1997 - 2011