Working Paper No. 999

Structural Change, Productive Development, and Capital Flows: Does Financial "Bonanza" Cause Premature Deindustrialization?

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January 2022

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ISSN 1547-366X

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 relationship that may exist between productive backwardness and the intensity of the COVID-19 socioeconomic 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 deindustrialization. We consider a sample of 36 developed and developing countries from 1980 to 2017, with major emphasis on the case of emerging and developing economies (EDE) 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 tools for promoting long-run productive development on top of strengthening (short-term) financial and macroeconomic stability.

KEYWORDS: COVID-19; Structural Change; Capital Inflows; Macroprudential Policies

JEL CLASSIFICATIONS: 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 EDEs 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 significantly negative growth. The economic effects of COVID-19 seem to be the most present 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).

Such heterogeneity may be explained making reference to many factors. First, the in our study countries managed the spread of the pandemic in different ways and with different outcomes. Second, their "fiscal spaces" for the implementation of countercyclical fiscal policies[1] were considerably different. Third, the level of productive diversification and development characterizing an economy may have played a role both in taming and exacerbating COVID-19's economic consequences (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 weak productive economic structures such as: (i) a larger share of the informal sector in the 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 toward some high-tech manufacturing industries (i.e., electronics and information and communication 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 policymaking increasingly put emphasis on the leading importance of structural change and productive development toward environmentally friendly and digital economies to achieve sustained and sustainable recovery.

[1] See IMF (2020b) for an overview of the considerable differences in fiscal policy responses to COVID-19 between developed countries and EDEs, and among EDEs themselves.

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 identifying the sources of such backwardness. An expanding body of literature has recently tackled this issue by presenting evidence of "premature" deindustrialization, particularly in the case of EDEs (Palma 2005; Tregenna 2009; Rodrik 2016; Andreoni and Tregenna 2020; Dosi, Riccio, and Virgillito 2021). According to Rodrik (2016), in the last three decades most EDEs—with the noteworthy exception of East Asian countries—have been experiencing a remarkable contraction in the contribution of manufacturing to total employment and real and nominal GDP. This contraction has started much earlier (in terms of both economywide development and manufacturing development specifically) than what one would have expected by looking at the historical experience of advanced economies.[2]

Despite detecting widespread phenomena of "premature" deindustrialization, the literature does not go deeper into exploring the possible sources of such structural transformation. Our contribution aims at filling this gap by empirically identifying some possible causes of premature deindustrialization.[3] More specifically, our work brings together two streams of analysis that have rarely been connected so far. On the one hand, we make reference to above-mentioned literature on structural change, productive development, and premature deindustrialization. On the other hand, we look at the literature about the macroeconomic effects of large capital inflows on the recipient

[2] The manufacturing's central role in a broader development process in advanced economies can be traced back to the theoretical contributions of Nicholas Kaldor (1967), among many others. In line with a Kaldorian perspective, though manufacturing might have partially exhausted its pro-growth properties in developed countries, it seems to still play a strategic role in EDEs (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 EDEs 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 deindustrialization can have on productive development.

[3] To be fair, some authors have identified different modalities of the Dutch disease as a key source of premature deindustrialization (see, for instance, Palma [2014], Ocampo [2011], Guzman, Ocampo, and Stiglitz [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 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).

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 explaining episodes of premature deindustrialization 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 EDEs for which enough data are available, in particular balance of payment (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 s 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 EDEs than in the advanced economies. Third, we illustrate that this finding holds true for various measures of industrialization and productive development, be they captured by either manufacturing contribution to employment and economic activity, or by the ECI index. The term "manufacturing" hides a significant degree of heterogeneity,[4] 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 relationship 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,

[4] See Dosi, Riccio, and Virgillito (2020), who use the traditional Pavitt typology to highlight the differences in the behavior of the various branches of the manufacturing sector along the overall development process, and Andreoni and Tregenna (2020), who show that the greater the technological intensity of manufacturing is, the less concave its pattern of development will be, with seemingly less-pronounced deindustrialization dynamics.

arguing that external macroprudential 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 EDEs 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, Spiegel, and Stiglitz 2008; Perez Caldentey and Vernengo 2021), with rather few benefits in terms of faster growth (Ostry, Loungani, and Furceri 2016). Finance-led short-run fluctuations 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 (Cerra 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 on this point (see Palma [2014], Ocampo [2011], Guzman, Ocampo, and Stiglitz [2018] and 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 nontradable 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, he 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 greater international borrowing, widening current account deficits and generating consumption booms in the home economy. Adjustments in the economy mainly take place via changes in relative prices in the context of an optimizing intertemporal traverse toward the long-run equilibrium. Once again, the model does not pay attention to the 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 that form the basis of (or, at least contribute to) finance-led processes of deindustrialization, 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 rates, 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.[5]

[5] 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 nontraditional, noncommodity tradable sector, say manufacturing, but stronger linkages with the (over-) expansion of the financial industry and/or real estate. Taylor (1991) does not place foreign capitals at the center of his analysis, as for him financial booms unfold via

Figure 1 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. 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 of the evolution of an economy's sectorial composition, away from manufacturing and toward nontradable services, that surges in portfolio inflows and international credit may bring about. These surges affect the nominal and real exchange rates and, therefore, the price competitiveness of domestically 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 economy's expansion. Relative prices move in favor of nontradable goods and services.[6] The *real* exchange rate appreciates and productive factors find more profitable to move away from "nontraditional" tradable sectors (read manufacturing) toward nontradable 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 gaps (Botta 2021).

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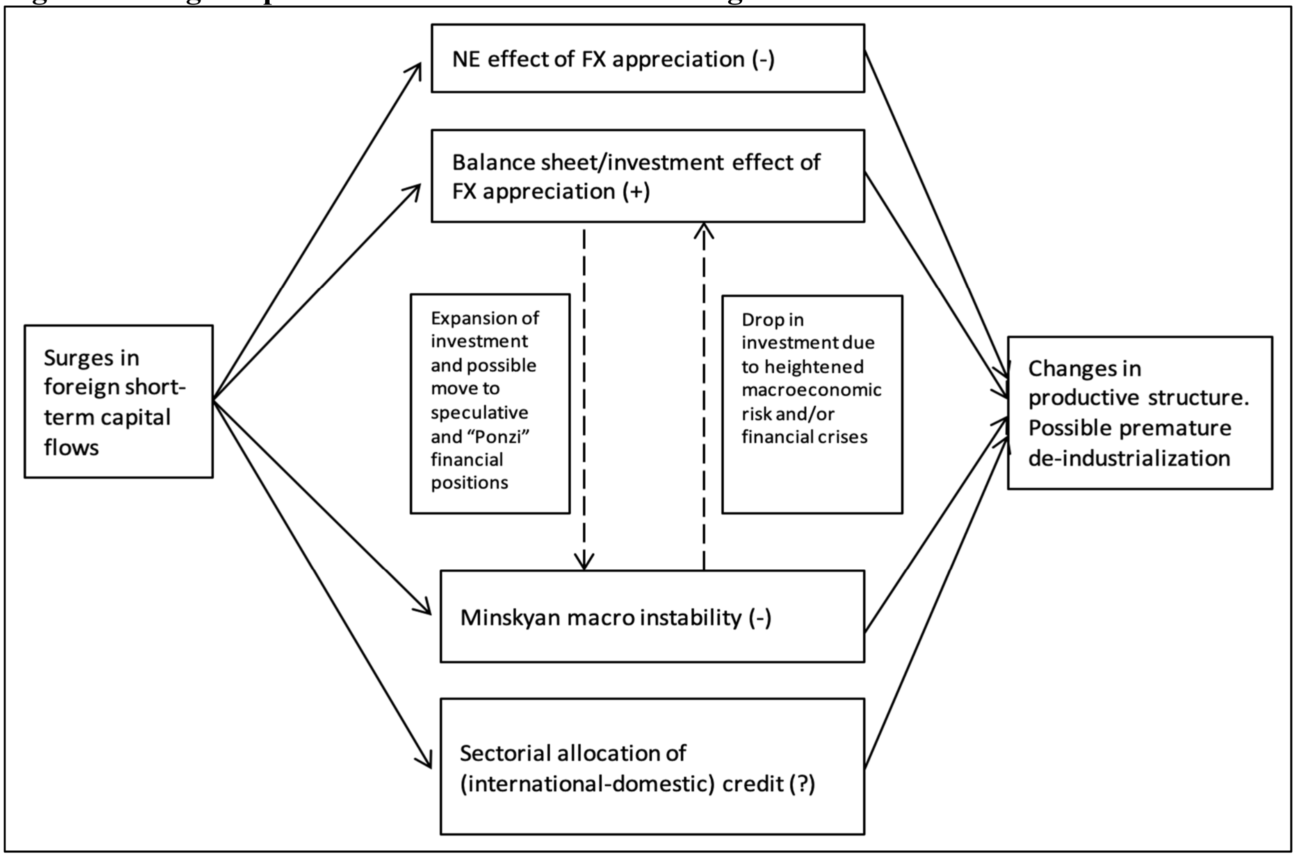
internal mechanisms. Nevertheless, he explicitly admits that foreign capitals can play a relevant role in triggering or feeding financial booms.

[6] 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.

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 domestically 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 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 EDEs (Chui, Kuruc, and Turner 2016; Pérez-Caldentey, Negront, and Lobos 2019). Against this backdrop, the appreciation of the nominal exchange rate caused by booming capital inflows makes the balance sheets of domestic firms more solid. This, in turn, may induce them to increase 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 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 innovations 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 EDEs in particular (Frenkel and Rapetti 2009). A perverse destabilizing feedback among 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, Kuruc, and Turner [2016] and Perez-Caldentey, Negront, and Lobos [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.[7] 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, Rogoff, and Savastano 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 and may actually generate "speculative" or "Ponzi" positions at the micro level. At the macro level, perverse externalities can be observed in cases of fragile financial positions, as they 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. 2020).

[7] Portfolio capital inflows may also take the form of investment in equities. This type of capital inflow 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.

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 nontraditional tradable good sector can likely lead to different long-term development implications with respect to credit bubbles inflating the nontradable 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.

Sectoral patterns of investment may play a relevant role not only because of their direct effects on the evolution of the productive structure of the economy, but also because they may feed back onto domestic firms' financial position by increasing (or not) currency and/or maturity mismatches on 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, leading to a rise in exports. On the other hand, if foreign capital mainly fuels companies in the nontradable 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 nontradable over tradable sectors, they are more likely to aggravate 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 involve 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 EDEs 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 1,000 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 has 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) capital and the commodity boom may have exacerbated the resource curse and the process of premature deindustrialization undergone by the country. Botta, Godin, and Missaglia (2016), in turn, provide empirical evidence of finance-led structural changes in Colombia. In this case, initial increases of foreign direct investment (FDI) 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 real exchange rate appreciation, particularly those associated with capital inflows in the 1970s and 1990s, led to a process of structural change in which technology-intensive sectors lost ground in the productive structure. With a broader focus on the whole Latin American region, Perez-Caldentey and Vernengo (2021) argue that premature deindustrialization 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, Converse, and Fornaro (2015) and Bortz (2018) provide more general empirical evidence about the effects of large capital inflows on the productive structure of recipient economies.[8] Bortz (2018) shows that there is a positive correlation between the increase in *gross* capital inflows toward some EDEs and the variation in the contribution to GDP of the financial, real estate, and commerce sectors. Benigno, Converse, and Fornaro (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 inflow bonanzas are associated with the squeeze—at least in relative terms—in manufacturing.

The empirical findings of Benigno, Converse, and Fornaro (2015) may implicitly complement the evidence about premature deindustrialization 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, Converse, and Fornaro (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 FDI. We present the details and novel contributions of our empirical analysis in section 3.

[8] Other studies have focused their attention on the effects of international resource *transfers* on productive development. Acosta, Lartey, and Mandelman (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.

3. FINANCIAL BONANZA, STRUCTURAL CHANGE AND PREMATURE DEINDUSTRIALIZATION: 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) deindustrialization 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.[9] Given such "fundamental" forces, *premature* deindustrialization takes place in developed countries if the decline in the economywide importance of manufacturing is more pronounced than expected. In a similar vein, premature deindustrialization can be observed in EDEs when the share of manufacturing starts to contract earlier than expected, i.e., at a lower 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 finds evidence of premature deindustrialization 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 population size, both in squared terms, as "fundamental" variables that capture the manufacturing share's inverted U-shaped trajectory over time. Rodrik's analysis is certainly useful for detecting cases of premature deindustrialization, yet it does not provide any explanation or identify any specific cause behind such phenomenon. Benigno, Converse, and Fornaro (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.

[9] Statistical evidence about deindustrialization 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 nontradable goods.

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 deindustrialization. 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 extend the set of possible dependent variables to the ECI, which to some extent may provide a broader measure of productive (and technological) development. Second, unlike Benigno, Converse, and Fornaro (2015) we look at *direct* data about (some types of) capital inflows. Benigno, Converse, and Fornaro (2015) use data about current account deficits—adjusted for variations in foreign reserves—as *indirect* measures of net *total* capital inflows, i.e., portfolio investment, international credit, and FDI. We use direct data about the private sector's portfolio investment and international credit only, thus excluding FDI 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 here is on portfolio investment and international credit. Second, we do not consider FDI, since is is likely to follow different motives and behave in a different fashion with respect to more speculative capital inflows (see Krugman [2000], for instance).[10] 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

[10] 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 FDI 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 impedes one from distinguishing brownfield FDI from greenfield FDI and merging 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 countercyclical 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 and Gopinar 2005; Shin, Acharya, and Yorulmazer 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.

primarily interested in (although economic actors' decisions can certainly be influenced by the accumulation of foreign reserves and/or sterilization measures).

3.2 Methodology

From a technical point of view, our analysis is based on a sample of 36 countries, including 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.2 provides 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 ECI are taken from the Atlas of Economic Complexity.[11]

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. A 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 relationship between periods of large capital inflows and cases of premature deindustrialization 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 capita and population) capturing the "fundamental" inverted U-shaped dynamics of manufacturing shares. This is formally stated in equation (1):

[11] The ECI 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 may display a similar evolution and to some extent mimic the process of industrial development described by Rowthorn and Ramaswamy (1997).

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

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 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 and $pop_{i,t}$ 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 the value of 1 during periods of large capital inflows (and 0 otherwise). Following Benigno, Converse, and Fornaro (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 as episodes of large capital inflows are periods during which:

(i) net non-FDI capital inflows are not negative or equal to zero;
(ii) (ii) they show positive values for at least three years consecutively;
(iii) (iii) the subperiod average is higher than the full-period, country-specific average adjusted (increased) by 10 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 into account countries' peculiarities by paying attention to country-specific averages and variability. Fourth, our definition seems to be able to capture all the major episodes of large capital inflows already tracked by the economic literature (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[12] from 1980 to 2017. This can be explained by the procyclical nature of international financial transactions involving domestic capital, particularly in EDEs. At the start of a financial boom, positive foreign capital inflows are amplified by the (at least partial) repatriation of domestic capital that was previously invested abroad. Symmetrically, the outbreak of financial turmoil may reduce gross foreign capital inflows and encourage domestic capital to leave the country in search of safer foreign assets. Within the theoretical framework portrayed in figure 1, heightened financial volatility is one way through which international capital movements can affect an economy's productive development. We try to capture this aspect by adopting 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 growth rate for the rest of the world (ROW). Finally, $r_{i,t}^{NR}$ is the share of natural resource rents over GDP as measured by Lange, Wodon, and Carey (2018). By using these control variables, we seek to capture the

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

effects of other forces besides liquidity cycles in the international financial system that contribute to shaping the pattern of specialization.

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 1980–81, for instance). Tables 1–4 report the results of our regression analysis. Table 1 looks at the manufacturing employment share. Table 2 and table 3 pay attention to the nominal and real manufacturing GDP shares, respectively. Table 4 puts emphasis on the ECI. We estimate equation (1) for the full sample, as well as consider developed and EDE countries separately.

Our results replicate Rodrik's findings on structural factors (GDP per capita and population) that account for the "natural" process of deindustrialization. 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 ECI decreases. Large net non-FDI capital inflows may become a source of premature deindustrialization 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 with 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 deindustrialization when the focus is on the *real* manufacturing GDP share.

When we do a separate analysis for the advanced and EDE countries, clear evidence is found that the long-term detrimental effects of large capital inflows are more serious in the latter than in the former. EDEs always experience statistically significant *contractions* (at least at 10 percent confidence level) in the manufacturing employment share, the manufacturing *nominal* GDP share, and the ECI 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 ECI. Consistent with the economic theory outlined in figure 1, large net non-FDI capital inflows may fuel and feed the expansion of nontradable sectors rather than (nontraditional) tradable ones. They may also lead to protracted periods of appreciation in the nominal and real exchange rates. These facts may in turn harm EDEs' capabilities to compete in international goods markets 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 with the financial dummy variable becomes statistically insignificant in the case of the manufacturing employment share (see column [3] in table 1). It turns positive, albeit statistically insignificant, in the case of the manufacturing nominal GDP share (column [3] in table 2). The financial dummy variable continues to display a statistically significant (at 10 percent confidence level) negative correlation with the ECI, even in the advanced economies (column [3] in table 4). Nonetheless, the size of this effect is approximately half of reduction observed in EDEs.[13]

Among the other explanatory factors included in our analysis, the coefficient associated with 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. In this last case, such a negative correlation becomes statistically significant (and larger in size with respect to the full sample regression) in the specific case of EDEs. The results thus show the

[13] This may be explained by the fact that developed countries are specialized in sectors characterized 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, Riccio, and Virgillito (2021). Being that these sectors are 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., exchange traded funds).

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 EDEs. We consider the share of natural resource sectors over GDP and the weighted price index of exported commodities.[14] In both cases, results (not presented here but available on request) are in line with and reinforce those already discussed. Greater dependence on natural resources, whatever measure we employ, always gives rise to sizable and statistically significant negative effects over our indicators of productive development. The only exception is the coefficient associated with 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 counterintuitive positive values.[15]

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, semielasticity values range from a minimum of -0.0035 for manufacturing contribution to real GDP to a maximum of -0.021 for the ECI. In the specific case of EDEs, all values increase, ranging from -0.0081 (for the manufacturing real GDP share) to -0.03 (for manufacturing nominal GDP). Semielasticity values associated to EDEs' manufacturing employment share and ECI are equal to -0.021 and -0.022, respectively. During periods of financial bonanza, EDEs 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 on the order of 2.2 percent. Perhaps more importantly, such economic outcomes may become even more relevant over the long run, since finance-led (relative) contractions in manufacturing or in the degree of economic complexity may become irreversible and can hardly be reversed 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.

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[14] Weights are given by the share of each single commodity over total commodity exports.
[15] In line with channel 2 in figure 1, this result somehow reflects the positive (but transitory) influence of an improvement in EDEs' 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) EDEs	(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 (percent 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) EDEs	(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 (percent 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) EDEs	(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 (percent 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) EDEs	(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 (percent 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 rerun 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 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 EDEs, 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 the 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 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 to the ECI. This negative relationship is statistically significant for the nominal manufacturing GDP share and for the ECI in the full sample regression and in the case of EDEs.

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 EDEs, the estimated elasticity with respect to non-FDI net capital inflows ranges from -0.0013 in the case of the manufacturing employment share to -0.0064 for the manufacturing nominal GDP share. Elasticity related to both the manufacturing real GDP share and ECI 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 on the order of a few percentage points over a relatively long time span. For example, periods of financial bonanza in EDEs could lead net non-FDI capital inflows to increase by almost seven 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 EDEs' 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 EDEs' 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) EDEs	(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 (percent 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 (percent 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) EDEs	(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 (percent 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 (percent 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) EDEs	(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 (percent 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 (percent 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) EDEs	(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 (percent 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 (percent 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.[16] 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 EDEs. 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, Loungani, and Furceri 2016). Financial bonanza is a critical factor in spurring premature deindustrialization and compromising any progress toward 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.[17] Other contributions present different findings. Ostry et al. (2012) argue that CFM policies do not

[16] 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.
[17] 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 foreign-exchange-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 sets of policies are conceptually different, they de facto overlap with each other in relation to the goals they pursue (for example, reducing financial instability caused by external borrowing in foreign currency), the variables they influence (for example, the exchange rate and foreign indebtedness), and the phenomena they attempt to control (for example, domestic credit booms fueled by foreign capitals). This explains why they are both included in the general CFM toolkit.

change the overall amount of gross capital inflows. Yet, they modify their composition away from debt instruments, reduce the relevance of foreign-exchange-denominated credit in domestic lending, and ultimately strengthen domestic financial solidity. Forbes, Fratzscher, and Straub (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 economywide exposure to exchange rate risk, even though this is partially moved to the nonfinancial 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.[18]

It is not possible to discuss all the empirical evidence about the relationship between CFM policies and macroeconomic and financial instability. Yet, the empirical evidence showcased in this study suggests two possible ways for CFM policies to generate long-term sectorial consequences; they are shown in table 9 as a list of specific CFM measures along with their targeted variables and goals.

First, it is crucial to look at the link among 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 rates have pushed many countries, especially EDEs, 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 EDEs 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 prevent 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 in preventing the crowding-out of nontraditional tradable sectors resulting from real exchange rate appreciations.

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

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 of crowding-in private investment and feeding 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 rates. Domestic monetary authorities would therefore be able to take milder positions in the foreign exchange 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, Ostry, and Qureshi 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, Ostry, and Qureshi 2018). They may also soften the "original sin redux"[19] and mitigate foreign investors' reactions to swings in the exchange rate (Hofmann, Patel, and Wu 2021) by dampening exchange rate volatility itself. More relevantly, domestic monetary authorities may gain wider margins of maneuver for pursuing growth objectives once the exposure to global financial shocks has been reduced. National strategies for post-COVID sustainable recovery might benefit from more independent monetary policies that can *accommodate* the implementation of publicly financed recovery plans, prioritizing public investment, public (social and physical) infrastructure, and, eventually, structural change.[20]

Second, the design of CFMss should explicitly take into account the sectorial effects of large capital inflows by paying attention to the sectors that are most 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 nontraditional (e.g., nonnatural resource) tradable sector. As a

[19] The "original sin redux" differs from the standard "original sin" in the sense that what matters for a country exposed to foreign debt is not only the currency in which debt is denominated, but also who "owns" this debt (Carstens and Shin 2019).

[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 counteracting crisis with the final goal of promoting productive development.

consequence, CFM policies should impose different restrictions on foreign capitals depending on the sector. Let us take the example of (noninterest bearing) deposit requirements or direct taxes levied on foreign borrowing. On the one hand, these measures should become tighter when foreign debt is denominated in foreign currency. On the other hand, they should foresee issues and apply tougher "penalty" rates on foreign borrowing by corporations in the nontradable sector with respect to companies operating in the nontraditional tradable sector. Similarly, given the foreign-currency-denominated debt of the domestic banking system, macroprudential policy should discriminate against credit to nontradable industries and favor bank loans to those activities that have the potential to generate hard currency revenues.

The purpose of sector-specific CFMs is twofold. First, additional restrictions imposed at sectoral level may further coincide to reduce economywide currency mismatches and mitigate financial instability. Second, they go beyond the general claim of avoiding excessive external borrowing and focus more on the *allocation* of collected funds, with the aim of creating a more diversified and technologically advanced productive system with stronger export capacity. Industry-specific CFMs 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). From a 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 and Williamson 1985), and/or quicker in achieving postcrisis recoveries thereafter. Latin America, 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. Economywide and Sector-Specific CFM Policy Measures

ECONOMYWIDE 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 foreign exchange 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 toward nontraditional tradable sectors 3. Discourage overexpansion of nontradable 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 the EDEs, characterized by poorly diversified productive structures, large informal sectors, high dependence on natural resource exports 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 sustained and sustainable recovery post-COVID 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 toward more technology-intensive sectors. Based on a previous study by Rodrik (2016), we provide empirical evidence suggesting that large capital inflows may cause premature deindustrialization 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 in 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 EDEs compared to developed countries.

The findings of our study provide further support to the widening consensus that CFMs, i.e., capital controls and external macroprudential policies, can contribute to improving the economic performance and financial stability of an economy, particularly in EDEs. The positive effects of CFM policies go beyond an increased short-term resilience against global financial shocks. They also help counteract Dutch disease–like phenomena triggered by large non-FDI net capital inflows, as they help reduce the implicit costs of large foreign reserve 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 toward new export activities and away from the nontradable 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	SUBSAMPLE
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 (percent 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	1980–81	31	JPN	Japan	2014–17
2	ARG	Argentina	1991–98	32	KEN	Kenya	2012–16
3	ARG	Argentina	2006–12	33	MEX	Mexico	1990–94
4	BOL	Bolivia	1992–94	34	MEX	Mexico	2007–17
5	BOL	Bolivia	1996–98	35	MYS	Malaysia	2009–13
6	BOL	Bolivia	2001–5	36	NLD	Netherlands	1997–2006
7	BOL	Bolivia	2008–17	37	NGA	Nigeria	2005–15
8	BWA	Botswana	2001–3	38	PER	Peru	1994–97
9	BWA	Botswana	2006–9	39	PER	Peru	2002–7
10	BRA	Brazil	1991–98	40	PER	Peru	2010–17
11	BRA	Brazil	2005–15	41	PHL	Philippines	1992–95
12	CHL	Chile	1980–82	42	PHL	Philippines	2002–6
13	CHL	Chile	1992–94	43	SEN	Senegal	2013–15
14	CHL	Chile	1997–2014	44	SGP	Singapore	1993–96
15	CHN	China	2000–2	45	SGP	Singapore	2001–7
16	CHN	China	2005–7	46	KOR	South Korea	1994–96
17	COL	Colombia	1980–85	47	KOR	South Korea	2001–7
18	COL	Colombia	1994–2001	48	KOR	South Korea	2010–14
19	COL	Colombia	2009–17	49	SWE	Sweden	1995–2011
20	CRI	Costa Rica	2002–8	50	ZAF	South Africa	1994–2000
21	CRI	Costa Rica	2010–17	51	ZAF	South Africa	2004–7
22	DNK	Denmark	1999–2010	52	ZAF	South Africa	2009–14
23	FRA	France	1998–2009	53	ESP	Spain	1998–7
24	IDN	Indonesia	1993–96	54	THA	Thailand	1993–97
25	IDN	Indonesia	2005–13	55	THA	Thailand	2005–7
26	IND	India	2001–5	56	GBR	United Kingdom	1995–2001
27	IND	India	2009–14	57	GBR	United Kingdom	2003–7
28	ITA	Italy	1994–2000	58	USA	United States	1995–2007
29	ITA	Italy	2003–6	59	VEN	Venezuela	1990–994
30	JPN	Japan	2004–7	60	VEN	Venezuela	1997–2011