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

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Abstract
Recent contributions to the literature on industrialization and development has confirmed that manufacturing continues to play a key role as a driver of economic development. As a corollary, these contributions highlight the importance of premature industrialization as a barrier to economic development and as a one of the main sources of the middle-income trap. In this paper, we analyze the factors that may have hindered industrial development in the past four decades. In particular, we focus on 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 a 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 in advanced ones, and that they may similarly occur across EDE countries regardless structural difference in the way manufacturing contributed to their development. 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.

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1. Introduction

There is an open debate in economics about whether manufacturing continues to be a key driver of growth and economic development. Baldwin and Forslid (2019), for instance, claim that services increasingly present growth-enhancing properties (i.e., tradability, learning-by-doing, economies of scale and space for innovation) traditionally attributed to manufacturing. The 2021 UN World Economic Situation and Prospects notes that trade in high-skill services (i.e., ICT, finance, education, R&D and business-related services) has increased faster than trade in goods over the last 15 years (United Nations, 2021). Moreover, rising emerging economies' participation to this type of services mostly concentrate in emerging and newly industrialized Asian countries. Is Indian-type service-led development path the new norm rather than the exception for the developing world?

These facts notwithstanding, Haraguchi *et al.* (2017) remark that "almost no country has achieved and sustained a high standard of living without making significant development in its

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manufacturing sector, except for a few oil rich countries and small financial havens" (Haraguchi *et al.*, 2017, 296). Szirmai and Verspagen (2015) and Su and Yao (2016) offer econometric support to this view by showing that manufacturing remains the leading engine of growth in low and middle-income countries, albeit this is increasingly conditional to the availability of a sufficient level of human capital (Szirmai and Verspagen, 2015). Felipe *et al.* (2019) point out that those countries that are now developed did attain, at some point in their development process, a certain critical level of manufacturing employment share, which appears to be a necessary requirement to advance in the technological ladder. More than this, Meliciani and Savona (2015) and Castellani *et al.* (2016) emphasize complementarities and synergies between manufacturing and high-skill business services. To some extent, manufacturing development, at least that of high-tech industries such as chemicals and motor vehicles, may act as pre-condition for the subsequent expansion of high-value added services (UNIDO, 2013).

Even the empirical evidence about the supposed shrinkage of manufacturing contribution to GDP and employment in the post-industrial stage of development is controversial. Indeed, (Haraguchi *et al.*, 2017) show that the share of manufacturing in employment and nominal value added did not fall when the world as a whole is considered, but remained broadly the same since the 1970s. What happened was a concentration of manufacturing value added and employment in a few specific countries, mainly populous East Asian countries. Moreover, there is significant heterogeneity within the manufacturing sector itself. While less technology-intensive branches of manufacturing declined, other (more technology-intensive) steadily increased their share in both employment and GDP. Dosi *et al*. (2020), for instance, use the traditional Pavitt typology to highlight such differences in the behavior of the various branches of the manufacturing sector all along the overall development process. Tregenna and Andreoni (2020) 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 dynamic.

The rediscovery of the importance of industrialization in economic development and the observed heterogeneity at country/region and sectoral level has important analytical and policy implications. Indeed, the identification of those factors/policies that foster or hinder manufacturing development may help to better understand and tackle likely intertwined phenomena such as the middle-income trap and premature de-industrialization. The so-called middle-income trap refers to the empirical observation that many countries found increasing difficulties to sustain growth once they have attained a certain critical level of GDP per capita. Eichengreen *et al.* (2013) note that it emerges as a result of a slowdown in productivity. The reasons behind such slowdown may arise from difficulties to further diversify the domestic economy and advance towards more sophisticated industries in which both employment and productivity increases more rapidly than on the average of the economy (Hartmann *et al*., 2021). "*Premature"* deindustrialization, in turn, is the phenomenon by which the expected decline in the economy-wide importance of manufacturing is more pronounced or kicks in at a lower level of per-capita GDP (or at a lower "peak" of manufacturing development itself) with respect to the historical experience of advanced economies. Rekhla and Babu (2022) have recently stressed the long-run perverse consequences of premature deindustrialization in middle-income countries. It may ultimately increase the probability of falling in the middle-income trap by leading to a slowdown in sectorial diversification, technological progress and productivity growth.

An expanding body of literature has presented evidence of premature de-industrialization, particularly in the case of emerging and developing economies – EDE henceforth (Palma, 2005; Tregenna, 2009; Rodrik, 2016; Castillo and Neto, 2016; Tregenna and Andreoni, 2020). According to Rodrik (2016), for instance, 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. Despite detecting cases of premature de-industrialization, a few contributions go deeper in exploring the possible sources of such structural transformation from an empirical point of view (see Tregenna *et al.*, 2021)[1].

This paper builds upon such embryonal literature and aims at finding more evidence about possible causes of premature de-industrialization. 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 premature de-industrialization (Rodrik, 2016; Tregenna and Andreoni, 2020; Dosi *et al.*, 2021; Tregenna *et al.*, 2021). On the other hand, we look at the literature about the long-run productive effects of large capital inflows over host economies (Benigno and Fornero, 2014; Benigno *et al.*, 2015). Our goal is to analyze whether periods of large net capital inflows, i.e., periods of financial "bonanza", may explain episodes of premature de-industrialization and setbacks in the broader process of productive development, here measured by the economic complexity index (ECI). In doing this, our work departs from Tregenna *et al.* (2021) by putting emphases on the most volatile components of capital flows, i.e., portfolio investment and international credit, and by considering a *direct de-facto* measure of financial "bonanza" (i.e., the ratio of non-FDI net capital inflows over GDP) with respect to *de-jure* measures of capital account liberalization (i.e., the Chin-Ito index).

Our study covers a wide range of countries. We consider both developed and EDE economies for which enough data are available, in particular data about financial components of the Balance of Payments (BoP). 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. In addition, the need to look more closely at the EDE countries stems from the above-mentioned crucial role that manufacturing development (and reaching a certain threshold of employment in manufacturing, in particular) still plays in sustaining the momentum of economic development.

We obtain three main results. 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 host economies. Second, these effects are considerably stronger in EDE countries than in the advanced economies. Moreover, periods of financial bonanza seem to carry out similar negative consequences on manufacturing, on manufacturing employment share in particular, across different EDE regions despite of deep structural differences in the way manufacturing has developed in such regions themselves. Third, our 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[2].

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

[1] 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). In some cases, capital account liberalization and international capital flows are indicated as possible causes for such regressive structural change. These contributions, however, do not test such hypothesis 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.

[2] As said, the term "manufacturing" hides a significant degree of internal heterogeneity between low, medium and high-tech productive sectors. We somehow attempted to tackle this issue by including the ECI as an alternative proxy for the productive/technological capabilities of an economy.

empirical works that, so far, have investigated this topic. 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. Section 4 draws some policy implications of our analysis. We argue that capital flow management policies that may restrain excessive capital inflows should be conceived in conjunction with industrial policy as integrated pillars of a complex policy package aimed at fostering 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 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, also “shape” long-run macroeconomic dynamics by changing the productive structure of the recipient economies. Some contributions already shed some light of this point (see Palma, 2014; Ocampo, 2011; Guzman *et al.*, 2018; Cimoli *et al.*, 2020). Few works, however, have formally modeled or, more importantly, econometrically analyzed what Benigno and Fornaro (2014) label as “financial resource curse”, and Botta (2017, 2021) defines as financial Dutch disease.

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[3].

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. 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[4]. 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).

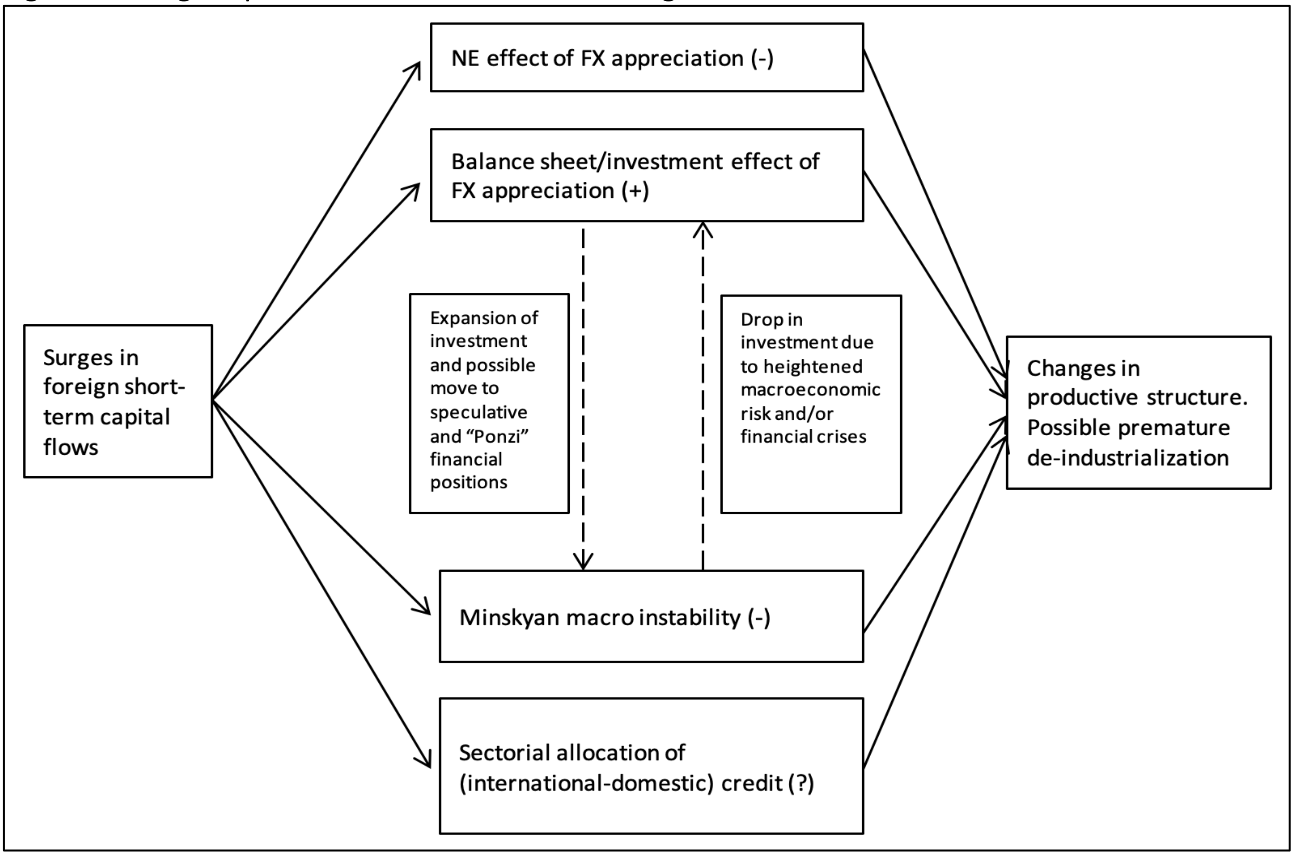
The nominal exchange rate is not only a component of the real exchange rate and of relative prices between imported and home-made goods. It is also the "financial price" that determines the domestic currency equivalent of foreign currency-denominated assets and liabilities. The "financial side" of the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

[3] 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.

[4] 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.

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.

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



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[5]. 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?)

[5] 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.

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 EDE countries. Credit booms may in turn affect the productive dynamics of the economy according to the different industries that benefit the most from credit expansion. 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.

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

Rowthorn and Ramaswamy (1997) and Palma (2005) show that 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[6]. Given such "fundamental" forces, *premature* de-industrialization takes place if manufacturing employment and GDP shares start to contract earlier than expected at a lower level of per-capita GDP, or at a lower "peak" of manufacturing shares themselves, with respect to the historical experience of the advanced economies.

[6] 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.

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.

There are relatively few empirical works that rigorously test for the theoretical contributions mentioned in section 2.1 and try to identify the causes of premature industrialization, finance-related ones among others. 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) 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 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), Bortz (2018), and Tregenna *et al.* (2021) provide more general empirical evidence about the effects of large capital inflows on the productive structure of recipient economies[7]. Bortz (2018) shows that there is a positive correlation between the increase in *gross*

[7] 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

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. Finally, Tregenna *et al.* (2021) run an extensive econometric analysis of the determinant of manufacturing contribution to nominal GDP and employment in a sample of 100 countries from 1970 to 2014. They use the Chin-Ito index as *de-jure* measure of financial account openness and capital mobility. With the sole exception of emerging Asian countries, they generally find a negative effects of financial account liberalization over manufacturing shares, even though estimated coefficients are often statistically insignificant when the analysis is conducted at regional level or in smaller groups of countries.

The empirical analyses of Benigno *et al.* (2015) and Tregenna *et al*. (2021) may 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 expand these streams of literature further. Similar to Tregenna *et al.* (2021), 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. Different to Tregenna *et al.* (2021), however, we take into account *de-facto* measures of abundant capital inflows, namely the share of portfolio investment and international credit over recipient economies' GDP, instead of a de-jure measure of financial account liberalization such as the Chin-Ito index. Indeed, even if the Chin-Ito index may well give information about how quickly and abundantly (all types of more or less volatile) capitals might legally move in and out of a country, it may actually say very little what practically happens in reality. 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)[8]. On top of this, the study of the long-

more traditional Dutch disease argument, the mechanisms investigated in this work are different with respect those studied in other contributions.

[8] 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

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).

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

3.1 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.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 Economic Complexity Index (ECI) are taken from the Atlas of Economic Complexity[9].

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:

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

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.

[9] 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).

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:

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[10] 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.

[10] 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.

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.

3.2 Overall 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 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[11].

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 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[12]. 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[13].

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.

[11] 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).

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

[13] 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 countries	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 countries	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 countries	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	0.00120***	0.000119***	3.16e-05**
	(4.67e-06)	(1.08e-05)	(1.45e-05)
GDP per capita, squared	-1.24e-09***	-1.96e-09***	-2.26e-10
	(8.69e-11)	(3.27e-10)	(1.79e-10)
Population	1.00e-06***	1.68e-06***	5.94e-06***
	(3.50e-07)	(3.38e-07)	(1.64e-06)
Population, squared	-0	-0***	-0***
	(0)	(0)	(0)
Financial boom dummy	**-0.0615*** **	**-0.0559*** **	**-0.0265* **
	(0.0165)	(0.0192)	(0.0152)
Trade Openness	-0.000860**	0.00219***	-0.00122**
	(0.000359)	(0.000731)	(0.000486)
ROW GDP growth rate	8.11e-05	4.56e-05	-0.000325
	(0.00142)	(0.00153)	(0.00108)
Total natural resources rents (% of GDP)	**-0.0139*** **	**-0.0167*** **	-0.00749
	(0.00484)	(0.00478)	(0.0161)
Constant	-0.956***	-1.153***	0.820***
	(0.0667)	(0.0794)	(0.284)
Observations	896	648	248
R-squared	0.649	0.450	0.827
Number of countries	36	26	10

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

We implement a battery of sensitivity analyses and robustness checks in order to verify the robustness of our findings to any possible bias created by the construction of the financial dummy variable. We first remove the "10 percent of one standard deviation" adjustment we apply to country-specific averages of net non-FDI capital inflows in the definition of periods of large capital inflows (see criterion (iii) above). By doing this, we control for different results possibly related to a "more benevolent" definition of periods of financial bonanza. Second, we control for the adoption of a more restrictive definition of capital inflow booms when country-specific net non-FDI capital inflows averages are adjusted by adding 20 percent of one standard deviation. Third, we run the regression model specified in Equation (1) by using direct data about net non-FDI capital inflows (as a percentage of GDP) instead of our "constructed" financial dummy variable. Finally, we run again this last model using *lagged* values of net non-FDI capital inflows in order to control for possible endogeneity issues. Tables A.5 – A.12 in the Appendix present the outcomes of sensitivity analyses and robustness checks. They provide further support to our study and confirm the hypothesis that large capital inflows bear negative structural consequences in terms of productive development and economic complexity.

In Tables A.5 – A.8, sensitivity analysis shows that our results do not change with the adoption of different more or less stringent definitions of periods of financial bonanza and of the connected financial dummy variable. In EDE countries, the relation between surges in net non-FDI capital inflows and manufacturing development or technological complexity remains negative and statistically significant (with the exception, as before, of real manufacturing GDP share – see Table A.7). Sometimes, there is an expected reduction in the statistical significance of estimated coefficients, in the case of advanced economies in particular, when the stricter definition of periods of financial bonanza is used.

In Tables A.9 – A.12, columns 1 – 3, the regression coefficients remain negative even when we use direct values of net non-FDI capital inflows instead of the financial dummy variable. The procedure we use to identify surges in large capital inflows does not seem to create any bias in the tested relation between periods of financial bonanza and manufacturing/technological development. 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). These results hold true also when the ECI index is used as dependent variable.

Columns 4 – 6 in Tables A.9 – A.12 present the results of our robustness check when we use *lagged* values of net non-FDI capital inflows instead of current ones. Once again, regression results are in line with main findings described above. Interestingly, the estimated negative coefficient for lagged net non-FDI capital inflows is statistically significant also in the regression for the manufacturing employment share. This result suggests that surges in speculative capitals may take some time before displaying their negative effects over manufacturing employment (share), perhaps after leading to real exchange rate appreciations that are particularly detrimental for low-skill labor intensive manufacturing sectors.

Finally, Tables A.5 – A.12 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 A.5 – A.12 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.

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[14]. 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.

3.3 Regional differences

The various EDE countries considered in this study present deep structural differences in the way manufacturing contributed (or not) to economic and technological development. Consider the well-known divide between emerging and newly industrialized East Asian countries and Latin American ones, for instance (Cimoli *et al.*, 2006). On the one hand, the former managed to climb the technological ladder and narrow (or close) the gap with respect to advanced economies by diversifying their economies and progressively moving towards more technologically complex industries (Hartmann *et al.*, 2021). On the other hand, the latter still present largely underdeveloped productive structures concentrated in natural resource or low-technology intensive industries (Cimoli *et al.*, 2006; Ocampo and Porcile, 2020). Rodrik (2016) himself stresses that East Asia is a remarkable exception in the developing country as it is the only region that resisted and actually counteracted premature de-industrialization.

Given such heterogeneity in the development path of EDE countries, we wonder whether periods of financial bonanza display different effects on the productive structure of different EDE regions. In order to see this, we split our set of EDE countries in three different sub-groups: EDE Asian countries, with and without China; Latin America and African economies. We run the regression model formalized by Equation (1) for each sub-group for all four dependent variables considered in this study. Tables 5 – 8 below present our findings.

In line with previous contributions (Rodrik, 2016; Tregenna *et al.*, 2021), other explanatory variables beyond "fundamental" forces frequently become statistically insignificant due to lack of observations. With this caveat in mind, Tables 5 – 8 show that periods of financial bonanza tend to carry out similar negative effects over manufacturing and technological development across the three EDE regions just mentioned. This is particularly true for manufacturing employment share

[14] 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.

(Table 5) and the economic complexity index (Table 8). In Table 5, surges in speculative capital inflows bear statistically significant negative consequences for manufacturing contribution to total employment in Asia (both with and without China) and Africa. In Latin America, this effect is negative but statistically insignificant. One possible explanation for this result is that Asian countries such as India, Indonesia, Philippines or even China present quite strong comparative advantages in low-technology low-skill labor intensive manufacturing sectors such as textile products, apparel, or footwears (UNCTAD, 2022)[15]. Surges in speculative capital inflows that lead to real exchange rate appreciations and losses of price competitiveness in international markets may thus force companies in these sectors to counter-act such trends by cutting employment and raising labor productivity. Periods of financial bonanza may also cause a decrease in economic diversification and a reduction in the economic complexity index in all the EDE regions taken into account, even though such effect is statistically significant in Africa only.

Results related to both nominal and real manufacturing GDP shares are partially different (Tables 6 and 7). In the cases of Latin America and Africa, surges in net non-FDI capital inflows tend to squeeze manufacturing GDP shares. In the end, Latin America and Africa are the two EDE regions that more consistently present negative long-run effects of large speculative capital inflows over the four different measures of productive and technological development considered in this study. In Asia, the relation between periods of financial bonanza and real manufacturing GDP share turns positive albeit not significant. The same applies for nominal manufacturing GDP share in Asia once China is dropped out of the sub-sample. This finding might be due to the fact that in Asia, differently with respect to Latin America, surges in speculative capitals came along with rising investment rather than booming consumptions (Calvo *et al.*, 1996). Increasing investment may have raised overall productivity. Moreover, they may have supported the progressive move of Asian manufacturing towards more high-tech industries (see more on this below). Both facts likely contributed to keep momentum for manufacturing development in Asia despite of *net* negative employment effects of changes in the sectoral composition of manufacturing itself (see also Dosi *et al.*, 2021 on this).

Figures 2 – 6 below complement the regional econometric analysis just described. Consistent with Felipe *et al.* (2019) and for the sake of space, we focus on manufacturing employment share only. Figures 2 – 6 portray the evolution of the manufacturing employment (share) *gap*, i.e., the difference between actual manufacturing employment share and the "expected" one according to structural factors à la Rodrik from 1960 to 2018. Manufacturing employment gaps are presented as a ratio of expected values. Positive values indicate manufacturing sectors whose contribution to total employment is larger than what expected by considering the general level of development and size of the economy. Negative values stand for relatively undersized manufacturing employment. We concentrate on some relevant EDE countries. Figure 2 portrays changes in the manufacturing employment gap in the three largest Latin American economies, i.e., Argentina (ARG), Brazil (BRA) and Mexico (MEX). Figure 3 shows data for Chile (CHL), Colombia (COL) and Peru (PER). In Figure 4, we focus upon South Korea (KOR) and Taiwan (TWN). Figure 5 shows the cases of Indonesia (IDN), Malaysia (MYS) and Thailand (THA). Figure 6, finally, portrays the case of other developing countries such as China (CHN), India (IND) and South Africa (ZAF). In all Figures, we highlight periods of large capital inflows as defined and detected in this study with grey areas. Figures 2 – 6 may help us to better appreciate structural differences in EDE countries' development trajectories, as well as

[15] Similar revealed comparative advantages in low-skill labor-intensive manufacturing sectors also characterize African countries such as Egypt, Mauritius and, to a lesser extent, Ghana. With the partial exception of Mexico and Costa Rica, most Latin American countries are far away from these industries and present strong comparative advantages in natural resource intensive sectors. See UNCTAD Revealed Comparative Advantage Radar (2022).

similarities and differences in the way surges in speculative capital inflows may have influenced such long-run dynamics. We can identify three main stylized facts.

First, the quite long-time span covered by Figures 2 – 5 enables us to identify two well distinguished development patterns between Latin America and East Asia. With the exception of Mexico, Latin American countries present manufacturing employment gaps that are *negative* (Brazil, Chile, Colombia, Peru and, since mid 1990s, Argentina), positive *but declining* (Argentina before mid 1990s), or a *mix* of both (Argentina and Chile in the last two decades). "Active" industrial policies in the 1960s and in the 1970s contributed to the relative expansion of domestic manufacturing by encouraging domestic substitution for imported goods (see, for instance, Chile before 1973 and Brazil between 1974 and 1978). The switch to neoliberal policies since 1980s, instead, prompted its "relative" downsizing. Mexico is the noteworthy exception to this, as its productive structure went through a considerable shift towards (maquila-based) manufacturing after Mexican integration in the North American Free Trade Agreement (NAFTA). The picture related to East Asian countries is somehow opposite. All East Asian countries started with negative manufacturing employment gaps, which however followed a long-term *positive* trend over time and became positive thereafter. Malaysia and Thailand now present manufacturing sectors whose size is comparable to the Mexican one. In first-tier East Asian countries such as South Korea and Taiwan, their *positive* manufacturing employment gaps range from being about two times (South Korea) to more than six time larger (Taiwan) than that of Mexico. Figure 6, finally, reveals the opposite development trajectories followed by China and India. Service-led development in India came along with a considerable squeeze of manufacturing contribution to total employment, which was initially over-dimensioned before 1980s due to pervasive interventionist policies. In South Africa, manufacturing contribution to total employment has been always deficient. South African increasing integration in international trade and financial markets since the beginning of the 1990s may have even worsened it, if anything.

Second, the manufacturing employment *gap* seem to move pro-cyclically. The manufacturing employment gap worsens during major domestic and/or "imported" international economic crises. It may improve, instead, during periods of strong domestic or worldwide economic growth, also depending on the capability of the economy of benefitting from upward phases in global business cycles. This seems to be a common pattern between developed and EDE countries, as well as across EDE countries themselves. See, for instance, the dramatically negative values taken by the manufacturing employment gap in Argentina at the heights of the Argentinian crisis at the beginning of the 2000s (Figure 2), the case of Mexico in 1995 *after* the outbreak of the "Tequila" crisis (Figure 2), or the downswing observed in East Asia in correspondence of the 1997 East Asian crisis (Figures 4 and 5). See also "relative" throats in manufacturing employment gap in most EDE countries at the time of the 2007-2008 financial crisis. In the end, this evidence is consistent with the negative relation between manufacturing development and finance-led economic shocks spotted by *et al*. Vu *et al*. (2021).

Third, and more relevantly for our study, periods of financial bonanza do not seem to contribute positively, if anything, to the relative expansion of manufacturing employment. In Latin America, surges in speculative capital inflows tend to *accelerate* or *exacerbate* the process of premature de-industrialization. They may actually contribute to generate noteworthy exceptions with respect to stylized fact two, at least before the 2000s. In Mexico, for instance, at the beginning of 1990s *before* the "Tequila" crisis and up until the end of 1994, large portfolio inflows contributed to resuscitate Mexican growth from economic stagnation in the 1980s (Krugman, 1999). Yet, the manufacturing employment gap worsened by almost 15 percentage points even in a fast-growing economy.

Table 5 – Econometric estimations for manufacturing employment share (*manemp*), different EDE regions, 1980 – 2017.

	(1)	(2)	(3)	(4)
VARIABLES	EDE Asia	EDE Asia (ex: CHN)	Latin America	Africa
GDP per capita	0.000570***	0.000588***	0.00137***	0.000934*
	(8.49e-05)	(8.26e-05)	(0.000276)	(0.000491)
GDP per capita, squared	-9.04e-09***	-9.37e-09***	-5.65e-08***	-3.30e-08
	(1.22e-09)	(1.18e-09)	(1.16e-08)	(3.16e-08)
Population	-5.10e-06	-1.35e-06	5.54e-05***	2.98e-05
	(3.63e-06)	(3.09e-06)	(1.31e-05)	(2.93e-05)
Population, squared	0***	0	-2.92e-10***	-2.20e-10
	(0)	(0)	(6.09e-11)	(1.48e-10)
Financial dummy variable	**-1.012*****	**-0.982*****	-0.0457	**-0.415***
	(0.305)	(0.327)	(0.157)	(0.239)
Trade Openness	0.0225***	0.0237***	0.00408	-0.00363
	(0.00533)	(0.00522)	(0.0119)	(0.0108)
ROW GDP growth rate	0.0114	0.00385	0.00375	-0.00277
	(0.0155)	(0.0139)	(0.0128)	(0.00990)
Total natural resources rents (% of GDP)	0.0189	0.00135	-0.0197	-0.0145
	(0.0343)	(0.0334)	(0.0233)	(0.0357)
Constant	8.408***	7.996***	4.552***	5.844***
	(0.982)	(0.941)	(1.552)	(1.373)
Observations	190	161	308	161
R-squared	0.881	0.900	0.681	0.674
Number of countries	8	7	9	9

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

Table 6 – Econometric estimations for manufacturing nominal value-added share (*nommanva*), different EDE regions, 1980 – 2017.

VARIABLES	(1) EDE Asia	(2) EDE Asia (ex: CHN)	(3) Latin America	(4) Africa
GDP per capita	0.000186***	0.000210***	0.00103***	0.000184
	(7.07e-05)	(5.27e-05)	(0.000399)	(0.000443)
GDP per capita, squared	-3.78e-09***	-4.19e-09***	-4.16e-08***	-2.14e-08
	(1.01e-09)	(7.77e-10)	(1.60e-08)	(2.63e-08)
Population	-1.15e-05*	-1.03e-05***	3.58e-05	9.82e-05**
	(6.30e-06)	(3.61e-06)	(2.85e-05)	(4.14e-05)
Population, squared	0**	-0	-1.32e-10***	-5.96e-10***
	(0)	(0)	(1.43e-10)	(1.96e-10)
Financial dummy variable	-0.378	0.0413	**-0.633*** **	**-1.729*** **
	(0.299)	(0.304)	(0.223)	(0.446)
Trade Openness	0.000882	-0.00422	-0.0159	0.0199
	(0.00461)	(0.00334)	(0.0201)	(0.0216)
ROW GDP growth rate	0.0158	0.0343**	0.0316**	0.0169
	(0.0185)	(0.0170)	(0.0158)	(0.0236)
Total natural resources rents (% of GDP)	**-0.104** **	**-0.199*** **	-0.0182	-0.0670
	(0.0406)	(0.0409)	(0.0393)	(0.0725)
Constant	25.14***	25.53***	14.94***	13.54***
	(1.048)	(0.778)	(2.098)	(1.821)
Observations	190	161	300	161
R-squared	0.907	0.944	0.608	0.736
Number of countries	8	7	9	9

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

Table 7 – Econometric estimations for manufacturing real value added share (*realmanva*), different EDE regions, 1980 – 2017.

	(1)	(2)	(3)	(4)
VARIABLES	EDE Asia	EDE Asia (ex: CHN)	Latin America	Africa
GDP per capita	0.000128	0.000140**	0.00125***	0.000689
	(7.99e-05)	(6.99e-05)	(0.000255)	(0.000501)
GDP per capita, squared	-2.15e-09*	-2.49e-09**	-4.13e-08***	-3.97e-08
	(1.20e-09)	(1.01e-09)	(1.01e-08)	(2.89e-08)
Population	-2.29e-05***	-1.01e-05***	5.72e-05***	-2.31e-06
	(5.46e-06)	(3.24e-06)	(1.96e-05)	(4.67e-05)
Population, squared	0**	0	-4.16e-10***	-1.35e-10
	(0)	(0)	(1.09e-10)	(2.35e-10)
Financial dummy variable	0.117	0.603	-0.206	**-1.006****
	(0.302)	(0.388)	(0.144)	(0.443)
Trade Openness	-0.00442	-0.00318	-0.0345***	0.00444
	(0.00517)	(0.00441)	(0.0121)	(0.0177)
ROW GDP growth rate	0.0317**	0.0332	0.0263**	-0.0117
	(0.0162)	(0.0204)	(0.0103)	(0.0235)
Total natural resources rents (% of GDP)	**-0.0102****	**-0.170*****	-0.00389	0.0990
	(0.0426)	(0.0399)	(0.0192)	(0.0754)
Constant	24.12***	23.26***	10.94***	12.21***
	(1.128)	(0.892)	(1.433)	(1.475)
Observations	190	161	309	161
R-squared	0.896	0.918	0.725	0.696
Number of countries	8	7	9	9

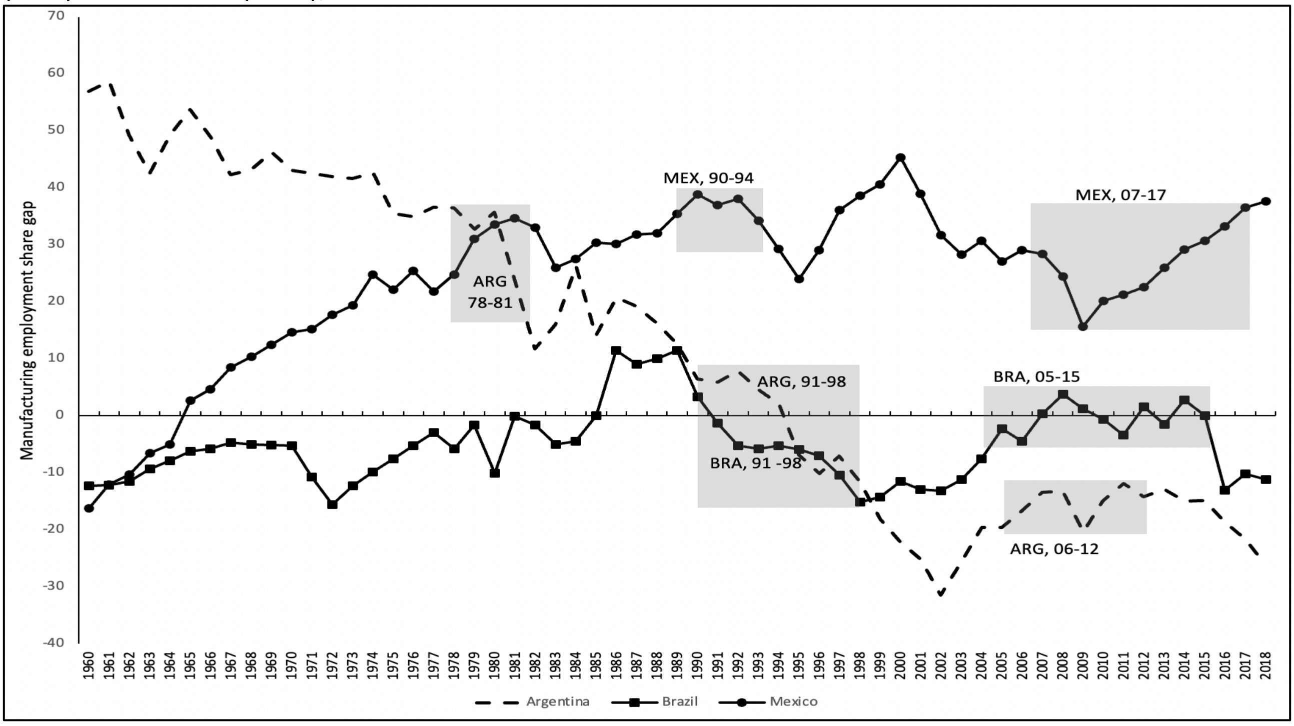
Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Table 8 – Econometric estimations for Economic Complexity Index (ECI), different EDE regions, 1980-2017.

VARIABLES	(1) EDE Asia	(2) EDE Asia (ex: CHN)	(3) Latin America	(4) Africa
GDP per capita	1.68e-05***	1.66e-05***	2.21e-05***	4.88e-05***
	(1.17e-06)	(1.18e-06)	(5.71e-06)	(6.68e-06)
GDP per capita, squared	-1.51e-10***	-1.50e-10***	-7.96e-10***	-2.22e-09***
	(0)	(0)	(2.46e-10)	(3.60e-10)
Population	-2.68e-08	-1.46e-07	3.09e-06***	2.33e-07
	(8.58e-08)	(1.27e-07)	(3.20e-07)	(8.01e-07)
Population, squared	0	0	-0***	-0**
	(0)	(0)	(0)	(0)
Financial dummy variable	-0.00316	-0.00104	-0.00427	**-0.0152***
	(0.00570)	(0.00576)	(0.00413)	(0.00801)
Trade Openness	-0.000152***	-0.000180***	0.000571*	0.000457
	(5.32e-05)	(5.51e-05)	(0.000310)	(0.000363)
ROW GDP growth rate	0.000198	7.39e-05	-0.000116	0.000163
	(0.000438)	(0.000412)	(0.000423)	(0.000391)
Total natural resources rents (% of GDP)	**-0.00187***	**-0.00260***	**-0.00262***	-0.00262
	(0.000910)	(0.00100)	(0.000781)	(0.00173)
Constant	0.429***	0.446***	0.273***	0.247***
	(0.0181)	(0.0204)	(0.0364)	(0.0243)
Observations	190	161	309	161
R-squared	0.957	0.959	0.713	0.855
Number of countries	8	7	9	9

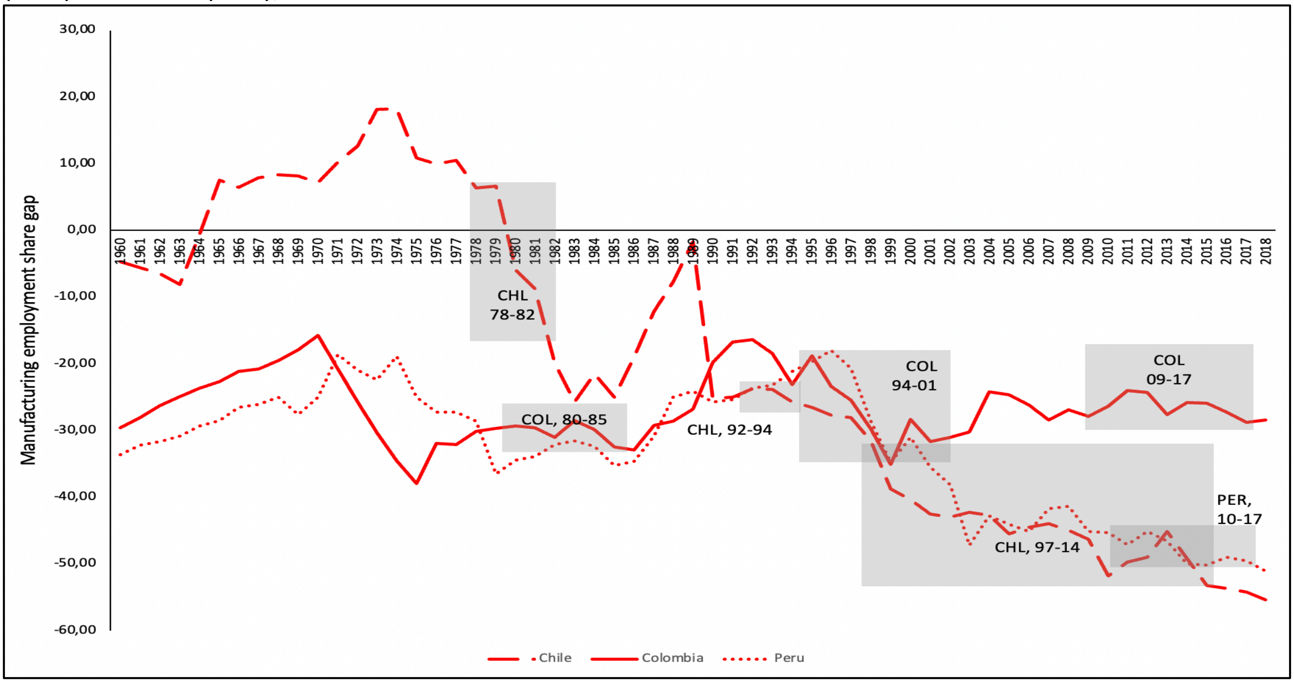
Note: Standard errors in parentheses (*** p<0.01, ** p<0.05, * p<0.1)

Figure 2 – Manufacturing employment share gap and financial bonanza in Argentina (ARG), Brazil (BRA) and Mexico (MEX), 1960 – 2018.



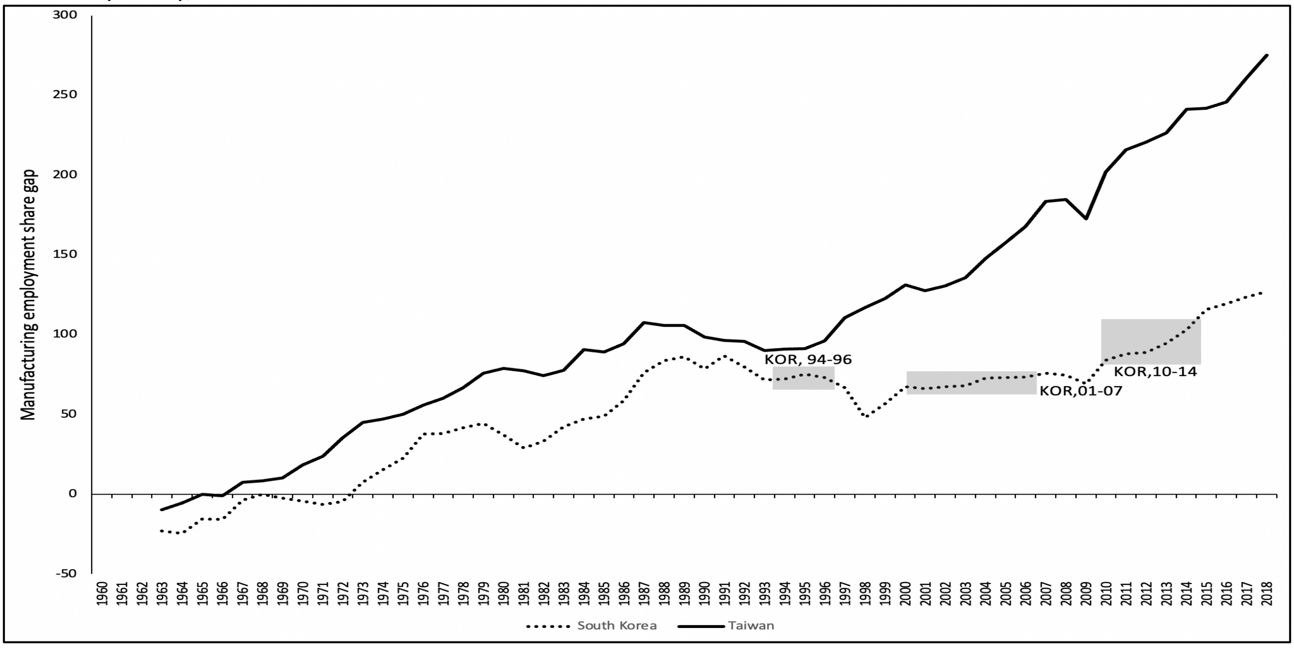
Source: Authors' computations on the basis of data from GGDC and ECLAC.

Figure 3 – Manufacturing employment share gap and financial bonanza in Chile (CHL), Colombia (COL) and Peru (PER), 1960 – 2018.



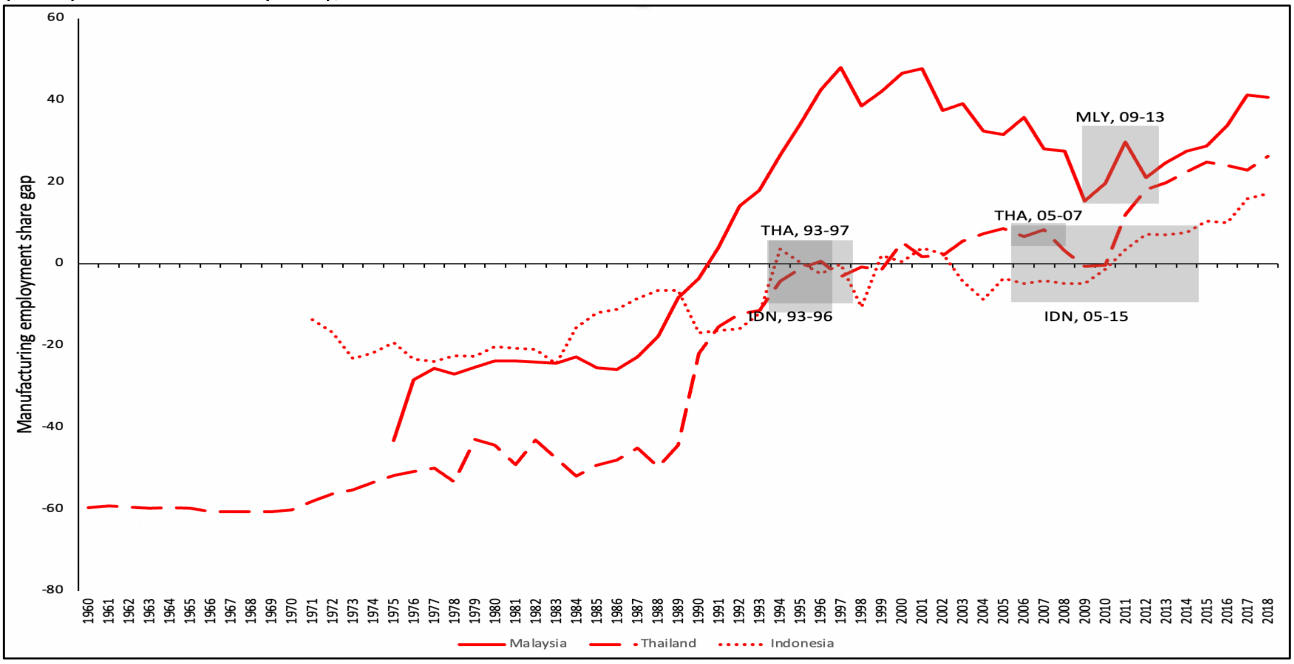
Source: Authors' computations on the basis of data from GGDC and ECLAC.

Figure 4 – Manufacturing employment share gap and financial bonanza in South Korea (KOR) and Taiwan (TWN), 1960 – 2018.



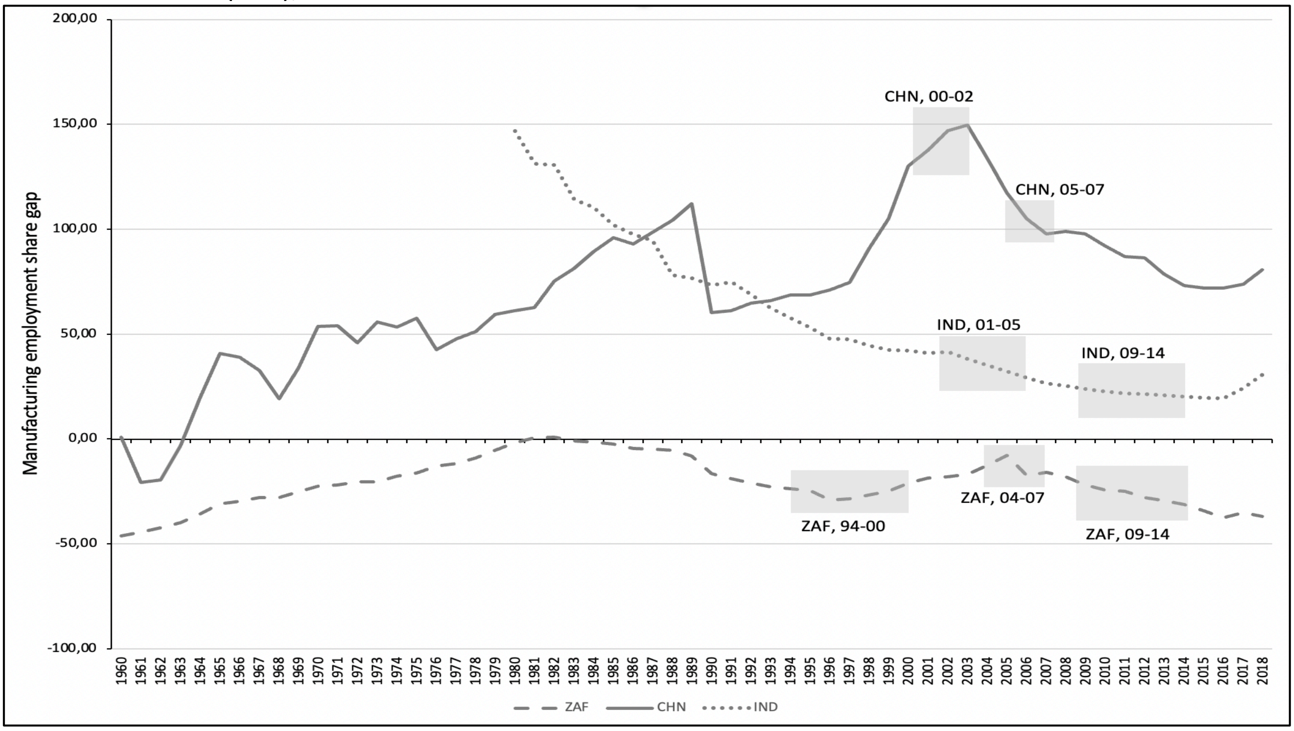
Source: Authors' computations on the basis of data from GGDC and ECLAC.

Figure 5 – Manufacturing employment share gap and financial bonanza in Indonesia (IDN), Malaysia (MYS) and Thailand (THA), 1960 – 2018.



Source: Authors' computations on the basis of data from GGDC and ECLAC

Figure 6 – Manufacturing employment share gap and financial bonanza in China (CHN), India (IND) and South Africa (ZAF), 1960 – 2018.



Source: Authors' computations on the basis of data from GGDC and ECLAC.

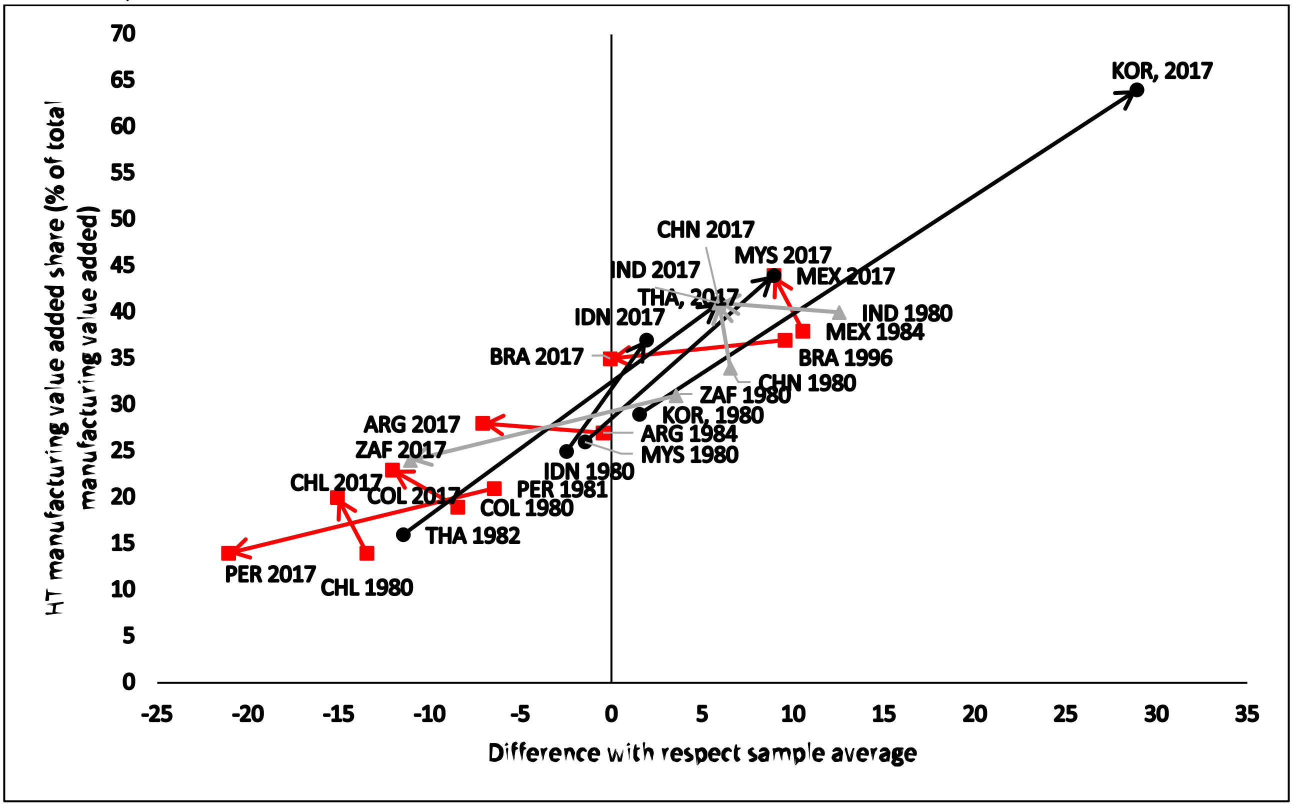
We can observe very similar structural dynamics in expanding economies in about the same period in Brazil and Argentina, as well as in Chile and Colombia. Even before that, Chile experienced a worsening manufacturing employment gap during the short-lived foreign capital-led economic boom it went through at the end of the 1970s and the beginning of the 1980s. Chile is usually considered a frontrunner of financial integration among EDE economies. In that period, very large capital inflows (international credit in particular) fueled Chilean economic rebound after painful neoliberal reforms introduced by the military junta in 1974 and 1975. It is quite clear that large capital inflows did not target the development of domestic manufacturing but pushed for the relative expansion of other sectors, as they also seem to be doing since 1997. In the case of South Korea and Taiwan, financial liberalization at the end of the 1980s seems to have caused a somehow *temporary perverse structural break* in the long-term *relative* expansion of manufacturing employment (Figure 4). In second-tier East Asian countries such as Indonesia, Malaysia and Thailand, surges in capital inflows were associated to initial increases in the importance of manufacturing that flattered out or partially reverted thereafter (Figure 5). In other developing countries such as China, India and South Africa (Figure 6), periods of financial bonanza are generally associated with persisting or worsening negative manufacturing employment gaps (South Africa) or, if positive, declining ones (China and India).

Similarities and differences in the way surges in speculative capital inflows have influenced the dynamics of manufacturing development across regions and time may be explained by different combinations of factors and policies. In the 1990s, for instance, we already noted how abundant capital inflows gave rise to consumption-led economic booms in Latin America, whilst investment was the demand component that benefitted the most from larger external finance in Asia (see Calvo *et al.*, 1996). Haraguchi *et al*. (2019) emphasize how investment have been a fundamental positive factor behind successful industrialization in the post-1990 period. Following Cimoli *et al.*, (2020) and Ocampo and Porcile (2020), the two regions also differed as to the role played by "active" industrial and "developmental" macroeconomic policies in the context of a general process of financial liberalization. Indeed, "the effects of financial shocks crucially depend on the country's combination of macroeconomic and industrial policies" (Cimoli *et al.*, 2020, p.1). In the 1990s (and even before in Chile, Uruguay and Argentina), Latin American countries adopted a "shock therapy" approach according to which financial liberalization was implemented together with the dismantling of active industrial policy. In East Asian countries, instead, increasing liberalization of trade and finance notwithstanding, national governments kept "new developmentalist" industrial and macroeconomic policies well in place (Bresser-Pereira, 2012). They actively kept on pursuing the development of high-tech tradable sectors and tried to tame finance-led appreciations of the real exchange rate. Such in institutions and policies accompanying (and perhaps contrasting) the effects of financial liberalization may explain why periods of financial bonanza *accelerated* premature de-industrialization in Latin America, whilst they only caused *temporary setbacks* in the long-term buyout expansion of manufacturing and technological capabilities in East Asia in the 1990s or before. By the same token, the later (partial) rediscovery of industrial policy tools, together with increased awareness about long-run effects of finance-led exchange rate appreciation, may have helped Latin American governments to more actively contrast the perverse structural implications of large financial inflows since around 2010.

A different mix of industrial and macro-financial policies likely affects the sectorial composition of manufacturing itself. Figure 7 below portrays the quite heterogenous evolution of *high-tech* manufacturing sectors[16] in the productive structure of EDE countries considered throughout Figures 2 – 6. Continuous support to technological upgrading and pro-industrialization macro-financial policies enabled most Asian countries to significantly raise the contribution of high-tech manufacturing sectors to total nominal manufacturing GDP. This share is now comparable to what recorded in advanced economies and substantially higher than the EDE countries sub-sample average. In Latin America (but we could say the same for African countries such as South Africa), more radical trade and financial liberalization are associated to languishing high-tech manufacturing industries that decreased their importance or remained significantly under-dimensioned with respect to what observed in more successful EDE countries.

[16] In this paper, we adopt the definition of high-tech manufacturing used by CEPAL for the construction of the "Cepalitec" technological capability index (CEPAL, 2016). High-tech manufacturing comprises: (i) productions of fabricated metal products; (ii) electrical and non-electrical machineries; (iii) office, accounting and computing machines; (iv) radio, televisions and communication equipment; (v) medical, precision and optical instruments; (vi) motor vehicles; (vii) other transport equipment. In Figure 7, we focus on sectorial contribution to nominal manufacturing GDP due to larger availability of data with respect to sectorial employment.

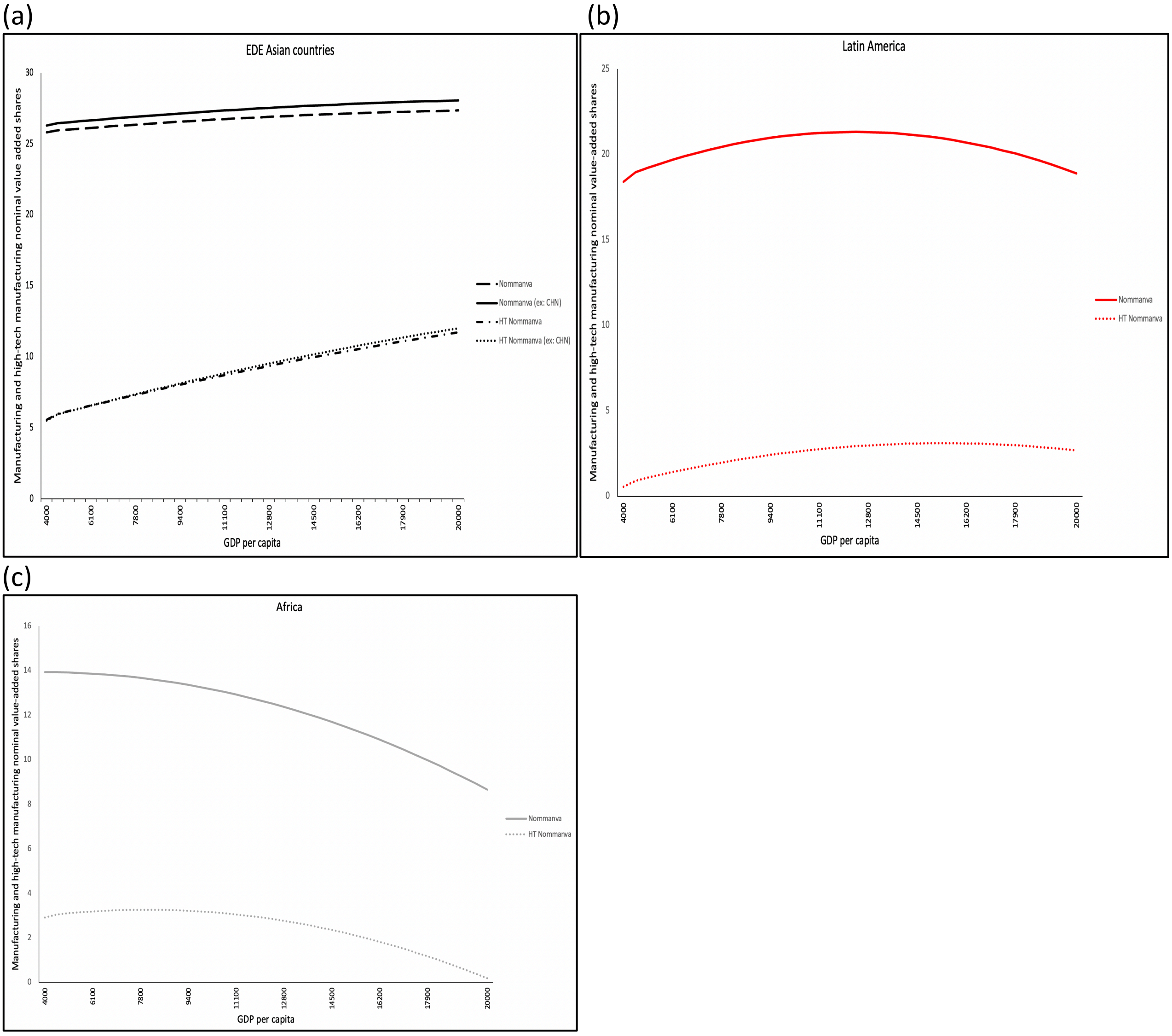
Figure 7 – Contribution of high-tech sectors to total nominal manufacturing GDP, various EDE countries, 1980 – 2017.



Source: Authors' computations on the basis of data from GGDC and ECLAC.

Different productive structures and sets of technological capabilities are not neutral in terms of future development trajectories. More diversified and technologically complex productive structures in more advanced EDE countries may breed further progress and feed a virtuous cumulative path-dependent process. Productive and technological backwardness could instead give rise to middle-income development traps in lagging-behind countries. Figure 8 plots the projected evolution of total manufacturing (*nommanva*) and of high-tech manufacturing (*HT nommanva*) nominal value-added shares in the three EDE regions considered so far. In general terms, there are signs of premature de-industrialization even for *fragile* high-tech manufacturing sectors in relatively backward Latin American and African economies (Figure 8 – plots b and c). In the case of Africa, this fact mimics what Tregenna (2015) labels "pre-industrialization de-industrialization". However, this trend is far less pronounced with respect to the contraction in the share of overall manufacturing and, therefore, low-tech sectors. In a way, the much higher importance of high-tech industries in Asia better equips these economies to resist de-industrialization. Indeed, Figure 8 – plot (a) clearly shows that total manufacturing nominal GDP share is rather stable and high-tech industries are even expanding. In the end, consistent with Rodrik (2016), Asia seems to be the only EDE region that does not suffer from premature de-industrialization and is less exposed than other EDE economies to the negative long-run consequences of periods of financial bonanza.

Figure 8 – Projected evolution of manufacturing and high-tech manufacturing nominal value-added shares in EDE regions: Asia (plot a); Latin America (plot b); Africa (plot c).



Source: Authors' computations on the basis of data from GGDC and ECLAC.

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 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.

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 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[18].

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

[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 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.

[18] 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.

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. Indeed, given more limited capital mobility, a more independent developmentalist monetary policy could more easily set interest rates at relatively low values of its own willing. By doing this, consistent with Haraguchi *et al*. (2019), it may foster productive investment whilst suppressing speculative carry trade and "killing" the rentier. In the post-Covid era, it may also *accommodate* the implementation of publicly financed recovery plans, prioritizing public investment, public (social and physical) infrastructures and, eventually, structural change[19].

Second, the design of CFM measures should explicitly take onboard the sectorial effects of large capital inflows. Following the example of China (see Andreoni and Tregenna, 2020), for instance, CFM measures should be part of and consistent with broader financial regulation and policy having a pro-industrial development orientation. CFM measures should pay 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 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,

[19] 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.

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.

The sector dimension of macroprudential policies draws attention towards the crucial interaction between macroeconomic and industrial policies. Macro prudential policies are a necessary condition for successfully implementing industrial policies. Hartmann *et al*. (2021) show that overcoming the middle-income trap and moving upwards in the complexity ladder requires “smart” industrial policies. The complexity ladder is not linear but S-shaped, and making the journey to the top of the S would not come spontaneously from market forces. It requires specific sector-level policies for technological catching up in order for the more sophisticated sectors to conquer a position in the global markets. But no smart industrial policy could provide the competitive edge required to compensate for a significant overvaluation of the currency, not could be implemented in the context of high real exchange rate instability. The combination of a stable and competitive real exchange rate and a moderate interest rate with a smart industrial policy characterized the successful cases of catching up after World War Second (Haraguchi *et al.*, 2019; Ocampo and Porcile, 2020). Last but not least, from a political economy point of view, macroprudential policies helps to reduce the veto power that bond vigilantes have on the ability of the state to define and implement industrial policies (which usually requires a more expansionary fiscal stance and public investment). Less mobility to short-term capital implies more policy space in EDEs.

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. All these factors reveal long-run structural problems in EDE economies. To attain sustained and sustainable recovery they 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. These impacts have long-run implications for the EDE economies, to the extent that the literature shows that premature industrialization may compromise the prospects of sustained growth in the long run. It makes it more difficult for middle income countries to move towards more sophisticated activities, thereby remaining in a slow-growth, slow learning path at relatively low levels of economic complexity.

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.

To the extent that macroprudential policies succeed in keeping the real exchange rate stable at a competitive level, they create an economic environment in which smart industrial policies could be more effectively implemented, with a stronger impact on international competitiveness. This competitiveness in turn, along with a more sophisticated industrial structure, would help reduce the impact of external shocks on the domestic economy and contribute to macroeconomic stability. By highlighting the crucial link between capital account, the real exchange rate, industrial policy and premature deindustrialization, this paper highlighted the need to combine industrial and macroprudential policies within a coherent strategy for escaping from the middle-income trap.

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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

Table A.5 – Sensitivity analysis: no standard deviation adjustment (columns 1 – 3) and 20 percent standard deviation adjustment (columns 4 – 6) in the definition of the financial dummy variable, manufacturing employment share (*manemp*), 1980-2017.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All	EDE	Developed	All	EDE	Developed
GDP per capita	0.000615***	0.000878***	-0.000634***	0.000608***	0.000853***	-0.000639***
	(5.29e-05)	(6.42e-05)	(8.77e-05)	(5.31e-05)	(6.72e-05)	(8.66e-05)
GDP per capita, squared	-1.00e-08***	-2.02e-08***	4.33e-09***	-9.90e-09***	-1.94e-08***	4.36e-09***
	(1.09e-09)	(1.78e-09)	(1.15e-09)	(1.08e-09)	(1.84e-09)	(1.13e-09)
Population	-4.76e-06*	4.33e-07	2.44e-05***	-4.95e-06*	-3.59e-08	2.44e-05***
	(2.45e-06)	(2.60e-06)	(8.18e-06)	(2.58e-06)	(3.02e-06)	(8.03e-06)
Population, squared	0***	0	-9.43e-11***	0***	0	-9.40e-11***
	(0)	(0)	(0)	(0)	(0)	(0)
Financial boom dummy variable (no 10% SD)	**-0.264****	**-0.259****	-0.168			
	(0.104)	(0.106)	(0.184)			
Financial boom dummy variable (with 20% SD)				**-0.283****	**-0.201***	-0.0789
				(0.118)	(0.111)	(0.170)
Trade Openness	0.00668*	0.00419	0.0167***	0.00645*	0.00307	0.0167***
	(0.00367)	(0.00492)	(0.00302)	(0.00368)	(0.00494)	(0.00294)
GDP growth rate of ROW	0.00134	0.00151	0.00211	-0.000161	-9.00e-05	0.00207
	(0.0102)	(0.00888)	(0.00908)	(0.00957)	(0.00759)	(0.00937)
Total natural resources rents (% of GDP)	-0.0188	-0.00200	-0.0161	-0.0196	-0.00288	-0.0184
	(0.0186)	(0.0199)	(0.189)	(0.0181)	(0.0181)	(0.191)
Constant	8.217***	6.403***	31.79***	8.344***	6.640***	31.90***
	(0.568)	(0.474)	(1.668)	(0.574)	(0.495)	(1.656)
Observations	896	647	249	896	647	249
R-squared	0.789	0.764	0.942	0.789	0.756	0.941
Number of countries	36	26	10	36	26	10

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A.6 – Sensitivity analysis: no standard deviation adjustment (columns 1 – 3) and 20 percent standard deviation adjustment (columns 4 – 6) in the definition of the financial dummy variable, manufacturing nominal value added share (*nommanva*), 1980-2017.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All	EDE	Developed	All	EDE	Developed
GDP per capita	0.000221***	0.000572***	-0.000564***	0.000220***	0.000526***	-0.000588***
	(5.79e-05)	(0.000124)	(0.000136)	(5.80e-05)	(0.000128)	(0.000134)
GDP per capita, squared	-4.98e-09***	-1.81e-08***	4.47e-09**	-4.95e-09***	-1.73e-08***	4.70e-09***
	(1.07e-09)	(3.83e-09)	(1.76e-09)	(1.06e-09)	(3.88e-09)	(1.73e-09)
Population	4.42e-06	1.25e-05**	2.18e-05*	4.58e-06	1.35e-05**	2.07e-05*
	(4.69e-06)	(5.08e-06)	(1.15e-05)	(4.70e-06)	(5.39e-06)	(1.11e-05)
Population, squared	0	-0	-1.32e-10***	0	-0	-1.29e-10***
	(0)	(0)	(0)	(0)	(0)	(0)
Financial boom dummy variable (no 10% SD)	**-0.298****	**-0.411*****	0.00691			
	(0.127)	(0.157)	(0.236)			
Financial boom dummy variable (with 20% SD)				**-0.381*****	**-0.462*****	0.214
				(0.142)	(0.153)	(0.239)
Trade Openness	0.00853*	0.0103	0.0108**	0.00861*	0.0136*	0.0104**
	(0.00462)	(0.00727)	(0.00427)	(0.00460)	(0.00755)	(0.00420)
GDP growth rate of ROW	0.0197*	0.0187	0.0281**	0.0181*	0.0153	0.0289**
	(0.0109)	(0.0127)	(0.0138)	(0.0108)	(0.0116)	(0.0140)
Total natural resources rents (% of GDP)	-0.0550*	-0.0494	-0.0754	-0.0580*	-0.0553*	-0.0613
	(0.0295)	(0.0317)	(0.225)	(0.0296)	(0.0307)	(0.226)
Constant	18.16***	15.71***	33.84***	18.24***	15.85***	34.29***
	(0.894)	(0.970)	(2.589)	(0.899)	(1.004)	(2.542)
Observations	888	639	249	888	639	249
R-squared	0.753	0.735	0.919	0.753	0.724	0.920
Number of countries	36	26	10	36	26	10

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A.7 – Sensitivity analysis: no standard deviation adjustment (columns 1 – 3) and 20 percent standard deviation adjustment (columns 4 – 6) in the definition of the financial dummy variable, manufacturing real value added share (*realmanva*), 1980-2017.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All	EDE	Developed	All	EDE	Developed
GDP per capita	0.000194***	0.000763***	-0.000346***	0.000193***	0.000746***	-0.000365***
	(5.36e-05)	(0.000108)	(0.000105)	(5.41e-05)	(0.000109)	(9.31e-05)
GDP per capita, squared	-2.92e-09***	-1.93e-08***	3.74e-09***	-2.87e-09***	-1.88e-08***	3.87e-09***
	(1.09e-09)	(3.58e-09)	(1.35e-09)	(1.10e-09)	(3.60e-09)	(1.20e-09)
Population	-1.43e-06	5.58e-06	3.10e-05***	-1.30e-06	5.81e-06	2.97e-05***
	(4.67e-06)	(4.47e-06)	(1.07e-05)	(4.73e-06)	(4.72e-06)	(1.01e-05)
Population, squared	0*	0	-1.70e-10***	0*	0	-1.65e-10***
	(0)	(0)	(0)	(0)	(0)	(0)
Financial boom dummy variable (no 10% SD)	-0.0231	-0.126	0.144			
	(0.0957)	(0.124)	(0.235)			
Financial boom dummy variable (with 20% SD)				-0.0917	-0.163	0.360
				(0.104)	(0.123)	(0.268)
Trade Openness	0.00392	-0.00119	0.0112***	0.00407	-0.000496	0.0108***
	(0.00466)	(0.00594)	(0.00308)	(0.00468)	(0.00597)	(0.00273)
GDP growth rate of ROW	0.0135*	0.0145	0.0259**	0.0131*	0.0131	0.0290**
	(0.00724)	(0.00880)	(0.0129)	(0.00723)	(0.00844)	(0.0143)
Total natural resources rents (% of GDP)	-0.00417	-0.00758	-0.289	-0.00501	-0.00671	-0.426**
	(0.0157)	(0.0203)	(0.194)	(0.0156)	(0.0193)	(0.208)
Constant	15.88***	13.08***	24.85***	15.91***	13.15***	25.27***
	(0.733)	(0.802)	(1.984)	(0.740)	(0.811)	(1.753)
Observations	893	648	245	893	648	245
R-squared	0.760	0.765	0.899	0.758	0.762	0.888
Number of countries	36	26	10	36	26	10

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A.8 – Sensitivity analysis: no standard deviation adjustment (columns 1 – 3) and 20 precent standard deviation adjustment (columns 4 – 6) in the definition of the financial dummy variable, Economic Complexity Index (ECI), 1980-2017.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All	EDE	Developed	All	EDE	Developed
GDP per capita	0.00222***	0.00219***	0.000618**	0.00220***	0.00213***	0.000626**
	(8.54e-05)	(0.000197)	(0.000258)	(8.84e-05)	(0.000207)	(0.000266)
GDP per capita, squared	-2.30e-08***	-3.64e-08***	-4.31e-09	-2.27e-08***	-3.47e-08***	-4.55e-09
	(1.61e-09)	(5.98e-09)	(3.20e-09)	(1.63e-09)	(6.17e-09)	(3.26e-09)
Population	1.85e-05***	3.15e-05***	0.000105***	1.78e-05***	3.00e-05***	0.000105***
	(6.14e-06)	(6.08e-06)	(2.74e-05)	(6.68e-06)	(6.71e-06)	(2.91e-05)
Population, squared	-0	-0***	-3.76e-10***	-0	-0**	-3.71e-10***
	(0)	(0)	(8.63e-11)	(0)	(0)	(9.19e-11)
Financial boom dummy variable (no 10% SD)	**-0.823*****	**-0.679***	**-0.513***			
	(0.294)	(0.347)	(0.285)			
Financial boom dummy variable (with 20% SD)				**-0.894*****	**-0.703****	-0.491
				(0.310)	(0.346)	(0.309)
Trade Openness	-0.0165**	0.0413***	-0.0243***	-0.0161**	0.0406***	-0.0238***
	(0.00649)	(0.0134)	(0.00860)	(0.00682)	(0.0139)	(0.00869)
GDP growth rate of ROW	0.00360	0.00257	-0.00812	-0.00312	-0.00524	-0.00894
	(0.0280)	(0.0293)	(0.0205)	(0.0261)	(0.0275)	(0.0205)
Total natural resources rents (% of GDP)	-0.285***	-0.323***	-0.146	-0.250***	-0.282***	-0.124
	(0.0922)	(0.0900)	(0.302)	(0.0889)	(0.0862)	(0.301)
Constant	33.81***	30.11***	66.24***	33.97***	30.42***	66.25***
	(1.213)	(1.449)	(5.087)	(1.289)	(1.539)	(5.253)
Observations	895	648	247	895	648	247
R-squared	0.907	0.846	0.976	0.904	0.843	0.974
Number of countries	36	26	10	36	26	10

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table A.9 – Robustness check for manufacturing employment share (*manemp*) using net non-FDI capital inflows (columns 1 – 3) and *lagged* net non-FDI capital inflows (columns 4 – 6), 1980 – 2017.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All	EDE	Developed	All	EDE	Developed
GDP per capita	0.000604***	0.000804***	-0.000614***	0.000633***	0.000874***	-0.000582***
	(5.28e-05)	(7.10e-05)	(7.86e-05)	(4.82e-05)	(6.94e-05)	(7.66e-05)
GDP per capita, squared	-9.76e-09***	-1.80e-08***	4.07e-09***	-1.02e-08***	-2.02e-08***	3.72e-09***
	(1.09e-09)	(1.88e-09)	(1.02e-09)	(1.03e-09)	(1.80e-09)	(9.71e-10)
Population	-5.62e-06**	-9.46e-07	2.46e-05***	-5.16e-06**	-7.06e-08	1.99e-05***
	(2.71e-06)	(3.63e-06)	(7.23e-06)	(2.10e-06)	(2.71e-06)	(6.60e-06)
Population, squared	0***	0	-9.29e-11***	0***	0*	-7.81e-11***
	(0)	(0)	(0)	(0)	(0)	(0)
Net non-FDI capital inflows	-0.0150	-0.00468	-0.0199			
	(0.00992)	(0.00656)	(0.0125)			
Lagged net non-FDI capital inflows				**-0.0431*** **	**-0.0186***	**-0.0266***
				(0.0161)	(0.00959)	(0.0138)
Trade Openness	0.00658*	0.00176	0.0174***	0.00796**	0.00492	0.0170***
	(0.00371)	(0.00488)	(0.00252)	(0.00370)	(0.00529)	(0.00223)
ROW GDP growth rate	0.000288	0.000418	0.00141	0.00154	0.00248	-0.00150
	(0.00934)	(0.00662)	(0.0107)	(0.0127)	(0.00893)	(0.0121)
Total natural resources rents (% of GDP)	-0.0166	-0.00187	-0.115	-0.0215	-0.00154	-0.160
	(0.0176)	(0.0163)	(0.214)	(0.0200)	(0.0191)	(0.218)
Constant	8.300***	6.939***	31.50***	7.931***	6.344***	31.07***
	(0.583)	(0.535)	(1.480)	(0.564)	(0.507)	(1.448)
Observations	896	647	249	893	644	249
R-squared	0.786	0.728	0.936	0.781	0.757	0.933
Number of countries	36	26	10	35	25	10

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

Table A.10 – Robustness check for manufacturing nominal value-added share (*nommanva*) using net non-FDI capital inflows (columns 1 – 3) and *lagged* net non-FDI capital inflows (columns 4 – 6), 1980 – 2017.

VARIABLES	(1) All	(2) EDE	(3) Developed	(4) All	(5) EDE	(6) Developed
GDP per capita	0.000242***	0.000451***	-0.000548***	0.000297***	0.000682***	-0.000513***
	(5.55e-05)	(0.000125)	(0.000131)	(5.61e-05)	(0.000114)	(0.000150)
GDP per capita, squared	-5.13e-09***	-1.57e-08***	4.39e-09***	-6.20e-09***	-2.14e-08***	3.66e-09*
	(1.02e-09)	(3.64e-09)	(1.70e-09)	(1.03e-09)	(3.29e-09)	(1.95e-09)
Population	3.06e-06	1.41e-05**	2.12e-05*	-1.35e-07	1.10e-05**	1.03e-05
	(4.61e-06)	(5.89e-06)	(1.11e-05)	(4.03e-06)	(4.84e-06)	(1.08e-05)
Population, squared	0	-0	-1.32e-10***	0*	-0	-9.60e-11***
	(0)	(0)	(0)	(0)	(0)	(0)
Net non-FDI capital inflows	**-0.0386*****	**-0.0337*****	-0.0207			
	(0.0128)	(0.0126)	(0.0152)			
Lagged net non-FDI capital inflows				**-0.0413****	**-0.0398****	-0.00842
				(0.0164)	(0.0164)	(0.0175)
Trade Openness	0.00836*	0.0183**	0.0108***	0.00586	0.0129*	0.0101**
	(0.00450)	(0.00772)	(0.00411)	(0.00411)	(0.00707)	(0.00431)
ROW GDP growth rate	0.0193*	0.0161	0.0267*	0.0189	0.0149	0.0255
	(0.0114)	(0.0108)	(0.0142)	(0.0146)	(0.0156)	(0.0178)
Total natural resources rents (% of GDP)	**-0.0552***	**-0.0557***	-0.124	**-0.0662****	**-0.0622***	-0.251
	(0.0304)	(0.0297)	(0.228)	(0.0322)	(0.0336)	(0.242)
Constant	18.06***	15.81***	33.66***	18.08***	15.19***	33.75***
	(0.888)	(1.043)	(2.492)	(0.891)	(0.964)	(2.807)
Observations	888	639	249	885	636	249
R-squared	0.761	0.703	0.920	0.769	0.748	0.916
Number of countries	36	26	10	35	35	10

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

Table A.11 – Robustness check for manufacturing real value added share (*realmanva*) using net non-FDI capital inflows (columns 1 – 3) and *lagged* net non-FDI capital inflows (columns 4 – 6), 1980 – 2017.

VARIABLES	(1) All	(2) EDE	(3) Developed	(4) All	(5) EDE	(6) Developed
GDP per capita	0.000234***	0.000758***	-0.000328***	0.000282***	0.000898***	-0.000316***
	(4.83e-05)	(0.000102)	(0.000113)	(4.43e-05)	(9.56e-05)	(0.000122)
GDP per capita, squared	-3.67e-09***	-1.88e-08***	3.63e-09***	-4.89e-09***	-2.36e-08***	3.03e-09*
	(9.85e-10)	(3.40e-09)	(1.46e-09)	(8.53e-10)	(3.06e-09)	(1.56e-09)
Population	-2.87e-06	5.40e-06	3.17e-05***	-4.06e-06	4.91e-06	3.26e-05***
	(3.94e-06)	(4.72e-06)	(1.12e-05)	(3.61e-06)	(4.23e-06)	(1.06e-05)
Population, squared	0**	0	-1.73e-10***	0***	0	-1.71e-10***
	(0)	(0)	(0)	(0)	(0)	(0)
Net non-FDI capital inflows	**-0.0246****	**-0.0246***	-0.00765			
	(0.120)	(0.0133)	(0.0137)			
Lagged net non-FDI capital inflows				**-0.0297***	**-0.0304***	0.00841
				(0.0170)	(0.0174)	(0.0143)
Trade Openness	0.00296	-5.87e-05	0.0117***	0.00336	0.00251	0.0131***
	(0.00431)	(0.00592)	(0.00343)	(0.00378)	(0.00560)	(0.00356)
ROW GDP growth rate	0.0152*	0.0141*	0.0239*	0.0124	0.0108	0.0213
	(0.00816)	(0.00856)	(0.0122)	(0.0113)	(0.0130)	(0.0140)
Total natural resources rents (% of GDP)	-0.0108	-0.00726	-0.201	-0.0271	-0.0331	-0.119
	(0.0181)	(0.0195)	(0.176)	(0.0217)	(0.0254)	(0.158)
Constant	15.87***	13.05***	24.43***	15.72***	12.40***	24.38***
	(0.689)	(0.795)	(2.133)	(0.711)	(0.806)	(2.305)
Observations	894	648	245	886	645	241
R-squared	0.775	0.764	0.903	0.762	0.765	0.909
Number of countries	36	26	10	35	25	10

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

Table A.12 – Robustness check for Economic Complexity Index (ECI) using net non-FDI capital inflows (columns 1 – 3) and *lagged* net non-FDI capital inflows (columns 4 – 6), 1980-2017.

VARIABLES	(1) All	(2) EDE	(3) Developed	(4) All	(5) EDE	(6) Developed
GDP per capita	0.000121***	0.000117***	3.36e-05**	0.00221***	0.00230***	0.000515**
	(4.51e-06)	(9.81e-06)	(1.24e-05)	(8.29e-05)	(0.000177)	(0.000237)
GDP per capita, squared	-1.24e-09***	-1.87e-09***	-2.04e-10	-2.31e-08***	-4.23e-08***	-2.37e-09
	(8.23e-11)	(2.86e-10)	(1.53e-10)	(1.47e-09)	(5.35e-09)	(2.97e-09)
Population	8.80e-07**	1.55e-06***	5.77e-06***	2.13e-05***	3.57e-05***	0.000106***
	(4.05e-07)	(4.28e-07)	(1.31e-06)	(6.62e-06)	(7.09e-06)	(2.27e-05)
Population, squared	-0	-0*	-0***	-0	-0***	-3.90e-10***
	(0)	(0)	(0)	(0)	(0)	(7.26e-11)
Net non-FDI capital inflows	**-0.00489*****	**-0.00526*****	-0.00163			
	(0.00146)	(0.00165)	(0.00127)			
Lagged net non-FDI capital inflows				**-0.0653****	-0.0553	-0.0119
				(0.0303)	(0.0341)	(0.0274)
Trade Openness	-0.000728*	0.00237***	-0.00146***	-0.0119*	0.0580***	-0.0266***
	(0.000375)	(0.000718)	(0.000396)	(0.00712)	(0.0145)	(0.00688)
ROW GDP growth rate	-3.36e-05	-6.82e-05	-0.000667	0.00469	2.84e-05	-0.00650
	(0.00144)	(0.00153)	(0.00124)	(0.0293)	(0.0310)	(0.0260)
Total natural resources rents (% of GDP)	**-0.0137*****	**-0.0154*****	-0.00957	-0.270***	-0.310***	-0.186
	(0.00488)	(0.00468)	(0.0176)	(0.0916)	(0.0877)	(0.344)
Constant	-0.979***	-1.168***	0.777***	33.71***	28.95***	67.28***
	(0.0691)	(0.0776)	(0.250)	(1.360)	(1.384)	(4.673)
Observations	895	648	247	892	645	247
R-squared	0.651	0.432	0.872	0.908	0.851	0.980
Number of countries	36	26	10	35	25	10

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