

Cimoli, Mario; Ocampo Gaviria, José Antonio; Porcile, Gabriel

**Working Paper**

## Choosing sides in the trilemma: International financial cycles and structural change in developing economies

LEM Working Paper Series, No. 2017/26

**Provided in Cooperation with:**

Laboratory of Economics and Management (LEM), Sant'Anna School of Advanced Studies

*Suggested Citation:* Cimoli, Mario; Ocampo Gaviria, José Antonio; Porcile, Gabriel (2017) : Choosing sides in the trilemma: International financial cycles and structural change in developing economies, LEM Working Paper Series, No. 2017/26, Scuola Superiore Sant'Anna, Laboratory of Economics and Management (LEM), Pisa

This Version is available at:

<https://hdl.handle.net/10419/174576>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

INSTITUTE  
OF ECONOMICS



Scuola Superiore  
Sant'Anna

LEM | Laboratory of Economics and Management

Institute of Economics  
Scuola Superiore Sant'Anna

Piazza Martiri della Libertà, 33 - 56127 Pisa, Italy  
ph. +39 050 88.33.43  
institute.economics@sssup.it

# LEM

## WORKING PAPER SERIES

**Choosing sides in the trilemma: international  
financial cycles and structural change in  
developing economies**

Mario Cimoli <sup>°</sup>  
Jose Antonio Ocampo <sup>§</sup>  
Gabriel Porcile <sup>¶</sup>

<sup>°</sup> ECLAC, Santiago, Chile, and University of Venice, Italy

<sup>§</sup> Columbia University, New York, USA

<sup>¶</sup> ECLAC, Santiago, Chile, and Universidad Federal do Parana, Brasil

**2017/26**

**October 2017**

**ISSN(ONLINE) 2284-0400**

# Choosing sides in the trilemma: international financial cycles and structural change in developing economies

---

Mario Cimoli<sup>(a)</sup>, Jose Antonio Ocampo<sup>(b)</sup> and Gabriel Porcile<sup>(c)1</sup>

(a) ECLAC and University of Venice

(b) Columbia University

(c) ECLAC and UFPR

This version May 01 2017

## Abstract

This paper analyzes the impact of international financial cycles on structural change in developing economies. It is argued that the impact of these cycles depend on the specific combination of macroeconomic and industrial policies adopted by the developing economy. The cases of Brazil and Argentina are contrasted with those of Korea and China. In the Asian economies, macroeconomic policy has been a complementary tool along with industrial policy to foster the diversification of production and capabilities. Inversely, in the case of the Latin American countries, long periods of real exchange rate (RER) appreciation, combined with the weaknesses (or absence) of industrial policies, gave rise to loss of capabilities and lagging behind. Tests of structural break in times series of indexes of technological intensity of the production structure confirm the long run effects of financial shocks in the Latin American case. In the case of Korea there is evidence of hysteresis à la Baldwin-Krugman: a high RER was initially required to export and diversity the economy, but it was no longer necessary when the country had already built indigenous capabilities.

---

<sup>1</sup> The authors are grateful to Nunzia Saporito, Antonio Soares Neto and Martin Fernández for useful comments and competent research assistance. Nunzia Saporito programmed and performed the tests of structural break in time series. The program and data set (in R) are available on request. We are also grateful to Andre Nassif, Pablo Lavarello and the participants of the ISIGrowth session in the 50 Anniversary Conference of the Science Policy Research Unit, held on the 7-9 September at the University of Sussex, Brighton, UK. The ISI project received funding from the European Union Horizon 2020 Research and Innovation action under grant agreement No 649186.

## 1. Introduction

This paper analyzes the effects of international financial shocks on the production structure of developing economies. Two reasons justify the interest in looking at these effects. Firstly, development is to a large extent a process of structural transformation that moves workers from low-technology sectors to high-technology sectors. If financial shocks hamper this transformation they contribute to the persistence of informality in the labor market and low-productivity jobs in developing economies. Secondly, financial shocks tend to be seen by policy-makers as a short-term issue that can be handled with short-term macroeconomic policies. However, if these shocks affect the production structure, they will have long run implications for productivity and growth<sup>2</sup>. As a result, short-term policies will either heighten or compromise the efficacy of industrial policies<sup>3</sup> in fostering structural change. The interaction between both policies is, therefore, critical for policy makers to prevent short-term shocks from turning into long-run losses of capabilities.

The paper argues that financial shocks have significant structural results, whose direction and intensity depends on the specific policy response of the affected country. More specifically, the effects of financial shocks crucially depend on the country's combination of macroeconomic and industrial policies. They are not fate, as they can be shaped by policy decisions. To shed light on the role of these policies, different experiences in developing economies are contrasted: on the one hand, the experience of two Latin American economies, Argentina and Brazil, that combined the appreciation of the RER with weak (or lack of) industrial policies; on the other, the experience of Korea and China, in which a competitive RER was in place along with an industrial policy aimed at technological catching up and the upgrading of the industrial structure.

The paper consists of 5 sections besides this introduction and the concluding remarks. Section 2 briefly reviews the literature on the trilemma and highlights the differences in

---

<sup>2</sup> The idea that short-run shocks may have more than a transitory effect is not new in the literature. It has been confirmed in empirical studies of the behavior of the unemployment rate; for recent reviews of hysteresis in unemployment, see Blanchard et al (2015), Blanchard (2016) and Yellen (2016). See also Setterfield (2014).

<sup>3</sup> The term industrial policy is used in this paper in its conventional meaning, which is a policy that reshapes incentives to favor certain types of activities or sectors over others.

macroeconomic policy between the Latin American and Asian economies. Section 3 addresses the macro-micro dynamics of learning and structural change and the role of industrial policy in shaping this dynamics. Section 4 identifies international financial cycles since 1970 and analyzes their effects on the RER, trade and growth in the four countries. Section 5 focuses on the evolution of structural change using different indicators of the technological intensity of the production structure. Statistical tests are performed to identify the years of structural break of each of these indicators and the persistence of the shocks, and to relate them to the international financial cycle and policy variables.

## **2. The trilemma: macroeconomic policy and external disequilibrium**

### 2.1 The trilemma and macroeconomic regimes

A useful starting point to analyze the impact of financial cycles on the macroeconomic dynamics of a small developing economy is the well-known trilemma or “impossible trinity”, which states that it is not possible for policy-makers to have at the same time an open capital account, an autonomous monetary policy and the desired real exchange rate (RER). They can uphold two of them but not the three at the same time<sup>4</sup>. The policies that each country implements define on which side of the triangle it will be.

At least three alternative scenarios potentially emerge from the trilemma. In the first scenario, the monetary policy focuses on curbing inflation by raising the real interest rate at home when the inflation rate is above a desired or acceptable level (which may include an explicit inflation target). In an international system with substantial capital mobility, a rise in the interest rate attracts short-term foreign capital which arbitrates over the rates of return on financial assets denominated in different currencies. The ensuing appreciation<sup>5</sup> of the domestic currency helps reduce inflation, but compromises equilibrium in current account and may lead to an unsustainable deficit. In the second scenario, policy-makers mainly aim at keeping a stable,

---

<sup>4</sup> This is the classical macroeconomic trilemma, but there are others associated with open capital accounts; see Rodrik (2011, chapter 11).

<sup>5</sup> The real exchange rate is defined as  $q = P^*E/P$ , where  $P^*$  is the international price level,  $P$  the domestic price level and  $E$  the price of the foreign currency (usually US dollars) in units of the domestic currency. Therefore, the appreciation (depreciation) of the real exchange rate implies a fall (a rise) in the country's international competitiveness.

competitive RER, in which case the monetary policy is endogenous as the governments is obliged to sell or buy domestic currency in the foreign exchange market. Finally, policy-makers may regulate capital mobility, which gives them more room for maneuver to use the monetary policy as a stabilization tool without compromising competitiveness.

The first scenario can be typically found in most Latin American economies, while a combination of the second and third scenarios characterize several Asian economies. In broad terms, they correspond to what Dooley et al (2003) have called “capital account regions” (which keep open the capital account and let the currency fluctuate as in many Latin American countries) and “trade account” regions (which peg the currency and control capital flows, as in many Asian economies). They define how the economy responds to international financial cycles. Capital account countries have experienced higher external disequilibria and instability than the “trade account” countries. As will be discussed later, this had implications for diversification and the building of indigenous technological capabilities.

The scenarios described above are, of course, “pure types” in the Weberian sense, and assume that the economy is on one of the vertices of the triangle defined by the trilemma. In practice, authorities may adopt a policy mix trying to strike a balance between the different trade-offs involved—in a sense, placing themselves inside the triangle defined by the “trilemma”. This is, in fact, what has tended to happen, particularly since the 2008 global financial crisis, as countries have increasingly adopted managed exchange rate flexibility mixed with some form of capital account regulation (Ocampo, 2017, chapters 3 and 4; and on the evolution of exchange rate regimes, Ghosh et al, 2015).

## 2.2 Latin America: appreciation and stop and go dynamics

The RER has been used in Latin America mainly with anti-inflationary objectives—an anchor for expectations on future inflation rates. The dynamics is characterized by a situation of “balance-of-payments dominance”, as defined by Ocampo (2016): a macroeconomic regime in which external shocks, positive or negative, dominate the short-term macroeconomic dynamics. The canonical sequence of the associated cycle has been extensively discussed in the literature (see Frenkel and Rapetti, 2011; Bresser Pereira, 2008; Ocampo et al, 2009; Ocampo, 2016; Palma, 2012). It begins with a period of high international liquidity and low international interest rates which prompts a surge in foreign capital inflows, attracted by higher domestic interest rates.

Such inflows appreciate the domestic currency, raising real wages and the price of domestic assets. Poorly regulated domestic financial markets give rise to bubbles in the real estate sector, a short-lived boom in consumption and, in some cases, a short-lived surge in investment, with a parallel rise in the external debt. The boom may be heightened by a rise in commodity prices in the international market, which may be boosted by speculative forces at work in these markets.

As a result, expectations on the sustainability of the boom endogenously become—à la Minsky—less optimistic. Mounting external disequilibrium and the deceleration of growth (that may be aggravated by bad news from other developing areas) make foreign capital increasingly wary about lending to already highly indebted economies. The building of uncertainty ends up in a major depreciation and a fall in the rate of growth, or in some cases a recession, the severity of which will depend on the level of the external debt and the intensity of the reversal of foreign investors' expectations (the so-called “sudden stop” syndrome). Uncertainty and the volatility of macro-prices and GDP halt investment decisions.

The impact of the financial cycle varies with the reaction of domestic policies to disequilibrium. The position of each country within the limits defined by the trilemma is not destiny, but reflects policy options. Latin America is the developing region with the most open capital account in the developing world (Chinn and Ito, 2008; Ocampo, 2017, chapter 4). Economic policy in the region has emphasized the role of the RER in the control of inflation over its role in encouraging competitiveness and diversification. Several factors concur to explain why the RER has played such role.

First, appreciations are a powerful tool for taming inflation. By reducing the price of imported consumption goods, they raise real wages and constrain wage demands; by reducing the price of imported inputs and capital goods, they curb production costs. In addition, currency appreciations help discipline firms which face increasing foreign competition. At least in the tradable sector, mark-ups will experience a downward pressure (as firms try not to lose market shares at home and abroad). Second, appreciations may be expansionary, at least in the short run (Krugman and Taylor, 1978). This comes from a temporary boost in consumption (related to higher real wages and wealth effects on consumption) and investment (related to cheaper capital goods and the capital gains generated by appreciation in a situation in which private agents have net

liabilities in foreign currency). Falling inflation, economic expansion and rising real wages and wealth, are all ingredients that make “exchange rate populism” so appealing in the short run<sup>6</sup>.

The “balance-of-payments dominance” is reflected in the fact that changes in international liquidity or in the terms of trade drive the behavior of crucial macroeconomic variables (the real exchange rate, the inflation, real wages, consumption, aggregate demand)<sup>7</sup>. Note that if appreciations are expansionary, aggregate demand will increase rather than fall after the rise in the interest rate, which makes monetary policy ineffective as a stabilization tool. More than that, each convolution of the interest rate - capital inflows - exchange rate spiral worsens the current account and makes a crisis more likely. The persistence of appreciation and very high volatility of the exchange rate and other macro prices are the consequence of this dynamics.

### 2.3 Argentina: early liberalization and macroeconomic orthodoxy

There are several examples of this type of cycles driven by financial liquidity and debt in Argentina and Brazil. In the case of Argentina, the military regime that seized power in 1976 opened the capital account<sup>8</sup> and speeded up unilateral trade liberalization in the second half of the 1970s. Argentina became an extreme case of using the exchange rate as a nominal anchor in stabilization plans—an experiment whose theoretical underpinnings were provided by the so-called “Monetary Approach to the Balance-of-Payments”, the dominant vogue in the orthodox macroeconomics of the period. It took the form of pre-announced exchange rate depreciations (“la tablita”), which should make expectations on future inflation rates converge to the international inflation rate. La Tablita, however, led to large deficits in current account and eventually to the 1982 external debt crisis—aggravated by the political and economic consequences of the disastrous “Malvinas / Falklands War” fought by Argentina and the United Kingdom.

In the 1990s, Argentina espoused a fixed exchange rate regime (Cavallo’s 1991 “Convertibility Plan”), which took advantage of the return of foreign capital to Latin America after the long drought of the 1980s. Stabilization was a crucial objective as Argentina had

---

<sup>6</sup> For a discussion of why Latin American policy makers show a strong preference for an appreciated RER see. Frieden (2015), Chapter 5.

<sup>7</sup> As discussed in Palma (2012), causality goes from the capital account to the current account.

<sup>8</sup> The opening of the capital account was a policy adopted by the end of 1976 and subsequently confirmed in the financial reform of June 1977 (see Dornbusch and de Pablo, 1989, pp. 37-56).



experienced hyper-inflation episodes in 1989, which explains why this country adopted such a rigid regime—namely a currency board. This policy resembled to some extent that of the 1970s, not least because this macroeconomic regime was fashionable among orthodox economists in the 1990s<sup>9</sup> as it had been the monetary approach to the balance of payments in the 1970s. In parallel, as part of a broad agenda of neoliberal reforms, tariffs on imports and export duties were eliminated (Salvia, 2015). But again, after a short-lived surge in consumption and investment, growth faltered while current account deficits and external debt were on the rise (prompted by a marked fall in the RER). Financial instability in South East Asia and Russia, and the Brazilian devaluation of 1999, further weakened the Argentine Convertibility Plan, which collapsed in January 2002 engulfed by fiscal and currency crises. The nominal exchange rate, which during the Convertibility Plan (until January 2002) was one peso per dollar, reached four pesos per dollar in July 2002. The RER in July 1993 was 93% higher –expressed in terms of domestic currency needed to buy foreign currency, the typical convention in the developing world— than the average in the years of the Convertibility Plan (Frenkel and Rapetti, 2011, p. 39).

The 2001 collapse forced Argentina to apply strict capital controls<sup>10</sup> in December 2001 that forbade transferring funds abroad. Although most controls were lifted in June 2003, barriers to capital inflows were re-imposed in 2005 (Levi-Yeyati et al, 2010). Starting in 2004, the recovery of Argentina was stimulated by a stable and competitive RER and the positive external shock represented by the commodity boom. In addition, a more protectionist stance was taken in favor of the industrial sector. However, inflation went on the rise since 2005 and so did capital flights. Growth began to abate once again, even before the 2008 global financial crisis, as uncertainty rose and the RER appreciated out of a combination of improving terms of trade, expansionary fiscal policies and the escalation of inflation. The fact that the Argentine government masked the actual inflation figures was another factor that heightened uncertainty.

## 2.4 Brazil

---

<sup>9</sup> In the words of The Economist, “(E)very peso in circulation had to be backed by a dollar in reserves. This type of “currency board” arrangement is super-fashionable among economists. So much so that Argentina's descent into economic crisis (...) is also a crisis for the prevailing orthodoxy about emerging-market exchange-rate policy.”, 22 March 2001, “Argentina in a fix”.

<sup>10</sup> We would use this term here, due to its broader use in international debates, despite the argument by one of us (Ocampo, 2017, chapter 4) that the broader term “capital account regulations” is more appropriate.

Brazil, on the other hand, did not formally open its capital account in the 1970s, but nevertheless sought to take advantage of the high international financial liquidity by allowing private firms to finance their investments in the international capital markets. At the same time, public companies were strongly encouraged to borrow in the Euromarkets. This was part of the effort to sustain high rates of growth in Brazil in the face of the adverse effects of the oil price shocks in an economy that was highly dependent on imported oil, and therefore started to run large current account deficits (Cardoso and Fishlow, 1989). The Brazilian industrial policy aggressively sought to diversify exports and markets, and in this it had some success (Bertola and Ocampo, 2012, chapter 4). The large current account deficits were further enhanced by the second (1979) oil shock and the strong slowdown of the global economy, led to the major currency and debt crises that (like in most Latin American countries) erupted in 1982. The allure of abundant international liquidity was as fatal for Brazil as it was for Argentina, although the routes that led to the crisis were different.

Like Argentina, Brazil went through a difficult period of extremely high inflation rates in the second half of the 1980s, fed by the fiscal burden represented by the external debt—which had been at the beginning mostly private, but absorbed by the public sector after the crisis. Brazil became a massive exporter of capital. This would only be overcome in the 1990s with the adoption of a new stabilization program, the Real Plan (in place between July 1994 and January 1999), which heavily relied on the exchange rate to anchor expectations on future inflation (Prates et al, 2009)<sup>11</sup>. The Real Plan was highly successful in de-indexing the economy and curbing inflation. At the same time, the trade and capital accounts were liberalized.

Brazil's Real Plan was less rigid than Argentina's Convertibility Plan, and was abandoned earlier than the latter. In addition, Brazil imposed a tax on foreign exchange transactions as a response to the surge of capital inflows in 1993-1996 (Goldfain and Minella, 2005; Carvalho and Garcia, 2008). These factors made the Brazilian crisis of January 1999 (that marked the end of the Real Plan) milder and shorter than the Argentine crisis of 2002. However, they failed to curb the appreciation of the Real, given the "attractiveness" of the Brazilian market stemming from

---

<sup>11</sup>In the words of Antonio Delfim Netto, "The great success of the Real Plan was produced in the midst of a disastrous policy of pegging the currency to the U.S. dollar", see the interview by Solange Monteiro in "Tell the truth to society", The Brazilian Economy, FGV, Rio de Janeiro, [https://www2.gwu.edu/~ibi/FGV%20Report%20Files/2014\\_February.pdf](https://www2.gwu.edu/~ibi/FGV%20Report%20Files/2014_February.pdf).

the very high interest rate differential that existed between the foreign and domestic financial markets. After the 1997-1999 turbulences, capital controls were lifted<sup>12</sup>.

The Brazilian economy experienced a strong recovery since 2004, boosted by the commodity bonanza. The shock of the Great Recession of 2008 was relatively mild, as an active anti-cyclical policy combined with the Chinese recovery allowed Brazil to move out of recession in 2010. Since October 2009, Brazil deployed a vast array of capital controls to prevent the Real from continuing appreciating. A tax on the notional amount of derivatives was applied, which complemented other measures to close loopholes that had allowed investors to bypass controls. However, differences in interest rates between foreign and domestic markets remained very high in the 2000 (Kaltenbrunner and Paineira, 2015)<sup>13</sup>. Capital controls began to be dismantled since 2012, as the Real showed increasing weakness and the monetary policy became less restrictive.

## 2.5 China: shifting objectives for capital controls

A different approach to macroeconomic policy prevailed in the two Asian economies with which the Latin American economies are compared. There was no full-fledged capital account liberalization as it was observed in Latin America (except perhaps for a short period in Korea in the second half of the 1990s; see below).

By keeping closed its capital account and highly regulated its financial markets, China sustained the RER at a stable, competitive level in spite of low international interest rates in the global economy in the 1990s and early 2000. The expression “currency war” highlights, precisely, the Chinese efforts for sustaining competitiveness. Capital controls allowed China to remain relatively untouched by global financial instability, even in the heydays of the Asian crisis in 1997-1998 (in which the Korean won sharply depreciated)<sup>14</sup>.

---

<sup>12</sup> See Baltar (2015). Brazil fell into what has been labeled a “low RER x high interest rates trap” (Oreiro et al, 2012).

<sup>13</sup> It was observed that the composition of financial investments was heavily concentrated in short-term maturity assets. Kaltenbrunner and Paineira, p. 1287, show that in “June 2008, just before the failure of Lehman Brothers, Brazil’s total stock of outstanding short-term external liabilities rose to US\$679 billion, or 46.1% of GDP. This compares to a stock of only 28% of GDP before the Brazilian crisis of 1999. This stock stood at US\$883 billion or 39.7% of GDP in March 2011”.

<sup>14</sup>As Cechetti and Schoenholtz (2014) point out: “Residents of China faced limits on transfers abroad, while nonresidents required government permission to invest onshore. Despite some modest relaxation of the capital account over time, the situation in China was largely the same during the global financial crisis that began in 2007. Again, the economy was shielded from the brunt of the trauma abroad”, “China's Capital Controls and the Exchange Rate Regime”, 24 August 2014, <http://www.moneyandbanking.com/the-authors>.

China pegged the Renminbi to the dollar in 1994 (the peg was abandoned in 2005), which helped the country remain competitive while it was building new industrial capabilities, supported by a rapid growth in productivity. Frieden (2015, pp. 258-59) observes that:

“(T)here is little question that the Chinese government has purposely kept the renminbi artificially weak at least since the early 1990s, and that this has played a major role in *stimulating China’s manufactured exports to the rest of the world. (...) Many producers in North America and Europe see the weak renminbi as one of the more important sources of distress in developed-country industries.*”

This strategy was not free of inconveniencies. Sterilization policies and the large accumulation of foreign reserves gave rise to an excess of liquidity in the economy, overheating and excess capacity in many sectors. There was also a mounting international pressure on the Chinese government to appreciate the Renminbi and stimulate domestic consumption in order to “rebalance” its growth pattern (Capiello and Ferruci, 2008). Indeed, the Chinese currency appreciated significantly in real terms in the 2005-2015. Moreover, the goals of capital controls changed in China since 2015, from sustaining competitiveness to avoiding the depreciation of the Renminbi. As stressed by Dollar (2017)<sup>15</sup>, the problems that China faces now are different from the problems it faced in the 1990s. In recent years, capital controls have been used to curb capital outflows that would depreciate the Chinese currency. While its current account remains favorable and there is no competitiveness challenge to the Chinese economy, the capital account did become negative in 2015. This means that a liberalization of the capital account could prompt capital outflows that further compromise the financial stability of the Chinese economy, already threatened by the rapid growth of domestic credit and shadow banking.

The openness of the Chinese capital account increased in the 2000s, in spite of a short setback in 2008. It is possible that in the next years such a move will continue. Some small-scale experiments with open capital accounts have been taking place since 2013 in the Free Trade Zones of Shanghai, Guangdong, Tianjin, and Fujian. But as noted by Chen and Quiian (2016), this is taking place at a controlled, step by step approach. In addition, the trend to reduce controls affects mostly capital outflows, while capital inflows show cycles of tightening and loosening.

---

<sup>15</sup> Dollar, D (2017), “China is struggling to keep its currency high, not low”, Brooking Institutions, 26 January 2017. <https://www.brookings.edu/blog/order-from-chaos/2017/01/26/china-is-struggling-to-keep-its-currency-high-not-low/>.

## 2.6 Korea: expanding the room for maneuver of the macroeconomic policy

While the differences in industrial policy between Korea and Latin America received ample attention in the literature (see below), those in financial and monetary policies have been less studied. Korea combined in different degrees import substitution and export promotion throughout its development process, but emphasized export promotion since the early 1960s. In this transition, the won went through major depreciations in February and October 1960 and in May 1964 (when the price of the dollar jumped from 130 to 255 won per dollar). The system of multiple exchange rates was replaced by a single fluctuating exchange rate, which remained high and fairly stable thereafter (Koh, 2012, p. 34).

Financial market and credit allocation remained tightly controlled in the 1960s and 1970s. Korea relied on several specialized public banks to direct from 40 to 60% of domestic loans to selected industries, particularly in the capital and intermediate goods sectors. Last but not least, the Korean government owned all major banks and controlled interest rates (Yoon and Kim, 1995)<sup>16</sup>. Such a policy combined with export-promotion (the “acid test” of learning) gave space for Korea to redefine its comparative advantages.

For a long period, Korea also had in place capital controls as part and parcel of its satellite-development strategy. This country delinked domestic and international capital markets during the fast growth phase (Noland, 2017). As set forth by Choi (2013, pp.108-109), former Ministry of Trade, Industry and Energy in Korea, strict regulations of foreign exchange flows were crucial in the early stages of development, and probably necessary even in the mature stages. In the light of the impact of the 1997 crisis, he observed that “(A) *financial crisis is much more painful than inflation. The 1997 financial crisis made the streets overflow with unemployed people, and good companies and properties were turned over to foreign speculative capital. Thus, controlling the cross-border flow of capital is more important than containing inflationary pressures*” (Choi, 2013, p. 201).

As part of the process of joining the OECD in 1996, Korea eased regulations that constrained the ability of banks and financial institutions to operate with foreign exchange and in

---

<sup>16</sup> Noland (2013, p. 486) points out that “(M)odest financial-sector liberalizations that had been undertaken in the late 1960s were reversed in 1972, when interest rates were lowered and direct government control of the banking system was increased in order to channel capital to preferred sectors, projects, or firms”.

foreign markets<sup>17</sup>. This was not matched by the setting up of a domestic macroprudential framework to restrain short-term debts and the appreciation of the RER<sup>18</sup>. The rapid increase in the current account deficit, along the short-term maturity of debts contracted in the external market, led to the 1997 crisis. The intensity of the economic crisis was aggravated by a contractionary fiscal and monetary policy adopted in December 1997 and implemented in the first half of 1998—which was part of the agreement signed with the IMF that provided a US\$57 billion rescue package. The trend since the 1990s has been clearly towards opening the capital account, although Korea has in some cases resorted to safeguards to protect the country against financial instability and crisis similar to those of 1997 and 2008<sup>19</sup>. In addition, the country sought to build up its stock of foreign reserves with a view to reducing its vulnerability to capital flights<sup>20</sup>.

To a large extent, macroeconomic management became something very different in the 1990s from what it had been during the period of state-led development tout court. What does explain the policy change in the 1990s? First, the crisis and the idea that the authoritarian regime and the developmental state were Siamese twins weakened the legitimacy of the latter (Chang and Evans, 2005, pp. 99-129). Secondly, by then the technological catching up required for overcoming the underdevelopment condition had been attained in Korea. Last but not least, industrial and technological policies remained highly “developmentalist” and protected learning, as will be discussed later.

Taking stock: despite its differences, both Argentina and Brazil showed a similar path, based on a strong dependence of foreign borrowing, RER appreciation and current account deficits. They were highly vulnerable to cycles of international liquidity. Both liberalized the capital account (Argentina made a first attempt in the seventies, and both countries did so in the 1990s), but capital controls had to be applied as a defensive measure when the crises emerged. Inversely, in Korea and China the macroeconomic policy was subordinated to competitiveness

---

<sup>17</sup> A detailed analysis of the process of liberalization of the capital account can be found in Noland, M. (2017).

<sup>18</sup> A Financial Supervisory Commission responsible for setting regulations and standards in the financial market was established in 1998.

<sup>19</sup> For instance, Korea has placed some restrictions on derivative markets: “(O)n June 13<sup>th</sup> (the Korean government) set limits to the build-up of foreign-exchange derivatives that it believes makes the won one of the most volatile currencies in the rich world. Local banks will be allowed to have foreign-exchange derivatives no higher than half their capital base. Foreign branches, which have greater access to hard currency, have a higher ceiling of 2.5 times their capital.” The Economist, “Capital controls in Korea”, June 17 2010.

<sup>20</sup> In this the country was extremely successful. Already in the early 2000s there was a debate in Korea about the costs of keeping which was already a massive amount of foreign reserves (see Azeinman and Marian, 2004).

and growth. The capital account remained closed in China and it was opened in Korea only after this country had by large overcome the competitiveness challenge.

### **3. Beyond macroeconomics: short vs. long run and the micro-macro dynamics**

#### 3.1 International financial shocks and the building of technological capabilities

International financial shocks entail very different implications for technological learning and growth in the different macroeconomic scenarios describe above. A key question is how they affect decisions on investment, particularly with respect to diversification towards sectors and activities which are more technology-intensive—considering that this diversification and the building of indigenous capabilities (that reduce the North-South technology gap) are the main drivers of long run growth<sup>21</sup>.

There are several channels through which the financial cycle can affect investment, technical change and specialization. Investment suffers disproportionately from the higher levels of uncertainty associated with external crisis that leads to nominal and real volatility. Economic contraction gives rise to periods of underutilization of the stock of capital, compromising the profitability of investment<sup>22</sup>. Moreover, public debt increases, in part because the public sector frequently absorbs the debt of the private sector, but mostly because the post-crisis recession cripples public finances (Turner, 2011, pp. 82-83). The ensuing loss of fiscal space hampers the ability of public investment to lead and encourage private investment (as discussed in Mazzucatto, 2013; Fagerberg et al, 2010). As firms delay investments in new capital goods or in adopting a new technology, they fall behind in the technological race (the “Red Queen effect”).

Not only does the investment rate fall as a result of the external crisis, but its composition varies through the financial cycle. By changing the relative profitability of the various sectors of the economy, financial cycles shape the structure of incentives. Periods of currency appreciation reallocate resources towards non-tradable goods and services. Macro prices have microeconomic

---

<sup>21</sup> Several models have formalized the interactions between technical change, structural change and growth. See for instance Verspagen (1993), Fagerberg et al (2001), Fagerberg and Verspagen (2002) and Cimoli and Porcile (2014). Empirical evidence is provided by Castelacci (2002), Anderson and Ejemo (2006), Ocampo et al (2009) Abdon et al (2010), Gouvea and Lima (2010), ECLAC (2012), Lee (2013), Dosi et al (2015) and Storm and Naastepad (2015).

<sup>22</sup> This is a classical theme of the Kaleckian investment functions, but it is also captured by the accelerator in conventional functions.

outcomes: the share of imported inputs increases, local producers are replaced by foreign producers, and investments are directed at reducing costs rather than at expanding production or diversifying the product mix. This is the micro-macro story set forth by Katz (1997), Katz and Stumpo (2001) and Cimoli and Katz (2003).

Some activities will be lost as competitiveness and market shares of exporting firms shrink (McMillan and Rodrik, 2011). Exporting opens a learning trajectory associated with economies of scale in the international market and the flow of information from foreign consumers and producers, who usually face fiercer competition and demand higher quality and production standards. As a result, the loss of industrial diversification, particularly in exporting activities, depresses learning and slows down technical change. The outcomes go beyond the short run. Path dependence and hysteresis phenomena may arise due to the loss of capabilities and lower knowledge externalities across technological-intensive sectors<sup>23</sup>.

Baldwin (1985) and Baldwin and Krugman (1988) have suggested a different source of hysteresis in specialization. These authors argue that there are fixed costs to enter into the international market. A depreciated RER may be seen as an enabling initial condition: the firm pays these fixed costs to begin to export in the first place. Once the firm has a foot in the foreign market and is already an established exporter, a depreciated RER is no longer necessary to sustain the export drive. Even if the RER appreciates, this would not have a significant impact on the firms' ability to survive<sup>24</sup>. Fixed costs may be interpreted as the time and experience required to building indigenous capabilities to compete.

The impact of financial shocks on learning and structural change does not depend solely on macroeconomic policy and the RER. Industrial policies are also central to mitigate (or enhance) the negative effects of appreciation and macroeconomic volatility on industrial diversification. The influence of financial cycles on growth and structural change is crucially mediated by the industrial policy, as discussed below.

---

<sup>23</sup> Arrow (2004, p. 24) argues that irreversibility is the crucial determinant of path dependence. One cannot revise decisions and change a growth or technological trajectory when investments are irreversible. This is precisely the case of investments in knowledge. Tacit, experience-based learning implies that firms and countries build capabilities that are sector-specific. They cannot use these capabilities in production and innovation in sectors totally unrelated (from a technological point of view) to the one in which they operate.

<sup>24</sup> Setser (2016) notes that China, Japan, Korea, Taiwan and Singapore rapidly recovered the levels of savings they had before the 2008 crisis. This author suggests that changes in the RER no longer suffice to reduce the superavit in current account in these countries, but a larger role should be paid buy a larger budget deficit and less corporate savings.



### 3.2 Industrial policy in Argentina and Brazil: navigating against the RER (and the political economy)

Differences in industrial policies between Latin America and Asia are well documented in the literature<sup>25</sup>. In a nutshell, the Asian countries followed a persistent, long-term strategy of moving towards increasingly more capital-intensive and technology-intensive sectors, of which China is the latest—and out of its scale, more impressive—example. Building capabilities in new sectors was a moving target. Strategic sectors changed as the economy diversified and (dynamic) comparative advantages upgraded. Conversely, in Latin America prevailed what Fajnzylber (1983) called a “truncated pattern of industrialization”, in which diversification was all but halted in the 1980s along with the slowdown in productivity growth. The Latin American failure to advance its own process of structural change gave rise to a process of “premature deindustrialization” (Palma, 2010) and persistent dependence on exports of commodities and natural resources. This in turn was related to erratic and ineffective industrial policies, increasingly so since the mid-seventies in Argentina and since the early eighties in Brazil.

During the seventies, the Brazilian industrial policy (and productivity path) had more in common with Asia than with Argentina. The latter country dismantled its policy in the second half of the seventies, while Brazil sought to advance industrialization in spite of unfavorable conditions in the international economy<sup>26</sup>. The military government that took office in Argentina in 1976 regarded state-led industrialization as the greatest burden inherited from previous administrations. Appreciation in the second half of the seventies was especially harmful for the Argentine industry because it took place hand in hand with the dismantling of protection.

Brazil, on the other hand, launched its Second National Plan of Development (II PND) in 1974, which represented the country’s last major (Asian-type) effort at developing indigenous capital goods and intermediate goods industries. Brazil remained a country relatively closed to international trade in the 1970s. There was a vast array of quantitative import restrictions which

---

<sup>25</sup> See for instance Bell (2006) and Chang (2000).

<sup>26</sup> Nevertheless, the Brazilian policy, if compared to that in Korea, was far less effectual. In particular, it lacked the capacity to set targets, assess progress and penalize those firms that fell short of attaining the targets (in terms of productivity growth and competitiveness; cf. Moreira, 1995).

limited the impact of RER appreciation on imports. This isolated the Brazilian industry and prevented domestic production from losing market shares to cheaper imports. The Brazilian catching up, however, ended with the 1982 external debt crisis. Thereafter and until the early 1990s all policy efforts were directed at renegotiating the debt and fighting inflation.

The economic and political crises of the 1980s made the Latin American governments particularly vulnerable to external pressure and more inclined to implement a drastic overhaul of their trade and industrial policies. The redefinition of these policies took place in the 1990s, when the idea that the “best industrial policy is none at all” prevailed. With respect to industrial policy, it happened something similar to what happened with the macroeconomic policy in the 1990s: the pace and intensity of changes were much more radical in Argentina than in Brazil. The latter kept some policy tools that partially compensated the overvaluation-cum-liberalization duo, such as “sector funds” to defend investments in R&D; a tariff of 14% on imports of capital goods; and financial assistance provided by the National Development Bank (BNDES) to selected sectors. Argentina, in turn, maintained some of the special promotional regimes (like the special free-import zone in Tierra del Fuego) which did very little to mitigate the impact of international competition on manufacturing, and even less to foster technological learning<sup>27</sup>.

By the end of the nineties, it was already visible a fatigue with the “neoliberal reforms”. Industrial policy entered again in the agenda of the Latin American countries (Peres, 2010). In Brazil in 2003 it was approved the Industrial, Technological and Trade Policy (PITCE by its Portuguese acronym), which favored high-tech sectors and innovation. It also set forth a new institutional framework with a key role for the Agency of Industrial Development (Portuguese acronym ABDI). PITCE was subsequently replaced by the Policy of Productive Development (PDP, 2008), in which the BNDES played a major role in encouraging the internationalization of large Brazilian firms (none of them in high-tech sectors, however). This was eventually substituted by the “Plano Brasil Maior” (2011, under President Dilma Rouseff), which showed a more protectionist stance as RER appreciation severely harmed growth and employment (see ECLAC, 2012; Nassif et al 2012, 2013). Although significant resources were devoted to these programs, and Brazil attained levels of investment in R&D as a percentage of the GDP (almost

---

<sup>27</sup> A remarkable exception was the automobile industry, which remained a protected sector in the two countries subject to managed trade within the MERCOSUR trade agreement. For a discussion of changes in industrial policy and their structural impact in Brazil, see Aldrighi and Colistete (2011) and Nassif et al (2013). For an interesting comparison between Argentina and Brazil see Bekerman and Dalmaso (2014),

1%) higher than the rest of the Latin American countries (but much lower than Korea, which invested in R&D about 4% of the GDP), industrial policy was fragmented and ineffective, driven by cronyism and political short-term pressures, targeting in many cases sectors which had little to do with technological learning and diversification.

In Argentina, the end of the (second) orthodox wave took the form of the 2002 collapse when GDP fell about 11%. Between 1998 and 2002, the accumulated fall in GDP was about 20% (IMF, 2003, p. 63). In 2002 and 2003 Argentina adopted a system of differential taxes on exports that amounted to a multiple exchange rate system that penalized agricultural exports and favored manufacturing (by reducing the cost of the workers' basket)<sup>28</sup>. However, RER appreciation eroded the pro-industry effect of differential taxes. This made the government turn to protectionism (as happened in Brazil). In particular, after the 2008 crisis a set of protectionist measures were adopted, including quotas, non-automatic import licensing (since 2009), managed trade and export requirements.

Some attempts at a technological policy were made in Argentina, albeit in a much modest scale than in Brazil. Sectorial technology funds and sectorial innovation funds (Spanish acronym FTS and FITS) were created to encourage technological learning in biotechnology, nanotechnology and agro-industries. There were as well public research programs in satellite and nuclear energy, and a rise in technology investments by large public firms, including the (re) nationalized REPSOL in the oil sector (Stumpo and Rivas, 2013; Lavarello and Sanabria, 2016, p. 73)<sup>29</sup>. Most of the resources for industrial policy, however, remained concentrated in special regimes like in electronics in Tierra del Fuego and the automobile sector, in which learning was not the priority.

Taking stock: in Argentina and Brazil the macroeconomic context—that heavily penalized the production of tradables— and the incapacity of the government to effectively set and monitor productivity and export targets (in exchange for the financial support / protection provided to firms in the public and private sectors), implied that these policies had very little impact on productivity, structural change and growth (Suzigan and Furtado, 2006; Lavarello and Sanabria, 2016; Nassif et al, 2012, 2013). The lack of real political clout was compounded by

---

<sup>28</sup> In Argentina, many of the agricultural goods that make the bulk of the export basket are also key components of the workers' consumption basket.

<sup>29</sup> Imports have to be authorized by the government, which had 60 days maximum to give or not the authorization. This raised the costs of imports, as capital had to be immobilized for 60 days. See Lavarello and Sanabria (2016 ),.

rapidly deteriorating fiscal and external conditions which became a severe constraint on the continuity on industrial policies in the two Latin American countries.

### 3.3 Asia: industrial policy as a moving target

There is a striking contrast between the experiences of Argentina and Brazil and that of China and Korea, where industrial policy showed a higher degree of political leverage and continuity.

China reformed its economy in the late 1970s and speeded up industrialization, initially based on the production of consumer goods for its large domestic market and exports by foreign firms in the coastal zone. It relied at this stage on static comparative advantages, in particular on an almost infinite supply of cheap labor. The evolution of the Chinese economy combined rapid structural change with a persistent—albeit gradualist—set of policies aimed at catching up in technology and production. Since the late 1990s and early 2000s, the industrialization strategy shifted to a new phase, encouraging more technologically intensive sectors, with a larger role for state-owned enterprises (SOEs) in the “commanding heights” of industry and joint-ventures with foreign capital (Ahrens, 2013; Brandt, 2014; Lo and Wu, 2014)<sup>30</sup>. Both the central state and provincial governments deployed a vast array of instruments to encourage industrial development, from infrastructure to subsidies and loans (Nahm, 2014<sup>31</sup>). China sought to develop new sources of energy, ICT industries, bio-industries and equipment of high complexity (high end), as well as automobiles based on clean energy, while making inroads in sophisticated military technologies. The policy commitment with industrial upgrading did not recede with the global financial crisis of 2008 (Heilmann and Shih, 2013; Gourdon, Monjon and Poncet, 2015).

In the late seventies, China also opened its economy to foreign direct investment through the creation of the Special Exporting Zones. Joint ventures of foreign and domestic firms

---

<sup>30</sup> The productivity gap between SOEs and foreign firms in the same sector has fallen steadily since the 1990s. While in 1998 the average productivity of the SOEs was half of that of foreign firms, it was only 10% lower in 2008. The SOEs have played a crucial role in power generation, transportation equipment, iron and steel, petroleum, and coal mining, and is also prominent “in newly emerging sectors” (Brandt, 2014, p.6).

<sup>31</sup> In particular, Breznitz et al (2011, p. 20) stress the role of experimentation and trial and error in policy-making, led by subnational entities and shaped by the interplay between the center and the provinces, as well as between conservatives and reformers in the Chinese Communist Party. Naughton (2007, p. 100-102) points out that the balance between center and provinces in policy-making moved towards recentralization, and the restructuring of SOEs, in the second phase of the market reforms led by Zhu Rongji.

(including SOEs) were the main mechanism adopted by FDI until the 1990s (more than half of the FDI between 1987 and 1996), but through time joint ventures lost ground in favor of wholly owned subsidiaries of foreign firms (Noughton, 2011, p. 413). China had a very selective policy towards foreign investment. FDI in China is classified as “encouraged”, “permitted”, “restricted” or “prohibited”. China used these classifications and restrictions with a view to encouraging joint-ventures and the transfer of foreign technology to Chinese firms (Davis, 2013). Access to a protected domestic market was crucial in some cases, as in the automobile industry, where it was followed a “market protection in exchange for technology transfers” strategy (Lo and Wu, p. 316). Restrictions on FDI have been gradually eased as the location factors that attracted FDI to China changed. Low wages lost influence on FDI decisions, while outward FDI from China became increasingly important<sup>32</sup>.

The role of industrial policy in targeting more sophisticated industries through time was also the hallmark of the Korean development process in the post-war period<sup>33</sup>. Indeed, China may be seen as the last example of the development pattern that characterized several economies in East Asia (the “flying geese”<sup>34</sup>), which combined widespread government intervention with a strong presence in international markets.

A watershed in the evolution of industrial policy in Korea occurred with the military coup of May 1961. The military focused on establishing an industrial basis that would allow South Korea to counterbalance the military power of North Korea and reduce its dependence on foreign finance and aid. With this objective The Economic Planning Board was created in July 1961, in charge of designing and implementing 5-year development plans. The firms’ export performance was a key selection criterion used by the Korean government to allocate resources based on the leverage provided by its control over the financial sector (Lim, 2004, p. 144)<sup>35</sup>. President Park himself chaired weekly meetings to monitor the advances in export targets, which clearly reflects

---

<sup>32</sup> See Li Leqiang Report on the work of the Government, Delivered at the Third Session of the National People Congress on March 5, 2015 by, Premier of the State Council. In addition, Chinese firms bought foreign firms going through difficulties after the 2008 crisis; see Poo (2014, p. 19).

<sup>33</sup> The classical work is Amsden (1989). See also Rodrik (1994), Kim (1997, 2011), and Lee (2013).

<sup>34</sup> See Palma (2010). An interesting early discussion is Wade (1994), who reviews the attempts may by several analysts and international organizations to downplay the role of industrial policy in Korean development

<sup>35</sup> Lim (2014, p. 150-51) observes that there was some hesitation with respect to whether stress export promotion or import substitution in the early 1960s. US opposition to the first alternative, and the need to reduce the dependence on foreign loans and US aid, led the Korean government to increasingly favor the second alternative. In practice, the emerging pattern is one in which import substitution offered in many sectors an initial training ground to exporting

the political weight this policy had within the state apparatus. In parallel, Korea invested heavily in education, which supplied highly qualified labor to an increasingly complex industrial sector.

Comprehensive policy support structured in successive 5-year plans helped transform the production structure from consumer goods to heavy industries in the seventies and, since the nineties, towards electronics, ITC, optics and aerospace. In the 2000s the quest for new engines of growth led to stress “green industries”, high-tech convergence and high value-added services. As observed by Koo (2013): “(...) next-generation growth engine industries received policy attention in 2003 with the development of high technologies, that is, the so-called 6T: information, bio-, nano-, space, environment, and cultural technologies.”

The broad transformation of the industrial structure was accompanied by a rise in R&D expenditure in Korea, first led by the public sector and subsequently, from the 2000s, with a larger role for the private sector (whose share in total R&D increased from 30 % in the late 1970s to 75 % in 2011; see Koo, 2013). The liberalization of imports was gradual and followed the path set by industrial upgrading, in such a way that by the mid-nineties Korea had attained a level of import liberalization similar to that of the OECD countries (Koh, 2010, p. 740), while keeping a positive balance in current account (see section 3.2). Indeed, as pointed out by Nassif et al (2016), the gradual, step by step approach to industrial policy in Asia (and its consistency with the macroeconomic policy) is in sharp contrast with the “shock therapy” observed in Latin America.

The next two sections look empirically at how the key endogenous variables in the process of development—structural change and productivity—co-evolved as a result of the interaction between external shocks and the macroeconomic and industrial policies.

## **4. International financial cycles and the RER: the risks of an open capital account**

### 4.1 Financial cycles in the international economy

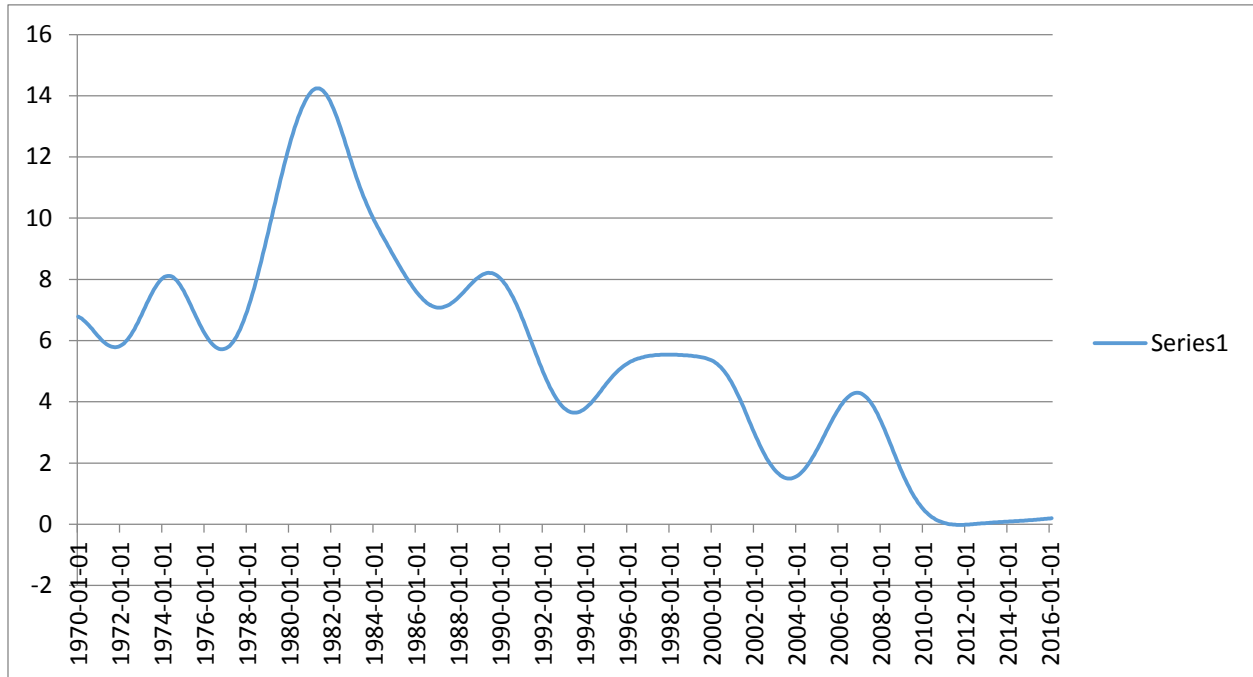
In the same way as the trilemma is a convenient starting point for the analysis of the macroeconomics of open economies, the starting point for the analysis of a financial cycle must be a surge in liquidity: the question to be responded is “*when, how and why*’ there was this increase in liquidity—and how its ‘clearing process’ led to increased ‘leverages’, asset price

bubbles, and the opening-up of new and *more risky 'liquidity-outlets'*” (Palma, 2012, p.5). This liquidity shocks may overlap with shocks in commodity prices; indeed, they reinforce each other.

This section identifies international financial cycles between 1970 and 2015, based on the evolution of the US Federal interest rate used as a proxy for liquidity in the system. The impacts of these cycles on the RER and trade balance in the Latin American and Asian economies are compared in this paper. Graph 1 shows the effective interest rates of Federal Funds in the USA between January 1970 and February 2016. This variable displayed large swings in the late 1970s and early 1980s, followed by a downward trend with milder fluctuations after 1990, which reflects underlying changes in policies, institutions and liquidity in the international financial system.

Five cycles can be identified, understood as phases of low-high-low interest rates. Note that the use of the term “cycle” in this context does not imply any assumption of regularity in the intensity or duration of the fluctuations. The first one occurred in the 1970-77 period and it was relatively mild. There was a peak in the interest rate in 1974-1975, in the wake of the first oil crisis, after which interest rates dropped until 1977. The second cycle that occurred between 1978 and 1986 was much more intense. There was a dramatic rise in the interest rate in 1979-80, after the second oil shock and the nomination of Paul Volcker as chairman of the Federal Reserve. Subsequently, Federal interest rates showed a consistently negative trend. There was a third, short-lived third cycle between 1987 and 1991, marked by a mild rise in the interest rates in 1989-90. The fourth cycle covers the 1992 – 2003 period, with a peak in 1994-2001. The rise in the interest rates was associated with a rapid sequence of crises in various countries, such as Mexico in 1994, Asia in 1997, Russian in 1998, Brazil in 1999 and Argentina in 2002. The last cycle took place between 2004 and 2016, with a peak in the US federal interest rate in 2008 in the wake of the Global Financial Crisis that affected mostly the European and US economies. Interest rates fell thereafter as a result of the US “quantitative easing”, followed by a similar expansionary monetary policy in Europe, which has kept them very close to zero.

**Graph 1. Federal Effective Interest Rates in the US, 1970-2016**



Source

The negative financial account balance of the 1980s in Latin America (a period in which the region had to pay the debt contracted in the 1970s) would only become positive in the 1990s. Such a positive balance began to falter in 1998 (as a result of the rise in the international interest rates after 1994) and remained at very low levels until 2004, when it moved upwards, stimulated by the commodity bonanza. There was a fall in the positive balance in 2008, but it experienced a strong recovery in 2010. The intensity of the recovery probably reflects both US quantitative easing and the phenomena of decoupling of the financial and real spheres, which multiplied financial assets and derivatives in a scale that has no correspondence with the increase in world GDP (ECLAC, 2014).

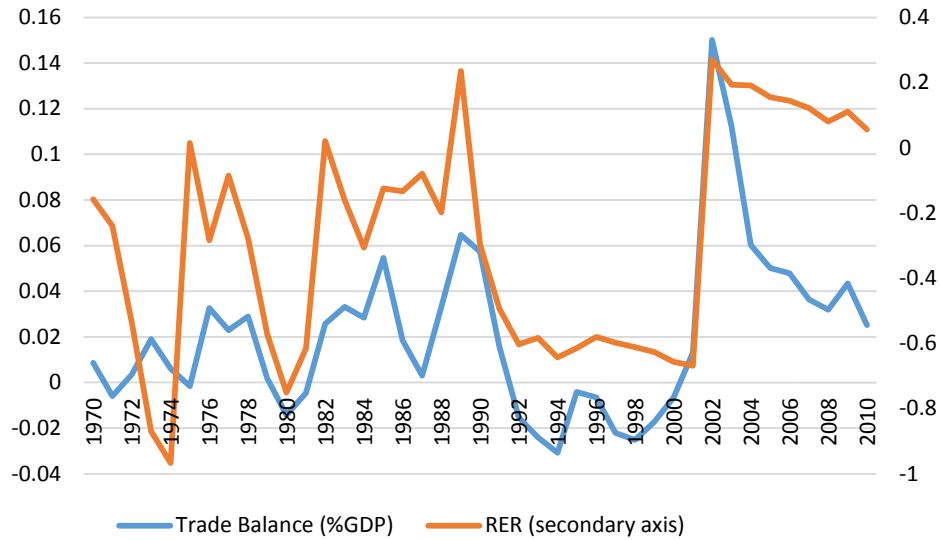
#### 4.2 Trends in the real exchange rate (RER) and the trade balance

The impact of the financial cycles on the macroeconomic performance of Argentina, Brazil, Korea and China will be analyzed looking at the evolution of the RER and the trade



balance. Periods of appreciation and depreciation with respect to the equilibrium RER are identified using the Balassa correction (as in Rodrik, 2008). There are some elements in common in the path followed by the Latin American countries. First, the RER appreciated in the phases of low interest rates in the USA and high financial liquidity leading to strong capital inflows in Latin America—as predicted by the trilemma in the case of an economy with open capital account in which the exchange rate is used as a nominal anchor to curb inflation (see graph 3A-3B). Second, periods of appreciation (such as those in the 1970s and 1990s) were followed by external crises, major depreciations and sharp contractions in economic activity (1981-82 in Argentina and Brazil, 1998-99 in Brazil and 2001-2002 in Argentina), fostering real instability.

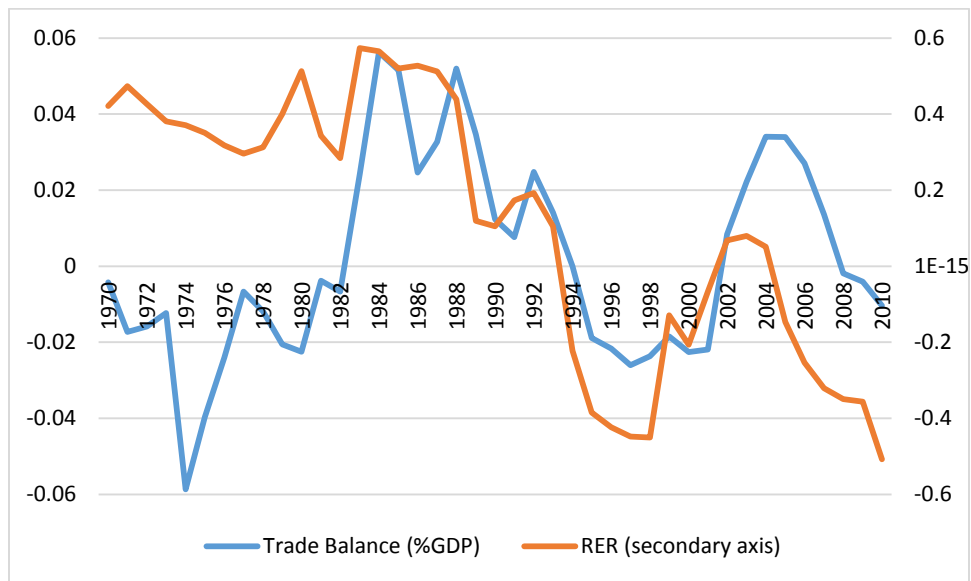
**Graph 3A: RER and Trade Balance in Argentina**



Source: Authors' calculation based on Penn World Tables and World Bank

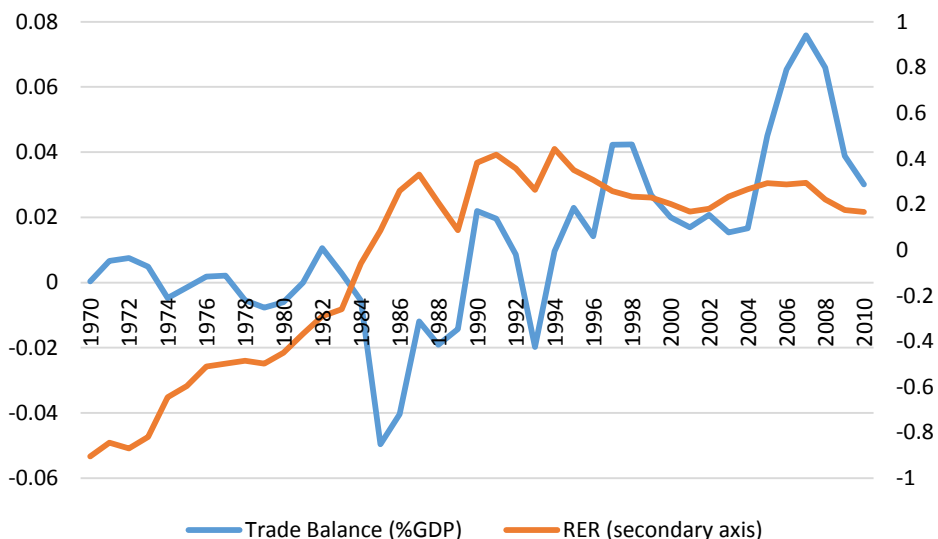
Note: As in Rodrik (2008), we build an undervaluation index. If the real exchange rate is negative (as it is from 2005-2010), it means that the real exchange rate is overvalued.

**Graph 3B. RER and Trade Balance in Brazil**



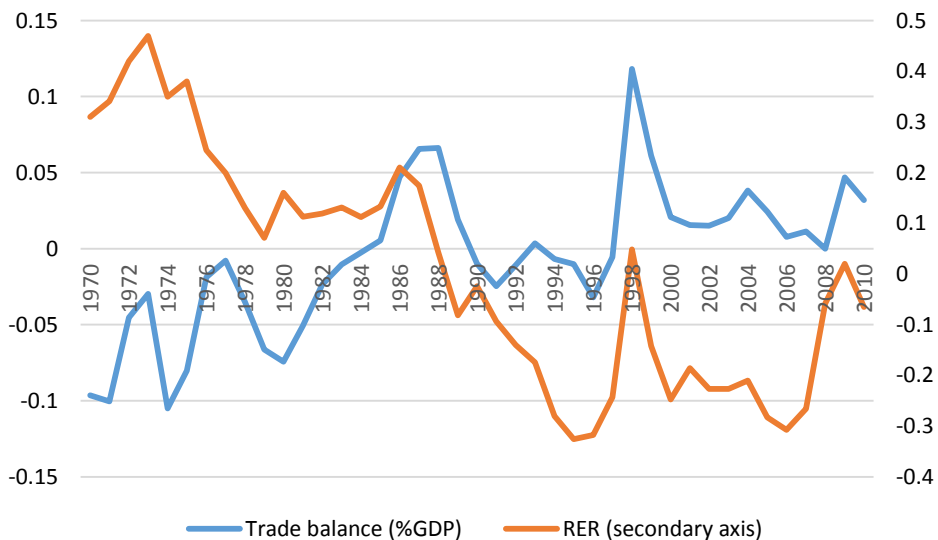
Source: Authors' calculation based on Penn World Tables and World Bank. As in Rodrik (2008), we build an undervaluation index. If the real exchange rate is negative (as it is from 2005-2010), it means that the real exchange rate is overvalued.

**Graph 3C. RER and Trade Balance in China**



Source: Authors' calculation based on Penn World Tables and World Bank. As in Rodrik (2008), we build an undervaluation index. If the real exchange rate is negative (as it is from 2005-2010), it means that the real exchange rate is overvalued.

**Graph 3K. RER and Trade Balance in Korea**



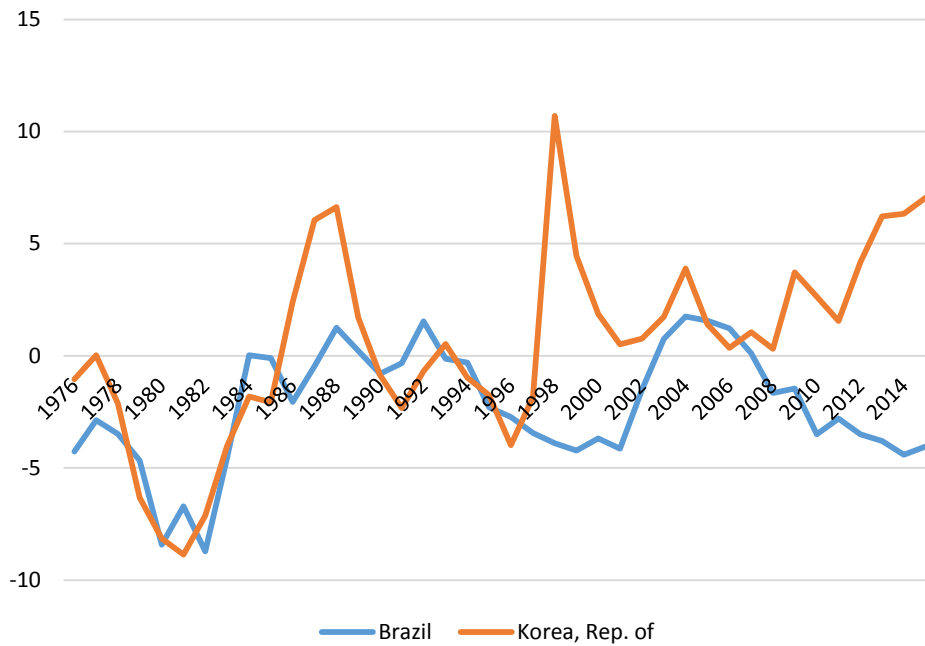
Source: Authors' calculation based on Penn World Tables and World Bank. As in Rodrik (2008), we build an undervaluation index. If the real exchange rate is negative (as it is from 2005-2010), it means that the real exchange rate is overvalued.

Differences can be detected within Latin America. First, Brazil's "closeness" in the 1970s explains the decoupling between the RER and the international financial cycle in this period. Second, Argentina tended to keep the RER appreciated for longer periods and with more intensity than Brazil, until the dramatic depreciation of 2000. Thereafter, the two countries changed positions and Brazil was the one in which appreciation and trade deficits were higher. Third, the trade balance remained positive albeit deteriorating in the 2000s in Argentina (which had no access to international credit after the 2002 default on its external debt), while Brazil plunged into a deficit after 2008.

As regards the trajectory of the RER in the Asian countries, it remained depreciated in Korea the 1970s and 1980s and appreciated thereafter. To some extent such a path reminds that of Brazil. There is a crucial difference between the two countries, however: appreciation in Korea in the 1990s was associated with the sophisticated, technology-intensive production structure developed in the previous decades. In Brazil, appreciation was related to external shocks (capital inflows in the 1990s and the commodity boom in the 2000s) and not to an endogenous process of convergence in productivity.

Korea kept a depreciated RER when it was developing its own technological capabilities and the RER was a key competitive tool; once it had built a sophisticated, diversified production structure, the country no longer needed a depreciated RER to compete internationally—to the extent that industrial and innovation policies had already given rise to a major reduction of the technological and productivity gaps. An evidence of this point is that Korea moved from deficits in the trade balance until the mid-1990s towards a surplus thereafter, while Brazil run a deficit in spite of the commodity boom (see graph 4).

**Graph 4: Brazil and Korea: Current Account Balance (%GDP), 1976-2015**



Note: Growth is on the left axis and the trade balance on the right axis.  
Source: World Bank

In the same vein, China strongly depreciated the RER when it opened its economy to international trade (see graph 3C). At variance with the experience of Argentina (in the 1970s and 1990s) and Brazil (in the 1990s), trade liberalization in China advanced *pari passu* with a rising RER. From that point and until recently, China sought to keep its RER at a competitive level, while its economy rapidly diversified and increased the share of capital-intensive and technology-intensive industries in total manufacturing value added. The Chinese Renminbi appreciated since the early 1990s, but this did not prevent the trade balance to remain positive as a result of the country's rising competitiveness in new dynamic sectors. It is likely that in the future China would allow its currency to appreciate as its competitiveness would become increasingly less dependent on a high RER and low salaries.

In sum: in Latin America appreciation reflected positive shocks in the terms of trade and/or favorable financial conditions abroad, while in Korea and China appreciation mostly reflected these countries' stronger competitive position associated with higher productivity and structural transformation. This is consistent with the description of the "capital account" regime versus the "trade account" regime suggested by Dooley et al (2003). In China, trade

liberalization occurred with a large depreciation of the Chinese currency that had a positive and sustained impact on the Chinese trade balance. In Latin America, on the other hand, trade liberalization took place *pari passu* with the appreciation of the currency, which explains why major crises incubated. Appreciation cum trade liberalization heightened the intensity of the crisis.

## **5. The financial cycle and structural change: linking the short run with the long run**

### 5.1 Investment in the financial cycle in a open developing economy

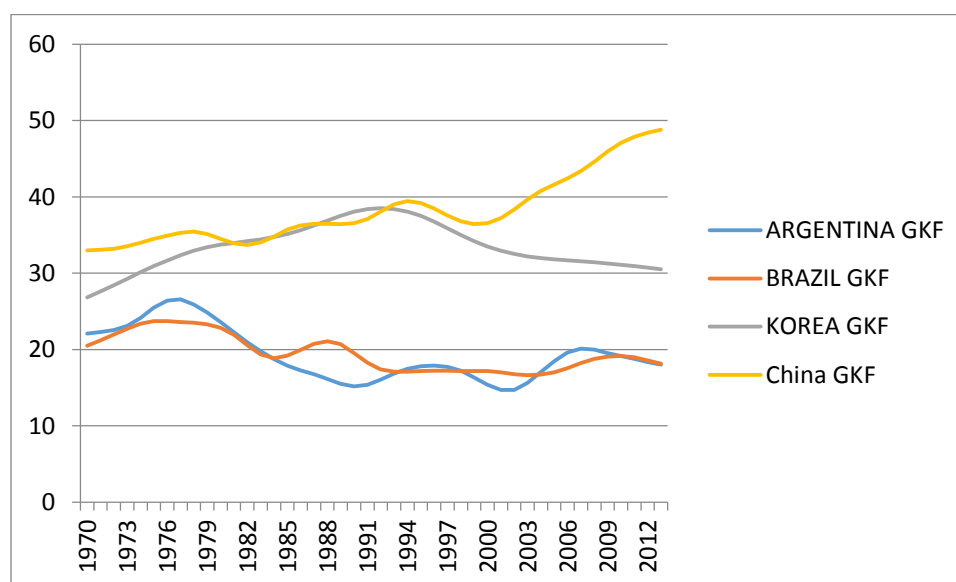
The level and composition of today's investment shape the production structure of the next period. If short-term fluctuations affect the level and direction of investment, there will be consequences for capabilities and specialization.

The effect of the expansionary phase of the financial cycle on investment is ambiguous. From one hand, it increases firms' access to finance. In addition, the appreciation of the RER implies that intermediate and capital goods are cheaper—a crucial point for developing economies which are strongly dependent on imports of capital goods. The consumption boom in one period raises the level of activity and—via accelerator and a higher rate of capital utilization—stimulates investment in the next period. All these factors make investment in capital goods more attractive. On the other hand, a lower RER in the expansionary phase implies that domestic production becomes less competitive both at home and abroad. Market shares will fall and so will the expected rate of profit. The favorable incentives that stem from cheaper capital goods and loans will be challenged by shrinking market shares and lower mark-up factors.

Which of these contradictory forces would prevail is an empirical matter. Non-tradable sectors intensive in foreign inputs would be the most favored, while exporting sectors that use mostly domestic inputs (such as land or labor) will be the worst affected by appreciation. The timing of the effects also matters. It is more likely that the positive effects of credit supply and cheap capital goods on investment occur in the short run, while in the long run the contractionary effects should prevail.

The evolution of gross capital formation (graph 5) suggests that investment tended to be higher when financial liquidity was higher. Such periods are also associated with faster economic growth. During the height of overvaluation in the 1970s, the investment rate was at its highest level in Argentina and Brazil for the entire 1970-2012 period. It also experienced a recovery in the 1990s, after the collapse of the 1980s. The crucial point, however, is that the expansionary phases—the 1970s and 1990s—were not sustainable. They ended up with major crises and recessions which made investment collapse. The increase in investment attained in the boom led to a more than proportional contraction in the bust. The recoveries after each crisis were not strong enough to fully compensate for the previous fall. In particular, the 1982 crisis in Argentina and Brazil seems to have reduced in a permanent way the investment rate, which never came back to the levels of the 1970s. This suggests that hysteresis phenomena, well documented in empirical studies on unemployment, may also occur in investment.

**Graph 5. Gross capital formation, 1970-2012**



Note: Hodrick-Prescott filter,  $\lambda = 6.25$

Policy responses can halt a downward trend. The Latin American pattern stands in sharp contrast to that in Asia. Graph 5 shows that not only fluctuations were milder in Asia, but there was also a positive trend in investment in Korea until the late 1990s (when the investment rate

fell but still remained at a much higher levels than in Latin America) and in China, where only recently receded.

In sum, the long-run negative impact of the financial cycle on growth and investment dominates the positive short-term impact of the boom.. As will be shown in the next sub-section, the analysis of the evolution of different indicators of structural change gives support to the hypothesis that financial shocks may have long run effects on economies characterized by “capital account regimes” and weak industrial policies.

## 5.2 Structural change: the proxies

To discuss whether shocks in international liquidity produce persistent effects on the production structure, this section tests for structural breaks and analyzes whether such breaks are subsequently reverted or not. In particular, we are interested in the technological intensity of the production structure for this is a key driver of long run growth (see section 3.1). If financial cycles and the ensuing external crisis compromise the upgrading of production towards sectors with higher technological intensity, then these cycles produce long run consequences for growth and catching up.

Different proxies will be used to measure the technological intensity of the production structure. The first is the Engineering Index (EI), defined as the ratio between the relative share of the engineering industries in total manufacturing value added<sup>36</sup> in a certain country, and this share in a country on the technological frontier, usually the USA. For instance: an  $EI = 0.5$  in country “*i*” means that the share in value added of the engineering industries in total manufacturing in “*i*” is half of that share in the USA. An increase in the EI indicates a move towards a pattern of production which is more technology-intensive. It also implies a catching up process, since the indicator considers that the technological frontier (captured by the denominator) is not static. The period of analysis is limited by the availability of data to compute the EI index, which is between 1970 and 2008 (in the case of China, 1980-2008).

The second proxy is the Economic Complexity Index (ECI) suggested by Hidalgo, Hausman et al (2014), which measures the diversity and sophistication of the export structure of country “*i*”. The index is constructed on the notion—shared by this paper—that “what you

---

<sup>36</sup> Engineering Industries comprise in the Standard International Trade Classification (SITC): Fabricated metal products, except machinery and equipment; Machinery and equipment; Transport equipment.



export matters” and that production capabilities reflect underlying technological capabilities. The ECI is based on trade data and computed from an iterative process which combines information about the diversification of the production structure of the country and the ubiquity of the goods it produces. If a country produces a good which very few countries produce, and it also has a diversified structure, this means that this country commands sophisticated capabilities that provide an advantageous position in international competition. As suggested by the authors (p.3), “*diversity and ubiquity are (...) crude approximations of the variety of capabilities available in a country or required by a product*”.

Both proxies of the technology intensity of the production structure—EI and ECI—have advantages and disadvantages and to some extent are complementary. EI is circumscribed to manufacturing and does not capture changes in other sectors of the economy. The ECI, on the other hand, covers all traded goods in the international economy and therefore entails a much broader scope than the EI. However, in certain cases the ECI overestimates technological capabilities. In particular, the vertical fragmentation of production (trade in tasks) implies that developing economies frequently participate at the very low-end of global value chains in sectors which are formally classified as high tech. From a statistical point of view, these exports are high tech; from a technological point of view, they are indeed labor-intensive segments of global value chains with little endogenous capabilities.

The question to be addressed in the empirical analysis is whether international shocks and the appreciation of the RER had a persistent impact on the production structure. If these effects are persistent, then policies aimed at protecting the economy from financial shocks are still more relevant for growth than is usually accepted. Macroprudential policies, capital controls and the stability of the RER should therefore be seen as part and parcel of the (long run) development policy.

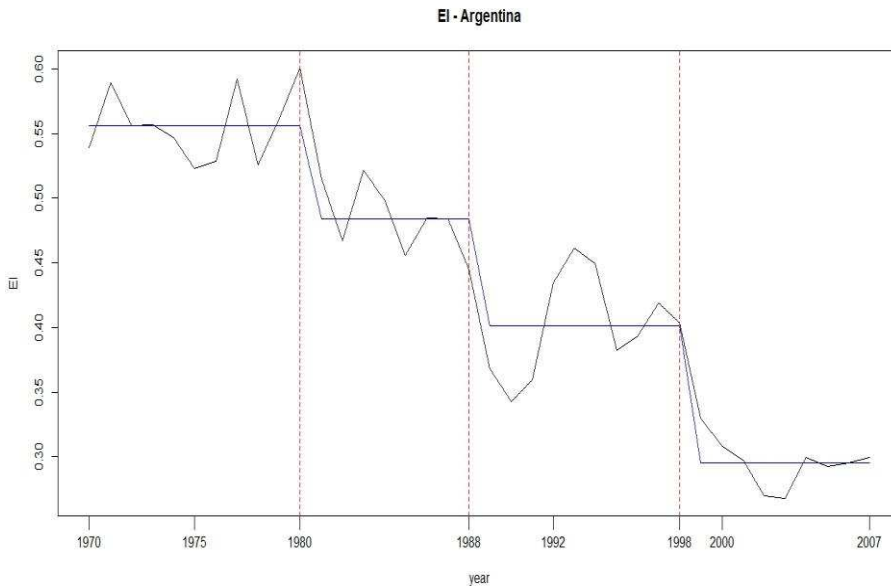
### 5.3 Outcomes: EI and ECI

The EI and ECI followed divergent paths in the two Latin American countries and in the two Asian countries considered in the analysis. To describe these paths, structural breaks are identified in the means of the time series of each indicator (EI and ECI) using Perron’s tests as suggested in Zeileis et al (2013). The evolution of the EI can be seen in graph 6, and the

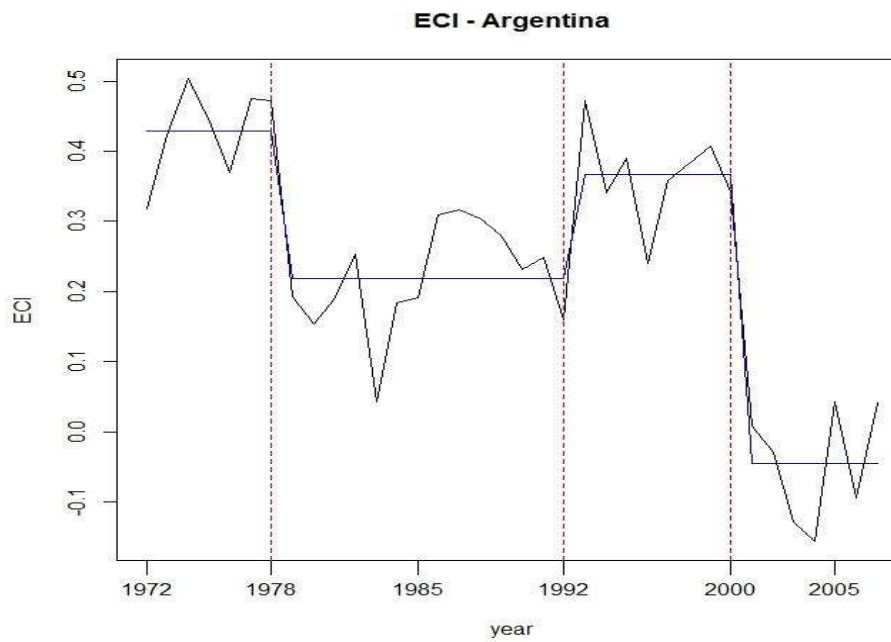
evolution of the ECI in graph 7. The vertical lines indicate the years in which structural breaks occurred.

In Argentina, since the late seventies / early eighties, a downward trend in both indicators is apparent (graphs 6 and 7). Each crisis—the external debt of 1980, the hyperinflation crisis of 1988-1989, and the debt crisis of 2000-2002—placed the country at a lower level in terms of relative technological intensity of its production structure. Subsequent recoveries were unable to bring the economy back to its previous position. EI and ECI differ in the years in which they show structural breaks, but in all cases the breaks occurred after a period of appreciation and in the vicinity of a major external crisis.

**Graph 6. Argentina: EI**



**Graph 7. Argentina: ECI**

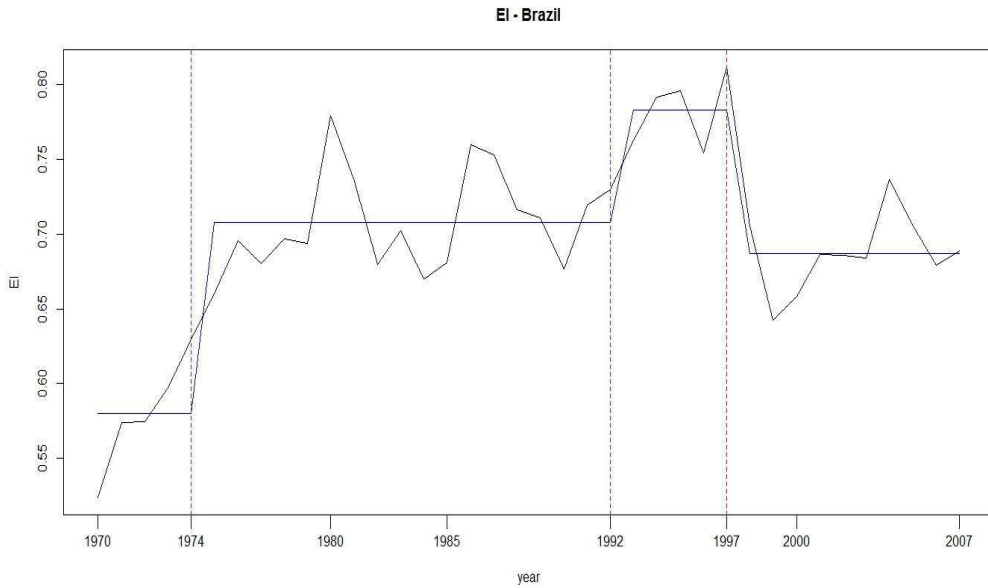


In the case of Brazil, the EI and ECI increased until the end of the 1970s, stagnated in the 1980s and remained more or less stable until the mid-nineties, when a downward trend emerged (graph 8 and 9). The downward trend of the 1990s is more visible in the EI than in the ECI. The

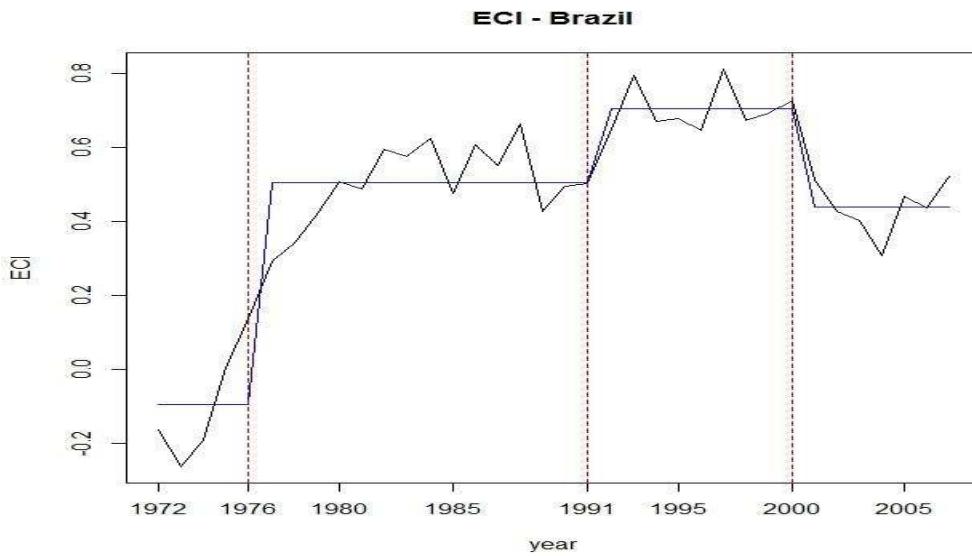
story told by the indicators is different from that of Argentina, because in Brazil the EI and ECI are on the rise in the 1970s and stagnated in the 1980s. This points out to the importance of industrial policy—and that the position of each country in the trilemma is a choice, not fate. The coincidence between the rise in EI and ECI with the implementation of the Brazilian II PND (1974-79) is remarkable. The impact of the II PND translated into a positive shock in the mid-1970s. A downward trend in EI and (to a lesser extent) in the ECI would eventually emerge in Brazil after the 1999 crisis, in association with a persistently lower rate of investment.

In the case of Brazil, the positive effect of industrial policy overcame the negative effects of appreciation on industrial diversification in the 1970s. Inversely, the overlapping of trade liberalization and a persistent overvaluation of the RER in the 1990s, combined with a faltering industrial policy in the 1980s and 1990s, help explain why structural change receded in Brazil in the past 30 years.

**Graph 8. Brazil: EI**



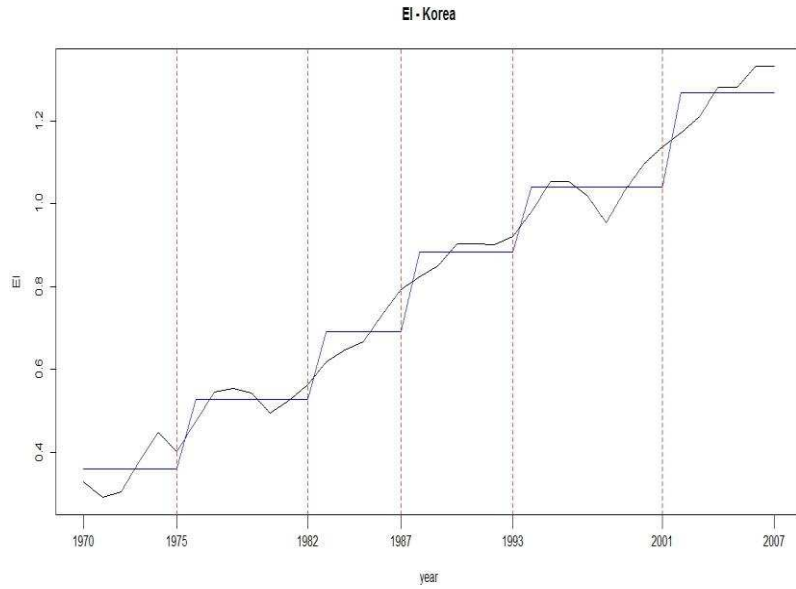
**Graph9. Brazil: ECI**



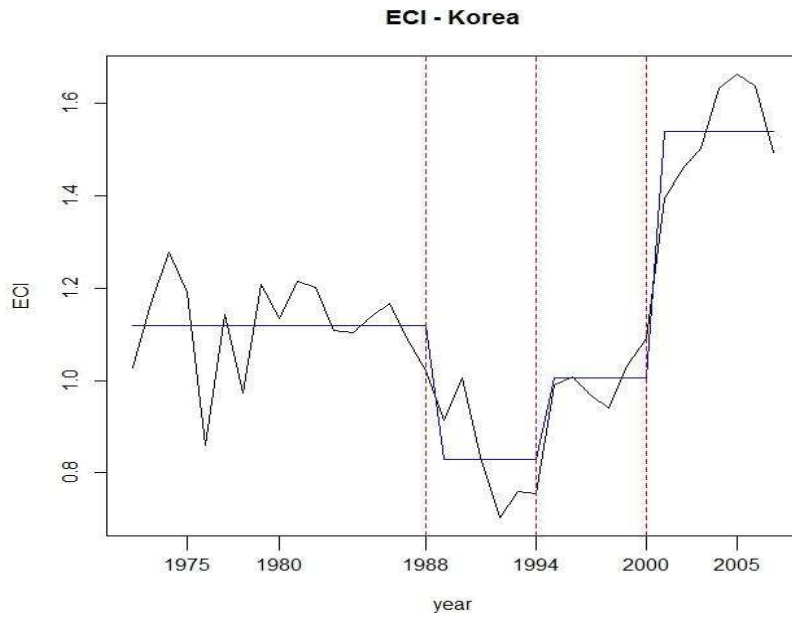
In spite of their differences, Argentina and Brazil shared a common process of slow structural change after 1980. In the case of Argentina, the EI in the 2000s was almost half of that at the beginning of the period (1970). In the case of Brazil, the EI and the ECI increased in the 1970s, but in the 2000s were approximately at the same level of the 1980s.

Korea, on the other hand, shows a strong upward trend in the technological intensity of production (graphs 10 and 11). The EI in Korea was below the EI in Argentina in 1970, but it became five times higher in 2008. The EI increased in Korea with almost no discontinuity, in correspondence with this country's "moving target" approach to industrial policy. The ECI, however, tells a less straightforward than the EI. The behavior of the ECI in Korea remained on average at the same level until the early 1990s, when it fell sharply. This was the period in which the process of trade and financial liberalization accelerated, which had an impact on industrial growth. The ECI had an impressive recovery thereafter and was about 50% higher in the 2000s than in the 1980s.

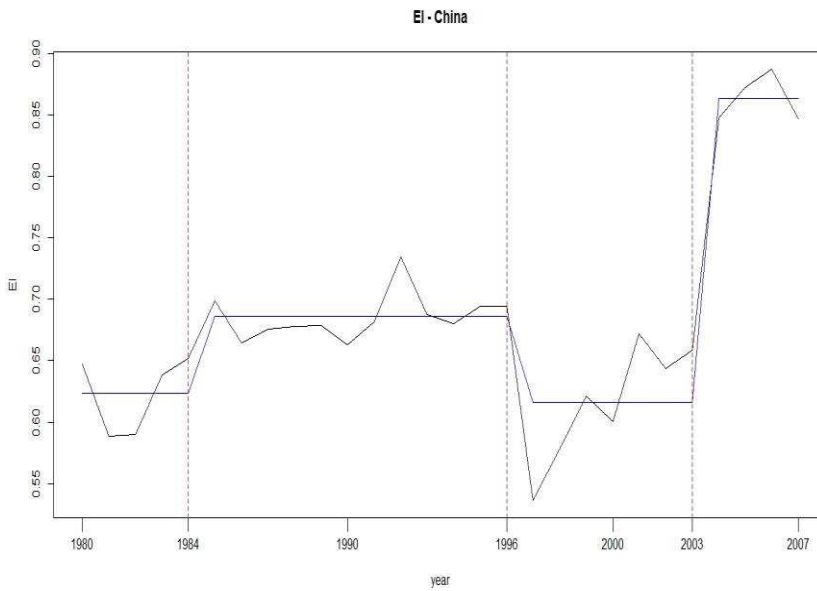
**Graph 10. Korea: EI**



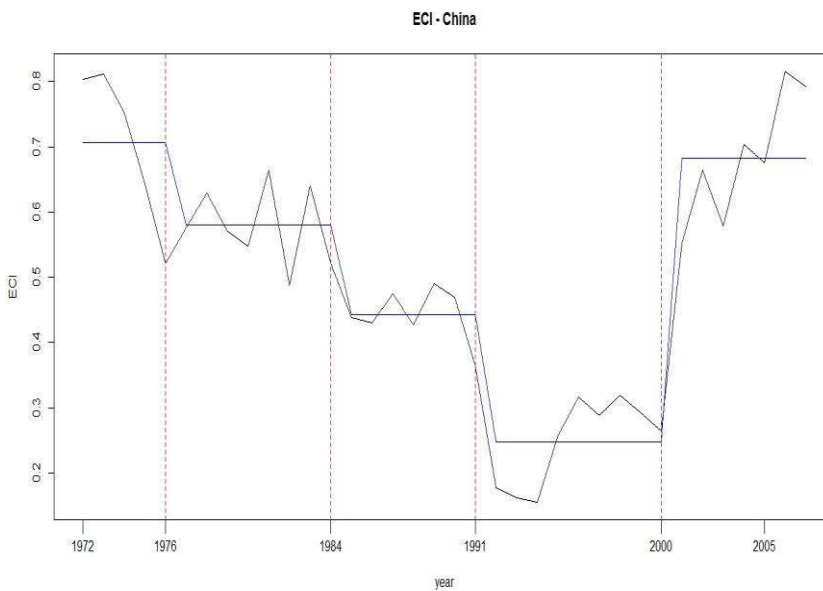
**Graph 11. Korea: ECI**



**Graph 12. China: EI**



**Graph 13. China: ECI**



The estimation of the EI for China is constrained by the availability of industrial data before 1980. The EI was stagnant in the 1980s and fell in the 1990s. The period of the fall in the EI in the 1990s broadly overlaps with the period in which the ECI also fell (see below). The reason why these falls happened is not clear, but they may reflect the impact of the Asian crisis and the transition towards a new industrial policy in China. Both factors were no longer present



in the 2000s, when the EI jumped to levels similar to those displayed in the early seventies, but now in the context of an open economy and with a strong Chinese presence in international markets.

China began its transition towards an open economy in the late 1970s. This transition reshaped its specialization pattern, initially in favor of labor-intensive, low-technology sectors. This explains why the ECI fell in China as its pattern of exports became more similar to the pattern of other developing economies (Graphs 12 and 13). The falling trend of ECI would only change with the new industrial policy of the 2000s, when China escalated positions in technology-intensive and capital-intensive industries. This made the export pattern much more similar to what advanced countries export (and this is why the ECI increased).

## **6. Concluding remarks**

The trilemma suggests that small open economies are bound to choose a side of the triangle formed by an open capital account, an autonomous monetary policy and a fixed exchange rate. “Capital account countries” maintains fully open the capital account and allow the RER to float; “trade account” countries focus on a competitive RER and either give up monetary policy or apply capital controls which expand the room for maneuver of both the exchange rate and monetary policies. In an attempt to manage the trade-offs in the face of the trilemma of open economies, with authorities increasingly friendly to mixed regimes.

Argentina and Brazil, in different moments, embraced the “capital account” approach—Argentina since the mid-1970s, Brazil since the 1990s. This reinforced the canonical stop-and-go cycle of the Latin American economies driven by shocks in the terms of trade or in international finance. Relying on the RER as a key tool to fight inflation made appreciation and external disequilibria more intense, and the Latin American economies more prone to exhibit both foreign exchange and debt crises. Inversely, capital controls and a focus on a competitive RER was a key tool in Korea and China for diversifying exports and gradually move upwards in the technological ladder.

Macroeconomic policies may have long run effects on growth and productivity for appreciation and external crisis produce volatility, uncertainty and a set of relative prices that conspires against diversification. But this is just part of the story. Industrial policy and its

interaction with macroeconomic policies are also crucial for learning and diversification. The paper briefly revisits industrial policies in the two regions and argues that that having or not in place these policies determined the ability of the country to resist international shocks, keep the external sector in equilibrium and avoid the loss of technological capabilities.

Economists tend to look at the short run and the long run as separate entities driven by totally different forces. Although such a sharp separation may be useful for certain analytical purposes, they should not be separated in policy-making. Short-term financial shocks change the volume and direction of investments and reshape the production structure. Since learning and productivity co-evolve with the production structure, development policy by necessity must combine, in a consistent way, the macroeconomic and the industrial policies. This is also related to the possibility of the emergence of hysteresis phenomena in structural change. Structural break tests give support to the idea that crises have persistent effects on the structure in Argentina. This country suffered two major external shocks that affected in a permanent way the levels of EI and ECI. The results are less clear-cut for Brazil; there is evidence of hysteresis only after the crisis of the 1990s. Finally, there is evidence of hysteresis effects à la Baldwin-Krugman in the case of Korea: a high RER was initially required to export and diversify the economy, but it was no longer necessary when the country had already become an exporter of sophisticated goods.

## Bibliography

- Abdon, A., M. Bacate, J. Felipe and U. Kumar (2010). Product complexity and economic development, Working Paper No. 616. Levy Economics Institute of Bard College.
- Ainzenman, J. and Marion, N.P. (2004), “International Reserves Holdings with Sovereign Risk and Costly Tax Collection,” *Economic Journal*, Vol. 114 (July), pp. 569–91.
- Aldrichi, D. And Colistete, R. (2013) “Industrial growth and Structural Change: Brazil in a Long Run Perspective”, Working Paper Series N. 2013-10, Department of Economics, University of Sao Paulo.
- Amsden, A. (1989), *Asia’s Next Giant: South Korea and Late Industrialization*, New York, Oxford University Press.
- Anderson, M. and Ejerme, O. (2006) “Technology and Trade - an analysis of technology specialization and export flows”, Working Paper 2006/05, CIRCLE, Lund University.
- Ahrens, N. (2013), “China’s industrial policymaking process”, A Report of the CSIS Hills Program on Governance, Center for Strategic and International Studies, Washington, DC.
- Kenneth Arrow, “Path Dependence and Competitive Equilibrium”, in *History Matters: Essays on Economic Growth, Technology and Demographic Change*, Stanford University Press, 2004, chapter 1, pp. 23-35.
- Baldwin, R. (1988) “Hysteresis in Import Prices: The Beachhead Effect”, *American Economic Review*, 78, pp. 773-785.
- Baldwin R., Krugman P. R. (1989) “Persistent Trade Effects of Large Exchange Rate Shocks”, *Quarterly Journal of Economics*, 104, pp. 635-654.
- Baltar, C.T (2015) “Inflation and Economic Growth in an Open Developing Country: the Case of Brazil”, *Cambridge J Econ* (2015) 39 (5): 1263-1280.
- Bekerman, Marta and Dalmaso, Gonzalo Políticas productivas y competitividad industrial: El caso de Argentina y Brasil. *Rev. Econ. Polit.*, Mar 2014, vol.34, no.1, p.158-181. ISSN 0101-3157
- Bell, M. (2006), “Time and technological learning in industrialising countries: how long does it take? How fast is it moving (if at all)?” *International Journal of Technology Management*, vol. 36, No. 1–3, pp. 25–39.
- Bértola, L. and Ocampo, J.A. (2012), *The Economic Development of Latin America since Independence*, Oxford: Oxford University Press.
- Blanchard, O. (2016) “The US Phillips Curve: Back to the 1960s?”, Peterson Institute for International Economics, Number PB 16-1, January.

- Blanchard, O., E. Cerutti, and L. Summers (2015). “Inflation and Activity: Two Explorations and Their Monetary Policy Implications”, In *Inflation and Unemployment in Europe*:
- Blecker, R.A. (2011) “Long-run growth in Open economies: Export-Led Cumulative Causation or a Balance-of-Payments Constraint?” in G. Harcourt and P. Kriesler, eds., *Handbook of Post-Keynesian Economics*. Oxford: Oxford University Press, forthcoming.
- Bresser-Pereira, L.C. (2008) “Dutch Disease and its Neutralization: a Ricardian Approach”, *Brazilian Journal of Political Economy* 28 (1) January, pp. 47-71.
- Botta, A. (2009) “A Structuralist North-South Model on Structural Change, Economic Growth and Catching up”, *Structural Change and Economic Dynamics* 20, pp. 61-73.
- Brandt, L. (2014) “Industrial upgrading and productivity growth in China”, in Fan, S. et al, *The Oxford Companion to the Economics of China*, London: Oxford U. Press.
- Breznitz, D. and Murphree, M. (2014) *The Run of the Red Queen: Government, Innovation, Globalization and Economic Growth in China*, New Heaven: Yale University Press.
- Capiello, L. and Ferruci, G. (2008) “The sustainability of China’s Exchange Rate Policy and Capital Account Liberalization”, *European Central Bank, Occasional Paper Series*, n. 82, March 2008
- Cardoso, E. and Fishlow, A. (1989) “The Macroeconomics of the Brazilian External Debt”, in Sachs, J. (1989) (ed) *Developing Country Debt and the World Economy*, Chicago University Press.
- Carvalho, B.S. de M. and Garcia, M. (2015) “Ineffective controls on capital inflows under sophisticated financial markets: Brazil in the Nineties”, in S. Edwards, M. Garcia (Eds.), *Financial Markets Volatility and Performance in Emerging Markets*, National Bureau of Economic Research, Cambridge, MA (2008)
- Castellaci, F. (2002) “Technology-gap and Cumulative Growth: Models, Results and Performances”, *DRUID Winter Conference, Aalborg*, January 17-19, 2002.
- Chang, H.J. (2001), “Infant Industry Promotion in Historical Perspective. A Rope to Hang Oneself or a Ladder to Climb With?”, document prepared for the conference *Development Theory at the Threshold of the Twenty-first Century*, Economic Commission for Latin America and the Caribbean (ECLAC), August 2001.
- Chang, H.-J. and P. Evans (2005), ‘The Role of Institutions in Economic Change’, in G. Dymski and S. Da Paula (eds), *Reimagining Growth*, London, Zed Press, pp. 99–129
- Chinn, M. D. and Ito, H. (2008). "A New Measure of Financial Openness". *Journal of Comparative Policy Analysis*, Volume 10, Issue 3, p. 309 – 322 (September).

- Choi, B.J. (2013) *Upside-Down Success Story of Korea's Economic Development*. Seoul: Daewon.
- Ciarli, T., Lorentz, A., Savona, M., & Valente, M. (2010). "The Effect of Consumption and Production Structure on Growth and Distribution. A Micro to Macro Model", *Metroeconomica*, 61(1), pp. 180–218
- Chen, J. and Quian, X. (2016) "Measuring on-Going Changes in China's Capital Controls: A de Jure and a Hybrid Index Sata Set" , *China Economic Review* 38 (2016) 167–182.
- Cimoli, M. and J. Katz (2003), "Structural Reforms, Technological Gaps and Economic Development: A Latin American Perspective", *Industrial and Corporate Change*, **12** (2), April, 387–411.
- Cimoli, M. and Porcile, G. (2014) "Technology, Structural Change and BOP Constrained Growth: A Structuralist Toolbox", *Cambridge Journal of Economics*, *Cambridge Journal of Economics*, (2014) 38 (1):215-237.
- Davies, K. (2013), "China Investment Policy: An Update", OECD Working Papers on international Investment, 2013/01, OECD Publishing, <http://dx.doi.org/10.1787/5k46911hmvbt-en>.
- Dooley, M.P.; Folkerts-Landau, D. and Garber, P. (2003) "An Essay on the Revived Bretton Woods System", Working Paper 9971, NBER, September.
- Dornbusch, R. and de Pablo, J.C. (1989), "Debt and Macroeconomic Instability in Argentina", in Sachs, J. (ed) *Developing Country Debt and the World Economy*, Chicago: University of Chicago Press, pp. 37-56
- Dosi, G.; Fagiolo, G. and Roventini, A. (2010) Schumpeter meeting Keynes: A policy-friendly model of endogenous growth and business cycles, *Journal of Economic Dynamics and Control*, [Volume 34, Issue 9](#), September 2010, pp. 1748–1767
- Dosi, G.; Grazzi, M. and Moschella, D. (2015) "Technology and Costs in International Competitiveness: From Countries and Sectors to Firms", *Research Policy*, 44, 1795–1814.
- ECLAC (2012) *Structural Change for Equality: An Integrated Approach to Development*, Santiago de Chile: United Nations.
- Fagerber, J. Srholec, M. and Verspagen, B. (2001) "Innovation and Development", in Hall, B. and Rosenberg, N. (eds.): *Handbook of the Economics of Innovation*, North Holland.
- Faberberg, J. and Verspagen, B. (2002) "Technology gap, Innovation-Diffusion and Transformation: An Evolutionary Interpretation", *Research Policy*, 31, 1291-1304.
- Fajnzylber, F. (1983) *La industrialización trunca de América Latina*. México: Nueva Imagen

- Frenkel, R. and Rapetti, M. (2011) “A Concise History of Exchange Rate Regimes in Latin America”, in Ocampo, J.A. and Ros, J. (2011) *The Oxford Handbook of Latin American Economics*, Oxford University Press.
- Frieden, J.A. (2015) *Currency Politics: the Political Economy of Exchange Rate Policy*, Princeton University Press.
- Ghosh, A. R., Ostry, J. and Qureshi, M (2015) “Exchange Rate Management and Crisis Susceptibility: A Reassessment”, *IMF Economic Review*, 63(1): 238–76.
- Goldfajn, I. and Minella, A. (2005) “Capital flows and controls in Brazil: what have we learned?”, NBER Working Paper, 11640, September.
- Gourdon, J., S. Monjon and S. Poncet (2015), “Trade policy and industrial policy in China: What motivates public authorities to apply restrictions on exports?” *CEPII Working Papers*, April, pp.11-12, [www.cepii.fr/PDF\\_PUB/wp/2015/wp2015-05.pdf](http://www.cepii.fr/PDF_PUB/wp/2015/wp2015-05.pdf).
- Gouvea, R.R. and G.T. Lima (2010) “Structural Change, Balance of Payments Constraint and Economic Growth : Evidence from the Multi-Sectoral Thirlwall’s Law”, *Journal of Post Keynesian Economics*, 33 (1), October, pp. 169-204.
- Engbom, N.; Detragiache, E. and Raei, F. (2015) “The German Labor Market Reforms and Post-Unemployment Earnings “, *IMF Working Paper*, Euroepan Department, WP.15/162., July 2015.
- Heilmann, E. and L. Shih (2013), “The rise of industrial policy in China, 1978-2012”, *Harvard-Yenching Institute Working Paper Series*.
- Hopenhayn, B.; Schvarzer, J. and Finkelstein, H. (2002) "El Tipo de Cambio Real en Perspectiva Histórica. Aportes para un Debate", *CESPA, Notas de Coyuntura*, (2): 1-9.
- International Monetary Fund (2003) “Lessons from the Crisis in Argentina”, prepared by the Policy Development and Review Department In consultation with the other Departments October 8, 2003, p. 63.
- Kaltenbrunner, A. and Painsieira, J (2015) “Developing Countries’ Changing nature of Financial Integration and New Forms of External Vulnerability: the Brazilian Experience”, *Cambridge J Econ* (2015) 39 (5): 1281-1306.
- Katz, J. (1997), “Structural Reforms, the Sources and Nature of Technical Change and the Functioning of the National Systems of Innovation: The Case of Latin America”, paper presented at the STEPI International Symposium on Innovation and Competitiveness in NIEs” Seoul, Korea, May.
- Katz, J. and Stumpo, G. (2001). Sectoral regimes, productivity and international competitiveness. *CEPAL Review* 75.

- Khan, M. (2000), “Rent-seeking as Process”, in M. Khan and K.S. Jomo (2000), *Rents, Rent-Seeking and Economic Development: Theory and Evidence in Asia*, Cambridge University Press.
- Kim, L. (1997), “Korea's national innovation system in transition”, Science and Technology Policy Institute, STPI, Korea.
- Kim, E.M. (2011) “The Korean Development Alliance Between Business, labour and Government”, paper presented to the seminar organized by UNRISD and KOICA, Seoul, South Korea, September 29, 2011.
- Koh, Y. (2012) “El crecimiento de la economía coreana y el papel del gobierno”, in Sakong and Koh (eds), *La Economía Coreana*, op.cit.
- Koo, Y. (2013), “Evolution of Industrial Policies and Economic Growth in Korea: Challenges, Crises and Responses”, *European Review of Industrial Economics and Policy*, n. 7, pp. 1-20, REVEL Electronic Journals and Conferences Proceedings of UNS.
- Krugman, P. and Taylor, L. (1978) “Contractionary effects of devaluation”, *Journal of International Economics*, 8(3), 445–456.
- Lee, K. (2013) *Schumpeterian Analysis of Economic Catch-Up*, Cambridge University Press.
- Levi-Yeyati, E.; Schmukler, S.L and van Horen, N. (2010) “Crisis, Capital Controls and Financial Integration”, in Masahiro Kawai and Mario B. Lamberte (ed), *Managing capital flows*, Edward Elgar, 2010.
- Lim, P.W. (2004) “Path Dependence in Action: The Adoption and Persistence of the Korean Model of Economic Development”, in Guinane, T.W., Sundstrom, W.A. and Whatley, W. *History Matters: Essays on Economic Growth, Technology and Demographic Change*, Stanford University Press, Stanford, California, 2004.
- Lo, D. and M. Wu, (2014), “The state and industrial policy in Chinese economic development”, in J. Salazar-Xinirachs, I. Nubler and R. Kozul-Wright (eds.), *Transforming Economies: Making Industrial Policy Work for Growth, Jobs and Development*, pp. 307-326, UNCTAD-ILO, Geneva, [www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms\\_242878.pdf](http://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_242878.pdf).
- McMillan, M. and Rodrik, D. (2011) “Globalization, Structural Change and Productivity Growth”, Joint ILO-WTO paper, February, M. (2013) *The Entrepreneurial State: Debunking Public Vs Private Sector Myths*. London: Anthem.
- Moreira, M. M.. *Industrialization, Trade and Market Failures: The Role of Government Intervention in Brazil and South Korea*. London: Palgrave McMillan.
- Moreno-Brid, J. (2003) “Capital Flows, Interest Payments and the Balance of Payments Constrained Growth Model: A Theoretical and Empirical Analysis”, *Metroeconomica* , 54 (3), pp. 346-365.
- Nahm, J. (2014) “Contradictory or Complementary? Indigenous Innovation and Manufacturing Policy in China’s Wind and Solar Sectors”, MIT Political Science, Working paper N. 2014-10,

- Narula, R. (2004) “Understanding Absorptive Capacities in an Innovation Systems Context: Consequences for Economic and Employment Growth”, DRUID Working Paper n. 04-02, December.
- Nassif, A.; Feijo, C.; Araujo, E. (2011) “The Long Term Optimal Real Exchange rate and the Currency Overvaluation Trend in Open Emerging Economies: The case of Brazil”, UNCTAD Discussion Papers 206, December.
- Nassif, A.; Feijo, C.; Araujo, E. (2012) “Structural Change and Economic Development: Is Brazil catching Up or Falling Behind?”, paper presented at the Congress of the Brazilian Centers of Graduate Studies in Economics (ANPEC), December.
- Nassif, A.; Feijo, C.; Araujo, E.. Structural change, catching up and falling behind in the BRICS: A comparative analysis based on trade patterns and Thirlwall’s law, PSL Quarterly Review, vol. 69 n. 278 (December, 2016), 373-421.
- Noland, M. (2017), “South Korea's Experience with International Capital Flows”, in Capital Controls and Capital Flows in Emerging Economies: Policies, Practices and Consequences Volume Author/Editor: Sebastian Edwards, editor Volume Publisher: University of Chicago Press.
- Noughton, B. (2007), The Chinese Economy: Transitions and Growth, Cambridge, Mass and London: The MIT Press.
- Ocampo, J.A. (2016) “Balance-of-Payments Dominance: Implications for Macroeconomic Policy”, in Damill, M., Rapetti, M. and Rozenwurcel, G. (eds), Macroeconomics and Development: Roberto Frenkel and the Economies of Latin America, New York: Columbia University Press, chapter 10, pp. 211-228.
- Ocampo, J.A. (2017), Resetting the International Monetary (Non)System, Oxford: Oxford University Press.
- Ocampo, J.A., Rada, C and Taylor, L. (2009) Growth and Policy in Developing Countries: A Structuralist Approach. Oxford University Press.
- Oreiro, J.L. Punzi, L. Araujo, E. (2012) “Macroeconomic Constraints to Growth of the Brazilian Economy: Diagnosis and Some Policy Proposals”, Cambridge J Econ (2012) 36 (4): 919-939.
- Pacheco-Lopez, P. and Thirlwall, A.P. (2006) “Trade Liberalization, the Income Elasticity of Demand for Imports and Economic Growth in Latin America”, Journal of Post-Keynesian Economics 29 (1), pp. 41-61.
- Palma, G. (2010) “Flying Geese and Waddling Ducks: The Different Capabilities of East Asia and Latin America to Demand-Adapt and Supply-Upgrade Their Export Productivity Capacity”, in M. Cimoli, G. Dosi and J. E. Stiglitz (eds) The Political Economy of



Capabilities Accumulation: the Past and Future of Policies for Industrial Development, Oxford University Press.

Palma, J.G. (2012), “How the full opening of the capital account to highly liquid financial markets led Latin America to two and a half cycles of ‘mania, panic and crash’”, Cambridge Working Papers in Economics 1201, January.

Poo, D. (2014) “China’s Development Trajectory: A Strategic Opening for Industrial Policy in the South”, UNIDO, Working Paper, N. 218, December.

Peres, W. (2010), “The (slow) return of industrial policies in Latin America and the Caribbean”, M. Cimoli, G. Dosi and J. E. Stiglitz (eds) *The Political Economy of Capabilities Accumulation: the Past and Future of Policies for Industrial Development*, Oxford University Press.

Prates, D. Cunha, A., Lelis, M (2009), “La Gestión del Régimen Cambiario en Brasil”, *Revista de la CEPAL*, vol 99, 97-118.

Rodrik (1994) “Getting interventions Right: How South Korea and Taiwan Grew Rich”, NBER Working paper 4964, December.

Rodrik, D. (2008) “The Real Exchange Rate and Economic Growth. *Brookings Economic Studies Program*, The Brookings Institution, vol. 39 (2 (fall)), pp. 365-439.

Rodrik, D. (2011) *The Globalization Paradox: Democracy and the Future of the World Economy*, New York: W.W. Norton @ Company, Inc.

Salvia, S. (2015) “The Boom and Crisis of the Convertibility Plan in Argentina”, *Revista de Economía Política*, vol.35, no.2, São Paulo, Apr./June 2015.

Sakong, I. and Koh, Y. (2012), *La economía coreana: seis décadas de crecimiento y desarrollo*, Santiago: CEPAL-Korean Development Institute.

Setterfield, M. and Suresh, S.G. (2014) “Multi-Agent Systems as a Tool for Analyzing Path-Dependent Macrodynamics”, *Structural Change and Economic Dynamics*, 38, September 2016, Pages 25–37.

Setser, B. (2016) "The Return of the East Asian Savings Glut." Oct 2016. Council on Foreign Relations, October.

Stalling, B. and Peres, W. (2000) *Growth, Employment and Equity: The Impact of Economic Reforms in Latin America and the Caribbean*, Washington, DC: Brookings Institution Press.

Storm, S. and Nastepaad, C.W. (2015) “[Crisis and recovery in the German economy: The real lessons](#)”, *Structural Change and Economic Dynamics*, Volume 32, March, Pages 11-24.

- Stumpo, G. And Rivas, D. (2013) “La industria manufacturera argentina 2003-2010. Reconstruyendo capacidades para enfrentar los desafíos del siglo XXI”, in G. Stumpo and D. Riva (eds) (2013) La industria argentina frente a los nuevos desafíos y oportunidades del siglo XXI, Santiago de Chile: United Nations, ECLAC.
- Suzigan, W. and Furtado, J. (2006) “Política Industrial e Desenvolvimento”, Rev. Econ. Polit., Jun 2006, vol.26, no.2, p.163-185
- Thirwall, A. (2011) “Balance of Payments Constrained Growth Models: History and Overview”. University of Kent, School of Economics Discussion Paper 1111, May.
- Vera, L.A. (2006) “The Balance-of-Payments Constrained Growth Model: A North-South Approach”, Journal of Post-Keynesian Economics, 29 (1), pp. 67-92.
- Verspagen, B (1993) Uneven Growth Between Interdependent Economies: An Evolutionary View of Technology Gaps, Trade and Growth. Avebury, Ashgate Publisher.
- Wade, R. (1992) “East Asia’s Economic Success: Conflicting Perspectives, Partial Sinsights, Shaky Evidence”, World Politics, 44 (2): 270-320, January.
- Yellen, J. “Macroeconomic Research After the Crisis”, speech at the 60th annual economic conference sponsored by the Federal Reserve Bank of Boston, Boston, "The Elusive 'Great' Recovery: Causes and Implications for Future Business Cycle Dynamics" , Boston, Massachusetts, October 14 2016.
- Yoon, J. and Kim, J.K. (1995) “Credit Policies and the industrialization of Korea”, World Bank Discussion paper 286, April.
- Zeileis, A.; Kleiber, C.; Kramer, KW; Hornik, K. (2003) "Testing and Dating of Structural Changes in practice", Computational Statistics and Data Analysis 44 (2003), 109-123.