Introduction

The origins of the Latin American Structuralism (LAS) can be found in a paper written in 1948 by Raul Prebisch and published the following year by the United Nations Economic Commission for Latin America—ECLA, which would become ECLAC after incorporating the Caribbean region in 1984. In this paper Prebisch outlined his center-periphery theory, the central building block of the Latin American Structuralist School (LAS). In a nutshell, center and periphery are two sets of countries that show distinct patterns of co-evolution of technological capabilities and trade specialization. The periphery is a laggard in terms of technological capabilities relative to the center. Technology is a crucial determinant of international competitiveness, and hence asymmetries in technological capabilities (the technology gap) shapes the set of goods the periphery can competitively produce and export. This set of goods constitutes the periphery’s pattern of specialization. Causality between technological capabilities and the pattern of specialization goes in both directions: specialization affects the learning trajectory of the periphery because what economic agents learn depends on what they currently produce and on their accumulated experience in specific sectors and technologies. In this way, specialization has an impact of its own on the technology gap.

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2 For a comprehensive review of the evolution of LAS, see Bielshowski (2009) and Rodriguez (1980, 2007).
The interaction between technological change and structural change has strong implications for the dynamics of growth and income distribution between center and periphery and within the periphery itself. The pattern of specialization determines the relative rate of growth of the demand for exports and imports, which in turn defines the rate of economic growth compatible with current account equilibrium in the long run. By shaping the BOP-constrained growth rate, specialization shapes the demand for labor in the periphery. It also determines the skills and level of education required in the production process, with key implications for the labor market, the bargaining power of workers and the wages share in total income.

LAS aims to elucidate the various interactions taking place between specialization, growth, the behavior of the labor market and income distribution in an international system characterized by significant technological asymmetries. These interactions are revisited and discussed in this chapter, differentiating the original (“old”) Structuralist contributions of the 1950s and 1960s from those that emerged from the late 1970s / early 1980s onwards, which would form the “Neo-Structuralist” school.

The chapter contains seven sections. Section I discusses why the technology gap between center and periphery emerges and persists, leading to asymmetric patterns of specialization in the international economy. Section II addresses the effects of these patterns on the equilibrium rate of economic growth. Section III is concerned with income distribution, in particular with heterogeneity in the labor market and the Prebisch-Singer hypothesis (deterioration of the terms of trade). Section IV puts the various parts of the Structuralist approach together in a diagram. Section V focuses on dynamics and section VI draws policy implications. Differences between the old Structuralist School and the New Structuralist School in LAS are highlighted to illustrate the evolution of the theoretical debate and analytical tools of LAS. A final section concludes.

I. The international diffusion of technology and the emergence of the center–periphery system
The Industrial Revolution accelerated technological and structural change, initially, in a few countries whose production structures were transformed by innovation, the emergence of new industrial sectors and new production processes. The diffusion of technology, along with the correlated transformation of the economic structure, was highly asymmetric in the international arena. In the words of Prebisch, the international diffusion of technology was “slow and uneven”. The result of this asymmetry was the emergence of an international system in which two ideal-types co-exist: a diversified center, whose structure encompasses a large number of activities, in particular high-tech sectors; and a highly specialized periphery, whose structure comprises few, mostly low-tech activities, intensive in unskilled labor and/or natural resources. The penetration of new technology in the periphery is partial, localized, concentrated in export activities, and therefore transforming only a handful of industries. These industries absorb a small part of the total labor force, while the rest remains in unemployment or underemployment (Prebisch, 1976; Pinto, 1976; Sunkel, 1978).

This description of the center-periphery system has a strong Schumpeterian flavor. It identifies development with structural and technological change as in Schumpeter (1942, chapter 7). However, when the center-periphery theory was formulated, structuralist economists did not have a microeconomic theory explaining the macroeconomics of divergence—i.e. why the technology gap fails to spontaneously decline over time or why the international diffusion of technology is “slow and uneven”. The reasons behind divergence in capabilities were then framed in terms of economies of scale and the mismatch between the lack of capital in the periphery and the high capital-intensity of modern industry. Only in the second half of the 1970s and in the 1980s, LAS began to draw more systematically from the evolutionary theory of technical change to explain rigorously why differences in capabilities and specialization are so large and persistent.

This more sophisticated perspective on the dynamics of technical change would become one of the pillars of what would be subsequently called “Neo-Structuralism”. Fernando Fajnzylber, a leading representative of the Neo-Structuralist school, observed that multinational
firms played a crucial role in the most dynamic sectors of the Latin American economies. However, these firms concentrated the creative side of the Schumpeterian process of creative destruction in the center countries, while the destructive side (the elimination of “old” sectors, technologies and competitors) occurred mostly in the periphery (Fajnzylber, 1983, 1990; Katz, 1987). In other words, creative destruction is highly asymmetric across countries and regions. Other Structuralist authors further advanced these ideas by taking advantage of an increasing amount of empirical evidence—part of which was produced by ECLAC itself—on the barriers to learning and structural change in the Latin American industry. In addition, new evidence regarding the role of the industrial and technological policies (ITP) on structural change came from the successful experience of the so-called South East Asian “tigers” in the 1960s and 1970s. The works of Amsden (1989) and Wade (1994) were highly influential, offering a detailed account of the importance of such policies for catching-up in Asia, and providing new insights on why they were less successful in Latin America.

Based on this evidence, Structuralists observed that divergence between center and periphery was not the inevitable outcome of international competition. Rather, divergence was one of various alternative paths crucially related to policy decisions. In more formal terms, the dynamics of center and periphery may produce multiple equilibria: in the successful cases of catching up, which occurred mostly in SE Asia, ITP was crucial to pick the equilibrium with a lower technology gap, a more diversified pattern of specialization and a higher rate of economic growth. On the other hand, although ITP did encourage convergence in some periods in Latin America (especially in the case of Mexico and Brazil during Hirschmann’s “glorious thirties”, between 1950 and 1980), these policies faltered after the debt crisis of the 1980s (Peres, 2009). The lost decade of the 1980s along with the prevalence of neoliberal views in economics in the

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4 The literature is extensive, cf. Chang (2001, 2002); Palma (2010); Nassif et al (2011, 2016); Doner and Ross Schneider (2016); on Korea see Lee (2013) and Koo (2013).
1990s, led to the discontinuity of industrial policies until the 2000s. Divergence prevailed, and the region fell behind most of the time between 1980 and 2004 (Bértola and Ocampo, 2012). After 2004, the commodity boom substantially eased the external constraint on growth for exporters of natural resources (especially minerals) in South America, opening a new phase of rapid growth until the Great Recession of 2008 (ECLAC, 2012).

The prevailing mainstream approach to technical change in the 1980s (which saw technical change as either exogenous or a pure externality stemming from capital accumulation) was of little help in the effort to interpret the empirical evidence coming from the contrasting experiences of Latin America and the SE Asian tigers, and from case studies of the Latin American industries. The evolutionary school, on the other hand, offered a more promising avenue. With its emphasis on tacit knowledge and the importance of experience and sector-specific learning by doing, the evolutionary school allowed Structuralists to discuss path-dependence, hysteresis and lock-in effects in technology and specialization. These phenomena play a crucial role in divergence and help understand why an economy can be trapped in a “bad” (slow-growth, slow-learning type of) equilibrium. The works of Nelson and Winter (1982) and Arthur (1994), among others, discussed dynamic increasing returns and cumulativeness in technology, giving rise to market concentration and the sluggish expansion of the demand for the goods produced in the periphery.

The idea that technological capabilities and learning are to a large extent “tacit” (i.e., they cannot be transmitted as blueprints or codified information, but depend on experience and are embodied in the routines of the firm) challenges the notion that all firms are homogeneous and that relative prices would suffice to provide the necessary stimulus for choosing the most efficient technology and specialization patterns. The evolutionary school provides the analytical tools required to discuss the persistence of asymmetries in technology and patterns of specialization, as well as the crucial role of ITPs in transforming the economy (Cimoli and Dosi, 1995). This school would then become the microeconomic foundation of the Neo-Structuralist approach to the dynamics of convergence and divergence between center and periphery.
II. Growth and the Balance-of-Payments constraint: technology, specialization and the real exchange rate

The center-periphery approach has important implications for the analysis of growth and income distribution within the periphery. This analysis requires combining the evolutionary supply side (discussed above) with a Keynesian view of the demand side in open economies. This section concerns itself with economic growth; the next section discusses income distribution.

The persistence of the technology gap implies that the periphery specializes in low-tech sectors, which typically tend to exhibit a lower income-elasticity of demand than advanced, sophisticated goods. As a result, the income elasticity of demand for exports from the periphery \(\varepsilon\) tends to be low, while its poorly integrated, porous production matrix entails a very high income-elasticity of imports \(\pi\)^5. The difference between the income elasticity of exports and imports brings forth an unsustainable external disequilibrium when the periphery raises its rate of economic growth above the rest of the world. Assume, for instance, that initially center and periphery grow at exactly the same rate \(y^P = y^C\), where \(y^P\) is the growth rate of the periphery and \(y^C\) the growth rate of the center). If the effect of changes in the real exchange rate (RER) are excluded (this assumption will be abandoned later), then the growth of exports and imports solely depends on the income elasticity of exports \(\varepsilon\) and the income elasticity of imports \(\pi\). If \(\varepsilon < \pi\), a persistent deficit in current account will raise the external debt to GDP ratio over time in the periphery^6. Such a deficit cannot be sustained in the long run. If the income elasticities cannot be modified, then the periphery will have to reduce its rate of economic growth to equalize the rate of growth of the demand for exports and imports. In other words: the periphery


^6 The correct approach to the external constraint on growth requires looking at the country’s current account balance, as it is this balance which defines whether growth (and indebted, if there is a deficit) is sustainable or not in the long run. It will be assumed throughout the chapter that factor incomes and unilateral transactions are negligible, implying that the current account balance and the trade balance are equal.
will adjust its rate of economic growth downwardly, making $y^p < y^c$, to attain external equilibrium when $\varepsilon < \pi$.

This type of reasoning is exemplary of a strong convergence of LAS with the Post-Keynesian tradition in analyzing open economy growth models. Both traditions argue that in the long run, the rate of economic growth of the periphery is Balance-of-Payments constrained (Thirlwall, 1979). The idea of BOP-constrained growth is captured by the following equilibrium condition of the current account:

$$y^p = \frac{\varepsilon y^c + (1+\vartheta+\mu)\hat{q}}{\pi},$$

As mentioned, $\varepsilon > 0$ is the income elasticity of exports, $\pi > 0$ the income elasticity of imports, $y^p$ and $y^c$ the growth rate of the periphery (with external equilibrium) and the center, respectively, $\vartheta < 0$ the price elasticity of exports, $\mu < 0$ the price elasticity of imports, $q = P^*E/P$ is the RER, $P^*$ are foreign prices, $P$ domestic prices and $E$ the nominal exchange rate (price of the foreign currency in terms of the domestic currency). For simplicity, it is assumed that there is neither an initial debt nor capital inflows that could allow the periphery to grow at a higher rate than what is permitted by current account equilibrium. The well-known Marshall-Lerner condition implies $(1 + \vartheta + \mu) > 0$. In the long run the RER should be stable (it cannot increase or fall without bounds) and hence $\hat{q} = 0$, which renders the simplest version of the BOP-constrained growth rate:

$$y^p = \frac{\varepsilon y^c}{\pi}.$$

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7 For an account of how BOP-constrained growth models emerged and developed in the literature, see Thirlwall (2011); for a rigorous presentation of the model, see Blecker (2011); for a discussion contrasting the neoclassical and Keynesian views of the growth dynamics see Setterfield (2011); for an early formulation of this idea in LAS see Rodriguez (1977).
This result has been labeled Thirlwall’s Law after it was derived by Anthony Thirlwall from a dynamic system of demand equations for exports and imports. Convergence between center and periphery requires $y^p > y^c$, and hence $\varepsilon > \pi$.

Since the income elasticity ratio depends on the production structures of center and periphery (and hence on the technology gap), then in the long run, growth, convergence, technical change and structural change must go hand in hand (Dosi et al, 2015). Convergence requires developing indigenous capabilities to change the elasticities. There are exceptional periods in which the periphery wins “the commodity lottery”—if and when it produces a commodity in very high demand in the international markets—and the external constraint is eased without developing new capabilities. However, except for such exceptional periods, attaining a higher rate of economic growth than the center (convergence in income per capita) requires closing the technology gap (convergence in technological capabilities) and diversifying the economy (structural change).

An expanding Keynesian literature has been exploring the implications of this open economy model. From the LAS-Keynesian perspective, growth is not considered—as in the neoclassical tradition—a purely supply-side driven process. Technological backwardness in the periphery does not automatically lead to slower growth by reducing the rate of growth of total factor productivity.\(^8\) The effect on growth of leads and lags in innovation and diffusion of technology is mediated by changes in the pattern of specialization. As this pattern varies, so does the demand for exports and imports and the BOP-constrained equilibrium growth rate. Formally:

\[^8\text{Krugman (1988) calls the } y^p/y^c = \varepsilon/\pi \text{ result the 45}^\circ \text{ degree-rule out of its strong support in empirical trade studies (i.e. plotting the relative rate of growth against the elasticity ratio for a sample of countries gives a straight line with slope equal to one). This author, however, inverts the causality of the Thirlwall-LAS approach. He considers that technical change is the causa causans of growth, while the income elasticity of the demand for exports and imports endogenously adjusts to ensure that the equality } y^p/y^c = \varepsilon/\pi \text{ is validated. For a discussion of different closure equations consistent with the Balance of Payments constraint, see Dutt (2000), Ros (2013), Pérez Caldentey (2015), Blecker (2016) and Porcile and Spinola (2018).}\]
Equation (3) states that the ratio between the income elasticity of exports and imports is a function of the technology gap, \( G = \log(T_i^C/T_i^P) \), where \( T_i^C, i = C, P \) are technological capabilities in center and periphery, respectively. Behind this result lies the idea that—as mentioned—technology is the crucial determinant of the pattern of specialization and the BOP-constrained growth rate in the long run.

Note that in Thirlwall’s Law (as stated in equation 1) only changes in the RER can affect economic growth, but not its level (see the discussion in Blecker and Setterfield, 2019, chapter 9). Since in the long run \( \dot{q} = 0 \), then the RER is not in the argument of the BOP-constrained growth function in the simplest version of Thirlwall’s Law (equation 2). However, this result has been contradicted by the empirical evidence (Rodrik, 2008; Ffrench-Davis, 2012; Razmi et al, 2012; Cherkasky and Abeles, 2018). Moreover, LAS and Keynesian economists have challenged, also from a theoretical standpoint, the view that the level of the RER is ineffectual in shaping the BOP-constrained rate of growth (Blecker, 2016). The recognition that \( q \) matters for growth is the second pillar that distinguishes the Neo-Structuralism from the old Structuralism (being the first pillar, as mentioned above, a more sophisticated understanding of technical change at a micro level).

What are the avenues through which the RER can influence the BOP-constrained equilibrium rate of growth in the Post-Keynesian and Neo-Structuralist traditions? One possible mechanism is that a higher RER compensates (at least partially) for the competitive disadvantage associated with technological backwardness in the periphery (this is the mechanism suggested, for instance, in Cimoli and Porcile, 2014, and Oreiro, 2016). Depreciation (a higher \( q \)) may help the periphery to diversify and remain competitive in a broader set of goods, particularly in goods in which the technological disadvantage is not so large. To the extent that the RER affects the pattern of specialization, it also affects (as discussed above) the BOP-constrained growth rate. This mechanism is probably relevant for sustaining competitiveness in medium-tech sectors,
while it is highly unlikely that a high RER could effectively provide a competitive edge for the periphery in high-tech sectors.

A second mechanism involves hysteresis phenomena related to the loss of technological capabilities, or at least to a slower accumulation of such capabilities with respect to the movement of the international technological frontier. The loss of firms, activities and capabilities during a period of RER appreciation compromise learning and reduce technological spillovers across sectors in the domestic economy. In addition, phases of RER appreciation are associated with subsequent phases of debt crises, economic recession and a sharp fall in the investment rate (Moreno-Brid, 2003; Botta, 2009; Ocampo et al, 2009; ECLAC, 2016). The collapse of investment compromises the steady absorption of new technology. As a result, when the RER returns to a more competitive level and investments recover, crucial capabilities are no longer in place to help the periphery reinitiate the process of diversification and catching up. There is a hysteresis factor at work associated with a new (higher) technology gap in equilibrium. The persistence in time of a temporary loss in capabilities and learning is the expression of the so-called “Red Queen Effect”, i.e. the need to continuously run to remain in the same place in the technological race when the international technological frontier is shifting.

When the interactions between RER, specialization and technology in the BOP-constrained growth model are taken into account, the relative South-North growth function becomes:

\[ \frac{y_P}{y_C} = y(\theta G, q) \]

with \( \theta_G < 0 \) and \( \theta_q > 0 \)

At variance with equation (3), the equilibrium relative rate of growth is now a function of the technology gap and the RER (through its direct effect on diversification and indirect effect on

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9 The loss of export markets, in particular, is especially costly in terms of learning because these markets are more exigent and subject to more intense competition.
learning and investment). Equation (4) condenses the Neo-Structuralist view, in which both a fall in the technology gap and a rise in the RER boost competitiveness and curb the BOP constraint on growth.

The importance of the RER in sustaining growth when the economy is BOP-constrained, and the impact of periods of RER appreciation on investment and the production structure of the country (impact that goes beyond short term fluctuations, due to hysteresis phenomena and loss of capabilities), explain why neo-Structuralists strongly support: (a) macro-prudential policies and capital controls, especially in periods of high financial liquidity in the international system, to avoid the appreciation of the domestic currency, credit bubbles and the risk of an explosive path of the external debt; (b) anti-cyclical policies aimed at sustaining public and private investments throughout the economic cycle, in order to keep the catching up effort, preventing the technology gap from widening; (c) exchange rate policies aimed at keeping the RER stable and competitive 10.

III. Income distribution, structural heterogeneity and the Prebisch-Singer hypothesis

The production structure shapes income distribution before taxes and transfers in two ways. Firstly, a poorly diversified production structure implies a lower BOP-constrained growth rate and hence, ceteris paribus, a less dynamic demand for labor. Second, a low-tech production structure demands mostly unskilled workers, offering fewer opportunities to learn and accumulate specific skills and knowledge. Both forces reduce the bargaining power of labor and hence the ability of workers to translate productivity growth into higher real wages. The weakness of the labor market is aggravated by the existence of a large reserve army in developing

10 Among others, see on RER and growth Ffrench-Davis and Ocampo (2001); Bresser-Pereira (2008); Frenkel and Rapetti (2011); Missio et al (2015); Neto and Porcile (2017) and Guzman et al (2018).
economies (usually in the form of a large informal sector), which puts a downwards pressure on wages and creates a cleavage between the earnings of formal and informal/subsistence workers.

A large share of total employment in low-productivity and subsistence sectors is a distinctive feature of the periphery. It reflects the limited penetration of technical change in the production structure, creating few high-productivity jobs. It also implies the persistence of substantial productivity gaps between modern (usually export-oriented) sectors and the rest of the economy, which LAS labels “structural heterogeneity”. Such productivity gaps are also present in center economies, albeit in a less marked and less pervasive form. For this reason, LAS characterizes the periphery as “heterogeneous” in opposition to the more homogenous levels of labor productivity prevailing in the center economy.

The downward pressure on wages contributes to what is usually regarded as one of the main LAS insights, namely the theory of the deterioration of the terms of trade (the Prebisch-Singer hypothesis). This theory argues that in the long run the terms of trade of the periphery falls as workers and firms fail to retain the fruits of technical progress in the form of higher wages or higher profits. On the one hand (as discussed above), the weakness and fragmentation (structural heterogeneity) of the labor market prevent the periphery from transforming productivity gains in higher real wages. On the other hand, the periphery cannot capture productivity gains in the form of higher profits due to the nature of its export and import markets. Since the periphery specializes in low-tech, homogeneous goods, it competes in sectors in which entry barriers are relatively low. Technology is widely diffused in these sectors, and prices tend to fall pari passu with technical change. Inversely, the periphery imports technology-intensive goods, whose markets comprise high entry barriers associated with advanced technological capabilities that are difficult to master. Firms in the center are therefore price-makers: they can secure oligopoly rents through innovation. In the typology suggested by Reinert (2006), the

\[\text{11 Even if large disparities in productivity across industries exist in the center, the share of informal and subsistence workers in total employment is very low as compared to the periphery.}\]
prevailing mode of social distribution of the gains in productivity in the periphery is “Ricardian”, based on the fall in prices (benefiting everyone in the international economy), while what predominates in the center is the “collusive” mode, by which such gains are captured either by oligopolistic firms or by workers organized in powerful labor unions (productivity gains are therefore kept in the center)\textsuperscript{12}.

The empirical debate over the evolution of the terms of trade attracted much attention when it was first formulated in the 1950s and continues to be controversial (for a review see Razzaque et al, 2007). Contrasting results have been found in the literature, associated with the use of different price indices commodities bundles, definitions of the terms of trade and time periods. All in all, the evidence mildly favors the Prebisch-Singer hypothesis. While the commodity boom of the 2000s reinvigorated the Ricardian prediction that natural resources would become increasingly more expensive than industrial goods, Ocampo and Parra (2010) show that this is not the case when commodity prices are studied from a very long-run perspective (i.e, from the late 19\textsuperscript{th} century to the first decade of the 21\textsuperscript{st} century). Similar results are reported by Erten (2010) for a shorter period of time (1960-2006). She stresses that the declining trend in the terms of trade does not take the form of a smooth, continuous process but, on the contrary, punctuated by discontinuities and structural breaks. This author also shows that such a trend is an attribute of the developing economies rather than of the (broadly defined) types of goods they export (manufactures versus primary goods). Developing economies that are major exporters of manufactures showed an even more acute decline in their terms of trade than non-oil exporters of primary goods.

\textsuperscript{12} Reinert (2006) argues that “(T)he benefits of technology clearly spread in the economy in a different pattern from what the classical and neoclassical economists expect. I call this the collusive mode of diffusing the benefits from technological change: the benefits are divided among the capitalists, the workers, and the government in the producing nation. (The word collusive does not imply a conspiracy. This collusion comes about by the normal working of the economic, social, and political forces”.
The debate over the terms of trade is important for many reasons. It alerts policy-makers about the “fallacy of composition” (Blecker and Razmi, 2010) and the risks of following a “desperate export strategy” that may bring about “immiserating growth”. In addition, it reinforces the need to address the dynamic forces of technological and structural change behind the decline of the terms of trade. The fact that the relative price of both primary goods and manufactures exported by developing economies declined underlines the importance of building more sophisticated capabilities in these countries to allow them to capture the benefits of technical change and international trade.

IV. A schematic representation of LAS

The existence of a technology gap and the self-reinforcement mechanisms that link structural change, labor demand and economic growth are the main drivers of international divergence and convergence. They explain the high vulnerability of periphery economies to trade, finance and technological shocks. These interactions are represented—in a highly stylized form—in Figure 1.

Relative productivity, relative wages and specialization

The diagram begins assuming the existence of a technology gap between center and periphery. The story is told from the standpoint of the periphery and takes the growth rate of the center \( y^C \) as exogenous. The technology gap is defined in Box A as \( G = \log(T^C/T^P) \). Asymmetries in productivity between center and periphery increases with the technology gap. These asymmetries, in combination with the relative wage, define the sectors in which the periphery is competitive in the international markets. In other words, they define the pattern of specialization, being the periphery less diversified than the center and specialized in low-technology sectors (Box B). Such specialization results in a lower relative (periphery/center) rate of growth consistent with external equilibrium (Box C).

It is assumed that the higher the technology gap, \textit{ceteris paribus}, the lower is the technological intensity of the production structure of the periphery and the lower the BOP-constrained equilibrium rate of growth. The asymmetry in technological capabilities could be to
some extent compensated by a lower relative wage and/or a higher nominal exchange rate in the periphery, which raises the RER and boosts price-competitiveness and diversification\textsuperscript{13}. This compensating effect captures the role of the level of the RER in growth as argued by the Neo-Structuralists.

\textsuperscript{13} A rise in relative wages produces \textit{ceteris paribus} a rise in relative South-North prices, if firms in both regions set prices by applying a constant mark-up on unitary costs. Assume prices are set following the mark up rule, $P_i = z^i(W_i/a_i)$, $i = C, P$, where $z > 1$ is the mark up factor, $a$ is labor productivity and $i = C, P$. Assume $P^i$ is a composed price index of the goods produced in country $i$. Therefore, it will be true that the RER equals $q = \frac{P_C}{P_P} = \frac{z^C (W_C/a_C)}{z^P (W_P/a_P)}$. Ceteris paribus, the RER will fall with a rise in the periphery-center relative wage.
The relative periphery / center rate of growth, in combination with productivity growth (see below), gives the relative rate of growth of labor demand in the periphery vis-à-vis that in the center (Box D). The supply of labor, in turn, is represented by the elasticity of labor supply in response to rising wages in the periphery (Box E). By combining the supply and demand of labor in the labor market, it is possible to find the relative center / periphery wage (Box F). Wages in center and periphery must be expressed in the same unit; this is why the nominal wage in the center is multiplied by the nominal exchange rate in the periphery, defined as units of the
periphery currency per unit of the center currency. The nominal exchange rate $E$ varies with the countries’ exchange rate policy.

In the special case in which the periphery is Lewisian (infinite supply of labor), the adjustment process in the labor market takes the form of a rise in employment and the corresponding contraction of the labor reserve army (fall of underemployment and informality). In a “modified Lewisian” center-periphery model, the relative wage is constant—modified with respect to the traditional Lewisian model, in which the real wage is constant. If, on the other hand, relative wages (and with them the terms of trade) vary, international competitiveness and the pattern of specialization will change.

Figure 1 also shows that growth and diversification have a feed-back effect on the technology gap. A more diversified production pattern implies a higher rate of growth which—through learning by doing as in the Kaldor-Verdoorn Law—reduces the technology gap (Box G). Another learning-enhancing effect of diversification is related to technological externalities generated by the diversified set of skills and knowledge that exist in a more complex economy. Diversification by itself can help reduce the technology gap, as represented by arrows pointing in the two directions between Boxes A and B.

Figure 1 facilitates viewing LAS through both Schumpeterian and Keynesian lenses. Boxes A and B are clearly Schumpeterian (supply side and technology-driven), while Boxes C and D are predominantly Keynesian (demand-driven); Box G (Kaldor-Verdoorn) combines Keynesian and Schumpeterian forces, as demand growth and learning reinforce each other. The boxes related to the demand and supply of labor, and to the behavior of the RER, give a crucial role to the institutions of the labor market and to the exchange rate policy in defining growth as well as income distribution in the periphery, a topic expanded in the next section.

V. Dynamics: technology, specialization and the labor market

This section addresses the dynamics of the LAS diagram of the previous section. There are four endogenous variables: relative South-North growth (convergence), the relative South-North wage, the technology gap (relative North-South technological capabilities) and the degree of
diversification and sophistication of the pattern of specialization of the South. As a constant markup is assumed, which implies that changes in relative wages and in the nominal exchange rate directly translate into changes in the RER (see footnote 12).

The state variables move with different velocities. Changes in technological capabilities tend to occur at a much slower pace than changes in wages and growth. The short run is defined as the period in which both the labor market and the current account attain equilibrium (defined by a constant RER and a zero current account balance14), while the technology gap is constant. In the long run, technological capabilities vary, and the technology gap moves towards its equilibrium position.

The long run: The National System of Learning and the dynamics of the technology gap

To keep the LAS story as simple as possible, it is assumed that technological learning comes as an externality to all firms, stemming from international technological spillovers from the center to the periphery. The idea is that the higher the technology gap, the higher the opportunities for learning and the higher the potential technological spillovers from which the periphery may benefit.15 These potential spillovers, however, will only become actual learning if the periphery builds up the required absorptive capabilities—which includes indigenous R&D, education and training, policies for encouraging more technology-intensive industries, and support to public and private institutions engaged in innovation and diffusion of technology. The

14 As mentioned, it is assumed that there are neither income factors payments abroad nor unilateral transfers, and therefore the current account and the trade balance go hand in hand.

15 Verspagen (1993) convincingly argues in favor of a more realistic nonlinear relationship between the rate of growth of the technology gap and the level of the gap. A monotonous decreasing relation between the two variables will be assumed to keep the model simple, while acknowledging that the actual dynamics is much more complex than the one discussed in this section.
set of enabling conditions shaping the absorptive capacity of the periphery is the National System of Learning (NSL).

Formally, the rate of growth of the technology gap is an inverse function of the gap itself \( G \), potential technological spillovers and an exogenous parameter \( \mu \) that represents the NSL, i.e., the efforts of the periphery to adopt, adapt and improve on foreign technology. For simplicity, it will be ignored the influence of the RER and diversification in the evolution of the technology gap (more on this below). Formally:

\[
\dot{G} = G(G, \mu), \quad G_G < 0, \quad G_\mu < 0
\]

There is an equilibrium value of the technology gap (that makes \( \dot{G} = 0 \)) for which the effective spillovers that benefit the periphery exactly matches the creation of new capabilities in the center. In other words, the velocity with which the center creates new technology is equal to the velocity with which the periphery absorbs these innovations. Such an equilibrium value of the technology gap is a negative function of the NSL represented by \( \mu \). An increase in \( \mu \) shifts the \( \dot{G} \) curve to the left and reduces the technology gap in equilibrium. This in turn has a positive effect on the pattern of specialization (namely, structural change towards more technology-intensive goods), the income elasticity ratio and the BOP-constrained rate of growth.

**The dynamics of the labor market and the real exchange rate**

The short run dynamics leads to equilibrium in the labor market and in current account.\(^{16}\) Equilibrium is defined as a situation in which economic agents have no motives to change behavior. Equilibrium in the labor markets implies that workers neither demand higher wages nor accept lower wages than those prevailing in the market, while firms do not have incentives to change the prices they charge or the quantity of labor they demand. In turn, current account

\(^{16}\) Our short-run equilibrium corresponds to the medium-run equilibrium suggested in Carlin and Soskice (2000). Recall that in during the adjustment of the economy to its short-run equilibrium, the technology gap is constant.
equilibrium implies that the existing levels of investment and consumption are compatible with a zero current account balance. Therefore, there are no turbulences in the external sector leading firms and consumers to revise expectations and decisions.

Take first the behavior of the labor market. The isocline \( \dot{q} = 0 \) shows all the combinations of relative growth and RER that keeps the RER constant. It represents a situation in which workers are satisfied with the relative wage they have, given the relative rate of growth. The link between growth and RER in the labor market is given by changes in prices and in the bargaining power of workers. How does a stable relation between growth and RER is attained?

Assume that initially there is an increase in the periphery / center relative growth \( (y = y^P / y^C) \) that heightens the demand for labor in the periphery as compared with the demand for labor in the center (the rate of relative growth increases from \( y_1 \) to \( y_2 \)). The economy moves from point \( A \) to point \( B \) in Figure 2. Higher growth implies a higher demand for labor and a higher bargaining power of the workers, particularly if there are organized labor unions. As a result, part of the rise in the demand for labor takes the form of a rise in wages. The rise in wages leads to a rise in prices, assuming a constant mark-up factor as before. The rise in prices in the periphery (with constant prices in the center) entails a fall in the RER. At the end of the adjustment process, the relative wage moved in favor of the periphery and the RER appreciated (from \( q_1 \) to \( q_2 \)). The labor market will be in a new equilibrium in the growth \( \times \) RER plane in point \( C \).

In other words, the higher the rate of growth, the higher the bargaining power of workers, and the higher (the lower) the relative wage (RER) that is necessary to satisfy union’s demands in equilibrium.\(^{17} \) This is why the slope of the \( \dot{q} = 0 \) isocline is negative. In the special case of a “modified Lewisian” labor market, workers have no bargaining power. The entire effect of the rise in the demand for labor will be a reduction of underemployment (and the consequent rise in formal employment), without affecting relative wages and prices (the \( \dot{q} = 0 \) curve is vertical at

\(^{17} \) Note that it is assumed that firms are also in equilibrium in the sense that they are applying their desired mark-up factor over unit wage costs and using efficiently labor and capital.
the level defined by the subsistence wage in the periphery).\textsuperscript{18} Equilibrium in this case means that the rate of growth of labor demand equals exactly the rate of growth of the labor supply drawn from the labor reserve army, with no changes in the RER.

Figure 2. Labor Market Equilibrium: the $\hat{q} = 0$ isocline

The institutions of the labor market—such as the degree of unionization, social legislation, minimum wages and unemployment benefits—may either hinder or boost the bargaining power of workers. In this way they affect the position and slope of the $\hat{q} = 0$ isocline. In addition, since the relative wage in center and periphery are evaluated in the same currency, changes in the

\textsuperscript{18} For a more general discussion of the implications of a labor surplus for growth in developing economies, see Ros (2013).
exchange rate policy also shift the $\hat{q} = 0$ curve, especially when workers do not have the capacity to fully neutralize the impact of devaluations on real wages.

**Current account equilibrium, the animal spirit and the dynamics of aggregate demand**

The forces that bring about current account equilibrium are represented in Figure 4 by a conventional $CC = 0$ curve. Plotting relative growth against the RER when the current account is in equilibrium produces a positively sloped curve. If the periphery increases its rate of economic growth, imports of goods and services will grow accordingly. A higher real exchange rate will then be necessary to bring forth the exports required to pay for those imports. Inversely, if the relative rate of growth falls triggering a fall in imports, then external equilibrium will be compatible with a lower RER and a lower export growth rate.

How do actors behave when the economy is off the $CC = 0$ curve—for instance if there is a deficit of the current account associated with a high rate of growth, e.g., at point A in Figure 3? The main adjustment mechanism works through changes in expectations associated with a deficit or a surplus of the current account. Private and public expectations will react to current account unbalances. If there are persistent deficits, expectations shift to a pessimistic mood, as a sharp depreciation or fiscal contraction loom in the horizon. The animal spirits falter, investment and consumption fall, and economic growth recedes. As the rate of growth declines, imports decline too, bringing the current account back to its equilibrium path ($CC = 0$).

Inversely, a surplus of the current account induces favorable expectations about the possibility of having a higher rate of growth that is sustainable for a longer period. In this case, investment and consumption move upwards, led by a reinvigorated animal spirit. This is the point stressed by Joan Robinson (1967): “the most important benefit of a surplus on income account, which affects the whole economy, is that, provided that there are energetic enterprises and thrifty capitalist to take advantage of it, it permits home investments to go full steam while a deficit country is nervously pulling on the brake for fear of excessive imports”. As relative grows...
increases, imports will also be on the rise, moving the current account back to its equilibrium path.

**Figure 3. Current Account Equilibrium: the \( \hat{y} = 0 \) isocline**

Based on the behavioral rule discussed above, the \( CC = 0 \) represents the combinations of relative growth and the RER that keep, at the same time, the current account in equilibrium and the relative rate of growth steady. Formally, the \( CC = 0 \) represents the isocline \( \hat{y} = 0 \), the combinations of \( y \) and \( q \) that keep \( y \) constant.

**Combining the equilibrium of the labor market with a balanced current account**

It is now possible to put both curves together: the one representing adjustments in the labor market and the one representing adjustments to current account unbalances. This
combination appears in Figure 4, in which the adjustment process leads to the stable equilibrium \((q^e, y^e)\).

**Figure 4. The short-run equilibrium**

![Graph showing the short-run equilibrium](image)

While relative wages, inflation and the RER are driven by conflicting claims in the labor market (the \(\hat{q} = 0\) isocline), relative growth is driven by changes in expectations and aggregate demand triggered by deficits or surpluses in the external sector (the \(\hat{y} = 0\) isocline). Equilibrium implies at the same time a truce in the labor market and a sustainable path in the external sector.

VI. **Comparative dynamics: the impact of exchange rate, labor market and industrial policies**

The LAS phase diagram permits to study the consequences of adopting different type of policies in the periphery. Figure 5 illustrates the effect on growth and distribution of changes in
the exchange rate policy, while Figure 6 does the same for the industrial and technological policy—the two pillars of Neo-Structuralism.

Comparative dynamics in the short run: exchange rate policy and the institutions of the labor market

Assume there is a change in the exchange rate policy by which the government prevents capital inflows from appreciating the domestic currency and/or accelerates the rate of nominal devaluation. Since the relative wage is defined as \( w = \frac{W}{W^*E} \), a rise in \( E \) (with constant nominal wages in periphery and center) shifts the \( \hat{q} = 0 \) isocline to the right, from \( \hat{q}_1 = 0 \) to \( \hat{q}_2 = 0 \). For the same rate of growth, the equilibrium level of the RER (and the relative wage) is now higher (lower) than before the policy change, increasing from \( q_1 \) to \( q_2 \) in Figure 7. There is a worsening of income distribution in the periphery’s formal labor market\(^{19}\) and a deterioration of the terms of trade. At the same time, the competitiveness of the periphery increases, giving rise to a higher relative rate of growth with external equilibrium. Inversely, a policy that allows periods of financial bonanza to appreciate the real exchange rate and/or delays devaluations to avoid a rise in inflation shifts the \( \hat{q} = 0 \) isocline to the left. Relative growth in this case falls hand in hand with the fall in competitiveness.

A similar effect comes out of a change in the institutions governing the labor market. Any policy that weakens the union’s bargaining power (such as limits to their ability to organize and mobilize resources, lower benefits for the unemployed or lower minimum wage) raises the RER for all rates of relative growth. The \( \hat{q} = 0 \) isocline then shifts to the right. In some cases, the exchange rate policy and the labor market policy may reinforce each other to increase

\(^{19}\) The aggregate net effect on income distribution in the periphery when the real exchange rate appreciates is ambiguous. A rise in the relative wage with lower growth may imply more people underemployed or unemployed, and a higher wage gap between workers in the formal and informal sectors. On the other hand, the deteriorating effect of a higher real exchange rate on real wages and on income distribution in the formal labor market is negative with no ambiguity. The analysis in this chapter focuses on the latter.
competitiveness—for instance, if the government sets a rule by which wages are renegotiated between certain intervals, while the nominal exchange rate adjusts continuously; or if the government negotiates a truce in wage demands as part of a stabilization program after a devaluation of the currency.

Figure 5. Growth, income distribution and the exchange rate policy

Changes in the institutions shaping the bargaining power of labor and/or the exchange rate policy entail a trade-off between growth and relative wages. This trade-off does not emerge, as in conventional models, out of a contradiction between the profit rate and real wages. The economy is not at full employment and hence a direct opposition between consumption and savings is not what constrains investments. What drives the trade-off between distribution and growth is the incompatibility between the RER required to overcome the external constraint and the RER required to attain equilibrium in the labor market. A crucial gap from a development policy point of view is the one that separates the coordinates \((q_3, y_3)\) (which combine external equilibrium and full employment, the horizontal dashed line in figure 4) from \((q_1, y_1)\) (which combine external equilibrium \textit{and} labor market equilibrium). The distance between \(q_1\) and \(q_3\) measures the magnitude of the fall in the relative wage required to attain full employment with
external equilibrium in the periphery. This is also a measure of the intensity of the distributive conflict that besets the periphery — what Gerchunoff and Rapetti (2016) have called a “structural distributive conflict”.

*Comparative dynamics in the long run: industrial policy and the NSL*

A different outcome emerges when the government implements a long-run policy aimed at strengthening the National System of Learning (a rise in $\mu$). To the extent that these policies reduce the technology gap, they also boost diversification and productivity growth in the long run. There will be an increase in “non-price competitiveness”: for all values of the RER, the economy will attain a higher rate of growth with external equilibrium when $\mu$ is higher. In Figure 6, the $\hat{y} = 0$ curve shifts to the left (from $\hat{y}_1 = 0$ to $\hat{y}_2 = 0$) after the rise in $\mu$. The new equilibrium that emerges from the change in policy (in point $B$) entails at the same time higher growth and a better income distribution than the old equilibrium (in $A$). For simplicity, in Figure 6 is assumed that the impact of technological learning and structural change is strong enough as to bring the periphery to full employment with equilibrium in the labor market and in the external sector.

*Figure 6. Growth, income distribution and the industrial and technological policy*
This result reflects the LAS perception of the central role that structural change and technological catching up play in economic development. It also carries important implications for thinking the political economy of development, which was central to ECLAC’s work (Sunkel and Paz, 1980) and the focus of Prebisch’s latest book (Prebisch, 1981). Without technical change and diversification, the economy will be stacked in the bad equilibrium A. Any attempt to boost growth will be curbed by the external constraint. Such an equilibrium entails slower growth, more unemployment and lower wages as compared to point B, making political conflict and instability (and the threat to political democracy) more intense. A change towards full employment equilibrium would require channeling investments towards new, more technology-intensive activities, and away from traditional sectors, with a crucial role for ITP and public investment.

Concluding remarks

This paper summarized some of the key LAS ideas, differentiating—in a highly stylized form—the original LAS from the contributions of the New Structuralism. It is also argued that many of these ideas are nowadays part of a broader intellectual tradition, represented by economic models of growth and distribution combining Keynesian and evolutionary traits.

The evolutionary side of LAS stresses the role of the technology gap in shaping competitiveness and diversification in the periphery. To overcome specialization in a narrow set of goods based on static comparative advantages, it is necessary for the periphery to reduce the technology gap with the center and accelerate technological learning. The analysis of the learning process in laggard economies, technological innovation and diffusion approached LAS to the works of evolutionary economists. In particular, the so-called New Structuralism gradually introduced (explicitly or implicitly) the evolutionary view of technical change as the micro foundations of structural change and international specialization. The concepts of tacitness, path-dependence and lock-in of technological capabilities are central to the understanding of why Latin America failed to converge and of the critical role that ITP plays in catching up.
The Keynesian side, in turn, stems from the perception that the Balance-of-Payments constraint and external vulnerability in the periphery are the chief manifestations (at the macroeconomic level) of center – periphery technological asymmetries. The external constraint on growth curbs the expansion of aggregate demand, reduces the demand for labor and hinders the ability of the periphery to fully absorb, in the modern sector, its large stock of underemployed or informal workers. As a result, “structural heterogeneity” in the labor market tends to persist and debilitates the bargaining power of labor. This makes more difficult for the periphery to transform productivity increases into higher wages. In addition, as the periphery competes mainly in commodity markets with very low technological barriers, it cannot retain gains in productivity in the form of higher profits. These two forces combined explain the trend in the periphery towards the deterioration of its terms of trade (the Prebisch-Singer hypothesis).

To some extent, a competitive and stable RER may help the periphery to diversify exports despite technological backwardness. By fostering price-competitiveness, it would allow the periphery to grow at higher rates and benefit from Kaldor-Verdoorn gains in productivity. However, the RER will not be a useful tool if differences in productivity between center and periphery are too high to be compensated by lower relative wages. In addition, a high RER have negative consequences in terms of income distribution (brings about a fall in real wages). This is why the ITP and the exchange rate policy should be seen as strategic complements, not substitutes, and they must go hand in hand, as the New Structuralists have claimed, in the process of economic development.

Most Latin American countries have kept their capital accounts open since the 1990s—albeit, in a few cases, capital controls have been temporarily applied. In this context, periods of abundant financial liquidity exacerbate the appreciation of the RER and boost external disequilibria, leading to “sudden stops”, debt crises, the collapse of investment and economic contraction or slow growth. New Structuralists has been especially preoccupied with the need to apply prudential macro policies and capital controls to curb the impact of short-term capital
inflows, whose negative effects on growth and technological capabilities extend well beyond short-run cycles.

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