

STRUCTURAL DYNAMICS AND ECONOMIC GROWTH IN DEVELOPING COUNTRIES

José Antonio Ocampo

I. INTRODUCTION

Debates on economic growth since the mid-1980s have left a legacy of analytical innovations and rich empirical contributions. The explicit recognition of the role of scale economies in economic growth (as well as in international and regional analysis), the related revival of ideas expounded by classical development economics, and the contribution of neo-Schumpeterian and evolutionary theories, as well as of institutional economics, are among the most important analytical innovations.¹ On the empirical side, extensive analyses have been made of the relative weight of institutional, policy and geographical factors in explaining the divergence in income levels and growth experiences in the world economy.²

The richness and diversity of analytical paradigms contrast with trends in policy design, where the triumph of liberal economics is the dominant rule. After an era marked by strong State intervention and protectionism, it was expected that less interventionist, open economies would provide the basis for rapid growth in the developing world. These expectations have been largely frustrated so far, however. Latin America represents, in this regard, an outstanding example of a region where the record of economic liberalization has not only been disappointing, but indeed has been considerably poorer than that of State-led (or import-substitution) industrialization.³

Recent controversies shed light on the frustrations that trends in policy making have generated. Nonetheless, this involves going beyond the aggregate dynamics that has been the focus of the recent literature and delving into the analysis of the dynamics of heterogeneous

¹ The recent literature is extensive. Among the most useful contributions, see Romer (1986), Lucas (1988), Taylor (1991), Barro and Sala-i-Martin (1995), Nelson (1996), Aghion and Howitt (1992 and 1998), Ros (2000), and Rodrik (1999 and 2003).

² See, for example, Easterly (2001) and Rodrik *et al.* (2002).

³ On Latin America's recent growth frustrations, see ECLAC (2003b), Stallings and Peres (2000), Cimoli and Correa (2003) and Ocampo (2003c). On the record of State-led industrialization, see Cárdenas, Ocampo and Thorp (2000b).

production structures. In this regard, recent contributions should be complemented by old ideas that have received little attention in contemporary debates, including the growth-productivity connections associated, in particular, with the Kaldorian tradition (Kaldor, 1978) and the linkages among firms and sectors emphasized by Hirschman (1958).

This paper argues that economic growth in developing countries is intrinsically tied to the dynamics of production structures and to the specific policies and institutions created to support it, especially those that facilitate the diffusion of innovations generated in the industrialized world (including, in particular, the development of new branches of production), and the creation of linkages among domestic firms and sectors. Avoiding macroeconomic instability is also essential, if instability is understood in a broad sense that includes not only high inflation and unsustainable fiscal imbalances, but also sharp business cycles, volatile relative prices, unsustainable current account disequilibria and risky private-sector balance sheets. However, macroeconomic stability is not a sufficient condition for growth. The broader institutional context and the adequate provision of education and infrastructure are essential “framework conditions”, but generally do not play a direct role in bringing about changes in the momentum of economic growth.

The paper makes extensive use of concepts elaborated by the old and the new development and growth literature. The elements on which the analysis is built are well known. The particular emphasis and the way they are put together has a number of novel aspects. It is divided into four sections, aside from this introduction. Section II takes a look at some methodological issues and growth regularities. The third section focuses on the dynamics of production structures. The fourth provides a very simple model of the linkages between productive and macroeconomic dynamics. The last draws policy implications.

II. SOME METHODOLOGICAL ISSUES AND "STYLIZED FACTS"

Time series and cross-section analyses have identified some regularities that characterize growth processes. The role of institutions, social cohesion, productivity growth, physical and human capital accumulation, economic policies and geography, as well as the changes in GDP and employment structures that go along with economic growth, are among the variables that have been extensively researched.

The analysis of the causal links among these variables raises two methodological issues. The first relates to the need to differentiate between factors that play a direct role in generating **changes in the momentum of economic growth** vs. those that are essential for growth to take place but that do not play a direct role in determining such variations. This differentiation has been subject to different terminological approaches. Maddison (1991, ch. 1) refers to them as a difference between "proximate" and "ultimate" causality, whereas Rodrik (2003) differentiates between factors that "ignite" and those that "sustain" growth.

Institutions are the best case in point. Everybody would probably agree today that a certain measure of stability in the basic social contract that guarantees smooth business-labor-government relations (including the particular ideologies that serve this purpose), a non-discretionary system of legal provisions and customs that guarantees the security of contracts, and an impartial (and, it is to be hoped, efficient) State bureaucracy are crucial to facilitate modern, capitalist growth. Nonetheless, although in some cases they may become "proximate" causes of growth (or of the lack of it), as in the successful reconstruction (or breakdown) of socio-political regimes, they generally play the role of "framework conditions" for economic growth rather than that of direct causes of changes in the momentum of economic growth. Indeed, an important empirical observation is that some country characteristics, particularly institutional development, are fairly constant over decades, whereas growth is not.⁴ This emphasizes the importance of "proximate" causality or factors that "ignite" growth. We will thus focus on these factors in this paper.

⁴ See, for example, Easterly *et al.* (1993) and Kenny and Williams (2001).

A second methodological issue relates to the fact that a regular feature of economic growth is the simultaneous movement of a series of economic variables: improved technology, human capital accumulation, investment, savings, and systematic changes in production structures.⁵ Yet, these variables are to a large extent **results** of economic growth. Thus, higher investment ratios have usually been regarded as essential for the acceleration of economic growth, but they are largely the result of the accelerator mechanisms generated by dynamic growth. Through the significant externalities it generates, and particularly its complementarity with technology, human capital accumulation is also an essential factor in economic growth, but the accumulation of skills is largely the result of production experience and the expansion of education systems, facilitated by the additional public-sector spending that is generated by successful economic growth. The same can be argued with respect to productivity growth. In particular, as we will emphasize in this paper, if the causal links emphasized by Kaldor --also referred to as the Kaldor-Verdoorn law-- are correct, then productivity improvements are largely the result of dynamic economic growth, a causal link that is just the opposite to that assumed by neo-classical growth theory since Solow (1956 and 2000). This means that disentangling cause and effect or, in empirical analysis, leading and lagging variables, is what growth analysis is all about.⁶ Thus, many of the regularities mentioned in the growth literature may be subject to sharply differing interpretations, depending on the causal links involved.

Empirical analysis is obviously the final test of the significance of any theory. In this regard, it is useful to present five sets of regularities or "stylized facts" that are particularly important for understanding growth experiences in the developing world. Some have been seriously overlooked in recent growth debates.

The first one is the persistence of large inequalities in the world economy that arose quite early on in the history of modern capitalism and have tended to expand through time (Pritchett, 1997). Empirical studies indicate that (absolute) convergence in per capita incomes has been the

⁵ Nonetheless, it has also been argued that there is much less association between some of these variables and economic growth than was traditionally assumed. This has been claimed, in particular, in relation to physical and human capital. See Easterly (2001), Part II.

⁶ There may also be intermediate alternatives: some factors may not "cause" growth in the sense of accelerating the growth momentum, but can block it. Indeed, this is the case of macroeconomic stability, as has already been pointed out.

exception rather than the rule. Indeed, it seems to be a feature only of the more industrialized countries in the post-World War II (WWII) period and, more specifically, in the "golden age" years, 1950-1973. It was not a characteristic of industrialized countries prior to WWII (Maddison, 1991), nor has it been a characteristic of the developing world in the post-WWII period (Ros, 2000, ch. 1).

There have obviously been changes in the world hierarchy, such as the rise of Japan in the twentieth century, the only "peripheral" economy that has really made it to the top. In the developing world, there have also been some changes: the rise of the Southern Cone Latin American countries in the late nineteenth and early twentieth centuries, the broader rise of Latin America in the inter-war period, the rise of Asian NIEs in the post-WWII period, and that of China and India since the 1980s. These episodes of convergence are concentrated at middle-income levels and are associated with the reallocation of labor from low- to high-productivity sectors subject to increasing returns to scale (Ros, 2000). However, on many occasions, such convergence experiences have not endured, and many have ended up in growth collapses (Ros, 2003). The mix of rapid and "truncated convergence" and even collapses and, thus, the high variance of growth experiences in both low- and middle-income countries are also a major feature of international growth patterns.

In any case, despite changes in the economic landscape, the world economic hierarchy is surprisingly stable. This is reflected in the fact that slightly more than three-fifths of the current variance of per capita income levels in the world can be simply explained by the income differences that already existed in 1914, according to calculations using Maddison's (2001) data. Even differences in levels of development in the developing world are remarkably stable.⁷ But the world economic hierarchy goes beyond divergence in per capita incomes. It is associated with the very high concentration in the generation of core technology in those countries and the equally high concentration there of world finance and the home headquarters of multinational firms.

⁷ For example, some of the important differences in per capita income within Latin America were established in the early twentieth century and have been remarkably stable since then (Cárdenas, Ocampo and Thorp, 2000a, ch. 1).

The major implications of this fact are that economic opportunities are largely determined by the position that a particular country occupies within the world hierarchy, which makes climbing the international ladder a difficult task. Essential international **asymmetries** help to explain why the international economy is, in fact, an "**un**level playing field": (i) prohibitive entry costs into technologically dynamic activities and entry costs into mature sectors, which imply that the possibilities open to developing countries may be restricted to the attraction of established multinationals in those sectors; (ii) basic financial asymmetries that are reflected in differences in domestic financial development and in access to and costs of international financing; and (iii) macroeconomic asymmetries that generate quite different degrees of autonomy for the adoption of counter-cyclical macroeconomic policies and even a tendency for developing countries to adopt pro-cyclical policies, due to their dependence on unstable international financing (ECLAC, 2003a).⁸

For these reasons, economic development is not a question of going through "stages" within a uniform pattern associated with the rise in per capita income which industrialized countries have already followed. It is about increasing per capita income, about succeeding in carrying out the required structural transformations, and about employing the appropriate macroeconomic and financial strategies, within the restrictions that each country's position within the world hierarchy creates and based on the internal structures in developing countries that are partly functional to that position and partly determined by their own historical development. This is the essential insight of the Latin American structuralist school (see, for example, Prebisch, 1951, and Furtado, 1961) and of the literature on "late industrialization" since Gerschenkron (see Gerschenkron, 1962, and, for a recent formulation, Amsden, 2001).

A second set of regularities is associated with the fact that growth comes in spurts rather than as steady flows, and thus entails large elements of discontinuity. This is a basic lesson of historical analysis, one that is stressed by those who view the history of technology as a succession of technological revolutions or waves of innovation that gradually spread through the economic system (Freeman and Soete, 1997, and Pérez, 2002, Part I). The view of a growing

⁸ This paper will concentrate on asymmetries associated to the productive sector, and only peripherally to macroeconomic and financial asymmetries. For a more extensive analysis of these, see Ocampo (2003a).

economy as an "inflating balloon", in which added factors of production and steady flows of technological change smoothly increase aggregate GDP, may be a useful metaphor for some purposes, but it ends up overlooking some of the most essential elements of economic development (and technical change). An alternative perspective, derived from structuralist economic thinking (broadly defined), views growth as a dynamic process in which some sectors and firms surge ahead and others fall behind as part of a continual transformation of production structures. This process involves a repetitive phenomenon of "creative destruction" (Schumpeter, 1962, ch. VIII, and Aghion and Howitt, 1992 and 1998). Not all sectors have the same ability to inject dynamism into the economy, to "propagate technical progress" (Prebisch, 1964). The complementarities (externalities) between enterprises and production sectors, together with their macroeconomic and distributive effects, can produce sudden jumps in the growth process, or can block it (Rosenstein-Rodan, 1943; Taylor, 1991; and Ros, 2000) and, in so doing, may generate successive phases of disequilibria (Hirschman, 1958). These views imply, in short, that the dynamics of production structures are an active determinant of economic growth, and thus that growth cannot be reduced to the aggregate dynamics described by the "balloon" theories.

The contrast between the "balloon" vs. "structural dynamics" views of economic growth⁹ can be understood in terms of the interpretation of one of the regularities identified in the growth literature: the tendency of per capita GDP growth to be accompanied by regular changes in the sectoral composition of output and in the patterns of international specialization (see, for example, Chenery, Robinson and Syrquin, 1986, and Balassa, 1989). According to the "balloon" view, these structural changes are simply a by-product of the growth in per capita GDP. In the alternative reading, success in structural change is the key to economic development. The ability to constantly generate new dynamic activities --or, as they will be referred to below, innovations-- is, in this sense, the essential determinant of rapid economic growth. In this view, structural transformations are not automatic or costless. There are always entry costs for new activities. The inability to generate new economic activities --i.e., to cover entry costs-- may thus block the development process. Moreover, success in generating new sectors of production may

⁹ The contrast made here has some elements in common with the contrast between "yeast" vs. "mushrooms" views of economic growth (Harberger, 1998).

also involve “destruction” of previous activities. In Schumpeterian terms, "creation" is generally married with "destruction".

The third set of stylized facts stresses the role that elastic factor supplies for dynamic activities play in the development process. In open economies, this is reflected, at the aggregate level, in the most successful economies’ capacity to attract international capital and, when necessary, labor. The latter feature was more typical of the pre-WWI world, but it has also been a characteristic of the post-WWII period, as has been the outward mobility of labor (particularly skilled labor) from developing countries experiencing weak economic performance. Elastic factor supplies at the aggregate level also imply that demand, as well as supply factors, play a role in long-run growth. This is a critical element in Keynesian and Kaleckian theories of economic growth (Kaldor, 1978, chs. 1 and 2; Robinson, 1962; and Taylor, 1991) which has typically been ignored in neo-classical growth analysis and in the new growth literature.

The internal mobility (i.e., reallocation) of capital and labor towards dynamic activities is even more important. The ability of innovative activities to attract capital and labor is, indeed, the pivotal element in their ability to operate as engines of growth. Indeed, the central feature of pre-capitalist economies was the absence of a **mobile** labor force –(as well as some restrictions on changes in land property and land use), and the ways by which labor mobility was guaranteed were key to the transition to modern capitalist development, as well as an essential determinant of institutional development, as the economic history of Latin America indicates (Cárdenas, Ocampo and Thorp, 2000a).

Lewis (1954 and 1969) provides the essential insight into the role of elastic labor supply in economic development. In a similar fashion, Kaldorian growth-productivity links imply that underutilized labor plays a role in the growth process (Kaldor, 1978, ch. 4). Both views imply that economic growth is to a large extent the result of improved efficiency in the use of available resources, through the reallocation of labor towards activities subject to economies of scale and

scope (specialization),¹⁰ as well as the fuller utilization of underemployed labor in some branches of production, particularly agriculture. As Cripps and Tarling (1973) have pointed out, these observations fit the growth experience of industrialized countries even as late as during the post-WWII golden years. They are even more important in developing countries. Indeed, both classical and contemporary development theory make it clear that rapid economic growth in developing countries is the result of the reallocation of labor towards high-productivity activities subject to increasing returns to scale. This implies that rapid development is the result of the interplay between labor mobility and economies of scale (Ros, 2000; see also Krugman, 1995, ch. 1).

This has also been the essential insight of regional economic analysis ever since its origins, more than a century ago. According to this view, the interplay between these two factors, and their interaction with transport costs, are what lead to the formation of urban and regional “growth poles”, clusters and urban-rural hierarchies (for a modern version of this interpretation, see Fujita, Krugman and Venables, 1999). This insight can be extended to the analysis of international specialization, as Ohlin (1933) made clear in his seminal work on the subject –(even though it was not this but only another part of his thinking, on the effects of relative factor supplies on comparative advantage, that made its way into mainstream analysis). The role of scale economies in international specialization, and the divergence factors that are associated with it, were brought back to trade theory in the 1980s (Krugman, 1990, and Grossman and Helpman, 1991; in relation to developing countries, see Ocampo, 1986). The “vent for surplus” models of international trade, which go back to Adam Smith, provide an alternative source of elastic factor supplies: the existence of un- or underexploited natural resources (Myint, 1971, ch. 5).

The fourth set of stylized facts stresses the dependence of long-run growth patterns on the economy’s trajectory, i.e., path dependence (Arthur, 1994). This is particularly important in economic development due to dynamic economies of scale associated with learning, which

¹⁰ We will refer below to the phenomenon of increased specialization at the firm level (economies of scope) as “economies of specialization”, as it will be assumed (following, indeed, the line of inquiry pursued by Adam Smith) that the opportunities for such specialization are determined by the size of the market and are thus part of the mesoeconomic effects to which we will refer below as complementarities.

imply that the opportunities open to economic agents are largely determined by their production experience. To the extent that economic policies can affect the structure of production, this means that comparative advantages can be created. An interesting historical observation that is relevant in this regard is the evidence that successful experiences of manufacturing export growth in the developing world were generally preceded by periods of import substitution industrialization (Chenery *et al.*, 1986). This implies, in turn, that the loss of production experience may have cumulative effects on growth. This issue was brought forward in the literature on the Dutch disease (Krugman, 1990, ch. 7, and van Wijnbergen, 1984), but it applies equally to the long-term costs of dismantling import substitution activities during economic liberalization.

In a similar fashion, adverse shocks that affect short-term macroeconomic performance may have cumulative long-term effects in the presence of economies of scale (Easterly, 2001, ch. 10). The lasting effects of the debt crises of the 1980s in Africa and Latin America are the most telling example in this regard. Similarly, short-term success may breed long-term growth. There may thus be multiple long-term growth equilibria associated with the macroeconomic trajectories that economies follow. The fact that the formation of macroeconomic expectations involves a significant learning process, particularly in the presence of large macroeconomic shocks, is a basic reason for this (Heymann, 2000).

The still controversial role of economic policy in growth leads to a fifth set of stylized facts, which can be divided, in turn, into two subsets: those that relate to macroeconomic policy and those associated with structural reforms. With respect to the first subset, the disturbing, cumulative effects of debt and, more broadly, balance of payments crises on growth, as well as of domestic savings and fiscal constraints, have been subject to rigorous attention in the literature on macroeconomic “gaps” (Taylor, 1994). High inflation (e.g., above 20%) may also have adverse effects on growth, as a considerably body of literature has argued (see, for example, Barro, 1997, ch. 3). The volatility of growth and key relative prices (real interest rates and real exchange rates) may hurt investment and long-term macroeconomic performance.¹¹ To the extent that different forms of macroeconomic instability are not strongly correlated, one form of

¹¹ See, for example, the empirical evidence provided by Loayza *et al.* (2002).

macroeconomic stability may be chosen at the cost of instability in another sense, implying that macroeconomic stability is not only about low inflation and sustained fiscal deficits, but also about smooth business cycles, stability in key relative prices, and sustainable current account deficits and private sector balance sheets (ECLAC, 2000, chapter 8, and Ocampo, 2003b). Insufficient attention to this broad definition of macroeconomic stability and the tradeoffs involved is certainly one of the reasons why the return to stability, in the limited sense in which this term is widely used today (low inflation and low fiscal deficits), may not generate faster economic growth, as the recent Latin American experience indicates. More generally, the stylized fact can be formulated as follows: macroeconomic instability, in any of its different forms, can kill growth; macroeconomic stability, broadly defined, is thus a necessary but not a sufficient condition for economic growth.

With respect to structural reform policies, a strong focus of the development literature has been on the role of the trade policy regime in economic growth¹² and, more broadly, on the links between economic liberalization and growth. In this area, the attempt to derive simplistic relationships between trade liberalization and economic growth, and even between the trade regime and export growth, has led to misguided conclusions (Rodríguez and Rodrik, 2001).¹³ More broadly, recent empirical research has provided compelling evidence that policy regimes (as well as geographical factors) have no significant effect on growth when institutional factors are taken into account (Easterly and Levine, 2002, and Rodrik *et al.*, 2002). Indeed, in this regard, an additional stylized fact can be advanced: although trade policy, the private-sector/public-sector mix and, more broadly, policy-induced incentives do matter, there is no single rule that can be applied to all countries at any point in time, or to any single country in different time periods, as is conclusively demonstrated by comparative analyses of development experiences (Helleiner, 1994). Indeed, successful development experiences have instead been associated with variable policy packages involving different mixes of orthodox incentives with unorthodox institutional features ("local heresies") (Rodrik, 1999, 2001 and 2003).

¹² See, the survey on the literature of the 1980s by Edwards (1993) and the critical survey of the literature of the 1990s by Rodríguez and Rodrik (2001).

¹³ My own contributions to this debate were included in UNCTAD (1992, Part Three, ch. 1).

Thus, protection has been a source of growth in some periods in specific countries, but has blocked it in others. The same thing can be said of freer trade. Mixed strategies have worked well under many circumstances. The observation, as mentioned earlier, that successful experiences of manufacturing export growth in the developing world were generally preceded by periods of import-substitution industrialization indicate that simplistic generalizations are not useful in this regard. Bairoch (1993, Part I) comes to a similar conclusion regarding protection and economic growth in "late industrializers" among what are now developed countries during the pre-WWI period. He also reaches the paradoxical conclusion that the fastest periods of growth in world trade prior to WWI were not those characterized by the most liberal trade regimes. Indeed, recent research indicates that the link between trade opening and economic growth is at best only a recent historical phenomenon (Vamvakidis, 2002). The degree of openness in the world economy is, obviously, a decisive factor in this regard.¹⁴

Being the region of the developing world where the new liberal policy paradigm has gone the farthest in terms of implementation in recent decades, Latin America provides one of the most appropriate testing grounds for determining the validity of the links between economic liberalization and growth. The post-1990 period was characterized by falling inflation, rapid export growth and booming foreign direct investment, but it was also a time of mediocre economic growth; indeed, growth rates were far below the record levels seen in the period of State-led industrialization in the post-war period (2.6% a year in 1990-2002 vs. 5.5% in 1945-1980). It was also characterized by weak overall productivity performance. Moreover, since some of the microeconomic effects of reforms were significant –as reflected in the rapid growth of productivity in some leading primary, manufacturing and service sectors and firms (Katz, 2000)– the adjustment path involved increased un- and underemployment (ECLAC, 2000 and 2003b, and Ocampo, 2003c).

¹⁴ This is generally forgotten when the period of State-led industrialization in Latin America is analyzed. Import substitution obviously made more sense in the closed world economy of the 1930s-1950s (and in the midst of the protectionist wave that characterized the industrialized world in the late nineteenth and early twentieth centuries) than in the period of gradual but incomplete opening of the industrialized world to the exports of developing countries that started in the mid-1960s (Cárdenas, Ocampo and Thorp, 2000b, ch. 1).

A major reason for this weak growth performance was the deterioration of the trade balance/growth link (Ocampo, 2003a) or, alternatively, of the trade balance/productivity link (Cimoli and Correa, 2003). The structural deterioration of the trade balance/growth link seems to be a feature of most of the developing world (UNCTAD, 1999). This may explain why, despite economic reforms, the balance-of-payments-constrained model continues to be an essential explanation of economic performance in the region (Moreno-Brid, 1999, and Pérez and Moreno-Brid, 1999). This also helps to explain Latin America's high degree of sensitivity to volatile external financing (ECLAC, 2002 and 2003b).

III. THE DYNAMICS OF PRODUCTION STRUCTURES

The central theme of this paper is that the dynamics of production structures are the root cause of changes in the momentum of economic growth. These dynamics interact with macroeconomic balances, generating positive feedbacks that results in "virtuous" circles of rapid economic growth, or, alternatively, growth traps. Some measure of macroeconomic stability, broadly defined, is a necessary condition and, obviously, enters into the corresponding macroeconomic balance. A facilitating institutional environment, and an adequate supply of human capital and infrastructure, are "framework conditions", but are not active determinants of the growth momentum.

The ability to constantly generate new dynamic activities is, in this view, the essence of successful development. In this sense, growth is essentially a **mesoeconomic** process, determined by the dynamics of production structures, a concept that summarizes the evolution of the sectoral composition of production, intra- and inter-sectoral linkages, market structures, the functioning of factor markets and the institutions that support all of them. Dynamic microeconomic changes are the building blocks, but it is the **system-wide** processes that matter most. Moreover, the characteristics of the structural transformation largely determine macroeconomic dynamics, particularly through its effects on investment and trade balances.

The dynamics of production structures may be visualized as the interaction between two basic, though multidimensional, forces, namely: (1) **innovations**, broadly understood as new activities and new ways of doing previous activities, and the **learning processes** that characterize

both the full materialization of their potentialities and their diffusion through the economic system; and (2) the **complementarities, linkages or networks** among firms and production activities, and the **institutions** required for the full development of such complementarities, whose maturation is also subject to learning. **Elastic factor supplies for innovative activities** is, on the other, an essential condition in order for the full effects of these dynamic processes to make themselves felt.

These different mechanisms perform complementary functions: innovations are the basic engine of change; their diffusion and the creation of production linkages are the mechanisms by which they generate system-wide effects; the learning that accompanies these processes and the development of complementarities generate dynamic economies of scale and specialization, which are essential to rising productivity; and elastic factor supplies are necessary in order for innovative activities to operate as the driving force of economic growth.

A. Innovations and associated learning and diffusion processes

The best definition of innovations, in the broad sense in which this concept is used here, was provided by Schumpeter (1961, ch. II) almost a century ago ("new combinations" in his terminology): (i) the introduction of new goods and services or of new qualities of goods and services; (ii) the development of new production methods or new marketing strategies; (iii) the opening up of new markets; (iv) the discovery of new sources of raw materials or the exploitation of previously known resources; and (v) the establishment of new industrial structures in a given sector. Innovations may arise in established firms and sectors --in a constantly changing world, firms that do not innovate will tend to disappear-- but they involve many times the creation of new companies and the development of new sectors of production.

Innovation includes the "creation" of firms, production activities and sectors, but also the "destruction" of others. The particular mix between "creation" and "destruction" --or, alternatively, between the substitution vs. complementary effects of innovations¹⁵-- is critical. The term "creative destruction", coined by Schumpeter (1962), indicates that there tends to be

¹⁵ This is the way Easterly (2001, ch. 9) poses the issue.

net creation. This is, of course, essential for growth, but may not be the actual outcome in any given location at a certain point in time. There may be cases in which there is in fact little destruction, or, on the other hand, large-scale destruction of previous economic activities, or a mixed negative case of “destructive creation”. The more localized we see the effects of a given innovation are, the more likely it is that we will actually see the full typology, as some locations within the world economy may concentrate the “creative” and others the “destructive” effects of innovations (think, for example, of the discovery of a synthetic substitute that generates new activities in an industrial center but puts producers of the natural raw material, which is located elsewhere, out of business). Obviously, for growth to take place, net creative forces must prevail. Accordingly, those are the forces on which we will focus here.

A common feature of the first four forms of innovation is that they involve the creation of knowledge or, more precisely, of the capacity to apply it to production. They thus stress the role of knowledge, mediated by a competitive process, as a source of market power. Viewed from this perspective, success in economic development can be seen as the ability to create enterprises that are capable of learning and appropriating knowledge and, in the long run, of generating new knowledge (Amsden, 2001).

In industrial countries, the major incentive to innovate is provided by the extraordinary profits that can be earned by the pioneering firms which introduce technical, commercial or organizational changes, or which open new markets or find new sources of raw materials. This incentive is necessary to offset the uncertainties and risks involved in the innovators' decisions, as well as the higher costs that they incur due to the cost of developing the new know-how, the incomplete nature of the knowledge they initially have and the absence of the complementarities that are characteristic of well-developed activities.

In developing countries, innovations are primarily associated with the spread of new products, technologies and organizational or commercial strategies previously developed in the industrial centers. The industrial countries' innovations thus represent the “moving targets” which generate the windows of opportunity for developing countries (Pérez, 2001). The extraordinary profits of innovators are generally absent and, indeed, production usually involves

entry into mature activities with thin profit margins. Thus, entry costs are not associated with the development of new know-how, but instead with the process of acquiring, mastering and adapting it. Additional entry costs are associated with generating market information, building a reputation in new markets and, in particular, capitalizing upon opportunities to reduce costs in order to be in a position to successfully break into established production and marketing channels. Entry costs may turn out to be prohibitive for new firms; in this case, the possibilities open to developing countries will be limited to attracting established multinationals that are searching for new places to locate their production activities.

Viewed in this way, “innovations” in developing countries are associated much more closely with the transfer of **sectors** from the industrial world than with technological development as such --or, more precisely, the latter is largely dependent on the former. In this view, climbing up the ladder in the world hierarchy entails shortening transfer periods and gradually becoming a more active participant in the generation of technology. Thus, in the past, innovations have included the development of new export staples, the different phases of import substitution, and the reorientation of import-substitution sectors towards export markets. During the recent liberalization period, they have included the development of assembly activities as the result of the disintegration of value chains in the industrialized countries, the growing demand for some international services (e.g., tourism), the increased export orientation of previous import-substitution activities, the privatization processes and the associated restructuring of privatized firms and sectors, and increased access to raw materials (particularly minerals) as the result of more liberal property rights regimes. On the other hand, in the past the “destruction” of previous production capacities has included the elimination of staples as the result of the development of synthetic substitutes, the contraction of production in a specific location as a consequence of the discovery of new sources of raw materials, and the elimination of artisan production unable to compete with mechanization. In recent years, it has included the disintegration of domestic production chains as the result of international outsourcing, and the dismantling of import-substitution activities unable to compete in a more liberal trade regime.

No innovative process is passive, as it requires investment and learning. Innovations are, indeed, intrinsically tied to investment, since they require both physical investments and

investments in intangibles, particularly in technological development and learning, as well as in marketing strategies. Moreover, to the extent that innovative activities are the fastest-growing sectors of any economy at any given point in time, they have high investment requirements.¹⁶ These facts, together with the falling investment needs that characterize established activities, imply that the overall investment rate is directly dependent on the relative weight of innovative activities (and, obviously, on their capital intensity). High investment is thus associated with a high rate of innovation and structural change.

On the other hand, innovations involve learning. Technical know-how must go through a learning and maturing process that is closely linked to the production experience. More generally, to reduce the technology gaps that characterize the international economic hierarchy -- to “leapfrog” in the precise sense of the term¹⁷-- an encompassing research and development strategy, and an accompanying educational strategy, are necessary. Essential insights into learning dynamics have been provided by the “evolutionary” theories of technical change.¹⁸ These theories emphasize the fact that technology is to a large extent tacit in nature --i.e., that detailed “blueprints” cannot be plotted out. This has two major implications.

The first is that technology is incompletely available and imperfectly tradable. This is associated with the fact that technology is, to a large extent, composed of intangible human and organizational capital. This implies that, in order to benefit from technical knowledge, even firms that purchase or imitate it must invest in mastering the acquired or imitated technology. Since

¹⁶ Outsourcing of technology and some features of information and communications technology may have reduced the need for technological followers to invest in learning and adapting technology. However, they have certainly not eliminated the general link between the development of new activities and the investments associated with them.

¹⁷ “Leapfrogging” is generally used to refer to the adoption of the latest (e.g., modern information and telecommunications) technologies, even when previous technologies were not used in a given location. However, this is just a necessary condition for the successful development of a specific activity at a particular moment in time. It does not necessarily involve rising up through the international economic hierarchy, which is the appropriate sense in which the term “leapfrogging” should be used.

¹⁸ See, in particular, Nelson and Winter (1982), Nelson (1996) and Dosi *et al.* (1988) and, with respect to developing countries, Katz (1987), Lall (1990) and Katz and Kosakoff (2000). Similar concepts have been developed in some versions of the new growth theory in which “knowledge capital” is a form of “human capital” having three specific attributes: it is “embodied” in particular persons, it is capable of generating significant externalities and it is costly to acquire (Lucas, 1988). However, these theories do not capture a basic corollary of these attributes: firm-specificity and the corresponding coexistence of heterogeneous producers in any given sector of production. This fact turns the concept of “representative producer” into an abstraction that eliminates elements that play an essential role in determining the nature of competition and the divergence in the growth of firms, regions and nations through time.

this is the general case in developing countries, it implies that, although technology is largely transferred from industrialized countries, there is still an active absorption process that must take place. This process involves adaptation and may call for redesigns and other secondary innovations, which will further build up human and organizational capital. The efficiency with which this absorption process takes place will determine, in turn, the productivity of the relevant firms. This explains why firms with similar access to “knowledge” will generally have quite different productivities. Different organizational and marketing strategies will generate further firm-specific features, which are the essential factors behind the selection process that takes place in any sector through time. Existing firms or new entrants could challenge any equilibrium in the resulting industrial structure. According to our definition, major break-ups in existing industrial structures are themselves innovations. The entry of developing countries into mature activities also belongs to this category.

The second implication of “tacitness” is that technology proficiency cannot be detached from production experience, i.e., it has a strong “learning by doing” component.¹⁹ Daily production and engineering activities have, in this sense, a “research and development” component. This link is the specific microeconomic basis of dynamic economies of scale.

A third feature of technical change, unrelated to tacitness, indicates that competition will generate pressures that guarantee the generation and diffusion of innovations. As a result of the latter, innovative firms only imperfectly appropriate the benefits from investments in innovations. Intellectual property rights provide a mechanism for appropriating those benefits more fully in the case of technical innovations or new products and designs, but such a mechanism is not present in other forms of innovations (such as the development of new activities or a new marketing strategy). Innovations have thus mixed private/public-good attributes. The rate of innovation depends, then, on the particular balance between costs, risks, benefits and their appropriability (including their legal protection, in cases where this is possible).

¹⁹ This may also apply to technology creation. In this sense, the probability of major innovations, even when they are the result of explicit research and development efforts, depends on the accumulated technological knowledge and production experience of firms.

It must be emphasized that these three attributes of technical change --imperfect tradability, close association with production experience and private/public attributes-- are equally characteristic of other forms of knowledge, particularly organizational and commercial know-how (and, as we will see below, institutional development). The first requires few additional remarks. Imperfect tradability, due to its “social capital” attributes, and imperfect appropriability are paramount in this case. Commercial know-how plays a crucial role that tends to be overlooked in most analyses, and it certainly plays a pivotal role in international trade (Keesing and Lall, 1992). Indeed, one of the most important determinants of the expansion of firms relates to their ability to develop appropriate channels of information and marketing and to build a commercial reputation (goodwill) and a known trademark. Moreover, familiarity with the market enables producers to modify their products and their marketing channels and helps buyers to learn about suppliers, generating clientele relationships that are important to guarantee the stable growth of firms. The crucial role that these factors play is reflected in the fact that marketing departments in larger firms are usually staffed by high-quality personnel. The corresponding capital is organizational in nature and cannot be detached from commercial experience. The dynamic economies of scale are reflected here in reductions in transaction costs, which are associated with the firms’ accumulated reputation and trademark recognition. On the other hand, although the reputation of a particular firm can hardly be copied, its discovery of market opportunities will certainly be imitated. The public-good attributes are thus paramount in this case and play a vital role in determining the level of specialization. As regional analysis has recognized for a long time, the agglomeration of producers of certain goods and services in particular locations is largely determined by this factor.

B. Complementarities and the associated institutional development

Complementarities are associated with the development of networks of suppliers of goods and specialized services, marketing channels, and organizations and institutions that disseminate information and provide coordination among agents. This concept summarizes the role that backward and forward linkages play in economic growth (Hirschman, 1958) but also that of (private, public or mixed) institutions that are created to reduce information costs (e.g., on technology and markets) and to solve the coordination failures that characterize interdependent investment decisions (Chang, 1994).

The development of complementarities has demand as well as supply effects. The demand effects are part of the Keynesian multiplier mechanism; their absence implies, in turn, that Keynesian leakages may be large, as reflected, for example, in high propensities to import from abroad in a particular country (e.g., in purely assembly activities). Thus, the strength or weakness of the complementarities is an essential structural determinant of macroeconomic multipliers. This, together with the association between the rate of investment and innovations, which has already been explored in the previous section, are two of the essential links between economic structures and macroeconomic performance.

The supply effects of complementarities are associated with the positive externalities that different economic agents generate among themselves, through costs reductions generated by economies of scale in production or lower transport and transaction costs (economies of agglomeration), or through the induced provision of more specialized inputs or services (economies of specialization). These “strategic complementarities” are the basis of mesoeconomic dynamic economies of scale that determine the competitiveness --or lack of competitiveness-- of production activities. Under these conditions, competitiveness involves more than microeconomic efficiency: it is essentially a system-wide feature (Fajnzylber, 1990; ECLAC, 1990).

In an open economy, demand linkages may be induced by protection. This may facilitate positive supply (agglomeration) effects, but may also generate costs for other sectors if it involves the protection of intermediate and capital goods. On the other hand, as they cannot be imported, the efficient provision of **non-tradable** inputs and specialized services plays an essential role in guaranteeing system-wide competitiveness.²⁰ Three non-tradable activities are particularly relevant in this regard, and economic policy can thus play a critical role in these cases. The first category is made up of sectors that produce specialized inputs and services, including knowledge, logistic and marketing services, for which closeness to producers who use

²⁰ This also applies to the provision of foodstuffs, particularly perishables, if they affect nominal wages and thus production costs. Indeed, in the early stages of development of modern activities in the developing world, guaranteeing the availability of an elastic supply of foodstuffs was essential and, as such, became an important determinant of the development of new export activities.

the inputs or services is a critical factor. The second is the development of specialized financial services, particularly those that are important in facilitating the innovation process --the supply of long-term and venture capital. Indeed, due to the asymmetric information that characterizes financial markets, financial services (particularly for small and medium-sized firms) are largely non-tradable. The third is the provision of adequate infrastructure.

Institution-building shares the first two features of technological development --imperfect tradability and close association with experience-- and, by its very nature, has dominant public-good attributes. As already indicated, the two crucial services that institutions provide are the reduction of information costs and the solution of the coordination failures that characterize interdependent investment decisions. Many of the relevant institutions may be created directly by the private sector: producer organizations which share information that has public-good attributes, develop joint labor training facilities, and create strategic alliances to penetrate new markets or promotional agencies to encourage complementary investments. However, given their strong public-good attribute, their services tend to be provided in suboptimal quantities. The competitive pressure among firms is quite commonly a major obstacle to the creation and consolidation of such institutions, or a source of competing organizations of suboptimal size.

C. Elastic factor supplies

The capacity of innovations and complementarities to generate strong growth effects depends critically on how elastic the supply of factors of production for innovative sectors is. The crucial role played by the ability of innovative activities to attract capital and labor, and to gain access to the natural resources they need to expand, was indeed mentioned in Section II as a relevant "stylized fact". The crucial role played by venture capital and the availability of long-term finance for innovative activities, and the fact that these services have a large non-tradable component, have also been noted.

Schumpeter (1961) emphasized the elastic supply of capital as essential to facilitate the effects of innovations on economic growth. More broadly, elastic factor supplies play a crucial role in Keynesian and Kaleckian models in which investment --and, thus, aggregate demand-- drives not only short-term economic activity, but also long-term growth (Kaldor, 1978;

Robinson, 1962; Taylor, 1991). As these models make clear, elastic factor supplies can be guaranteed in several ways: (i) by the existence of unemployed, or more typically, underemployed resources (this issue was also emphasized in Section II); (ii) by the endogenous financing of capital accumulation through a redistribution of income towards profits; (iii) by interregional and international factor mobility; (iv) by social reorganization that allows greater participation in the labor force, particularly by women; and (v) by technical change that breaks factor supply constraints (e.g., increases land productivity or induces capital-intensive technological process to accommodate labor shortages).

In the developing world, an elastic supply of labor is guaranteed by the structural heterogeneity that characterizes developing countries' production structures, i.e., the coexistence of high- and low-productivity activities.²¹ Low-productivity activities, characterized by a considerable element of underemployment (or informality), act as a residual sector that both supplies the labor required by a surge of economic growth and absorbs the excess supply of labor when a dynamic generation of employment in high-productivity sectors is absent.²² The differentiation made in dualistic models between "traditional" and "modern" sectors is inappropriate to describe this feature of the developing world, as the corresponding structure is certainly more complex, and low-productivity activities are constantly being created anew to absorb excess labor, a fact that makes the label "traditional" entirely inadequate. Indeed, a typical feature of low-growth developing countries over the past two decades has been the expansion of low-productivity (informal) sectors to absorb excess labor, including the excess labor generated by restructured sectors. Thus, the term "structural heterogeneity", coined by Latin American structuralism to describe this phenomenon, is more appropriate (Pinto, 1970).

As education standards rise, underemployment may increasingly threaten skilled labor. International labor migration provides an additional adjustment mechanism that is probably more important in this case than in that of unskilled labor.²³ This is a reason why, although rising

²¹ As we have pointed out, this factor has not been entirely absent in the industrial world either, even as late as the post-WWII "golden age" (see Cripps and Tarling, 1973).

²² Obviously, mobility is not perfect or costless, particularly when it involves different skills.

²³ This does not mean that the skilled workers who migrate will necessarily be absorbed in high-productivity activities in the receiving countries.

educational standards are crucial for successful economic development, they may play a passive role in generating variations in the momentum of economic growth.

As discussed by Ros (2000, ch. 3), three features are essential to guarantee an elastic supply of labor for high-productivity activities: (i) low capital requirements in low-productivity activities, which guarantee that they will be largely made up of self-employed workers, whose income is thus determined by average rather than marginal productivities; (ii) competition between these activities and high-productivity sectors in the provision of certain goods and services (e.g., in the production or marketing of some consumer goods and in the provision of simple services in general); and (iii) a wage premium in high-productivity activities, associated, for example, with the predominance of “efficiency wages” in these sectors.

Structural heterogeneity implies that the dynamism generated by innovative activities and the strength of the linkages they generate determine the efficiency with which the aggregate labor force is used --i.e., the extent of labor underemployment (as well as the underemployment of other factors of production, particularly land). At the aggregate level, this process gives rise to Kaldorian growth-productivity links of similar characteristics, but additional to the microeconomic and mesoeconomic dynamic economies of scales associated with learning and the development of strategic complementarities.

This link is crucial to understanding the dynamics of aggregate productivity growth in developing countries and indicates why it is largely a **result** of dynamic economic growth rather than a cause. Moreover, it implies that there may be a divergence between micro and aggregate productivity trends. Indeed, the fact that some economic agents may be experiencing rapid productivity growth at the firm level, due to the incentives generated by a competitive environment or to their own learning efforts, does not necessarily mean that aggregate productivity will show the same degree of progress. The process itself may generate a reduction of employment in innovative activities that, if not counterbalanced by employment growth in other high-productivity sectors, will be reflected in increasing underemployment, thereby adversely affecting aggregate productivity growth. Increased underemployment (and, eventually, unemployment) may thus swamp the microeconomic gains in efficiency, generating the paradox

of a group of highly competitive firms being accompanied by frustrating rates of overall productivity growth. This has been, in fact, a feature of the Latin American panorama in the 1990s (ECLAC, 2000, ch. 1, and 2003b).

The concept of elastic factor supplies can be applied equally to natural resources and infrastructure. The “vent for surplus” models provide a similar adjustment mechanism, in which the increased productivity accompanying economic growth is the result of the exploitation of previously idle or underutilized natural resources. Due to the large indivisibilities characteristic of infrastructure, particularly of transportation networks, major projects may spread their benefits over long periods. An interesting implication of this is that the positive effects of infrastructure -- as well as investments in education-- may not only reflect the externalities they generate, as emphasized in the endogenous growth literature, but also their “fixed” or “quasi-fixed” character, which is reflected in variable degrees of utilization, even over long periods of time. Periods of low productivity growth associated with a “big push” in infrastructure (e.g., during periods of rapid urbanization) may thus be followed by high productivity growth in later periods. Similarly, a “big push” in education may not directly lead to faster economic growth, but the rapid absorption of a pool of educated labor into dynamic activities, as the result of an innovation drive, will be reflected in faster productivity growth.

D. The interplay of innovations, complementarities and elastic factor supplies

The interplay of these factors provides the essential driving force in structural dynamics. Innovation, if accompanied by strong complementarities, will be reflected in the absorption of an increasing number of workers into dynamic activities. The result will be a mix of high investment and accelerated technological learning and institutional development. On the other hand, “destructive” forces may predominate, giving rise to a slowdown in productivity and economic growth, a decline in investment, increased structural heterogeneity as surplus manpower is absorbed into low-productivity activities, and a loss of production experience that widens the technology gap vis-à-vis industrialized countries. As we will see in Section IV, the positive feedbacks between these structural and macroeconomic factors reinforce each other.

On the basis of previous analysis, Table 1 provides a typology of processes of structural change. We distinguish first between two polar cases, which we will call “deep” and “shallow” structural transformations. The first are characterized by strong learning (including induced technological innovations) and complementarities (economies of agglomeration and specialization) and, thus, by strong micro and mesoeconomic dynamic economies of scale, and by the additional productivity effects generated by the reduction in underemployment. This tends to be the case of periods of rapid growth in the developing world. Shallow structural transformations, on the other hand, can be characterized by the weakness of both learning and complementarities. A classic “shallow” structural transformation is the development of enclave export activities.

The typology also provides two mixed cases. One combines strong learning with weak linkages (e.g., due to high import requirements). This type of process may generate high productivity growth at the firm level in dynamic sectors but also strong structural heterogeneity. Some import-substitution investments of the past were of that sort. This will be called the "short-breath" case, as the initial innovative effect is soon exhausted due to its limited systemic effects. Strong linkages but weak learning processes, due to the simplicity of the technology involved, characterize the second mixed case. This type of structural transformation will have slow productivity growth at the firm level but will generate significant aggregate productivity effects associated with strategic complementarities and reductions in underemployment. The development of labor-intensive exports is a case in point. This kind of situation will be referred as a “labor absorbing” case.

Table 1
 TYPOLOGY OF PROCESSES OF STRUCTURAL CHANGE

Learning process	Complementarities	
	Strong	Weak
Strong	Deep	Short breath
Weak	Labor absorbing	Shallow

This classification is extremely useful in understanding the sources and strength of international competitiveness. Complementarities play the crucial role in this regard. In shallow structural transformation processes, competitiveness does not have any systemic features. Indeed, unless the corresponding activities are associated with the exploitation of natural resources, they are essentially footloose. Even in the case of natural resource development, we can argue that they are footloose, in the sense that once the resource base is exploited, the activity will decline, leaving little in the way of development behind. In the “short-breath” case, where learning is strong but complementarities are weak, competitiveness will be based on firm-specific advantages, which may also generate unstable competitive advantages, as firms can shift their location. However, in the case of deep innovations and, to a lesser extent, labor-absorbing transformations, the essential source of competitiveness is systemic. This gives more stability to the corresponding patterns of specialization. Even when challenged, the technological and broader development capabilities that have been built up may generate endogenous adaptive innovations.

By leading to the large-scale use of an international network of suppliers and centralized research and development efforts, globalization reduces entry costs into new activities and may facilitate higher productivity growth in a particular multinational firm or sector at the global level. However, it also generates processes of structural change that, from the point of view of each location, are increasingly “shallow” or, at best, of a “short-breath” character.²⁴ Thus, rapid productivity growth in dynamic firms may not be accompanied by rapid GDP growth in a specific country or location. The corresponding rise in underemployment will lead to low aggregate productivity growth. It must be emphasized that the problem does not lie, in this case, in low productivity growth at the firm level or in a lack of microeconomic efficiency. The problem really lies in the adverse features of the structural transformation process that generates weak links between export and GDP growth.

²⁴ A particular case of a shallow innovation is the takeover of domestic firms by multinationals, if it weakens domestic demand linkages (by the change in the network of suppliers) and concentrates research and development abroad. Maquila exports may have a similar character, although they can reduce underemployment and may serve as a mechanism for transmitting some organizational and marketing innovations. They may also deepen through time and gradually create domestic linkages, thus becoming a labor-absorbing innovation.

This interplay between factors also explains another feature of development processes mentioned in Section II: path dependence. As already indicated, dynamic scale economies engender patterns of specialization that are largely self-reinforcing. However, to the extent that acquired capabilities are intangible, strong structural shocks (“big bangs” as they were called a decade ago) may have permanent adverse effects, as intangible capital in activities that undergo “destruction” is lost, and it takes time (learning) to develop intangible capital in new activities. This includes institutional processes: old institutions are destroyed, and new ones take time to develop. Defensive restructuring of firms (rationalization of production activities that minimize fixed capital investments) will predominate under these conditions.²⁵

Negative macroeconomic shocks could also lead to a significant loss of intangible capital in bankrupt firms, which also generates deadweight losses. In addition, this leads to debt overhangs that weigh upon growth possibilities for a long time. Finally, in periods of rapid structural change and macroeconomic upheaval, uncertainty increases, as old patterns are no guide for the formation of expectations as to what the future will look like. Macroeconomic expectations thus become subject to learning, to trial and error, generating strong links between the short and long term growth paths (Heymann, 2000). This further encourages defensive restructuring, as well as speculative behavior on the part of firms. It must be emphasized, however, that this effect is additional to the links discussed in the previous paragraph, which relate to responses to the structural shock per se. Thus, defensive responses may predominate even if macroeconomic instability does not accompany the shock, particularly by firms that see few possibilities of success in the new structural context.

Finally, the classification provided in Table 1 is useful in understanding some of the social effects of structural transformations. Two particular issues are relevant in this regard: the effects of these transformations on living standards and on the evolution of structural heterogeneity, which will influence, in turn, income distribution. In this regard, “deep” transformations are characterized by a rapid rise in standards of living, whereas the opposite is

²⁵ This is a central conclusion of the ECLAC project on structural reforms in Latin America, which developed a typology of phases of response to structural reforms. According to this typology, an “offensive” attitude only comes with a lag, particularly when the new institutional environment settles down. See Stallings and Peres (2000), Katz (2000) and Moguillansky and Bielschowsky (2000).

true of "shallow" transformations. The evolution of structural heterogeneity will depend, in the first case, on the nature of the innovation, particularly its labor demand biases. Thus, deep transformations characterized by a skilled-labor bias (which seems to be a typical feature of technical change today worldwide) may generate a rapid increase in living standards, though accompanied by rising structural heterogeneity and income inequality. On the other hand, the basic differences between "short-breath" and "labor-absorbing" structural transformations are their radically different effects on structural heterogeneity: the first leads to increased heterogeneity, whereas the second will clearly have the opposite effect. In this sense, labor-absorbing transformations are attractive for low-income countries, as they are based on simple technology, but may have strong convergence effects (through the absorption of labor into higher-productivity sectors) as well as positive effects on equity. Because of their low entry costs, these activities tend to have thin profit margins and may be subject to a deterioration of the terms of trade if international demand fails to expand rapidly (due, among other reasons, to protectionism in the industrialized world, which slows down the transfer of these branches of production to developing countries).²⁶

IV. A SIMPLE FORMALIZATION OF THE LINKS BETWEEN STRUCTURAL AND MACROECONOMIC DYNAMICS

The interrelationships between structural dynamics and macroeconomic performance can be formalized in terms of a dual link between economic growth and productivity. On the one hand, economic growth has positive effects on productivity through three channels that have been explored in previous sections: (i) dynamic economies of scale of a microeconomic character, associated with learning and induced innovations;²⁷ (ii) those associated with the exploitation of intra- and inter-sectoral external economies (economies of agglomeration and specialization); and (iii) the positive links generated by variations in underemployment (the attraction of underemployed workers by the expansion of high-productivity activities or, alternatively, the absorption of excess labor by low-productivity activities). Variations in the use of the pool of skilled labor and infrastructure will also generate links of this sort. Using the term

²⁶ These issues hark back to the traditional controversies on the terms of trade, including the fallacy of composition effects. For recent reviews of these controversies, see Sapsford and Singer (1998) and Ocampo and Parra (2003).

²⁷ To the extent that new technology is embodied in new equipment, a higher rate of investment induced by faster growth will also increase productivity growth, and should thus be added to the list.

employed by Kaldor (1978, chs. 1 and 2), this link between productivity and production growth will be referred to as the “technical progress function”; it may also be called the Kaldor-Verdoorn function.

This relationship is shown as TT in Figure 2. The position of the curve depends on additional determinants of productivity growth. Some of them have been explored in previous sections: (i) the opportunity set associated with the position in the international hierarchy and acquired production and technological capabilities; (ii) the reaction of entrepreneurs to these opportunities (which may be called their degree of “innovativeness”); (iii) the incentives that firms face (those associated with the competitive environment will be the focus of our attention below); and (iv) the quality of relevant institutions.

The second relationship focuses on the reverse causality link: productivity growth increases economic growth. This relationship, shown as GG in Figure 2, captures the traditional macroeconomic links emphasized in the literature on economic growth. Different schools of economic thought have identified at least four channels. First, technical change increases aggregate supply. Secondly, it generates new investment opportunities and, through this mechanism, drives aggregate demand. The availability of finance plays a crucial role in facilitating this process. Thirdly, if domestic savings or external financing are not fully endogenous, savings or balance-of-payments gaps will become effective constraints on aggregate demand and will thus determine the shape of the curve.²⁸ Finally, technical change enhances international competitiveness, affecting the trade balance and, thus, aggregate demand; if the economy is foreign-exchange-constrained, the reduction in the trade balance relaxes this constraint and thus also has aggregate supply effects.

It must be emphasized that TT is not an aggregate production function in the traditional neo-classical sense. Rather, its positive slope implies that there is some underutilization of

²⁸ For a full analysis of gaps in macroeconomic adjustment, see Taylor (1994). As is well known, saving adjusts through variations in economic activity (the Keynesian mechanism), income redistribution between sectors with high and low propensities to save, particularly between capital owners and workers (the Kaleckian mechanism), and variations in the trade balance (external savings). Depending on the source of the rigidity of the mechanism, inflationary gaps, distributive struggles or external gaps may arise. For a full treatment of these issues, see Taylor (1991).

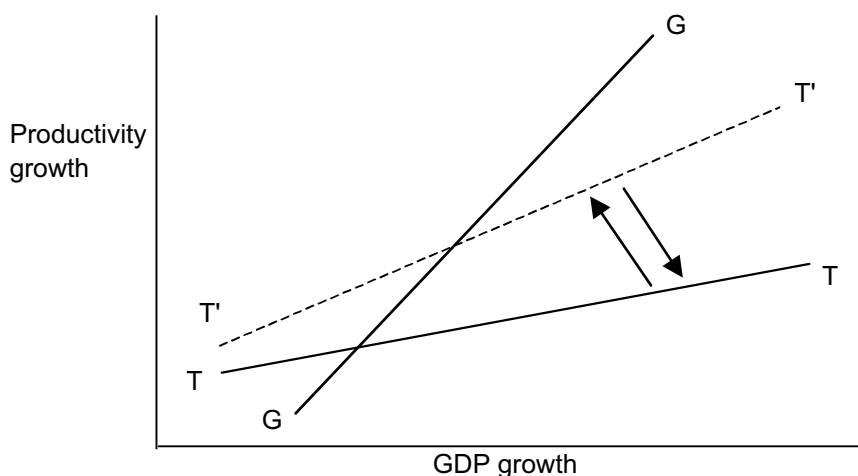
resources at any point in time, and thus growth induces a better allocation of resources (and the lack of growth, a misallocation, particularly through the underemployment of labor). Thus, growth has aggregate **supply** effects, through induced productivity improvements, which are captured in the TT curve. The long-run aggregate demand effects typical of Keynesian growth models are captured, on the other hand, in the GG function. Similarly, it should be underlined that complementarities have supply (economies of agglomeration and specialization) as well as demand (variations in the Keynesian multiplier generated by changes in the propensity to import) effects. Whereas the former are captured in the TT function, the latter affect the GG curve. If the economy is foreign-exchange-constrained, the corresponding changes in import dependence will also have aggregate supply effects that, in this case, will affect the GG function.

As both curves have positive slopes, the effects that they capture reinforce each other, generating alternating positive feedbacks but also possible negative feedbacks. A stable equilibrium exists when TT is flatter than GG, as shown in Figure 1.A. In Keynesian and foreign-exchange gap models --the two macroeconomic closures we will consider here-- the slope of GG will depend on the elasticity of investment, exports and imports to productivity; if they are relatively inelastic, the corresponding schedule will be steep; if elasticities are high, it will be flatter. Given the determinants of the technical progress function, TT will be flatter if the following conditions prevail: (i) both micro- and mesoeconomic dynamic economies of scale are not too strong; (ii) labor underemployment is moderate; and (iii) fixed factors are not very important in the long run.

However, under significant initial (unskilled and/or skilled) labor underemployment or significant underutilization of infrastructure (i.e., when these factors operate as fixed factors), the slope of TT may be high. Figure 1.B thus presents a case in which the slope of TT is initially steep but falls at higher rates of economic growth. In this case, there will be a stable equilibrium at B, similar to that shown in Figure 1.A, and an unstable equilibrium at A. Any displacement from saddle point A will lead the economy to a new, higher stable equilibrium at B or, alternatively, to a growth trap. Obviously, depending on the position of the curves, other possibilities may exist that can generate explosive virtuous or vicious circles. Also, nothing guarantees that equilibrium will always arise at a positive rate of growth.

steeper, to T'T' in Figure 2, accelerating both productivity and income growth. However, as this particular wave of innovations come to be fully exploited and their structural effects fully transmitted, the function will shift down and become flatter, to TT in Figure 2. Productivity and GDP growth will then slow down.³⁰ If the GG function also shifts leftward (due to weakened “animal spirits”), the slowdown will become even sharper.

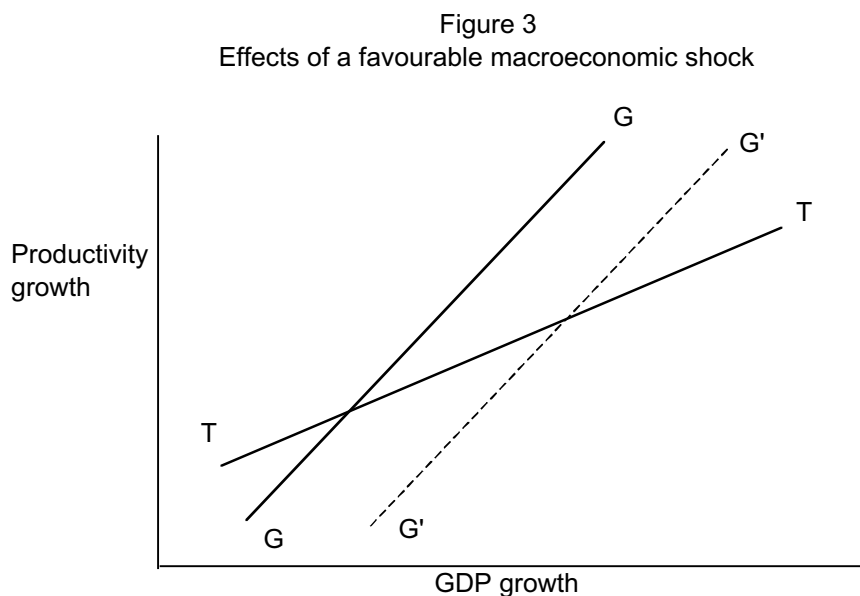
Figure 2
Effects of a new wave of innovations



A favorable macroeconomic shock –a positive financial shock in a foreign-exchange-constrained economy, or any factor that improves long-term expectations, or long-term investment financing that has a positive effect on investment in a Keynesian or Kaleckian model— will shift the GG function rightward to G'G'. The micro/meso/macro links summarized in the technical progress function now multiply the favorable macro effects. A negative macroeconomic shock will have the opposite effect. This could include any factor that increases macroeconomic instability. In line with the considerations discussed in Section II, **any** form of instability matters, including instability in the price level or in major relative prices, an increase in the intensity of the business cycle or any factor that adversely affects public- or private-sector debt sustainability, among others. A particular severe case would be present if a leftward shift in

³⁰ Of course, there is no presumption that TT will return to its original position. This is the case that, for the sake of simplicity, is shown in Figure 3.

GG in Figure 3 were to leave no equilibrium point, leading to a downward spiral of GDP and productivity growth.



This simple framework may be used to analyze the effects of trade reforms --and, more broadly, economic liberalization processes— on growth. For that purpose, we have to assume a specific relationship between competition and the rate of innovation. In this regard, a tradition of economic thought has emphasized the ability of large firms to internalize the benefits from innovation, a fact that may generate positive links between market concentration and innovations. Contrary to that tradition, the neo-classical defense of liberalization views the lack of competitive pressure as a factor that has adverse effects on productivity. This view highlights the fact that managers of large firms may be inclined to appropriate part of the monopoly power they hold in the form of “leisure” (reduced efforts to minimize costs). Increased competition has, in this case, positive effects on productivity. It should be emphasized, however, that this assumption implies that firms were **not** initially profit-maximizers (Rodrik, 1992).

Another link between reforms and productivity which was mentioned earlier has to do with the fact that the uncertainties that characterize structural shocks may lead firms to adopt defensive attitudes. Thus, the initial response to a shock may be rationalization rather a new

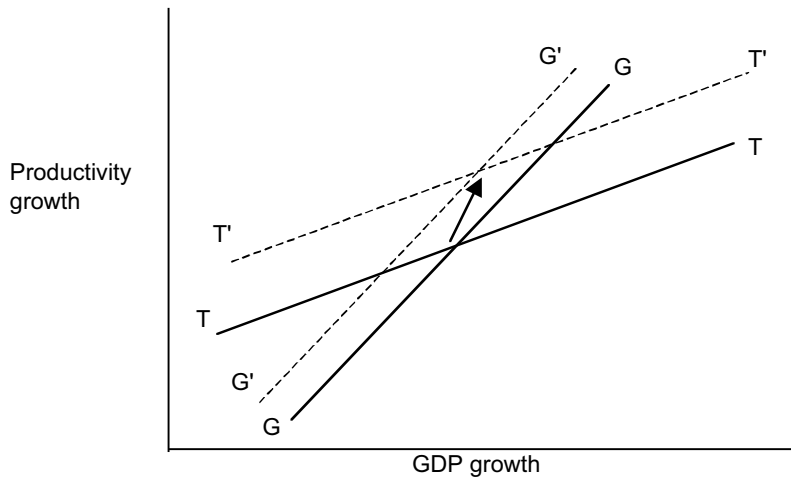
wave of innovation and investment. The latter may only come with a lag, when uncertainties are reduced. If this is so, the TT curve may not be affected, or indeed may be adversely affected, and the effects of increased competition on productivity will be only transitional.

If the neo-classical assumption about the links between competition and innovation is correct, then opening the economy to competition displaces the TT function upward. Liberalization unleashes, in this case, a degree of “innovativeness” that the more protected and State interventionist environments of the past repressed. Domestic firms will also have better access to imported inputs and capital goods. However, this is not all that matters. The destruction of domestic linkages and previous technological capabilities would have the opposite effect. Specialization in activities with weaker dynamic economies of scale would tend to make the TT function flatter. If firms shrink, their capacity to cover the fixed costs associated with innovative activities will also decline. One way to express these opposite effects is to say that, although the microeconomic effects of competition on productivity growth may be positive, specialization may have negative microeconomic effects and the mesoeconomic (structural) factors, in particular, may be adverse. The net effects of reforms on TT are thus unclear. On the other hand, through either Keynesian mechanisms or the supply effects characteristic of a foreign-exchange-constrained economy, the increased in the propensity to import generated by trade reform will lead to a leftward shift in the GG function.

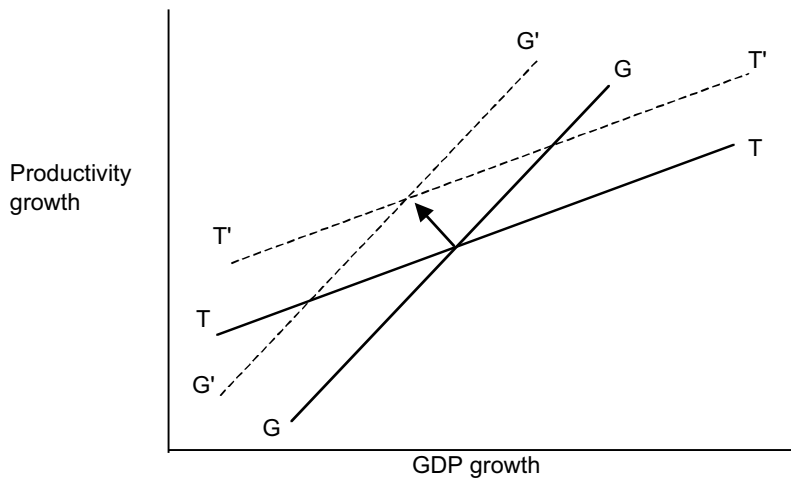
Figure 4 provides three possible outcomes (there may be others). In Case A, the neo-classical effects on TT are strong and prevail over weaker adverse movements of the GG function. Both GDP and productivity growth speed up. In Case B, neo-classical effects on TT continue to prevail but are weaker, whereas GG effects are strong. Productivity growth speeds up but overall economic growth slows down. An implication of this is that labor under- and unemployment increase. In Case C, adverse structural effects on TT prevail over the positive effects of competition, generating a reduction in both GDP and productivity growth. Under- and unemployment increase sharply. This implies that there is no general presumption that liberalization will accelerate growth, and that the microeconomic links emphasized by defenders of liberalization may be swamped by adverse structural and macroeconomic effects.

Figure 4

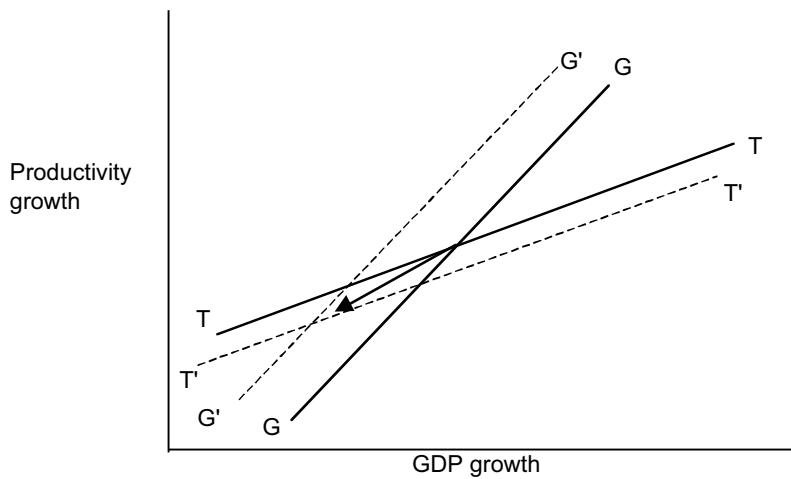
Case A: Strong TT, weak GG effects



Case B: Weak favorable TT, strong GG effects



Case C: Adverse TT and GG effects



V. POLICY IMPLICATIONS

The previous analysis indicates that institutions that guarantee stability in the basic social contract, the protection of business contracts and an efficient State bureaucracy, as well as the formation of human capital and the development of infrastructure, are certainly important to economic growth, but play the role of “framework conditions” which, by themselves, are unlikely to affect the growth momentum.

The key to rapid growth in the developing world is thus a combination of **strategies aimed at the dynamic transformation of production structures** with appropriate **macroeconomic conditions and stability**, in the broad sense of the latter term. Since, according to the views presented here, innovations and investment are deeply tied, this view coincides with Rodrik’s (1999 and 2003) call for a domestic capital accumulation strategy to kick-start growth, in conjunction with an appropriate macroeconomic environment. This may be seen as the combination that explains the rapid growth of the Asian economies. The vigorous growth that took place in Latin America during the period of State-led industrialization was also the product of a structural change strategy that was initially based on import substitution, but then began to rely increasingly on “mixed” models combining import substitution with export promotion (Cárdenas, Ocampo and Thorp, 2000b, ch. 1). Unlike what happened in the Asian countries, the lack of suitable macroeconomic conditions in the region bred the debt crisis of the 1980s that led to a sharp break in the growth pattern.

The focus on structural dynamics helps to identify the specific policy areas authorities should target to accelerate economic growth. Accordingly, efforts should be made to: (i) **encourage innovation**, in the broad sense of the term, and the associated learning processes in the areas of technologies, productive organization and marketing; to the extent that innovations in developing countries are largely associated with the transfer of sectors of production from the industrialized world, a strategy of **diversification of the production structure** is the key to increased innovations; and (ii) **encourage the development of complementarities** that generate positive demand and, above all, those that generate system-wide competitiveness; in the latter case, **non-tradable** inputs and specialized services should be a special focus of attention, particularly in terms of the development of sectors that produce specialized inputs and services

–(knowledge, logistics and marketing services), a strong and deep domestic financial system, and adequate infrastructure.

Under current conditions, we can identify four essential characteristics of the strategies that should serve as the framework for these policies. In the first place, the emphasis should be on integrating the developing countries into the world economy. Secondly, there must be a proper balance between individual entrepreneurial initiative, which is decisive for a dynamic process of innovation, and the establishment of institutions aimed at increasing information and coordination among agents. Among the latter, different mixes of public and private institutions should be considered, according to the tradition of each country. Moreover, different mixes of supranational (e.g., within the framework of integration processes), national and local (decentralized) institutions should also be designed. Thirdly, there should be a mix of horizontal and selective policies. Indeed, insofar as policies are intended to strengthen competitiveness, a degree of selectivity aimed at reinforcing successful patterns of specialization and helping to breed new sectors (creating comparative advantages) is essential. Furthermore, under budget constraints, any “horizontal” policy must be detailed and, hence, necessarily becomes selective. Clear cases of these sorts are the allocation of resources from funds for technological development and export promotion. Recognizing that there is an implicit selectivity in horizontal policies will lead to a better allocation of scarce resources than the alternative neutral stance. Finally, all incentives should be granted on the basis of performance, generating "reciprocal control mechanisms", to borrow Amsden’s (2001) term. Indeed, the institutional structure itself should be subject to periodic evaluation, within its own learning path.

Another complex issue relates to the framework of international rules, especially those of the World Trade Organization. In this regard, although priority should certainly be given to taking advantage of the maneuvering room provided under existing agreements, there is a strong sense that more opportunities should be made available to the authorities of developing countries, who were restricted too narrowly in the Uruguay Round of trade negotiations. In particular, they should be allowed to apply selective policies and performance criteria to encourage innovation and create the complementarities that are essential to development.

The assumption that dynamic productive development, and the particular institutions that support it, are automatic results of market mechanisms has been demonstrated by the facts to be wrong. In Latin America, the weakening of the public- and private-sector institutions that had been established to support productive and technological development during the period of State-led industrialization was a central feature of the "lost decade" of the 1980s. In the 1990s they were further weakened as a result of explicit policy decisions. Some institutions have since been developed around production clusters, free trade zones, the promotion of small and medium-sized enterprises or the development of demand subsidies to allocate technology funds. The suboptimal development of institutions in the area of productive development has thus become a direct institutional deficiency affecting economic growth, which is generally ignored in the call to strengthen institutional development. This institutional deficiency is probably not very important if growth is to remain at current levels. It is crucial, however, if the region is seeking to achieve the rapid rates of structural change (including penetration into dynamic technology-intensive sectors) that are essential to gradually bridge the gap separating it from the industrialized world.

In the past, development banks played a crucial role in the developing world in guaranteeing the availability of capital for new activities, and in many areas they continue to do so. It is unclear whether privatized financial sectors will provide an adequate substitute for them. Private investment banking and venture capital are the best alternatives, but past and recent experience indicates that their expansion in developing countries on an optimal scale is not automatic; indeed, these activities are highly concentrated in a few industrialized countries. Access to international services of this sort may thus be of paramount importance in order to guarantee finance for innovative activities, but this may generate a strong bias in favor of multinational and large national firms and against small and medium-sized enterprises. It should be mentioned, in this regard, that some of the most important innovations in financial development in the developing world in recent decades --the pension fund revolution in Latin America, for example-- have an explicit bias against risk.

Finally, I would like to emphasize two implications of the previous analysis. The first is that structural transformation is not a "once and for all" process, a belief that is implicit in

current views of structural reforms. It is rather an ongoing task, as the structural transformation process is continuous and may face obstacles at any stage which may block development. To the extent that, in developing countries, innovative activities are largely the result of the spread of new sectors and technologies previously created in the industrial center, these activities may, at any given point in time, be considered as the new set of “infant activities” to be promoted (more as infant **export** than import-substitution activities, today). Thus, the essential counterpart of intellectual property right protection, the essential tools for fostering innovations in the developed countries, are instruments to promote the transfer of those activities to the developing world through the design of trade rules that encourage such transfers and appropriate incentives and institutions to further the growth of these “infant activities” in developing countries. The instruments developed to promote innovative activities in earlier stages may serve this purpose, but they may have to be readapted or new institutions may have to be created to solve the specific issues involved in guaranteeing the successful development of new activities in a more interdependent world economy. If “leapfrogging” is the desired objective of economic policy, then the corresponding strategy will certainly be broader in scope.

The final implication is that the process of transformation is not by any means smooth. “Destruction” is a constant companion of “creation”, and structural heterogeneity is a persistent feature that can increase at different phases of the development process. Distributive tensions are presumably associated with both factors. There is, in this regard, no unique Kutznets trajectory, as there may be periods of increased structural heterogeneity in the middle stages of the development process as a result of structural transformations or macroeconomic imbalances. Facilitating the transfer of resources from less dynamic to more dynamic activities, avoiding transformation processes that increase structural heterogeneity, and working to upgrade low-productivity activities and generate positive links with high-productivity activities would, in this context, be critical elements in achieving a more equitable development process.

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