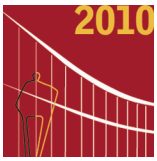

Chapter III

Structural heterogeneity and productivity gaps: from fragmentation to convergence

A. Introduction

In terms of productivity, two traits clearly set the economies of Latin America and the Caribbean apart from developed economies. The first trait is the region's technology gap with regard to developed regions, that is, the external gap —that reflects the asymmetries between the technological capabilities of the region and those found on the international frontier. Developed economies innovate in technology and disseminate it throughout their productive system more quickly than the countries of Latin America and the Caribbean are able to absorb, imitate, adapt and innovate in technology following international best practices.

The second distinctive trait is the internal gap, that is, the large productivity differences —much larger than those found in developed countries— among sectors, within sectors and among companies within a given country. This is known as structural heterogeneity, which refers to marked asymmetries among segments of enterprises and workers and the concentration of employment in strata characterized by very low relative productivity.

Most countries of Latin America and the Caribbean are known to suffer from a considerable degree of social inequality, which reflects the strong concentration of ownership and the sharp productive heterogeneity they display.

That is, segments with very low labour productivity exist alongside others whose labour productivity is in the middle or high ranges, as will be seen in this chapter. Social gaps, then, cannot be understood without a grasp of the uneven quality and productivity of jobs among (and within) economic sectors, which translates into highly uneven performances among workers, and disparate yields between capital and labour.

The interconnections between growth and social and production heterogeneity are complex and vary considerably depending on a country's historical experiences. For example, the process currently under way in China and India appears to illustrate the argument of Kuznets (1955) that, for a certain time during a country's development, inequality increases because a growing part of the peasantry, which was once "homogenously poor", migrates to the city and finds higher-productivity employment in the modern sectors that are emerging during industrialization. That is, for a time the productivity gap between occupations in the modern urban sectors and those in rural areas widens, intensifying occupational and productive disparities, at least until the proportion of occupations in the modern segments rises enough to produce an inflexion on the Kuznets curve.

In Latin America and the Caribbean, such disparities grew in the period from 1950 to 1980 and were examined early on by several classic ECLAC authors of (Furtado, 1961; Pinto, 1965; Sunkel, 1970). In the Latin American model of "social and productive heterogeneity" described by these authors, a small segment of the population appropriated a substantial portion of the gains from higher productivity in the economy overall; nevertheless, the rise in productivity that later accompanied industrialization underpinned a gradual improvement in the output of workers, who were increasingly absorbed by ever-expanding modern sectors.

Rather different dynamics, however, marked, the growing heterogeneity seen in most of the region's countries between the beginning of the lost decade (the 1980s) and the early 2000s, which marked beginning of the period of growth that lasted until the 2008 crisis. During that period (1980-2002), overall productivity in many Latin American and Caribbean countries remained more or less unchanged. The greatest changes took place in several segments of the urban services sector, in which average productivity declined sharply, especially during the 1980s, leading to the bloating of the informal services sector. This gave rise to a vicious cycle of spatial segregation in the cities (with high levels of urban marginalization) and productive segregation, with high percentages of the urban economically active population (EAP) in very-low-productivity sectors. Hence, spatial and productive heterogeneity mirror one another.

Structural heterogeneity largely explains acute social inequality in Latin America and the Caribbean, because gaps in productivity reflect, as well as reinforce, gaps in capabilities, in the incorporation of technical progress, in bargaining power, in access to social safety nets and in options for upward occupational mobility throughout working life. At the same time, the wider internal gap reinforces and, to a certain extent, depends on the external gap, as this chapter will discuss. To the extent that low-productivity sectors find it extremely difficult to innovate, adopt technology and promote learning processes, internal disparities aggravate systemic competitiveness problems. This creates vicious cycles not only of poverty and low growth but also of slow learning and weak structural change. As a result, both gaps must be addressed simultaneously in order to support stronger and more inclusive growth.

Recent ECLAC studies identify the conditions for narrowing the external gap, and thus carry on an analytical tradition that focuses on the relationship between technology, equity and transformation of the production structure.[1] In open economies, the lack of technology convergence

[1] See the studies by Fajnzylber (1990) and ECLAC documents (2008a, 2007, 2006a, 2004a, 2001, 1998, 1992 and 1990) cited in the bibliography. From this perspective, Infante (2009) argued that convergence depends on the relative speed at which technical progress is introduced into and spread within the region's production structures by means of fixed capital and know-how, compared with developments in the rest of the world.

with the international frontier results in a pattern of specialization that involves hardly any technology-intensive activities. This has two important implications. The first is a structure that is heavily biased towards activities in which little is spent on research and development, resulting in a slow learning process and scant productivity gains. This is because technology-intensive activities generate externalities —technology spillovers— and a range of incentives for innovation and learning that underpin the long-term accumulation of technological capabilities.

The second consequence is that a production structure with smaller technology-intensive sectors is poorly equipped to adapt to changes in demand. Indeed, the ability to innovate and imitate quickly is a key for entering markets in which demand grows more quickly. In the most dynamic markets, competitiveness depends on technological proficiency, and demand patterns (in both consumption and investment) shift frequently. The technological disadvantages of the region prevent it from responding quickly and powerfully enough to avoid losing its share of those markets. Consequently, exports are less dynamic than imports, which leads to external constraints on growth and concomitant foreign-exchange crises, while growth tends to be more volatile and dependent on a fluctuating international liquidity supply.[2]

Just as the external gap reflects the limited spread of international best practices to Latin America and the Caribbean, the internal gap results from difficulties with disseminating them among agents within each country. Infante (2009) noted that early theories of structural heterogeneity had argued that technical progress was not a generalized process that penetrated all economic sectors or branches to greater or lesser extents in most Latin American economies. On that contrary, it had been assimilated almost exclusively by certain activities, generally those linked to the export sector, leaving large swathes of the economy excluded from the process of technical progress.[3]

In every country, technical progress occurs at different rates in the various sectors and technology and opportunities for innovation are unevenly distributed. But in Latin America, these differences are much greater than in developed economies, and the most heavily lagging sectors and agents tend not to catch up with the "leaders".[4] Even within sectors that, in the aggregate, could be considered medium- or high-productivity, there remain strata of firms and jobs whose productivity is extremely low. The high rates of underemployment and informality in the region are the most visible, but not the only, sign of disparities, as well as a major source of inequity.

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2 On this point, see also chapter II.

3 Classic references in ECLAC literature may be found in Pinto 1965, 1970 and 1976. The topic is discussed in detail in Rodríguez (2007).

4 Schumpeter (1934) described the business cycle as being based on a wave of secondary innovations and the vigorous entry of imitators who erode the oligopolistic advantages of the leaders. Although major innovations are what initially drives economic growth, their most important impact on aggregate performance derives from the investments made by new entrants, drawn by the windfall profits of the pioneers. In the Latin American case, this wave of investments is cut short and rapidly weakens, and the advantages of the pioneers (who are often merely followers, in international terms) are not contested by the mass entry of imitators.

B. Heterogeneity among sectors and agents: external and internal convergence

1. Production structure and productivity dispersion

From a historical perspective, the most notable development has been the change in the nature of the main productivity gaps in the region. From 1950 to 1980 there was a large productivity gap between agriculture and secondary and tertiary activities, especially those conducted in urban areas. The predominance of large-scale ranch-style (*latifundista)* farming, which is not geared towards raising output, and a campesino economy with scant resources hampered the development of the relative productivity of agriculture and led Governments to introduce agrarian reforms and policies to modernize the sector.

The picture has changed in recent decades. Although in many countries the peasant economy continues to suffer from low productivity and a lack of access to the production resources needed to bring about a profound transformation, average labour productivity in the agricultural sector has increased substantially thanks to countryside-city migration, the emergence of non-agricultural rural activities and the modernization of agri-business. Low labour demand during the 1980s debt crisis and the subsequent crises in the late 1990s and early 2000s, together with supply-side pressures at a time when the working age population in many countries as growing at a high rate, meant that informal employment in urban areas surged. Average labour productivity in the tertiary sector consequently dropped sharply during the 1980s and remained low from then on.

This section presents an overview of the structure of production in Latin America and highlights the wage and production asymmetries, which are directly related to poverty and social exclusion in the region. An analysis of labour productivity (value added per worker) reveals that performance varies from one sector to the next. Changes in this variable are observed using two points of reference: (a) differences among sectors within the region (the productivity of each sector compared with average productivity for the economy); (b) the productivity of each sector in Latin America compared with that of the same sector in the United States, which can be considered to represent the international technological frontier (external gap).[5]

The fact that productivity gaps are larger in Latin America than in the developed countries means that the region also suffers from wider wage gaps and worse income distribution. A convergence of sectoral productivity (internal convergence) should therefore lead to better income distribution and less social exclusion. In addition, by narrowing its wage gap with the United States (external convergence), the region would raise its competitiveness level and be better positioned to reduce per capita income differences with the developed world. This would also create synergies in knowledge dissemination (complementary improvements in productive capabilities and the social distribution of capabilities) and, by raising competitiveness, prolong economic growth, boost fiscal revenue and enhance the State's ability to transfer resources and services to the most vulnerable sectors.

[5] The internal gap has two dimensions: differences between sectors and differences between agents or activities within a given sector.

Table III.1 presents labour productivity for each sector in Latin America as a percentage of average productivity throughout the economy. There are notable differences between sectors: mining productivity is seven times higher than average productivity; productivity in the electricity sector is four times higher; and productivity in the financial sector is twice as high. At the other end of the spectrum are agriculture, commerce and construction.[6] Productivity in sectors such as industry and transport is very close to the average for the economy. The unevenness of sectoral productivity increased between 1990 and 2008.

Table III.1
LATIN AMERICA (SELECTED COUNTRIES): PRODUCTIVITY INDICES [a]
(Total GDP=100)

	1990	1998	2003	2008
Agriculture	28.4	27.7	30.9	31.0
Mining	608.4	1045.5	932.8	767.4
Industry	99.3	112.7	115.5	114.2
Electricity	225.9	353.6	434.6	483.2
Construction	91.3	94.4	84.7	77.5
Commerce	76.1	63.3	56.2	59.5
Transport	118.7	134.4	148.4	146.1
Financial establishments	279.0	282.5	279.7	252.1
Community, social and personal services	84.5	74.4	78.9	75.8
Total GDP	100.0	100.0	100.0	100.0
Period		1990-1998	1998-2003	2003-2008
Average annual rate of productivity growth		1.9	-0.4	0.7

Source: Economic Commission for Latin America and the Caribbean (ECLAC), "América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008", *Cuadernos estadísticos*, No. 37 (LC/G.2415-P), Santiago, Chile, 2009. United Nations publication, Sales No. S.09.II. G.72 and International Labour Organization (ILO), LABORSTA [online database] http://laborsta.ilo.org/, 2009.

[a] Calculation based on the economically active population, broken down by sector as indicated by the International Labour Organisation (ILO), and corrected for the sectoral unemployment rates given by ILO. The figure given for Latin America is the simple average of 11 countries: Argentina, Bolivarian Republic of Venezuela, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Peru and Uruguay.

By contrast, an examination of sectoral productivity in the United States reveals smaller differences among sectors in that country (see table III.2). Productivity in the leading sectors (electricity and finance) is twice the average for the economy overall —a much smaller difference than that found in Latin America and the Caribbean— and the disparities narrowed from 1990 to 2008, whereas in Latin America they increased during the same period.

[6] Agricultural productivity is particularly low when viewed in terms of simple averages for the region as a whole (as is done here) owing to the extremely low output of the peasant economies in the less developed countries in which rural populations make up large proportions of the total population. When viewed in terms of weighted averages, the agricultural productivity of the region increases on account of the more buoyant agribusiness sectors of countries with relatively larger populations (such as Argentina and Brazil) but is still relatively low in comparison with that of other sectors.

Table III.2
UNITED STATES: PRODUCTIVITY INDICES
(Total GDP=100)

	1990	1998	2003	2008
Agriculture	36.9	35.3	44.6	71.2
Mining	273.6	299.7	278.9	176.8
Industry	73.3	92.6	110.1	126.2
Electricity	177.9	174.4	216.0	224.4
Construction	80.0	72.2	54.9	37.5
Commerce	51.1	62.8	65.6	66.9
Transport	114.0	125.4	165.2	210.1
Financial establishments	284.4	268.2	219.0	185.0
Community, social and personal services	84.1	69.8	66.7	65.1
Total GDP	100.0	100.0	100.0	100.0

Source: Economic Commission for Latin America and the Caribbean (ECLAC), "América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008", *Cuadernos estadísticos*, No. 37 (LC/G.2415-P), Santiago, Chile, 2009. United Nations publication, Sales No. S.09.II. G.72 and International Labour Organization (ILO), LABORSTA [online database] http://laborsta.ilo.org/, 2009.

Note: Calculation based on the economically active population, broken down by sector as indicated by the International Labour Organisation (ILO), and corrected for the sectoral unemployment rates given by ILO.

The coefficient of variation of productivity constitutes a more precise measure of the degree of divergence between Latin America's internal production structure and that of the United States.[7] Table III.3 confirms that the coefficient of variation is higher ("sectoral inequality" is greater) in Latin America than in the United States, and that in the latter sectoral productivity levels have converged (that is, the coefficient of variation has narrowed) since 1998.[8] In Latin America, sectoral dispersion of productivity increased sharply during the years of trade liberalization (the coefficient of variation widened between 1990 and 1998), and, although the coefficient of variation trended downwards thereafter, it remained above the levels seen in the early 1990s. Lastly, the relative dispersion, that is, the ratio of the coefficient of variation in Latin America to that in the United States, increased in the years in question. This indicates that the distance between the sectoral dispersion of productivity in Latin America and that of the United States increased: in 2009, the dispersion in Latin America was 101% greater than that in the United States, compared with 40% in 1990.

[7] The coefficient of variation is the ratio of the standard deviation to the arithmetic mean.

[8] The comparison with the United States is particularly instructive, not only because that country's economy is on the technological frontier but also because its regulatory framework favours market competition. Hence, productivity differentials originating in the unequal pace of technical progress can be assumed to be more clearly manifest in the United States.

Table III.3
LATIN AMERICA (SELECTED COUNTRIES) AND THE UNITED STATES: INTERNAL CONVERGENCE AND RELATIVE PRODUCTIVITY

	1990	1998	2003	2008
Dispersion index of productivity in Latin America	0.94	1.24	1.14	1.05
Dispersion index of productivity in the United States	0.67	0.67	0.60	0.52
Ratio between productivity in Latin America and in the United States	1.40	1.85	1.89	2.01

Source: Economic Commission for Latin America and the Caribbean (ECLAC), "América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008", *Cuadernos estadísticos*, No. 37 (LC/G.2415-P), Santiago, Chile, 2009. United Nations publication, Sales No. S.09.II. G.72 and International Labour Organization (ILO), LABORSTA [online database] http://laborsta.ilo.org/, 2009.

In addition, a sector-by-sector comparison of productivity in Latin America and in the United States shows that, for most sectors, productivity is much lower in Latin America (see table III.4). The exception is the mining sector, in which productivity in Latin America is 70% of that in the United States.

Table III.4
LATIN AMERICA (SELECTED COUNTRIES): RELATIVE PRODUCTIVITY WITH RESPECT TO THE UNITED STATES [a]
(Percentages)

	1990	1998	2003	2008
Agriculture, hunting, forestry and fishing	14.2	13.3	10.7	7.0
Mining and quarrying	40.9	59.2	51.5	70.2
Manufacturing	25.0	20.7	16.1	14.6
Electricity, gas and water	23.4	34.4	31.0	34.8
Construction	21.0	22.2	23.7	33.5
Commerce, restaurants and hotels	27.4	17.1	13.2	14.4
Transport	19.2	18.2	13.8	11.2
Financial establishments	18.1	17.9	19.7	22.0
Community, social and personal services	18.5	18.1	18.2	18.8
Total	18.4	17.0	15.4	16.2

Source: Economic Commission for Latin America and the Caribbean (ECLAC), "América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008", *Cuadernos estadísticos*, No. 37 (LC/G.2415-P), Santiago, Chile, 2009. United Nations publication, Sales No. S.09.II. G.72 and International Labour Organization (ILO), LABORSTA [online database] http://laborsta.ilo.org/, 2009.

[a] Calculation based on the economically active population, broken down by sectors, indicated by the International Labour Organisation (ILO), and corrected for the sectoral unemployment rates given by ILO.

In high-productivity sectors (mining, electricity and financial establishments), the productivity gap between Latin America and the United States narrowed between 1990 and 2008. In most medium- and low-productivity sectors, such as agriculture, industry, transport and commerce, the gap widened, however. The only exception was the construction sector, where, despite the low productivity that characterizes the Latin American building industry, the gap narrowed, mainly because of the decline in construction productivity in the United States.

The performance of high-productivity sectors has slightly narrowed the productivity gap between the United States' economy and that of Latin America as a whole in recent years. Slow growth in the remaining sectors, however, has led to a sharp increase in the coefficient of variation of relative productivity. In other words, a small percentage of enterprises and workers in Latin America are approaching the international frontier while the rest are moving away from it, which reinforces the structural disparities and acute inequalities in the region.

Figure III.1 shows changes in relative productivity and its dispersion. The increase in dispersion indicates that within Latin America the distance between the sectors in which the external gap is narrowing and those in which it is widening is growing. This comparison reveals sectors' different capacities to utilize their potential to absorb cutting-edge technology. A higher coefficient of variation is an indicator of problems with competitiveness and with linkages within the production structure, which have an adverse impact on economic growth.

Figure III.1
LATIN AMERICA (SELECTED COUNTRIES) AND THE UNITED STATES: RELATIVE PRODUCTIVITY AND COEFFICIENT OF VARIATION
(1990=100)

Source: Economic Commission for Latin America and the Caribbean (ECLAC), "América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008", *Cuadernos estadísticos*, No. 37 (LC/G.2415-P), Santiago, Chile, 2009. United Nations publication, Sales No. S.09.II. G.72 and International Labour Organization (ILO), LABORSTA [online database] http://laborsta.ilo.org/, 2009.

From 1990 to 2008, both the dispersion of relative productivity (the broken line in figure III.1) and the average external gap for the economy overall (the solid line) increased. This highlights the widening of the gap between a small group of sectors (and therefore of enterprises and workers) that are approaching the external production frontier and the rest of the economy, which is lagging further behind international standards. It should be noted, however, that the

decline in relative productivity from 2003 to 2008 was interrupted —it stood at 15.4% in 2003 but at 16.2% in 2008— within a very particular context of growth recovery associated with a favourable trend in prices for commodities and raw materials.

The economies of the Caribbean have adopted models of structural heterogeneity based on an abundance of natural resources and the specialization of trade which, until recently, depended on non-reciprocal preferential agreements with the European Union and North American markets. Some countries, especially those belonging to the Organisation of Eastern Caribbean States (OECS), have emerged as economies that largely depend on tourism and financial services. For example, in 2006, services exports as a share of all exports from Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia and Saint Vincent and the Grenadines stood at between 67% and 86%, and the OECS average was 77.2%. By contrast, the corresponding proportions for Belize, Dominican Republic, Guyana, Haiti, Jamaica, Suriname and Trinidad and Tobago ranged between 8.5% and 55%. Within the latter group, the economies of the Dominican Republic, Haiti, Jamaica and, to a certain extent, Barbados are based on a combination of basic-services and goods-producing sectors.

The fundamental problem for both services-based and goods-based economies is the limited range of goods and services produced and sold in the area and the effect that this factor has on growth.[9] A measurement of total factor productivity underscores the magnitude of the problems that arose in the late 1990s when trading regimes in the Caribbean and throughout the world were undergoing changes.[10] Kida (2005) notes that, in the 1980s, total factor productivity was positive in most Caribbean countries, accounting for nearly half of the growth in output.[11] Nevertheless, the findings suggest that, in the 1990s, total factor productivity, as well as competitiveness declined, except in Belize, Guyana and Trinidad and Tobago. In addition, a World Bank study (2008) shows that growth in total factor productivity in several OECS countries tapered off in the 1990s, although not in Saint Kitts and Nevis. Machado (2009) arrived at a similar conclusion for the Caribbean overall.

While there are various explanations for lower productivity growth, including overvalued exchange rates and rising Government investment —which may have crowded out private investment— manufacturing, agriculture, and services grew at a slower pace in this period. The structural changes are borne out in OECS data. For example, in the 1990s, average yearly banana output fell by 4.8% in volume terms, while in value terms it decreased by 3.9%, and in 2000 the two indicators decreased by 11.3% and 14.7%, respectively. At the same time, tourism receipts climbed by 17.6% in the 1980s, by 4.1% in the 1990s and by 4% in the 2000s.

2. Productivity gaps and employment

Data on the production structure must be examined in conjunction with data on employment. If the sectors in which productivity rises account for a small proportion of total employment, then only a few workers will benefit from higher wages, while the rest will continue to be employed in

[9] There was an attempt to diversify the range of tourism products and to create specialized markets, such as ecological tourism, community tourism, cultural tourism, tourist centres for couples and special events, including jazz festivals.

[10] Because of the limitations in the measurement of total factor productivity, these results are merely illustrative.

[11] The countries included were Antigua and Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago.

sectors where wages and productivity are lower. This relationship is examined briefly below and is analysed in greater depth in Chapter V, which focuses specifically on employment.

High-productivity sectors account for a rather small portion of all employment (8.1% in 2008), as shown in table III.5. From 1990 to 2008, employment in high-productivity sectors as a proportion of total employment remained nearly constant, increasing by only 0.2 percentage points from the beginning to the end of the period, while the ratio of employment in medium-productivity sectors to all employment decreased sharply (by three percentage points) and employment in low-productivity sectors as a share of all employment increased by 2.9 percentage points. The long-term trend from 1990 to 2008 was for the number of workers (and, probably, of enterprises) to increase in low-productivity sectors, at the expense of the medium-productivity ones. In other words, heterogeneity increased. Importantly, the expansion of the proportion of employment in low-productivity sectors was interrupted during the economic upturn from 2003 to 2008, although (as in the case of the external gap) not sufficiently for this proportion to return to its 1990 level.

Table III.5
LATIN AMERICA (SELECTED COUNTRIES): STRUCTURE OF EMPLOYMENT, 1990-2008 [a]
(Percentages)

	1990	1998	2003	2008
High-productivity sectors [b]	7.9	7.0	7.3	8.1
Medium-productivity sectors [c]	23.1	20.7	19.7	20.0
Low-productivity sectors [d]	69.0	72.3	73.0	71.9
Total	100.0	100.0	100.0	100.0

Source: Economic Commission for Latin America and the Caribbean (ECLAC), "América Latina y el Caribe. Series históricas de estadísticas económicas 1950-2008", *Cuadernos estadísticos*, No. 37 (LC/G.2415-P), Santiago, Chile, 2009. United Nations publication, Sales No. S.09.II. G.72 and International Labour Organization (ILO), LABORSTA [online database] http://laborsta.ilo.org/, 2009.

[a] Calculation based on the economically active population, broken down by sectors, indicated by the International Labour Organisation (ILO), and corrected for the sectoral unemployment rates given by ILO.
[b] Mining, energy and finance.
[c] Industry and transport.
[d] Agriculture, construction, commerce and community and personal services.

A rise in the proportion of workers in low-productivity sectors has an impact on social equity as it leads to a more unequal distribution of wages in favour of a small group of workers with more advanced skills who are more securely engaged in high-productivity activities. Recent trends in employment and its relationship with productivity are examined further in Chapter V, which focuses specifically on this topic.

3. Heterogeneity among agents: employment, wages and performance

Disparities are found both among sectors and among agents within different sectors. As noted above, there are enormous productivity gaps in the agricultural sector between the traditional peasant economies and the fastest-growing agro-industrial niches. In urban areas, large numbers of workers entered the informal sector over the last three decades as a sizeable population of low-

productivity economically active persons found work that requires little specialization in sectors such as commerce and services. This exacerbated existing disparities.

One way to quantify productive heterogeneity is to classify companies by size. More than 90% of the companies of the region are micro-, small and medium-sized enterprises, which account for a considerable proportion of employment, a much smaller share of output and a negligible share of exports. Recent, in-depth research by ECLAC on the magnitude of the differences in productivity among enterprises of varying sizes has confirmed the extent to which the region is heterogeneous and the relationship between heterogeneity and indicators of growth and inequality (Infante, 2009). Moreover, the lack of linkages in the production structure means that even the export sector is heterogeneous and offers only weak stimuli for small enterprises to grow (Infante and Sunkel, 2009). Hence, during certain stages, heterogeneity may curb economic growth. Table III.6 shows the share of total employment, GDP and exports for different types of agents.

Table III.6
LATIN AMERICA (SELECTED COUNTRIES): SHARE OF EMPLOYMENT, GDP AND EXPORTS FOR DIFFERENT TYPES OF ENTERPRISES [a]
(Percentages)

	Microenterprises	Small enterprises	Medium-sized enterprises	Large enterprises
Employment	30.4	16.7	14.2	38.7
GDP	7.3	9.8	11.4	71.5
Exports	0.2	1.8	6.4	91.6

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

[a] The table indicates employment, GDP and exports for each type of enterprise as a ratio of the total for the formal sector. A simple average, based on official data from Argentina, Brazil, Chile and Mexico, was used. The criterion for classifying enterprises by size is in keeping with the definitions used by the development institutions in each country (see Ferraro and Stumpo, 2009).

Relatively smaller agents constitute a highly heterogeneous group, ranging from subsistence microenterprises to somewhat fast-growing medium-sized exporters. A comparison of the performance of these enterprises in the region (their productivity versus that of large enterprises within each country) with the performance of similar-sized companies in developed countries sheds light on two important points:

First, differences in relative productivity within each country (between large enterprises and others) are much greater in Latin America than in developed countries. Whereas microenterprise productivity in Chile is just 3% that of a large company, the equivalent figure in France is 71%.

Second, as shown in table III.7 —again with regard only to relatively small enterprises— the differences between microenterprises, small enterprises and medium-sized enterprises are greater in the region than in the developed countries under consideration. In Brazil, the productivity of a microenterprise is 25% that of a medium-sized firm and 37% that of a small enterprise, while in Spain the respective ratios are 60% and 73%.

Table III.7
RELATIVE PRODUCTIVITY OF VARIOUS AGENTS COMPARED WITH THAT OF LARGE ENTERPRISES [a]
(Percentages)

	Microenterprises	Small enterprises	Medium-sized enterprises	Large enterprises
Argentina	24	36	47	100
Brazil	10	27	40	100
Chile	3	26	46	100
Mexico	16	35	60	100
Peru	6	16	50	100
Germany	67	70	83	100
Spain	46	63	77	100
France	71	75	80	100
Italy	42	64	82	100

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

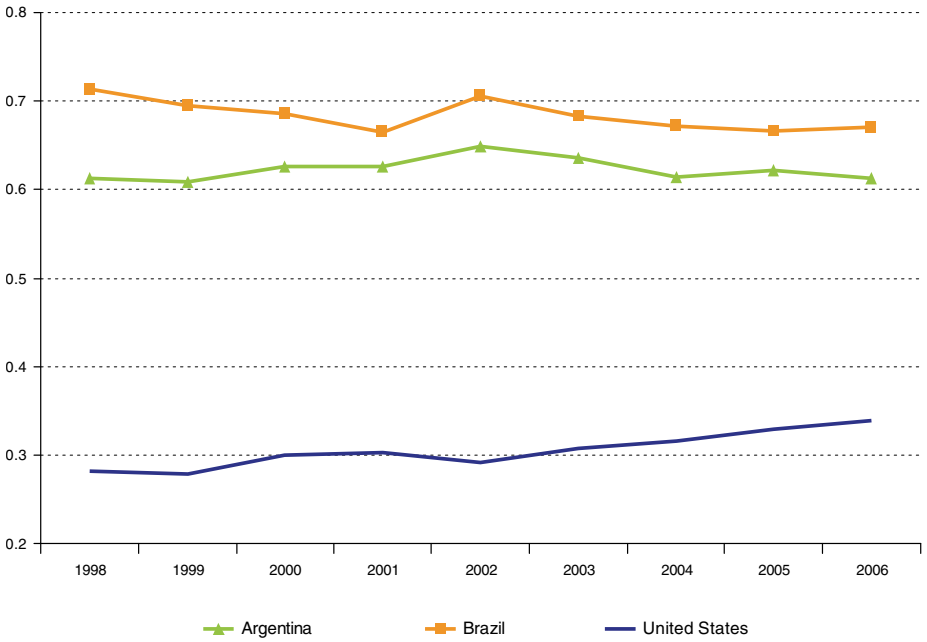
[a] The figures in the table correspond to the productivity for each type of enterprise as a percentage of that of their larger counterpart. The productivity data and the classification of enterprises by size comprise only the formal sector of the economy and are based on information released by the development institutions in each country (see Ferraro and Stumpo, 2009).

These data underscore the high degree of heterogeneity among relatively small enterprises. This has important policy consequences, given that different programmes, instruments and methodologies will be need to be implemented to take account of the differences among this highly diverse group of agents.

Because of the degree of heterogeneity, considerable wage differences can be assumed to exist both among sectors and among enterprises. To verify the validity of this assumption, information on the unit wages of different types of enterprises in the nine economic sectors of Argentina, Brazil and the United States were examined. A dispersion index was constructed for each country using data on the wages of workers in micro-, small and medium-sized enterprises, in the nine sectors. The index reflects wage differences both among sectors and among agents. As shown in figure III.2, wage dispersion levels are indeed much higher in Argentina and Brazil than in the United States.

Labour policies may help narrow wage differences and therefore influence the degree of dispersion of unit wages. Indeed, figure III.2 shows a reduction in the coefficient of dispersion starting in 2002-2003 both in Argentina and Brazil, just as more proactive labour policies were being implemented. Yet these policies failed to substantively reduce wage dispersion, because it is rooted in the very high degree of heterogeneity among sectors and among agents characteristic of Latin American economies. Hence the importance of production convergence policies, which are the focus of section D of this chapter.

Figure III.2
ARGENTINA, BRAZIL AND THE UNITED STATES: WAGE VARIATION COEFFICIENTS



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

C. Heterogeneity in the manufacturing sector: variations in the productivity gap and specialization

A more detailed analysis of the trends in the productivity gap and in the heterogeneity in the manufacturing sector is provided in this section. A study of the various segments of this sector reveals that asymmetries in the pace of technological change had an impact not only on productivity but also on productive specialization.

Manufacturing was highly protected for many years, which spurred strong growth in this sector, particularly in the largest economies of the region, namely Argentina, Brazil and Mexico. Still, the debt crisis and the low levels of investment during the "lost decade" of the 1980s dealt a severe blow to the sector. The downturn in industry was even sharper than that of the economies as a whole, and industrial output as a share of GDP declined. In the 1990s, however, when the economy began to overcome the crisis as a result of stabilization policies and the return of foreign capital, Latin America's manufacturing industry showed signs of recovery. Though, by then, its structure had changed.

Indeed, in the 1990s Latin America's policies and the growth model changed substantially, in association with sweeping trade liberalization and the abandonment of previous technology policies (Stalling and Peres, 2000). The coefficient of openness for the region rose significantly between 1990 and 2008, while the mesh of intersectoral ties and linkages became more diffuse.[12]

[12] The coefficient of openness is the ratio of the sum of imports and exports to GDP.

Under the new growth model, the input-output matrix contains fewer sectors overall, and there are more empty spaces in the production matrix and fewer production- and technology-related linkages (Infante and Sunkel, 2009).

There were two phases of rapid industrial growth, one in the 1990s and the other during the boom from 2003 to 2008 that was driven by a strong surge in raw materials prices. Both phases slowed the downward trend in the coefficient of industrialization that had characterized the region since the 1970s. In several of the countries considered in this document —Argentina, Colombia, Costa Rica, Ecuador, Nicaragua, Peru, Plurinational State of Bolivia and Uruguay— industrial output as a share of domestic value added actually increased.

Although the technology-intensive sectors of several countries of the region have grown at rates higher than those of other industrial segments, they have not recovered the relative weight they had in previous periods. Technological capabilities and production linkages diminished throughout the 1980s and 1990s while, at the same time, research and development expenditures were cut and high-technology-content goods imports climbed.

This loss of technological capabilities was accompanied by a considerable loss of institutional capabilities within the public sector (Katz and Stumpo, 2001). Consequently, the industrial plant responsible for the growth recorded in 2003-2008 was qualitatively very different from the productive system that had existed in the region in previous decades, just as the institutional framework within which production was promoted, and which set guidelines for growth, was also quite different. In recent years, the erosion of institutional capacity has meant that several countries of the region ran into serious difficulties in the design stage and encountered insurmountable obstacles in implementation when they attempted to carry out industrial promotion plans.

The near-complete absence of proactive industrial promotion policies in the 2003-2008 growth period, along with the profound transformation of the industrial sector in the preceding decades, meant that although there was a basically quantitative increase in output in technology-intensive sectors (and, in general, in the manufacturing sector as a whole), no concomitant build-up was recorded in technological capabilities.[13] The consequences can be seen in two aspects: the first is related to the region's position in external markets and its industrial trade balance, while the second is associated with changes in productivity.

The growing importance of the external sector can be seen in the rise in the industrial import and export coefficients. In particular, the sharper increase in the coefficients for industrial imports from 2003 to 2008 underscores the productive system's difficulty in competing in most sectors. This is particularly clear for technology-intensive sectors, although it also applies to labour-intensive ones which face competition from new producers, especially from Asia. As a result of this weakness and given the sustained increase in domestic demand, industrial trade balances are either running higher deficits or posting waning surpluses (table III.8).[14]

During the same years, the deficit was offset by high prices for the region's agricultural and mining exports. Over the medium and long terms, this situation is unlikely to be sustainable,

[13] The exception in this case is Brazil.

[14] In the English-speaking Caribbean, high-technology manufactures accounted for 6% of exports in 1985, compared with only 1.4% in 2000 (ECLAC, 2003).

given the degree of openness of the economies of the region and the volatility of raw materials prices (which has been confirmed by the current international crisis).

Table III.8
LATIN AMERICA: TRADE BALANCE
(Thousands of current dollars)

	1970	1980	1990	1998	2003	2008
Agriculture	1 302 191	3 229 446	8 053 713	12 045 198	14 048 738	28 384 653
Mining	2 594 776	15 345 835	18 048 226	17 696 919	40 372 224	150 455 987
Industry	-3 585 818	-22 486 471	-6 810 511	-60 463 927	-30 168 729	-148 563 691
Engineering-intensive industrial sectors	-4 974 309	-24 229 565	-20 033 217	-43 815 418	-19 375 174	-102 246 840
Natural-resource-intensive industrial sectors	1 958 858	2 759 600	12 702 086	-7 918 827	-676 687	-10 028 422
Labour-intensive industrial sectors	-570 367	-1 016 507	520 620	-8 729 681	-10 116 868	-36 288 428
Overall total	311 149	-3 911 191	19 291 428	-30 721 810	24 252 233	30 276 949

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of information from the External Trade Data Bank for Latin America and the Caribbean (BADECEL).

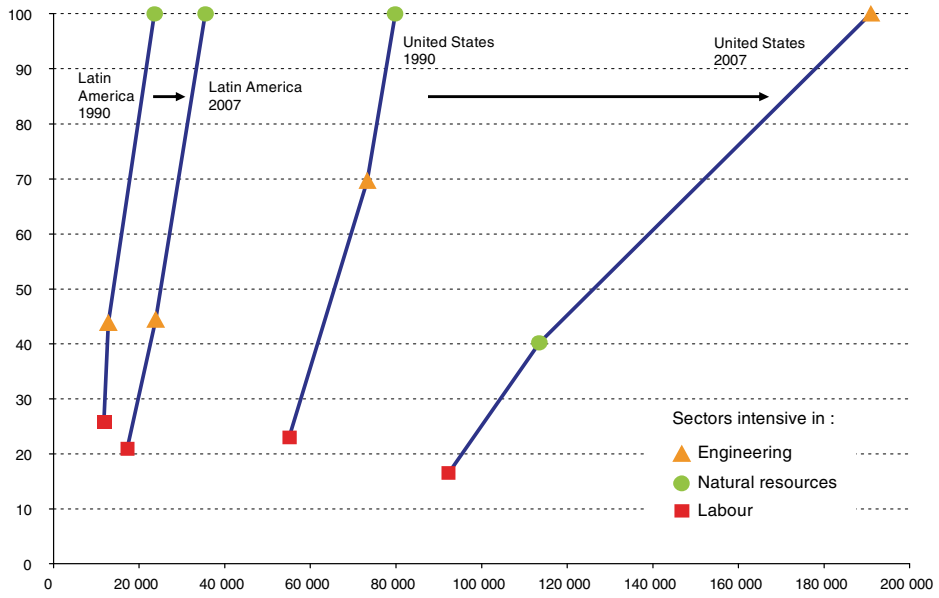
An analysis of the trends in the most technology-intensive sectors requires an examination not only of the external balance, but also of the transformations that have taken place within manufacturing, in terms of changing composition and rising productivity. Two indicators are used to evaluate these trends: (a) the share of industrial value added corresponding to the three categories into which industry has been broken down (high-technology-intensive, natural-resource-intensive and labour-intensive), and (b) the productivity of these three groups. As in the preceding sections, changes in some of the countries of the region from 1990 to 2007 have been compared with changes in the production structure in the United States during the same period. This comparison is presented in figure III.3 below, in which the square corresponds to labour-intensive sectors; the circle, to natural-resource-intensive sectors; and the triangle, to engineering-intensive sectors.

The vertical axis represents the total share of industrial GDP that these groups of sectors account for. As shown in the figure, in 1990 labour-intensive sectors in Latin America accounted for 25.7% of industrial GDP, compared with 18.2%[15] for technology-intensive sectors and 56.1%[16] for natural-resource-intensive sectors. The horizontal axis represents labour productivity (in 1985-constant dollars) for these groups of sectors. In Latin America in 1990, natural-resource sectors had the highest productivity, followed by technology-intensive sectors, while labour-intensive sectors had the lowest productivity. Thus, in the same year, natural-resource-intensive sectors, as a group, had the highest share of industrial GDP in the region as well as the highest productivity. In 2007, natural-resource-intensive sectors continued to have the highest share of GDP (55.6%[17]) and the

[15] The vertical distance between the triangle and the square on the first curve in figure III.3.
[16] The vertical distance between the circle and the triangle on the first curve in figure III.3.
[17] The vertical distance between the circle and the triangle on the second curve in figure III.3.

highest productivity. Moreover, the share of industrial GDP corresponding to engineering-intensive sectors rose, to 23.4%,[18] although productivity in these sectors is considerably lower than that of natural-resource-intensive sectors.[19]

Figure III.3
LATIN AMERICA (SELECTED COUNTRIES) AND THE UNITED STATES: PRODUCTIVITY AND BREAKDOWN OF INDUSTRIAL VALUE ADDED
(Percentages of industrial GDP and 1985 dollars)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of the Industrial Performance Analysis Program.

A comparison with trends in the United States shows that productivity increased much more in this country than in the region. The horizontal axis in figure III.3 measures productivity, with a rightward shift in a curve indicating an increase in productivity between the two years in question. The curve corresponding to the United States for 2007 shifted much further to the right than did the curve for Latin America. This is the case for all sectors under consideration, and in particular for technology-intensive ones.

However, the differences are not limited to productivity; they also include the composition of the production structure. In the United States, the share of industrial GDP corresponding to technology-intensive sectors rose from 46.7%[20] in 1990 to 60% in 2007.[21] In 1990, productivity in these sectors was lower than in natural-resource-intensive sectors, but by 2007 productivity in

[18] The vertical distance between the triangle and the square on the second curve in figure III.3.
[19] As can been seen from the horizontal axis of figure III.3, in 2007, productivity in natural-resource-intensive sectors was equivalent to US$ 35.51, compared with US$ 28.81 for engineering-intensive sectors.
[20] The vertical distance between the triangle and the square on the third curve in figure III.3.
[21] The vertical distance between the triangle and the circle on the fourth curve in figure III.3.

technology-intensive sectors was considerably higher that that of the latter group.[22] Hence, between 1990 and 2007, the production structure of the United States underwent a transformation, led by technology-intensive activities.

Technology-based segments generate knowledge spillover effects that encourage productivity increases throughout the industrial structure; hence, the structural transformation of the United States is accompanied by a generalized increase in productivity in the overall economy. By contrast, in Latin America, both in 1990 and 2007 the highest-productivity sectors and those that added the most manufacturing value were natural-resource intensive. The expansion of these sectors (especially in the absence of relevant policies) has few positive effects on overall technological capabilities, and their high productivity stems above all from the availability of natural resources. These sectors undoubtedly adopt technology, but mainly imported technology, and their lack of an endogenous capacity to innovate minimizes the catalytic role of learning. These sectors are characterized by continuous-production processes, which, by definition, are more difficult to break down into discrete spatial and temporal phases. Hence, they offer a much smaller number of opportunities for generating subcontracting linkages with other firms and therefore for transferring know-how and technology to other activities and enterprises (for example, to SMEs). Natural-resource-intensive sectors also have less capacity to generate backward and forward linkages, owing to the "technological strangeness" between existing activity and the new activities that are to be generated.[23]

Unlike that of the United States, Latin America's manufacturing sector did not undergo a structural change between 1990 and 2007 (see figure III.3). In Latin America, the sectors whose share of GDP and whose productivity make them the engines of economic growth have been the natural-resource-intensive sectors. This has brought about a modest increase in total output, but the associated increase in productivity has been far from sufficient to close the gap with the more developed countries. In the meantime, developed countries have succeeded in shifting their production structure in favour of technology-intensive sectors, and enterprises in these countries have transformed their business model, incorporating, among other things, new technological paradigms, such as information and communication technologies (ICT).

In terms of investments in research and development (R&D), not even the most advanced countries of the region have reached the level of European countries, Japan or the United States, where spending on R&D is between 2% and 3.6% of GDP (ECLAC, 2008b). In many countries of Latin America (Bolivarian Republic of Venezuela, Colombia, Costa Rica, Panama, Plurinational State of Bolivia and Uruguay), R&D outlays are, at most, 0.5% of GDP, and in others, spending is very close to that level (Argentina and Mexico). Only two countries (Brazil and Chile) spend substantially more. Brazil is an exception in the region, in that its R&D expenses have increased since the late 1990s and now stand at close to 1% of GDP, making it the regional leader in R&D investment (see table III.9).

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[22] As can been seen in figure III.3, in 1990, output of natural-resource-intensive sectors was equivalent to approximately US$ 80,000, compared with US$ 73,000 for engineering-intensive sectors. In contrast, by 2007, there was a reversal in this situation, and productivity in engineering-intensive sectors stood at of US$ 190,000, whereas in natural-resource-intensive sectors it had risen to US$ 113,000.

[23] This refers to Hirschman's idea of technological strangeness. Sometime the technologies used in an existing sector are of a complexity and have characteristics that make them very different from those used in the potential linkage (whether forward or backward). This will require a technological leap that is very unlikely to be made (Hirschman, 1977).

R&D investment functions according to a different logic in Latin America than in most developed economies, both in terms of funding sources and of the sectors that make investments for this purpose. The public sector continues to be the largest funder of R&D in the region, accounting on average for more than 50% of the total. By contrast, in more developed economies, the private sector funds and carries out most science and technology activities (with over 65% of the total in the United States) (ECLAC, 2008).

Table III.9
RESEARCH AND DEVELOPMENT EXPENDITURES
(Percentages of GDP)

	1998-2002	2002-2006	2007
Argentina	0.42	0.44	0.49
Bolivia (Plurinational State of)	0.29	…	0.28 (2002)
Brazil	0.56	0.92	1.02
Chile	0.55	0.67	0.67
Colombia	0.17	0.17	0.18
Costa Rica	0.36	0.41	0.41 (2004)
Cuba	0.51	0.51	0.41
Ecuador	0.07	0.09	0.15
Guatemala	…	0.04	0.05
Honduras	0.06	0.06	0.06 (2004)
Jamaica	0.06	…	0.07 (2002)
Mexico	0.40	0.44	0.46 (2005)
Panama	0.37	0.30	0.25 (2005)
Paraguay	0.10	0.09	0.09 (2005)
Peru	0.10	0.13	0.15 (2005)
Trinidad and Tobago	0.12	0.12	0.09
Uruguay	0.24	0.31	0.36
Venezuela (Bolivarian Republic of)	0.41	0.62	…
Latin America	0.54	0.57	0.63
Spain	0.91	1.09	1.20
Portugal	0.74	0.78	0.83
United States	2.65	2.62	2.60

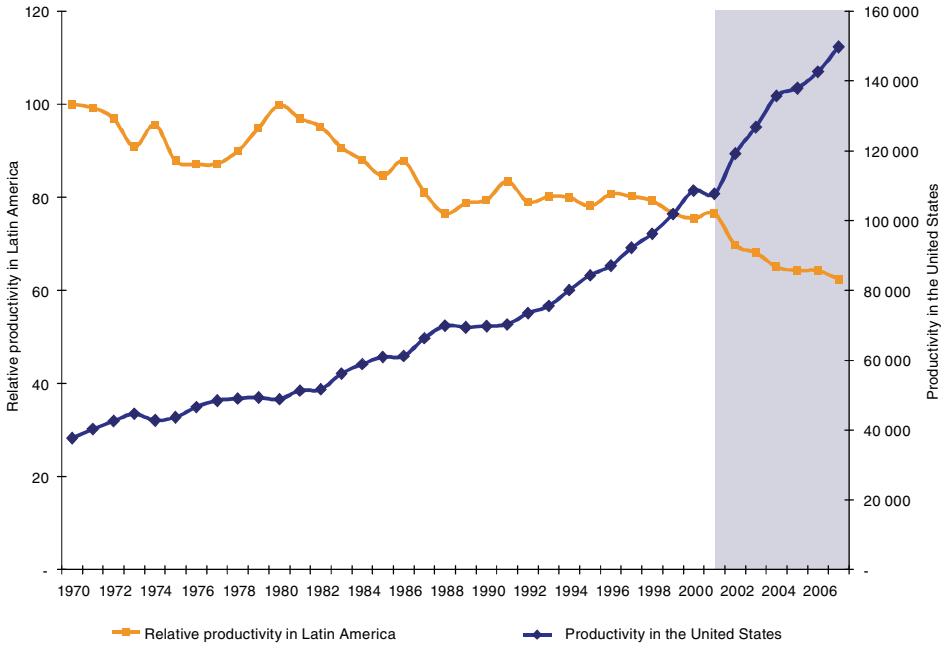
Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of information from UNESCO International Institute for Statistics (UIS) and Ibero American Network of Science and Technology Indicators (RICYT).

It is clear that technological change in Latin American industry has been limited and inadequate in light of the challenges posed by a production structure that is more open and more integrated into international trade. The situation may become even more difficult in an international context in which, for several years, technologies and production processes have been changing in response to increased ICT use.

A comparison of productivity in the countries of the region with that of the United States shows just how large a challenge the region faces in terms of technological convergence. The

trends in the relative labour productivity index for Latin America's industrial sector reveal that the gap has not been narrowed during the period under consideration (see figure III.4).[24]

Figure III.4
RELATIVE PRODUCTIVITY INDEX OF LATIN AMERICA (SELECTED COUNTRIES) AND PRODUCTIVITY IN THE UNITED STATES
(1970=100 and 1985 dollars)



Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of the Industrial Performance Analysis Program.

In the 1980s, the productivity gap began to widen, until the first half of the 1990s, when it started to narrow. In the mid-1990s, however, the relative productivity index for Latin America once again began to decline, with which the productivity gap widened. There were two reasons for this decline, which was particularly sharp in the last six years of the decade: (a) industrial labour productivity in the countries of the region increased by only 2% a year from 2003 to 2007, the worse performance for this indicator in 37 years (except for the "lost decade" of the 1980s); (b) beginning in the mid-1990s, the pace of productivity growth in the United States, which for 20 years had stood at approximately 3% per year, rose to about 5% per year. This higher rate of productivity growth resulted from changes in production processes based on the increased incorporation of ICT (Oliner, Sichel and Stiroh, 2007). The "acceleration" in the rate of increase of productivity in the United States therefore stemmed above all from the transformation of the industrial structure and the incorporation of new technological paradigms (in particular, ICT) into that structure.

[24] The index (base year 1970=100) is equal to the quotient of labour productivity in Latin America to labour productivity in the United States. A value of less than 100 indicates than the distance between productivity in the United States and productivity in Latin America has widened, and, therefore, that the productivity gap has also widened.

Figure III.4 also shows the effects of the various crises, with a drastic fall in relative productivity during the 1980s' debt crisis, a modest recovery starting in the early 1990s and a new decline starting in the second half of that decade (known as the "tequila crisis"). Each price- or real-exchange-rate-induced crisis was followed by a decline in productivity during the ensuing adjustment. If technological capabilities were destroyed, productivity increased more slowly after the shock, at least for a certain time. That is, under certain conditions, such as the destruction of know-how, each shock lowered the rate of post-adjustment productivity growth that could be attained. During the period of reforms, policymakers of the countries of the region were guided by the overarching assumption that companies and sectors adapted better and produced more efficiently when markets were liberalized and resources could shift freely to more competitive activities. This assumption proved mistaken as the loss of capacities in high- and medium-technology sectors was not offset by the symmetrical construction of new capabilities in natural-resource-intensive ones (Cimoli and others, 2009).

D. Productivity gap and energy gap

The energy sector plays a particularly important role in the productivity gap, for several reasons. The sector is strategic for international competitiveness, since energy is a key resource for raising output and lowering costs. The energy sector also affects the purchasing power of the most disadvantaged groups, given that in many countries of the region, energy sources and costs, as well as access to energy, vary considerably across income groups (ECLAC/SEGIB, 2009). Lastly, the energy sector accounts, both directly and indirectly, for a substantial proportion of the planet's greenhouse gas emissions.

There is growing consensus within societies and Governments regarding the need for environmentally sustainable growth models and, especially, for a shift towards low-carbon economies, and these issues will become increasingly important for future domestic- and foreign-policy agendas. A prime challenge for coming years is to discover and promote more sustainable paths for growth and, in particular, models for structural change in which progress in wealth distribution goes hand in hand with progress in sustainability. The evidence given below on the energy gap and structural change suggests that advances can be achieved with regard to learning, technological externalities and sustainability at one and the same time within the development process.

The industrial sector consumes large amounts of energy: around 30% of total energy consumption, both in the United States and in Latin America. On the other hand, as noted in this section, industry's traditional role in generating technical progress and passing it on to other areas of the economy means that industry is also crucial for generating the innovations needed to lower energy consumption and carbon emissions.

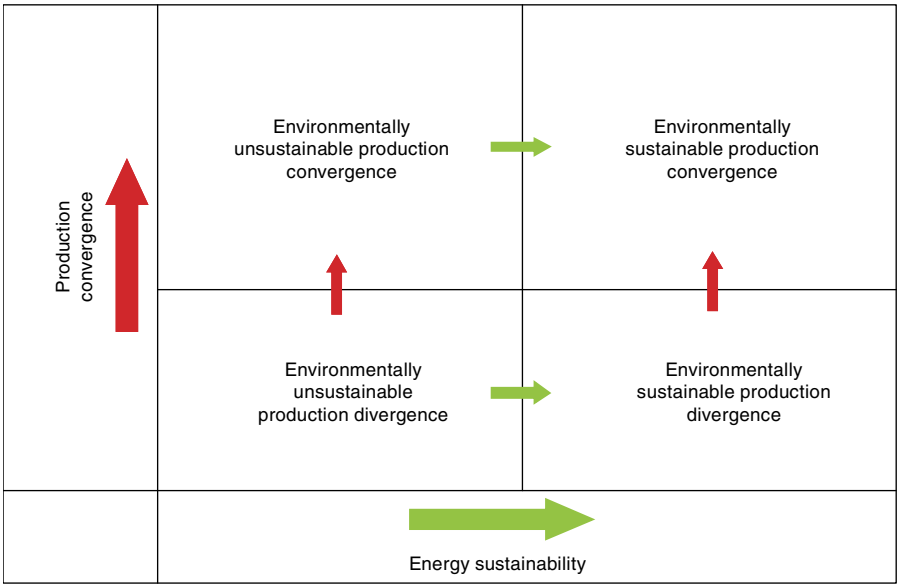
Given the importance of the industrial sector, the correlation between energy consumption and higher industrial value added has received close attention, since it underscores trends in energy. This correlation, widely discussed in the literature on the stages of industrialization processes in developed countries, has once again become pivotal for developing economies as the economies on the periphery move ahead with their industrialization.[25] There is no single, universal correlation between a society's energy consumption and its level of development: the

[25] See Cole, Rayner and Bates (1997); De Bruyn, van den Bergh and Opschoor (1998); and Pasche (2002).

disparities over time and in different areas of production appear to be associated, on the one hand, with technology choices, and, on the other, with resource use. Technology choices made by the agents of production affect energy consumption, as well as the productivity and competitiveness achieved with the energy consumed. This poses a twofold challenge for economic policy, given that countries must make technology choices that encourage efficiency, in terms of both production and energy consumption.

A commonly used indicator of efficiency is energy intensity, or the ratio of the quantity of energy consumed to industrial value added. This indicator can also be used to construct a measure of Latin America's energy intensity relative to that of the United States.[26] If labour productivity, as an indicator of the efficiency of production, is also considered, four different situations can be identified (see diagram III.1).

Diagram III.1
MATRIX OF PRODUCTION DEVELOPMENT AND ENERGY SUSTAINABILITY



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

To attain a virtuous, sustainable development pattern (upper-right quadrant of diagram III.1) Latin America will need to introduce structural changes and reduce its productivity differences with the most developed countries (that is, it will need a production convergence) while also lowering energy consumption per unit of output (environmental sustainability). This scenario might be called "sustainable convergence". The opposite of this virtuous pattern occurs when the least technologically dynamic sectors play a central role within the production structure, which widens the productivity gap, and when consumption patterns are adopted that cause energy consumption to be higher than is the case in developed economies (lower-left quadrant, unsustainable divergence). This type of growth pattern is often associated with natural-resource-

[26] This is the quotient of the energy intensity of a given country to the energy intensity in the United States. Hence, the energy gap is equal to: 1 – relative energy intensity.

intensive sectors, which are mature and are slower to incorporate technological change. Moreover, greater natural-resource use entails higher energy consumption.

In the remaining two scenarios, either efforts are focused on raising energy efficiency, but with less production efficiency (lower-right quadrant, sustainable divergence), or a more technology-intensive specialization pattern is adopted, narrowing the productivity gap but increasing energy consumption per unit of value added (upper-left quadrant, unsustainable convergence). The latter pattern heavily emphasizes production objectives, at the expense of energy objectives.

This section now analyses, on the basis of available information, the industrial sector in four countries of Latin America, Brazil, Chile, Colombia and Mexico, and compares energy consumption and productivity between these countries and the United States from 1996-1997 to 2006.[27]

In figure III.5 below, the square corresponds to labour-intensive sectors; the circle, to natural-resource-intensive sectors; and the triangle, to engineering-intensive sectors. The vertical axis represents the cumulative share of industrial energy consumption that these groups of sectors account for. In 1996, labour-intensive sectors in Latin America accounted for 17.4% of industrial energy consumption, compared with 8.8%[28] for technology-intensive sectors and 73.8%[29] for natural-resource-intensive sectors, as shown in the figure. The horizontal axis represents labour productivity (in 1985-constant dollars) for these groups of sectors. In Latin America in 1996, the group of sectors with the highest productivity were natural-resource-intensive sectors, followed by technology-intensive segments, while labour-intensive sectors had the lowest productivity. In 2006, natural-resource-intensive sectors continued to be the group with the highest productivity in the region, while their share of industrial energy consumption rose (to 76.6%).[30]

By contrast, in the United States, the highest-productivity sectors are engineering-intensive, and these sectors' share of total energy consumption declined from 28.4%[31] to 24.1%[32] between 1997 and 2006. Importantly, both in the United States and in the four Latin American countries, natural-resource-intensive sectors account for the largest share of industrial energy consumption and, therefore, their intensive use of energy per unit of output must not be overlooked. Given the specialization and the composition of industrial production in Latin America (described in the previous section), the region consumes an increasingly high amount of energy per unit of output, with lower levels of relative productivity. The opposite is true of the United States, as a result of that country's productive specialization.

The different patterns of development of countries or regions are determined by the closure of energy and productivity gaps, which, in turn, determines their position in the matrix of productive development and energy sustainability. Thus, it can be posited that even if the analysis were to include groups of sectors, the four countries of Latin America are far from closing the energy and productivity gaps, since for the most part they are located in the quadrant corresponding to a development pattern of unsustainable divergence (see diagram III.2).

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27 This sampling was selected on the basis of available data, given that only some countries give information on energy consumption with a breakdown by manufacturing sectors in their industrial surveys. The paucity of data also narrowed the study period, which is from 1996 to 2006.

28 The vertical distance between the triangle and the square on the first curve in figure III.5.

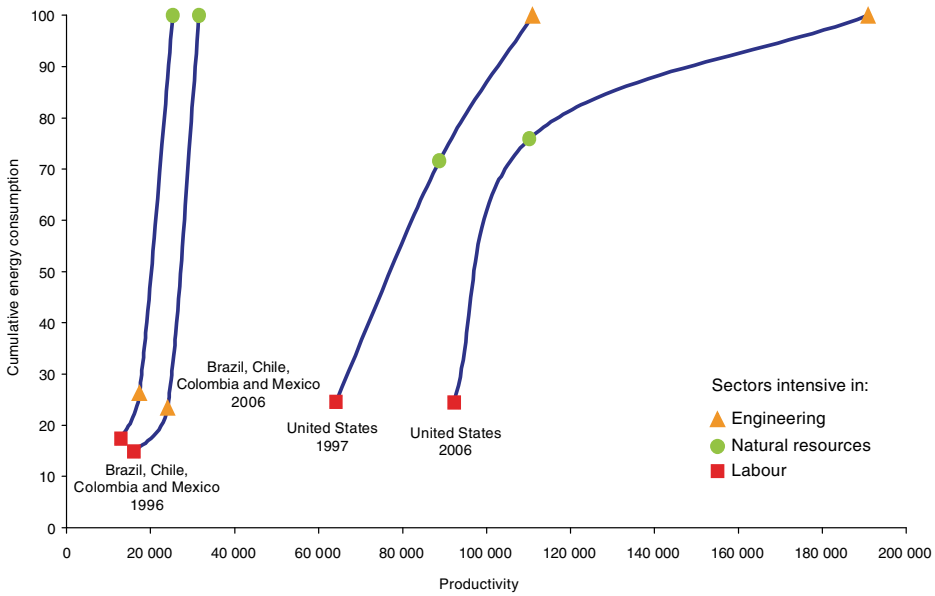
29 The vertical distance between the circle and the triangle on the first curve in figure III.5.

30 The vertical distance between the circle and the triangle on the second curve in figure III.5.

31 The vertical distance between the triangle and the circle on the third curve in figure III.5.

32 The vertical distance between the triangle and the circle on the fourth curve in figure III.5.

Figure III.5
LATIN AMERICA (FOUR COUNTRIES) AND THE UNITED STATES: STRUCTURE OF ENERGY CONSUMPTION AND PRODUCTIVITY
(Percentages and 1985-constant dollars)



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

Diagram III.2
ANOTHER EMPTY BOX? THE ENERGY GAP AND THE PRODUCTIVITY GAP, 1996-2006

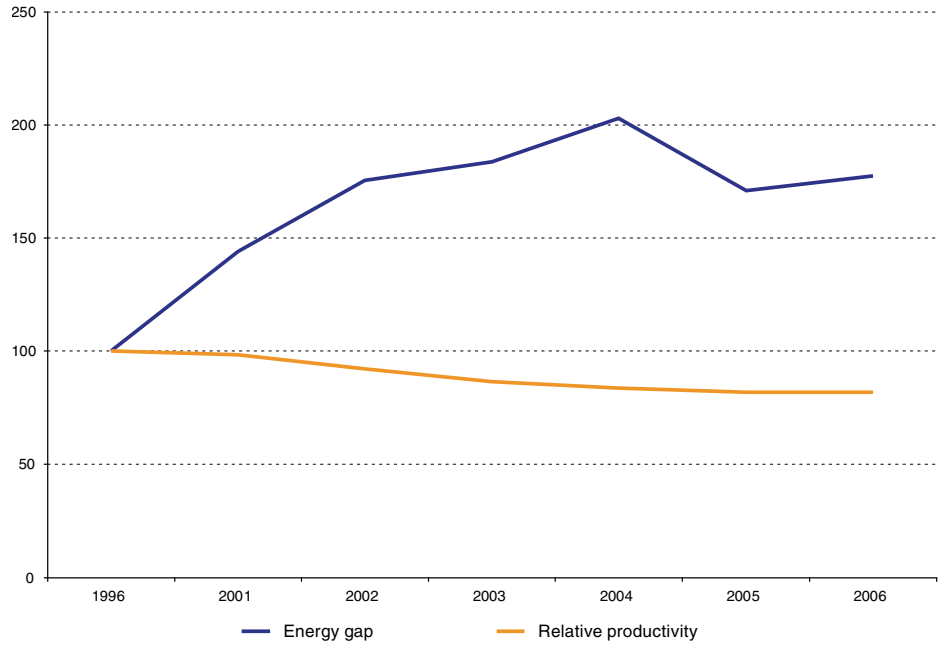
Production convergence	Narrowing of production convergence	Chile – Natural resources Chile – Labour Colombia – Natural resources Mexico – Natural resources		
	Widening of production convergence	Brazil – Engineering Brazil – Natural resources Brazil – Labour Brazil – Total Chile – Engineering Chile – Total	Colombia – Engineering Colombia – Labour Colombia – Total Mexico – Engineering Mexico – Total	Mexico – Labour
		Widening of energy convergence		Narrowing of energy convergence
		Energy sustainability		

Source: Economic Commission for Latin America and the Caribbean (ECLAC).

If productivity determines a country's pattern of specialization, further specializing in the most productive sectors in the United States would set the country on the course of virtuous development and would encourage high-technology-content activities, such as engineering-

intensive activities, in which productivity rises more quickly. This would also raise the United States' energy efficiency, given that the promotion of these activities would have a positive structural effect in terms of energy, as well. Further specialization in the most productive sectors (natural resources) in the four Latin American countries under consideration, however, would promote activities in which innovation and productivity gains come more slowly and, given their energy-intensive nature, would raise demand for energy**.** Because of these factors, energy consumption per unit of output is rising more quickly in the region than in the United States; without, however, there being a simultaneous narrowing of the productivity gap (figure III.6).

Figure III.6
BRAZIL, CHILE, COLOMBIA AND MEXICO: ENERGY GAP AND RELATIVE PRODUCTIVITY COMPARED WITH THE UNITED STATES, 1996-2006



Source: Economic Commission for Latin America and the Caribbean (ECLAC).

A final issue to be considered is the positive correlation between higher energy consumption per unit of output and rising greenhouse gas emissions. For economic and social reasons, current production and consumption patterns rely heavily on fossil fuels, and this has spurred higher energy consumption while at the same time generating an unsustainable pattern that the international community will begin to sanction through economic and trade measures.

Externally, as Latin America's export markets continue to emphasize consumption patterns based on lower-carbon-content goods and services, production processes will come under increasing pressure regarding the emissions that their outputs generate during their useful life. In France, Germany, New Zealand, the United Kingdom and the United States, for example, carbon labelling initiatives for products and services are already under way (see Samaniego and Schneider, 2009).

In addition to seeking to increase its involvement in more dynamic production processes, the region should also take steps to gradually but steadily adopt technology to reduce the carbon footprint of its exports and of its economy overall. One of the major challenges will be to transform current incentives so that relative levels of profitability are shifted and consumer demand is channelled towards lower-carbon-content materials and products.

In 2009, the United Nations Environment Programme issued a proposal to document this connection and called for in economic policy innovations that would reactivate the world economy while reducing carbon emissions at the same time, particularly as regards the energy supply, demand for transportation, waste management and agriculture. The aim is to promote options that offer the largest simultaneous benefits for the economy and the climate and to redirect economic incentives and policies towards the pursuit of increased energy efficiency and an energy matrix that is cleaner or, at least, carbon-free (UNEP, 2009).

E. Difficult choices

As far as designing a production development strategy is concerned, countries must keep in mind that the different options lead to different paths of specialization. In selecting from the range of options open to them, each country must weigh its current situation and its possibilities, as well as its patterns of international specialization and the manner in which it has chosen to respond to the challenges posed by climate change. The choice of sectors —which is the lynchpin of efforts to bring about structural changes through production development policy— should be keyed to the advantages and drawbacks of the different options. The analysis can start with a simple classification of economic activities into three types of sectors: natural-resource-intensive, technology-intensive and labour-intensive.

Except during the fifty-year import-substitution industrialization period, for centuries the region has been staking it bets on natural-resource-intensive sectors, whose productivity gap with regard to the technological frontier is, at most, negligible. However, these sectors are also highly capital-intensive and create only small numbers of jobs. Given the high concentration of ownership of natural resources (which is greater than in the case of industrial property, commerce and human capabilities), their development may also have an adverse impact on income distribution. These negative effects must be offset with redistributive policies that collect and share out the income obtained from natural resources. Chapter VI examines these policies.

Pursuing the development of technology-intensive sectors brings benefits in terms of incorporating technical progress, promoting learning and generating dynamic competitive advantages. Nevertheless, it also has costs, which must be taken into account. As the region is further from the international technological frontier in these sectors than in natural-resource sectors, the effort required to develop them will be greater.

There are two employment scenarios in the technology-intensive sectors. The sectors that rely on more mature technology (autos, mechanical-engineering, chemicals and petrochemicals) are dominated by concentrated oligopolies and produce differentiated goods, which generally take advantage of economies of scale. Labour intensity in these activities ranges from medium to low. In the sectors at the heart of the technological revolution (the electric-electronics, pharmaceuticals and petrochemicals industries), large enterprises exist alongside small ones. Knowledge is more highly valued for the activities carried out in these industries and wages are

thus also higher. However, the direct impact that these sectors will ultimately have on employment is not yet clear, and the initial assumption that sectors with predominantly small enterprises would become increasingly influential does not appear to be holding true, at least in the case of activities in which there are players that control a large share of the global market (for example, Amazon, Microsoft, Google, Intel, Sony and similar ICT companies, or large pharmaceutical firms).

Efforts to favour labour-intensive sectors could have a more positive impact on employment and equality, but such an option faces some constraints, the principal one being the cost of labour in the region. Much has been written on this topic, from Chinese competition to the "doubling of the global workforce." A choice in favour of labour-intensive sectors would require changing the type of relationship with the outside world (through trade protection) or reducing the cost of labour, which would undermine the objectives of equality and social cohesion.

These options must all be considered during the policy-design process. Even not selecting one, in other words, not pursuing a production development policy, is to make a choice: the choice to continue specializing in natural-resource-intensive sectors -with their rent-seeking advantages and their distance from the technological frontier- and to avoid the cost of adapting to a new structure. However, this also entails disadvantages, such as weak job creation, not fully participating in the technological revolution currently under way and perpetuating the concentration of income and power.

F. Incentive schemes and production policies

The region must construct a strategy that will allow it to overcome the structural heterogeneity that characterizes its production base and to narrow its productivity gaps. Consideration must be given to a series of elements related to macroeconomic policy and the microeconomic market incentives that affect enterprises, on the one hand, and to industrial, technological and SME support policies, on the other. The first set of elements defines the context in which promotion policies are designed and carried out, while the second is the basic core of tools and lines of action around which an integrated production development policy is built. Each set of elements is important and interacts with the other: it is not possible to consider one at the expense of the other and construct an effective proposal for tackling the backwardness and inequalities of production in Latin America.

1. Macroeconomic structures and development policies

Since the early 1990s, the countries of the region have generally corrected their fiscal disequilibria and brought down inflation within a context of less restricted trade and finance, more flexible markets and the privatization of public enterprises. As noted in chapter II, during the same period, inflation-targeting regimes were widely adopted, the prerequisites for which include a freely floating exchange rate and the partial or complete opening up of the balance-of-payments capital account. In this regard, macroeconomic stability goals may clash with development goals inasmuch as they make the economies of the region vulnerable to the abrupt exchange-rate swings that are generally associated with external shocks generated by the high volatility of the capital account and of the prices of the region's main exports. In addition, monetary policy itself may lead to exchange-rate appreciations, causing, among

other problems, a decline in the profitability (and viability) of non-traditional tradable-goods sectors. Countries often resort to a variety of policy tools to mitigate the unwanted effects of these macroeconomic policies on the real economy, including:

- a consolidated development bank with a strong capacity for intervention (such as in Brazil), to make it possible to offset the loss of price competitiveness stemming from a higher exchange rate by making large amounts of subsidized, long-term credit available;
- State ownership of the main natural-resource exports (for example, copper in Chile), taxes or royalties on extractive or primary-production activities, clearinghouses in the commodities markets (these policies make it possible to mitigate the effect of strong price swings and even finance, during international price booms, policies to offset Dutch disease, which may be caused by higher prices);
- a public-investment policy to strengthen existing production linkages by promoting new links in higher-knowledge-content sectors (hence, some State enterprises in the region that develop natural resources have a huge investment capacity, such as Petrobrás of Brazil);
- a proactive industrial policy that consistently supports non-traditional sectors by strategically combining various trade and fiscal tools (for example, tariffs and taxes) in the pursuit of a given sectoral development strategy;
- an aggressive technology-development policy to promote and finance R&D investment, public-private interaction in laboratories and universities and other measures to consolidate a national innovation system.

The countries have substantially different institutional frameworks of support for production development, as will be shown below. One prominent example is Brazil, with its more consistent and longer-standing industrial policy, which implies more enduring social consensuses regarding the aims of industrialization. The country's robust industrial policy is reflected in a strong development bank with considerable investment capacity and macroeconomic influence and a clearly defined policy for industry and technology. This distinguishes Brazil from the rest of the region, where development banks in some cases have been dismantled and in others are embryonic and therefore have little influence over the economy.

Despite these differences, in practice, macroeconomic regimes and microeconomic and sectoral policies would appear to have been designed as "compensation" mechanisms. In several cases, sectoral policies or public ownership of key natural resources has been used to counteract the negative impact of orthodox macroeconomic schemes on the real economy. In other cases, heterodox macroeconomic regimes have been used to orientate exchange-rate and relative price polices (for example, through mechanisms that set different exchange rates for each sector) in favour of given strategic (non-traditional) sectors, precisely to compensate for the lack of more consistent sectoral and microeconomic policies. What has not been seen in the region yet is an "ideal" combination of a macroeconomic regime that favours development and a set of aggressive microeconomic and sectoral policies that promote structural change on the basis of technical progress.

2. Microeconomic market incentives

An understanding of how the production structure has evolved requires a grasp of corporate behaviour at the microeconomic level. Production structures are shaped and transformed by their interaction with business strategies, which are an essential part of the region's international trade pattern. In particular, large companies' investment strategies play a highly important role in determining the future profile of industry.

If the incentives structure, of which relative profitability is a major component, is biased towards traditional sectors, a lock-in process may emerge. The region has overwhelmingly specialized in sectors that, according to past experience, generate less aggregate growth and knowledge over the long term. At the same time, there are no incentives for agents to channel their investments into new sectors.

Aggregate figures for sector-by-sector sales by large firms in Latin America show that the share corresponding to manufacturing has tended to decline while natural-resource and services sales have tended to rise.[33] Engineering-intensive sectors have had little effect on large enterprises, for multiple, complex reasons, some of which have been studied in depth: the macroeconomic context and related public policies, institutional shortcomings, limitations in executing policies to promote import-substitution industrialization, the manners in which foreign investment has been attracted and issues related to management models and family control of companies (ECLAC, 2007b). On top of all of these reasons is path dependence. There is a wealth of literature showing that apparently minor, and often random, historical events may have important, magnified repercussions for the future development of the system (David, 1985; Arthur, 1994; Arrow, 2000).

To break with the dominant pattern, an exogenous intervention that "alters its configuration or transforms the underlying structural relationships among the agents" (David, 2000) is needed, which implies a key role for policymaking. Otherwise, in the absence of such external forces, the existing pattern is perpetuated, as is poor economic performance.

Production specialization is linked to microeconomic incentives, which determine how investments are allocated. This fact sheds light not only on specialization, but also on the self-reinforcement of specialization and on the effect of certain shocks on the workings of the development model. Hence, sectoral profitability serves to impose path dependence and lock-in on the diversification model of the large companies in the region. Between 2001 and 2005, the quotient of companies' profits to their assets (that is, their return on assets, or ROA) was five times higher in the mining sector than in engineering-intensive activities (ECLAC, 2007b).

Profitability of knowledge- and engineering-intensive companies declined from 1991 to 2005, particularly after 2000. This stands in contrast with the profitability performance of mining and, to a lesser extent, of oil subsectors during the same period, which benefitted from international prices. These differences in profitability tend to reaffirm the current model for integration into the global economy as they encourage investment to flow to traditional sectors. The differences are explained by various factors, in particular, by technological asymmetries between Latin America and the Caribbean and the developed countries, which are sharper in more technology-intensive subsectors. The productivity gap is broader and competitiveness is more limited in these subsectors, and corporate profitability is therefore lower than in the

[33] Large enterprises are in a better position to lead a process of reallocation of production favouring not only static comparative advantages but also structural change, by strengthening more knowledge-intensive activities.

natural-resources subsectors, whose goods compete better in international markets. Under like conditions (at least in the tradable-goods sectors), the correlation between technological intensity and profitability is negative, which helps perpetuate inequalities over time.

Nevertheless, technological intensity is not the only factor that influences relative profitability among sectors. Shocks induced by international prices can also have a significant impact, such as the increase in international demand from the beginning of this decade until 2008 that considerably widened the gap between prices and unit production costs. Within a context of high demand for primary products, the trade-liberalization model caused the region to further specialize in products that had long been its competitive base.

As noted above, there is a set of production development policies that can counteract the influence of the less positive signals emanating from the macroeconomic climate and microeconomic market incentives that most discourage structural change. These policies are discussed in greater depth below.

3. Industrial policy

In the first half of the 1990s, significant progress was made in macroeconomic stability, but long-term policies were eschewed. As the State shrank in size, industrial policy further lost legitimacy, having been discredited by poor industrial performance since the late 1970s and early 1980s.[34] As a consequence, not only was industrial policy abandoned but such policies came to be perceived as an obstacle to growth.

The persistence of growth problems in the region, many years after the reforms had been carried out, and the ever-present contrast with the proactive policies adopted by better-performing Asian countries allowed industrial policy to gradually recover a significant place in the strategy debate in Latin America. In recent years, the region has slowly returned to industrial policies, with different characteristics and approaches from one country to the next.[35]

The sector-specific nature of industrial policy has varied across the region. Some countries have revived sector-specific policies; others have implemented de facto sectoral policies, labelled "cluster policies"; while still others have adopted more horizontal policies and eschewed sector-specific policies. Some countries have simultaneously adopted all three approaches, recognizing that each serves a specific development objective. This is the case of the 2008 industrial policy of Brazil.

The countries have differed not only in the sector-specificity of their industrial policies but also in their coordination of those policies with their national development strategies. Some countries continually seek to develop their industrial sectors within explicit public-intervention strategies (for example, Brazil, Colombia and El Salvador). Others often strive to implement an industrial policy but not as part of a national development strategy (Argentina, Chile, Costa Rica and Mexico). The vast majority of countries make only sporadic efforts without having a national development strategy. And in nearly all countries, policy as formulated is far removed from

[34] Industrial policy is a specific field of productive development policy. Whereas the latter encompasses both sector-specific and horizontal actions (technological development, SME promotion and so on), the term *industrial policy* should be used for cases in which the proper priority is given to approaches that are centred on the sectoral dimension or that have a vertical scope.

[35] See Peres and Primi (2009).

policy as actually carried out. Assessments of policy action should therefore focus not on what policy documents state but on the policies that are in fact implemented.

The institutional development component is crucial, since cases of stop-and-go industrial policies still exist. In addition to often being intermittent, industrial policy is much less sector-specific than it was in the 1960s and 1970s. In the end, this lack of sectoral specificity has favoured primary sectors such as petroleum and mining and some services.

As noted, pro-competitiveness macroeconomic policies are the required counterpart to, but not a substitute for, industrial policies. Whereas the former create a context that favours a buoyant export sector and growth, the latter make it possible to fully tap the resulting potentials for learning that are the offshoot of that growth. The task of industrial policy is to provide an exogenous stimulus that enables the economies of the region to take paths other than those leading to low-growth equilibrium. Consequently, and given the need for the region to move towards an inclusive development strategy that will reduce heterogeneity, a broad reappraisal of industrial policies is imperative. However, a yawning gap currently separates industrial policy on paper and the policies that are implemented. Two complementary approaches must be now adopted simultaneously.

First, institutional capacity must be improved or even rebuilt, with a focus on two priority areas: implementation capacity, which means narrowing the gap between policy design and the institutional capacity to carry policies out (by, among other things, increasing the number, and improving the skills, of the specialists who design and implement policies); and the assessment of the impact of initiatives to spur economic growth and technological progress and to raise productivity.

Second, industrial policy must have a clear sectoral focus and support a price structure that will make it possible to change predominant investment patterns. Relative prices must be skewed so as to favour technology-intensive sectors or sectors in which global demand is growing more quickly, so that resources are reallocated to them. Horizontal policies that reduce costs and facilitate innovation, although also important, are generally insufficient to bring about quickly changes as important as those needed for open economies to be able to catch up, especially with an international technological frontier that is moving ahead at speed. It should be borne in mind that productive capabilities and technological capabilities are highly complementary, and one cannot be fully developed without the other. Structural-change policies are required to increase the influence of technology-intensive sectors and to generate synergies with technology policy and the demand for innovation among agricultural and industrial producers. Consequently, vertical policies favouring the emergence and consolidation of capabilities in sectors that are highly dynamic in technological terms are a necessary condition to ensure that horizontal policies intended to foster innovation have a real impact.

Lastly, to complement income-redistribution policy and different types of sectoral incentives, the creation of mechanisms to supervise, evaluate and penalize firms and agents is extremely important, in order to ensure the correct use of these incentives. This is closely associated with the setting of targets and deadlines for meeting them. The lack of supervision and the certainty that there are no consequences for violating the implicit contract between society (which offers the resources) and firms (which use them subject to certain conditions and objectives) is one of the main differences between Asia's experience with industrial policy and Latin America's. An income-redistribution policy degenerates into a rent-seeking policy when agents fail to abide by agreed growth and competitiveness guidelines.

4. Technology policy

The region's history in science and technology policies provides useful lessons. During the import-substitution industrialization period, the public sector played a fundamental role, both directly and indirectly, by supporting the generation of technological capabilities and creating institutional infrastructure for science and technology (ECLAC, 2002). These efforts led to the establishment of national science and technology councils, whose objectives included founding universities and research institutes, improving university systems and promoting and supporting research projects. In addition, institutions and public enterprises were created and given the task of supporting scientific and technological research in specific strategic sectors considered critical for industrial development. Although some notable progress was made in broadening the supply of technological capabilities, the system was not linked to the demand for innovation. A top-down approach prevailed, with policies being decided by authorities without the participation of beneficiaries, under the notion that technological innovation and dissemination would follow a linear path from generation in research agencies to adoption in production methods. The key role played by users in innovation was thus overlooked.

In the 1990s, the focus shifted to demand-side factors. The goal was to lay new foundations for a hands-off science and technology policy in which the market would supplant the State as the active promoter of development (Chudnovsky and López, 1996). Public intervention was justified solely to correct market failures (information asymmetries) and to allow private-sector demand to guide scientific and technological activities. It was assumed that the dissemination of information and the guarantee of access to it would help solve problems related to the creation, adoption and spread of technology. Under these new public policies, however, knowledge and technology imports rose, which weakened the State's role and undermined its policy to boost home-grown technological capabilities.

Technology policies became contingent on market behaviour and on the productive sector's ability to explicitly make known its requirements for technological know-how. Foreign investment, as a source of technology, was promoted, and new patent laws were adopted. Demand was subsidized, mainly through the allocation of resources to projects proposed directly by companies, and the services of specialists and consultants in production and technology management ("technology brokers") were made available to companies to facilitate and increase access to information.

However, policies intended to subsidize demand helped make the local production system even more heterogeneous. Companies with little managerial ability and those with the greatest difficulties in obtaining information and resources were adversely affected. On balance, the policies implemented in the 1990s were better at dismantling the technology-supply system inherited from the import-substitution industrialization period than at constructing a new system based on incentives to increase the demand for innovation and technology. The market of agents driving up demand for technology never materialized. This was partly because the structural change process seen in the 1990s (which increased the importance of non-technology-intensive sectors) tended to depress such demand.

On the basis of the experience of the two previous phases, the vision of technology policy has gradually evolved into a systemic approach that privileges interaction between technology's supply- and demand-side variables. Firms acquire and adapt technology in response to signals from their milieu and improve it over time so as to enhance their technological capabilities and

competitive advantages. Their decisions are influenced by the incentives structure, the factors and resources markets (skills, capital, technology, suppliers) and the institutions (in the fields of teaching and training, technology, finance, and so on) with which they interact. Innovation is therefore an interactive process that links agents, such as firms, that respond to market incentives with institutions that operate on the basis of non-market strategies and rules. The agents, institutions and rules through which technology is incorporated together make up what is known as the "innovation system" (ECLAC, 2002).

The generation and incorporation of technology and the consequent attainment and improvement of international competitiveness thus constitute systemic processes. In developing countries, not only do externalities and huge information gaps make it difficult to frame a suitable response to these challenges, the institutions that should be backing companies are often ineffective or non-existent. In many countries of Latin America and the Caribbean, the action and efforts of science and technology agencies have been undermined by unstable policies, forcing institutions to act according to a short-term logic and, increasingly, to resort to market-like mechanisms. This instability has generally diminished the effectiveness of policies by dispersing accumulated capacities and sending out contradictory signals about incentives and what can be expected in terms of public-sector support.

The topic of intellectual property must be fully incorporated into any strategy for accumulating development capabilities. The region has fallen far behind in its analysis of this issue. Investing in the human resources and infrastructure needed to manage intellectual property effectively is, undoubtedly, expensive, and beyond the means of many developing countries and, in particular, of small enterprises. Nevertheless, an intelligent management of intellectual property rights has considerable potential benefits. They include reducing the costs of products that have a high impact on the population's well-being (as some developed countries have done with certain pharmaceutical products), paving the way for research activities based on patented technologies, preventing foreign patents being granted for biodiversity-related products and making progress with the patenting of the region's own innovations.

There are some fundamental requirements for designing and implementing a science and technology policy that will strengthen innovation processes: an institutional framework that places science and technology decision-making agencies on a par with other Government agencies, coordination with other policies (especially those related to education and industry) and a long-term outlook.

In recent years, several countries of the region (Argentina, Brazil, Colombia and Costa Rica) have supported institutional reforms to convert their decision-making centres into more centralized and cohesive units. They have thus elevated their science and technology institutions to the rank of ministries and allowed them to play a direct role in strategic decisions. Other countries still have institutional structures composed of various Government entities that design and implement innovation policies independently and through their own branch offices. In these countries, either decision-making remains in the hands of a number of different ministries (such as finance and education), or the agencies and commissions still have the status of presidential or ministerial bodies (Chile, Mexico and Uruguay).

The reformulation of the strategic vision and institutional framework for science and technology has been accompanied by a diversification of the policy instruments deployed. Rather than solely resorting to traditional mechanisms to stimulate supply and demand (such as support

for scientific and technological research and training, subsidies for projects proposed directly by the productive sector or fiscal incentives), some countries are broadening their range of tools. The most novel of these instruments include technology funds (which multiplied in the 1990s), sector-specific funds, venture capital incentives and other financial mechanisms, initiatives to promote university-enterprise cooperation, networking and government procurement. Although currently most incentives are horizontal in kind, others that seek better coordination between technology supply and demand, particularly between researchers and companies, are beginning to emerge.

One key element that needs to be strengthened is the monitoring of public policy and the evaluation of its outcomes. The region still lacks management mechanisms that provide continual feedback for improving policy design and updating policy guidelines (that is, monitoring systems). In addition, the time lags between the implementation and assessment of a policy are often so long that they make evaluation and ongoing adjustments extremely difficult.

In sum, technology policies in the region face a formidable challenge. Together with other industrial, education and macroeconomic policies, they need to foster an environment of fast learning and structural change that favours the development of the technologically most dynamic sectors. The results thus far are not encouraging, and parts of the production structure that were important for innovation have been lost.

5. SME-support policies

SMEs lag far behind other enterprises in productivity and export capacity and this increases structural heterogeneity and perpetuates the high levels of economic and social inequality in the region. SME-support policies are thus essential for raising productivity of the economy as whole, building an interlinked production structure, reducing differences among enterprises and sectors and helping a larger number of workers join the formal labour market and earn decent wages.[36]

Starting in the mid-1990s, Governments across the region began to take a greater interest in SMEs owing to the marked rise in unemployment triggered by the point reached in the economic reform process. Despite the good intentions, SME-support policies have so far yielded few concrete results. Although the situation varies from country to country, the institutions that design these policies wield little influence and suffer from a shortage of effective policy instruments. In the 1990s SME-promotion agencies in several countries were raised to the ministerial or vice-ministerial level, but this higher status has not come hand in hand with more power to execute policy (Peres and Stumpo, 2002).

The development of these agencies has differed greatly from one country to the next. Some countries have institutions with ample experience, scope and operational capacity, such as the Micro and Small Business Support Service (SEBRAE) in Brazil or the Production Development Corporation (CORFO) in Chile. Others have only recently created agencies with the power and capacity to unify and coordinate support for SMEs. Such is the case of the National Commission for Micro and Small Businesses (CONAMYPE) in El Salvador, established less than six years ago, and the Fund to Support Micro, Small and Medium-sized Enterprises in Mexico, created in 2004.

[36] This section refers primarily to SMEs, but there is a segment of microenterprises which, owing to their greater dynamism and capacity for accumulation, could also be addressed in the policy proposals put forward here. Microenterprises are otherwise difficult to incorporate into production development strategies and therefore need to be targeted by social policies instead.

These efforts recognized the importance of building a stable organizational and institutional framework to design policies with a view to meeting medium- and long-term needs that is, to a certain extent, immune to changes on the political front. In other countries, no sustained effort to develop institutional capacities has been made: isolated actions, lacking coordination and continuity, can be found in Argentina, Colombia, Ecuador, Paraguay, Peru and Uruguay (Ferraro and Stumpo, 2010).

Beyond these differences, the institutions responsible for designing and implementing policies all face severe financial and human-resources constraints. At best, an amount equivalent to not even 0.1% of GDP, and often less than 0.01% of GDP, is allocated to support thousands or hundreds of thousands of enterprises —depending on the specific country— which account for a significant percentage of total employment (see table III.10).

Argentina, Brazil, Ecuador, El Salvador and Mexico stepped up the amount of financial resources allocated to SME support between 2003 and 2008. In countries that rely heavily on international financial cooperation, the continuation and steady expansion of funding depend on exogenous decisions.[37] Often a limited institutional capacity produces bottlenecks that prevent funding allocated to SME policies from being used and increased. In sum, not only must development institutions' budgets increase, but their capacity to map out strategies, design policies and put support mechanisms and instruments into operation must also improve considerably.

Table III.10
LATIN AMERICA (SELECTED COUNTRIES): SPENDING BY INSTITUTIONS THAT SUPPORT SMALL AND MEDIUM-SIZED ENTERPRISES, 2005
(Percentages of GDP)

Country	Spending	Country	Spending
Argentina	0.004	Mexico	0.015
Brazil	0.085	Nicaragua	0.022
Chile	0.030	Panama	0.027
Colombia	0.008	Paraguay	0.005
Costa Rica	0.004	Peru	0.004
Ecuador	0.005	Dominican Republic	0.033
El Salvador	0.019	Uruguay	0.002
Guatemala	0.006	Venezuela (Bolivarian Republic of)	0.024
Honduras	0.005	Latin America	0.018

Source: Economic Commission for Latin America and the Caribbean (ECLAC), on the basis of P. Angelelli, R. Moudry and J.J. Llisterri, "Institutional capacities for small business policy development in Latin America and the Caribbean", *Sustainable Development Department Technical Papers Series*, Washington, D.C., Inter-American Development Bank (IDB), 2006.

Another recurring problem is that many Government initiatives have sought to have an effect through demand-side subsides, based on the erroneous assumption that potential beneficiary companies have similar capacities to respond to market signals. In many cases this error has led to the privileging of a small segment of faster-growing companies and widened the structural-heterogeneity gap. If the interventions are based solely on demand-side subsidies, only

[37] For example, in El Salvador, in 2006, 58% of the budget of CONAMYPE came from external funding, and in Paraguay almost all funding comes from international cooperation. In other cases, there are areas of strategic importance, for example, credit, that largely operate with external funding.

a small group of the most dynamic enterprises will be able to make effective use of the available instruments. The productivity of these companies allows them to cover the transaction costs required to gain access to support tools, and they can correctly diagnose their needs and help create markets for the different types of services that they need. Most SMEs do not fall into this category and have very limited access to support tools (Ferraro and Stumpo, 2010).

Some countries have been more rigorous than others in applying the logic of demand-side subsidies in the design and implementation of SME-promotion programmes. Whereas Chile has followed this logic very strictly, Mexico's adherence has been more nuanced, as seen, for example, in the direct action of some public agencies, such as the Regional Centres for Business Competitiveness (CETRO-CRECE). Brazil has taken a much more pragmatic approach, diversifying its policies by sector and geographic area, as evidenced by the actions of SEBRAE (Ferraro and Stumpo, 2009).

This all suggests that a new institutional framework is needed to bring about a qualitative leap in SME-promotion policies. To devise a strategy to support SMEs and transform them into enterprises that play a dynamic role in productive development and in their countries' international competitiveness will require more than a short- or medium-term effort. And this, in turn, will require the construction of institutional and learning capabilities. Some of the building-blocks of this process are outlined below.

First, the project must be a long-term one, and the retention of managerial and technical staff must be guaranteed.[38] Long-term planning requires institutional learning processes that involve systematic evaluations of all action carried out. Evaluations make it possible not only to measure the outcomes and the impact of tools and programmes but also to analyse and assess how instruments work and, above all, to determine if they are indeed contributing to the fulfilment of the overall strategy.

Second, institutional strengthening should be accompanied by a gradual, but steady, increase in funding, given the low amounts currently allocated to SME promotion. Consideration should be given not only to the financial but also to the human resources needed. In many cases, training will be required, in particular in areas such as production linkages.

A new institutional framework or, in some cases, an improved existing one is a necessary but not a sufficient condition for SMEs to overcome their considerable lags. For this objective to be attained, specific lines of action will also have to be designed and implemented in some priority areas.

For example, the problem of credit must be addressed. In the region's segmented financial markets, SMEs are treated less favourably than are large companies, as noted in chapter II. This bias can cause significant inefficiencies in resource allocation inasmuch as the lack of credit prevents the completion of viable projects that would produce higher returns than those that absorb the limited available financing. In addition, the credit limitations faced by SMEs can often lead to the closing of viable enterprises and to a loss of physical, human and organizational capital.

Although SME credit-support programmes have for many years been included on development institutions' agendas, no substantive improvements have been seen in SME access to financial markets.

[38] These characteristics, which should be obvious, are unfortunately not found in many SME-promotion systems in the region (Ferraro and Stumpo, 2010).

In the 1990s, approaches based on second-tier instruments were adopted throughout the region. Hence, rather than State-owned banks directly extending loans,[39] public development institutions call for tenders on funds to be used and managed by private banks to provide credit to SMEs.

Under second-tier public programmes, private banks tend to replicate the credit-market segmentation seen in operations they conduct outside of those public programmes. Thus, they repeat the selection bias that favours the largest enterprises, but within the beneficiary segment that they are "required" to serve (SMEs). Moreover, public institutions are often concerned mainly with the efficiency of their programmes and therefore focus on ensuring that the bids that they hold are successful. In several cases, they have raised the ceiling on annual sales for the classification of medium-sized enterprises, and enterprises that for every other purpose are classified as large have been included in second-tier lending programmes.

More than a decade after second-tier credit programmes began to be introduced in the region, no significant change can be seen in the ability of SMEs to access financial markets. This lack of progress is quite clear to the heads of many development institutions, who are becoming somewhat sceptical about second-tier approaches. First-tier programmes have thus become more common in recent years in the countries of Latin America.[40] Nevertheless, these programmes are of very limited in scope and have failed to significantly impact the operations of credit markets, in which SMEs continue to play an extremely small role.

Chapter II emphasized the role that development banks can play in giving relatively smaller enterprises access to credit. And this is a key reason for the State to once again take the lead in dealing with an issue that the market has clearly been unable to solve.

A second area in which State intervention can have considerable influence is human resources training. Chapter V notes that training incentives are used more commonly by large enterprises than by SMEs, essentially because approaches based on demand-side subsidies have also come to play a pre-eminent role in training policies.

The availability of skilled human resources has a two-fold importance for SMEs: they make it possible to improve existing production processes and to raise productivity and they disseminate knowledge and innovation within enterprises. This means that for SMEs to overcome their weakness in this area, policies must be devised that go beyond the logic of demand-side subsidies and reach the least dynamic enterprises (that is, most SMEs). For this to occur, the State must once again provide professional-training services in coordination with economic agents and intervene more vigorously, in particular for the least dynamic enterprises engaged in production-related activities.

The focus of these two areas of intervention is the provision of basic inputs (credit and human resources) for the vast majority of SMEs, which are unable to take advantage of instruments that are based on demand-side subsidies. However, there is another —clearly

[39] These are known as "first tier" operations.

[40] This is the case, for example in Ecuador, of National Financial Corporation's Credipyme (SME credit) programme and of the National Development Bank's 5-5-5 Programme. In Argentina, the National Development Fund for Micro, Small and Medium-Sized Enterprises (FONAPYME) is executed by the Office of the Deputy Secretary of Small and Medium-Sized Enterprises, the Bank of the Argentine Nation (Banco de la Nación Argentina) and the Foreign Trade and Investment Bank (Banco de Inversión y Comercio Exterior - BICE), while the Estímulo PYME (SME stimulus) programme is executed by BICE. In Brazil, the General Law on Micro and Small Enterprises requires State-owned banks to make specific credit lines available to small enterprises, and for some years the National Bank for Economic and Social Development (BNDES), Banco do Brasil and Caixa Econômica Federal (a federal savings and loan scheme) have had specific credit programmes for small enterprises.

smaller— group of more dynamic SMEs (as noted in section C of this chapter) that will need more specific tools. In this regard, production-linkage policies can have positive results and be effectively integrated with the industrial-policy actions referred to in that section.[41]

6. Towards an integrated agenda for production development

Structural heterogeneity calls for intervention in different spheres and consideration of the diverse agents whose needs must be met. To meet this challenge, an integrated agenda for production development that coordinates actions in the three policy areas in question —industry, technology and SME support— must be formulated. To focus on just one of the areas would raise the competitiveness of some groups of enterprises, to the detriment of others, exacerbate heterogeneity and fragment productivity. A strategy that prioritizes sectoral and industrial policy alone could strengthen large and perhaps medium-sized enterprises but would exclude the vast majority of SMEs and microenterprises. This could raise aggregate economic productivity, but at a slower pace than other alternatives would, and it would increase heterogeneity among agents regardless of the extent to which it succeeded in partially reducing heterogeneity among sectors. Likewise, a policy that focused solely on supporting the least dynamic enterprises might have positive effects on heterogeneity among agents but would not lead to the leap in productivity required to narrow the gap with the most developed economies.

In addition, actions in the three policy areas cannot be coordinated and integrated within a context of adverse macroeconomic policies. A macroeconomic approach strictly geared to meeting inflation targets, for example, would turn microeconomic-policy efforts into mere compensatory measures, greatly undermining their effectiveness.

A pivotal item on the agenda is the identification of key sectors, which will have to be selected on the basis of the specific features of each country's production structure and in accordance with the sectors' capacity to generate and disseminate knowledge and innovation and to encourage linkages with other manufacturing and services activities. It will be the task of industrial policy to focus efforts on these sectors.

For their part, SME-promotion policies will have to involve interventions in the areas of credit and human resources to provide these two basic inputs to nearly all enterprises in this category. As more SMEs succeed in upping their growth rate and narrowing their productivity gaps, they will also find it easier to join the supply chains of large companies and form enterprise networks, which will create synergies with industrial policy.

Technology policy will play a key role in this strategy, in two ways: first, by promoting innovation, essentially in large and medium-sized enterprises in selected strategic sectors; and second, by encouraging the dissemination of knowledge and technology in the companies with the greatest lags, through SME-specific interventions.

Establishing linkages among the different spheres of action is a complex process, as it involves various types of institutions (sectoral, technological, financial and those that focus on promoting SMEs) that tend to follow their own lines of action and specific objectives. For this reason, priority objectives need to be established within a strategic agenda. This can be attained only through consensus on those objectives (among public and private actors and, more generally, society as a whole) and under clear leadership by the State.

[41] That is, instruments intended to create horizontal and vertical networks, clusters and supply chains. See Dini and Stumpo (2004).