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meaningful for Latin America?

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WHICH “INDUSTRIAL POLICIES” ARE MEANINGFUL FOR LATIN
AMERICA?

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Economic growth in Latin America has proved to be elusive in the last twenty five years. After the “lost decade” in the 1980’s there were hopes that there would be an acceleration of growth after 1990. After all, in practically all economies of the region there was a significant move towards the implementation of structural reforms such as opening up national markets to imports, privatization of public-owned assets, and overhaul of social security systems. But this significant improvement in growth performance simply did not happen. Between 1990 and 2003 GDP-PPP per capita in Latin America and the Caribbean increased only 1% yearly compared to the 1.5% world average and similar rates in the mature OECD economies². In East Asia and the Pacific GDP-PPP per capita increased 6.3% yearly in the same period, in spite of the bad Japanese growth performance. Even if, to avoid the impact of the Argentinean debacle, focus is centered on the 1990-2001 period, the picture is not changed significantly as Latin America and the Caribbean still grew less in per capita PPP terms than the world and the developed economies. Only in a small number of Latin American and Caribbean economies the rate of growth of GDP-PPP per capita exceeded 2% yearly in 1990-2001: notably in Chile (4.4%) and Argentina (2.5%) among the larger economies, and in eight smaller Central American and Caribbean economies of which the largest were Costa Rica, the Dominican Republic and El Salvador (see table 1).

Given this mediocre regional growth performance, especially if compared with most Asian economies, it is only natural that there was a backlash concerning the views on the nature of policies that might contribute to assure that Latin America and the Caribbean enter an era of steady high growth. Some – with a rather selective memory – in fact argue that the mediocre performance resulted from the market-friendly reforms of the very late 1980s and 1990s. Others argue that it was the lack of sufficiently deep market-friendly reforms or their defective or incomplete implementation that answered for the lack of growth. In any case the idea that such reforms, even if well implemented, might have been insufficient to change the Latin American and Caribbean appalling recent growth record started to become widespread.

² World Bank WDI data base.

Table 1
Latin America: GDP-PPP per capita, GDP-PPP per capita yearly growth, total GDP-PPP, population and population density by economy, 2001 and 1990-2001

| | GDP-PPP | GDP-PPP | Population | Total |
|------------------------|------------|---------------|------------|---------------|
| | per capita | per capita | millions | GDP-PPP |
| | yearly | 1995 constant | | 1995 constant |
| | growth | US dollars | | US dollars |
| | 1990-2001 | | | billion |
| Antigua and Barbuda | 0.8 | 8542 | 0.1 | 1 |
| Argentina | 2.5 | 10715 | 36.5 | 391 |
| Bahamas | -0.4 | 14947 | 0.3 | 5 |
| Barbados | 1.1 | 13812 | 0.3 | 4 |
| Belize | 2.7 | 5435 | 0.2 | 1 |
| Bolivia | 0.8 | 2167 | 8.6 | 19 |
| Brazil | 1.3 | 6840 | 172.4 | 1179 |
| Chile | 4.4 | 8575 | 15.4 | 132 |
| Colombia | 0.3 | 5733 | 43.0 | 247 |
| Costa Rica | 2.6 | 7850 | 3.9 | 30 |
| Dominica | 1.8 | 5047 | 0.1 | 0 |
| Dominican Republic | 3.9 | 5714 | 8.5 | 48 |
| Ecuador | -0.4 | 3097 | 12.6 | 39 |
| El Salvador | 2.4 | 4308 | 6.3 | 27 |
| Grenada | 2.1 | 6144 | 0.1 | 1 |
| Guatemala | 1.1 | 3581 | 11.7 | 42 |
| Guyana | 1.7 | 3840 | 0.8 | 3 |
| Haiti | -3.4 | 1477 | 8.1 | 12 |
| Honduras | 0.0 | 2304 | 6.6 | 15 |
| Jamaica | -0.3 | 3451 | 2.6 | 9 |
| Mexico | 1.4 | 8032 | 99.4 | 798 |
| Nicaragua | 1.7 | 2307 | 5.2 | 12 |
| Panama | 2.8 | 5659 | 2.9 | 16 |
| Paraguay | -0.1 | 4354 | 5.4 | 23 |
| Peru | 1.7 | 4274 | 26.3 | 113 |
| St. Kitts and Nevis | 4.0 | 10517 | 0.0 | 0 |
| St. Lucia | 0.1 | 4736 | 0.2 | 1 |
| St. Vinc. & Grenadines | 2.8 | 5769 | 0.1 | 1 |
| Suriname | n.a. | 2500 | 0.4 | 1 |
| Trinidad and Tobago | 2.3 | 8237 | 1.3 | 11 |
| Uruguay | 1.6 | 7861 | 3.3 | 26 |
| Venezuela | -0.2 | 5253 | 24.6 | 129 |

Source: World Bank.

In many quarters, including influential sectors of the traditional academic establishment in developed economies, started to gain ground the idea that, after all, at least some of the old “industrial policies” – or perhaps other innovative *ad hoc* growth-promoting policies – could still have an important role to play in stimulating sustained growth in LAC economies. This “on second thoughts” literature is of course legitimate in its questioning of the limitations of orthodox recipes. But it has also had a less than fortunate influence on recent policy-making in many developing economies through their local reverberations especially in the local media and among populist politicians. They provide high-grade ammunition to those who favor a return to old pick-the-loser “industrial policies”. These were simply based on continuous subsidization of inefficient producers never able to become competitive in the international markets in a process which had nothing to do with divergences between social and private costs and benefits.

This paper’s main concern is to assess which “industrial policies” would be meaningful for Latin America nowadays. The first section considers definitions of “industrial policies” and their nature in the past. It analyses policies that are designed to correct market failures and how new proposals have widened the traditional understanding of the scope of these “second best” policies. The second section centers on national growth experiences that may serve as paradigms for LAC economies. It considers growth in a long-term perspective but focuses first on the post-1960 and then on the post-1990 periods in an effort of identification of paradigmatic experiences based on the actual growth performance of different economies. Section 3 is on economies which are growth paradigms and on their relevant policies. It analyses which specific policies were adopted by economies particularly successful in terms of growth performance and to what extent other factors may have explained growth. It includes an effort to compare, population- and GDP-wise, the size of economies in LAC and those of economies which may serve as growth paradigms.

Section 4 is on present multilateral constraints on “industrial policies”, especially in the case of subsidies and trade-related investment measures, as these have been considerably tightened as a result of the Uruguay Round of multilateral trade negotiations. The

following section analyses the link between macroeconomics and “industrial policies” both in relation to limitations imposed by macroeconomic instability on industrial policy and to how growth depends on the cost of investment on both micro and macroeconomic factors. Section 6 analyses industrial policy alternatives. The paper concludes with section 7 which is on policy recommendations seeking to improve criteria to pick winners where market failures are especially costly.

1. Industrial policies

The first problem with the term “industrial policy” is that it excludes agriculture and services from “government efforts to alter the [economic] structure to promote productivity-based growth”.³ The bias in favor of industrially-induced growth is obvious and does not even seem reasonable in the light of historical evidence. It would be perhaps preferable to use “microeconomic policies” as opposed to macroeconomic and institutional policies. From this point onwards in this paper, unless explicitly stated otherwise, by “industrial policies” are meant microeconomic policies.

Which were the industrial policies adopted in the past? They were mostly of a vertical nature, that is, based on a selection of targets. In certain economies, as Brazil, commodity prices were sustained by massive stockpiling since the beginning of the last century. The implications for Brazil, and also for free riders elsewhere in Central and South America, were of enormous significance. For non-agricultural goods until the great depression of 1928-1933, the most important vertical policy was related to the very high import tariff. Then a major role was played by import licensing as governments maintained a relatively overvalued exchange rate and needed an additional instrument to ration imports. This restriction was sanctioned by the rather lax application by the GATT of waivers in situations of balance of payments difficulties (article XVIII:b). As import substitution industrialization deepened a vast array of instruments was added to the arsenal of industrial policies. Without any hope of exhausting the long list, mention can be made to:

³ This is a minor adjustment of the definition of industrial policies suggested by the influential World Bank (1993).

selective access to credit, often heavily subsidized; requirements related to national content; stimuli to foreign direct investment, including favorable fiscal treatment, access to foreign exchange at favorable exchange rates and limitations to right of establishment for competitors; export subsidies.

But old policies, often of continuous subsidization, faced not only increasingly tight multilateral legal constraints, but in many cases also increasing domestic political resistance from those adversely affected by them. They have tended to be superseded by policies better justified on economic arguments, based on the correction of market failures which result in divergence between private and social costs and benefits. The nature of the externalities targeted by such policies can vary considerably. Policies which address the problems raised by externalities generated by the appropriation of results and risk related to scientific and technological research or to specialization of manpower have long been recognized and are uncontroversial. Policies targeting the reduction of regional disparities may be similarly rationalized: market failures are often more intense in poorer regions.

Policies designed to cope with coordinating failures including upstream and downstream investments are perhaps more controversial. The rationale for a focus on the clustering of investments is not unrelated to arguments in favor of public investments in infrastructure. The new angle is that the targeted infrastructure is often much more specialized than conventional investment in infrastructure of universal use such as roads.⁴

2. The search of paradigms

Dissatisfaction with the performance of Latin American economies has prompted a quest for successful national experiences elsewhere from which lessons could be hopefully extracted. There is, however, room for dissatisfaction with most of this pick and choose literature which fails to take into account national specificities which are at the root of the histories of success in achieving high and sustained growth.

⁴ See Rodrik (2004) and also Corden (1974), pp. 248-264.

High growth is not a new experience in the world economy. What is new is that after World War II so many economies have been able to sustain high growth, often continuously, in many regions: in the economies which have been called of recent settlement, in Western Europe, and particularly in Asia. In Asia, extremely high rates of growth in fact became commonplace. Before 1870 GDP-PPP per capita yearly growth rates were rarely above 1% in Europe. In Asia they were in the 0.1– 0.2% range. It was in parts of the periphery of the world economy, especially in Australia and New Zealand, and also to a less extent in the US and Canada, mainly in 1820-1850, that higher rates of growth were achieved (see Table 2).⁵

Between 1870 and 1913 rates of growth in Europe accelerated, typically exceeding 1% per capita, and approached 2% in selected cases as Switzerland in 1870-1900 and Norway and Italy in 1900-1913. Almost all the so-called western offshoots, but especially Canada and the United States, grew very rapidly. In Asia, only in Japan and in certain small British colonies – Hong Kong, Singapore – there was growth in the 1-2% yearly per capita range. In Latin America pre-1900 data are scarce but growth after 1870 was substantial in Argentina and Mexico (around 2.5% yearly). In 1900-1913 there was relatively high growth in all the region as growth accelerated in the world economy as a whole: above 2% in Chile, Uruguay and Venezuela and above 1.4% elsewhere.

From 1913 to 1928 growth in Europe was slower than in the golden age earlier in the century, but still generally above 1% per capita yearly with the exception of the defeated nations in the First World War – Austria, Germany and Turkey – and the United Kingdom and Ireland. GDP-PPP per capita in Greece and Switzerland increased more than 2% yearly. Canada and the United States grew above 1%, but the performance of Australia and New Zealand worsened considerably. For the first time since 1820 several economies in Asia grew at more than 2% – Japan and Malaysia – and some of them at more than 3%, as the Philippines and Taiwan. In Latin America, the Venezuelan growth

⁵ There is long-term information comparable to that on other regions only for a limited group of Latin American economies.

performance was outstanding – almost 8% yearly on a PPP per capita basis – and above 2% in Brazil and Peru. In Mexico, growth was below 1% in the midst of troubled times but in other economies it was in the 1–2% range.

Between 1928 and 1945 in very few European economies GDP-PPP per capita increased by more than 1% yearly: most of the neutral countries, the United Kingdom, Norway and Finland. Switzerland was the star performer with a rate of 2.5% (for 1945-2001 data, see Table 3). In many European economies and in most of Asia it fell substantially. Among the western offshoots, the United States performance was spectacular, depression and all, with GDP-PPP per capita growing 3.5% yearly. Canada and New Zealand approached 2% while Australia remained somewhat behind. In Latin America only in Venezuela GDP-PPP grew above 2% yearly. In most of the other big economies it increased around 1%, but in Argentina and Uruguay, as well as in Costa Rica, it stagnated or even fell slightly.

Between 1945 and 1960 the high growth rates in Europe partly reflected the fact that in 1945 the levels of GDP-PPP per capita in many economies were still below their peak in the late 1920s or early 1930s. In Belgium, France, Germany, Italy and the Netherlands this was recovered only in the late 1940s or even early 1950s. In Spain only in 1955. The United Kingdom was an exception as GDP-PPP per capita had not decreased during the war. Its much lower post-war growth rate was partly a reflection of this fact. Recovery was slower in Asia, with the exception of Japan, as the pre-1930 peak was only reached in the early 1960s in many economies.

Growth between 1945 and 1960 in the western offshoots was much slower than in Europe – and even negative in the US – given their much better performance in 1928-1945. In 1945-1960, the Latin American economies were already comfortably above their pre-depression peak levels and there was substantial growth in Venezuela, Brazil and Costa Rica – above 3% – and reasonable growth of 1–2% elsewhere.

Table 2
Selected economies: GDP-PPP per capita, average yearly growth rates, 1820-1850 to 1928-1945, and population, 1945*

| | Population | GDP-PPP per capita, average yearly growth rates | | | | | |
|--------------------------|------------|---|------------|------------|------------|------------|------------|
| | million | | | | | | |
| | 1945 | 1820-1850 | 1850-1870 | 1870-1900 | 1900-1913 | 1913-1928 | 1928-1945 |
| Europe | | | | | | | |
| Austria | 6.8 | 1.0 | 0.4 | 1.3 | 1.4 | 0.4 | -4.3 |
| Belgium | 8.3 | 1.1 | 0.7 | 1.1 | 0.9 | 1.3 | -1.0 |
| Denmark | 4.0 | 1.1 | 0.2 | 1.4 | 1.8 | 1.5 | 0.3 |
| Finland | 3.8 | 0.5 | 0.4 | 1.3 | 1.8 | 1.7 | 1.4 |
| France | 39.7 | 1.1 | 0.3 | 1.4 | 1.5 | 1.6 | -3.1 |
| Germany | 67.0 | 0.9 | 0.5 | 1.6 | 1.6 | 0.8 | 0.6 |
| Greece | 7.3 | 0.8 | 0.2 | 1.4 | 1.3 | 2.3 | -5.0 |
| Ireland | 3.0 | n.a. | 0.6 | 1.0 | 1.2 | 0.0 | 0.6 |
| Italy | 45.4 | 0.6 | 0.2 | 0.6 | 2.8 | 1.1 | -2.6 |
| Netherlands | 9.3 | 0.9 | 0.3 | 0.7 | 1.3 | 2.3 | -4.3 |
| Norway | 3.1 | 0.2 | 0.4 | 1.0 | 2.0 | 1.6 | 1.4 |
| Portugal | 8.0 | 0.0 | 0.1 | 1.0 | -0.3 | 1.1 | 1.2 |
| Spain | 26.8 | 0.2 | 0.2 | 1.3 | 1.1 | 1.5 | -1.2 |
| Sweden | 6.6 | 0.2 | 0.5 | 1.5 | 1.5 | 1.1 | 2.5 |
| Switzerland | 4.4 | 1.0 | 0.7 | 2.0 | 0.8 | 2.5 | 1.4 |
| Turkey | 18.8 | 0.5 | 0.2 | 0.9 | 0.9 | -0.9 | 0.5 |
| UK | 49.2 | 1.0 | 0.6 | 1.1 | 0.7 | 0.6 | 1.6 |
| | | | | | | | |
| Western offshoots | | | | | | | |
| Australia | 7.4 | 4.6 | 1.0 | 0.7 | 1.9 | 0.4 | 1.4 |
| Canada | 12.4 | 1.3 | 0.5 | 1.8 | 3.3 | 1.0 | 1.9 |
| New Zealand | 1.7 | 3.6 | 2.0 | 1.1 | 1.4 | 0.0 | 1.8 |
| US | 140.5 | 1.2 | 0.6 | 1.7 | 2.0 | 1.4 | 3.5 |
| | | | | | | | |
| Asia | | | | | | | |
| China | 532.6 | 0.0 | -0.2 | 0.1 | 0.0 | 0.1 | -1.1 |
| Hong Kong | 1.5 | 0.2 | 0.1 | 1.5 | 1.5 | 1.5 | 1.5 |
| Índia | 410.4 | n.a. | 0.0 | 0.4 | 0.9 | 0.3 | -0.4 |
| Indonésia | 73.3 | n.a. | 0.1 | 0.4 | 1.5 | 1.6 | -1.7 |
| Japan | 76.2 | n.a. | 0.1 | 1.6 | 1.3 | 2.4 | -2.3 |
| Korea, Rep. | 17.9 | n.a. | 0.0 | 0.7 | 0.7 | 1.6 | -3.1 |
| Malaysia | 5.7 | n.a. | 0.1 | 0.7 | 0.7 | 2.9 | -1.4 |

| | | | | | | | |
|----------------------|------|------|------|------------|------------|------------|------------|
| Phillippines | 18.2 | 0.2 | 0.1 | 0.1 | 0.1 | 4.0 | -3.4 |
| Singapore | 0.9 | 0.2 | 0.1 | 1.5 | 1.5 | 1.5 | 1.5 |
| Taiwan | 6.5 | 0.2 | 0.1 | 0.7 | 0.7 | 3.3 | -2.8 |
| Thailand | 17.3 | n.a. | 0.1 | 0.4 | 0.4 | -0.4 | 0.1 |
| | | | | | | | |
| Latin America | | | | | | | |
| Argentina | 15.4 | n.a. | n.a. | 2.5 | 1.4 | 1.8 | 0.1 |
| Brasil | 46.2 | 0.2 | 0.1 | -0.2 | 1.4 | 2.4 | 1.1 |
| Chile | 5.6 | n.a. | n.a. | n.a. | 2.4 | 1.1 | 0.9 |
| Colombia | 10.5 | n.a. | n.a. | n.a. | 1.9 | 1.3 | 1.4 |
| Costa Rica | 0.7 | n.a. | n.a. | n.a. | n.a. | n.a. | -0.3 |
| México | 23.7 | n.a. | -0.1 | 2.4 | 1.8 | 0.5 | 0.8 |
| Peru | 6.9 | n.a. | n.a. | n.a. | 1.9 | 2.4 | 1.8 |
| Uruguay | 2.1 | n.a. | n.a. | 0.1 | 3.1 | 1.1 | -0.2 |
| Venezuela | 4.2 | n.a. | n.a. | n.a. | 2.3 | 7.8 | 2.4 |

Source: Data from Maddison (2002).

* Growth rates of 2% and above in bold. N.a. means not available.

After 1960 it became clear that the world economy had entered a period of substantially higher growth than in any previous period. In contrast with the good performance concentrated on the western offshoots and a few economies in Northern Europe, and in Latin America in specific periods, now growth affected many parts of the world economy in a rather more sustained fashion. Growth in the western offshoots was generally at rates around 2%, but sometimes exceeded 3% yearly and with a sustained outstanding performance of the United States economy.

Western Europe's GDP-PPP per capita grew at more than 3% or 4% – especially until 1980 – with particularly good performances by Italy, the Iberian economies and Greece. After 1980, rates of growth decreased almost everywhere in Europe to under 2% with the exception of Austria, Finland, Ireland, oil-rich Norway, Portugal and Spain. The spectacular history of success in 1990s is Ireland where GDP-PPP per capita increased 6.3% yearly. Turkey's 1945-1990 performance was also rather good even if less mentioned.

After 1960, GDP-PPP per capita levels in almost Asia grew at much higher rates than elsewhere. Growth of GDP-PPP per capita was particularly fast in Japan in the 1960s – 9.2% yearly – falling to more than 3% in the 1970s and 1980s. In Hong Kong, Korea, Singapore and Taiwan it grew at 5– 8% yearly between 1960 and 1990, then fell to the 3– 5% range in the 1990s with the exception of Hong Kong where it fell rather more. Malaysia and Thailand's performance was generally 1-2% points below this performance in 1960-1990 and similarly in the 1990s. China's yearly rate of growth of GDP-PPP per capita increased from 3.1% in the 1970s to 6.6% in the 1990s. India grew very little until 1980 then – ceasing to be a clear outlier in Asia – at rather more than 3% yearly. In Asia even in the 1990s only in Japan and the Philippines GDP-PPP per capita increased less than 1%.

The contrast with Latin America is sharp. In the 1960s almost all Latin American economies increased their GDP-PPP per capita at rates in the 2-3% range in contrast with the 3–9% range in Asia. Only the big backward economies – China, India and Indonesia – were laggard with rates in the 1–2% range. In the 1970s Brazil approached the standard Asian performance with GDP-PPP per capita increasing 5.5% yearly and several other Latin American economies had creditable performances in the 2.4–3.8% range but others as Argentina, Chile, Peru and Venezuela much less so. The 1980s were a disastrous decade for Latin America with negative per capita PPP growth in most economies while in the 1990s the only cases where growth per capita exceeded 2% were Argentina, Chile and Costa Rica. Given the macroeconomic distortions which accompanied the Argentinean growth spurt it is to be doubted whether this specific case can be taken as exemplary. One of the more attractive features of the Chilean success history after the mid-1980s is that a very good growth record was accompanied by rather virtuous macroeconomic policies with stress on fiscal disciplines and avoidance of exchange rate misalignments. This was in sharp contrast with some of the previous success histories in Latin America.

3. Economic growth paradigms and their policies

Based on the evidence presented in section 2 it is clear that most examples of recent sustained high growth are in Asia, with China including Hong Kong occupying a prominent place. The news is that India has been performing extremely well in the last twenty years so that it is another experience to be taken into account. In Europe there is the well known case of Ireland whose GDP-PPP per capita increased 6.2% yearly in 1990-2001. Finland is another case of success although its pace of growth fell in the 1990s. Perhaps it is the central role of high technology firms that explains why the experience is so often quoted. While yearly rates of growth have been recently declining in Portugal and Spain their performance since 1960 has been excellent. Since 1960, Greece, Ireland, Portugal and Spain have expanded their GDP-PPP per capita 4–5 times compared to 6–13 times in the more successful Asian economies. Other more mature economies – European and offshoots – have typically increased it 2-3 times. In Latin America, Brazil, the most successful economy in 1960-2001, multiplied its GDP-PPP per capita 2.4 times compared to 2.6 in India, the least successful of the Asian economies for which there is information in the long-term. Finally, there is the case of Chile as a paradigm based on its very good performance in the 1990s.

The quest for paradigms of growth experiences must take into account many specificities both of economies selected as examples of fast growth and those which are seeking lessons which can serve to formulate more successful policies. Among those more relevant perhaps are: size of population and area, location in relation to major markets, conditions of access to those markets (FTAs), “cultural” factors (language, size of diaspora), factor endowments, savings ratio, among others. Table 4 presents a taxonomy of paradigm economies and of follower economies seeking growth lessons based on size.

It can always be argued that China and India are in a league of their own as their size has no counterpart in LAC. But the discussion of problems faced by Brazil and Mexico, the two big LAC economies, both with a rather mediocre growth history in the last 25 years, may gain something from the success experiences of China, and perhaps even more, of India. The political economy of clustering in economies with big populations and areas is

Table 3
Selected economies: GDP-PPP per capita, average yearly growth rates, 1945-1960 to 1990-2001*

| | Population millions in 2001 | Year in which 1928 or 1929 GDP-PPP per capita level was reached again | GDP-PPP per capita, average yearly growth rates | | | | | |
|--------------------------|-----------------------------|---|---|------------|------------|------------|-----------|------------|
| | | | 1945-1960 | 1960-1970 | 1970-1980 | 1980-1990 | 1990-2001 | |
| Europe | | | | | | | | |
| Austria | 8.2 | 1939 | 9.3 | 4.1 | 3.5 | 2.1 | | 1.6 |
| Belgium | 10.3 | 1939, 1949 | 3.2 | 4.3 | 3.1 | 1.7 | | 1.8 |
| Denmark | 5.4 | 1946 | 3.8 | 3.7 | 1.8 | 1.9 | | 2.1 |
| Finland | 5.2 | 1934 | 4.0 | 4.4 | 3.1 | 2.7 | | 1.7 |
| France | 59.7 | 1939, 1949 | 7.4 | 4.5 | 2.6 | 1.8 | | 1.4 |
| Germany | 82.3 | 1935, 1951 | 3.6 | 3.5 | 2.7 | 1.2 | | 1.5 |
| Greece | 10.6 | 1931, 1940 | 8.4 | 7.0 | 3.7 | 1.1 | | 2.1 |
| Ireland | 3.9 | 1936** | 2.4 | 3.8 | 3.3 | 3.3 | | 6.3 |
| Italy | 57.8 | 1935, 1948 | 7.8 | 5.1 | 3.1 | 2.2 | | 1.4 |
| Netherlands | 16.0 | 1949 | 7.8 | 3.7 | 2.1 | 1.6 | | 2.1 |
| Norway | 4.5 | 1934, 1945*** | 4.0 | 3.4 | 4.2 | 2.0 | | 2.6 |
| Spain | 40.1 | 1955 | 2.6 | 7.5 | 3.8 | 2.7 | | 2.4 |
| Sweden | 8.9 | 1934*** | 3.0 | 3.9 | 1.6 | 1.7 | | 1.4 |
| Switzerland | 7.3 | 1938, 1945 | 3.2 | 3.1 | 1.1 | 1.4 | | 0.3 |
| Portugal | 10.2 | 1933, 1941@ | 3.3 | 6.4 | 3.9 | 3.0 | | 2.5 |
| Turkey | 66.5 | 1933, 1946** | 4.5 | 3.2 | 2.7 | 3.1 | | 1.2 |
| UK | 59.7 | 1934 | 1.4 | 2.2 | 1.8 | 2.4 | | 1.9 |
| Western offshoots | | | | | | | | |
| Australia | 19.4 | 1937@@ | 1.6 | 3.2 | 1.8 | 1.7 | | 2.3 |
| Canada | 31.6 | 1937 | 1.4 | 3.2 | 3.0 | 1.6 | | 1.5 |
| New Zealand | 3.9 | 1936 | 2.3 | 1.4 | 1.0 | 1.2 | | 1.3 |
| US | 285.0 | 1940 | -0.2 | 2.9 | 2.0 | 2.2 | | 1.7 |
| Asia | | | | | | | | |
| China | 1275.4 | 1954 | 2.5 | 1.5 | 3.1 | 5.7 | | 6.2 |
| Hong Kong | 7.2 | n.a. | 2.8 | 6.2 | 6.3 | 5.3 | | 1.8 |
| India | 1023.6 | 1960 | 0.8 | 1.4 | 0.8 | 3.4 | | 3.7 |
| Indonesia | 214.3 | 1938, 1970 | 1.2 | 1.6 | 4.6 | 3.0 | | 2.4 |
| Japan | 126.9 | 1933, 1951 | 7.5 | 9.3 | 3.3 | 3.4 | | 0.9 |

| | | | | | | | |
|----------------------|-------|-------------|------------|------------|------------|------------|------------|
| Malaysia | 47.6 | 1964 | 2.2 | 3.1 | 5.8 | 3.4 | 3.8 |
| Phillippines | 22.2 | 1932, 1961 | 4.0 | 1.8 | 3.0 | -0.7 | 0.7 |
| Singapore | 81.4 | n.a. | 1.1 | 6.2 | 7.4 | 5.0 | 3.2 |
| South Korea | 4.3 | 1933, 1957@ | 4.0 | 5.9 | 7.7 | 7.8 | 4.9 |
| Taiwan | 22.3 | 1935, 1955 | 4.8 | 7.2 | 7.0 | 5.4 | 4.6 |
| Thailand | 63.0 | n.a. | 1.9 | 4.6 | 4.2 | 6.1 | 3.0 |
| Latin America | | | | | | | |
| Argentina | 37.9 | 1944 | 1.6 | 2.8 | 1.2 | -2.4 | 2.2 |
| Brasil | 177.8 | 1936 | 3.5 | 2.7 | 5.5 | -0.5 | 1.1 |
| Chile | 15.3 | 1943 | 1.2 | 2.1 | 0.8 | 1.1 | 4.1 |
| Colombia | 40.3 | 1933 | 1.8 | 2.2 | 3.3 | 1.3 | 0.5 |
| Costa Rica | 3.8 | 1937@@ | 3.5 | 3.3 | 2.7 | -0.3 | 2.3 |
| Peru | 101.9 | 1934 | 2.8 | 2.3 | 1.0 | -3.5 | 1.9 |
| Mexico | 27.5 | 1939 | 2.6 | 3.2 | 3.8 | -0.3 | 1.3 |
| Uruguay | 3.4 | 1946*** | 1.9 | 0.4 | 2.4 | -0.2 | 1.4 |
| Venezuela | 23.9 | 1936*** | 4.3 | 1.0 | -0.5 | -2.0 | 0.2 |

Source: Data from Maddison (2002).

* Growth rates of 2% and above in bold. N.a. means not available.

** Peak in 1926. *** Peak in 1930.

@ Peak in 1927. @@Peak in 1931.

likely to be more complex than that in very small economies where the national consequences of a single investment decision are bound to be much more important. The interplay between industrial and regional policies is likely to be more significant. The discussion of specific national experiences of high growth and related industrial policies should be read with these considerations on size in mind although it is perfectly possible that a policy instrument which has been successfully used in a small economy may be used in a large or very large economy with similar results.

Asian economies

There are a few stylized facts which are common to the successful Asian economies. Gross fixed capital formation was often quite high or at least has risen from the 1960's to the 1980's. In the 1960's only in China and Korea GFKF was above 20% of GDP (decadal average). By the 1970's and 1980's it exceeded 40% in Singapore and 30-35% in China. It was in the 25-27% range in 1970's in Korea, Hong Kong and Thailand and

22-23% in Indonesia and Malaysia. In all these latter economies it was in the 28-30% range in the 1980's. India was the laggard economy from the point of view of GFKF but even there the average rose from 18.7% in 1970's to 22% in the 1980's. In 1990-2003 it remained high in China (39%), around 29% in most other economies – Korea, Malaysia, Thailand, Singapore and Hong Kong – and lower in India and Indonesia (23.1%) and Indonesia (21.9%). But in many economies there was a marked fall in these levels after the end of 1990s: the low 20% in Thailand, Singapore, Malaysia and Hong Kong and 17% in Indonesia. In contrast, GFKF in LAC in the early 2000's is not markedly above its level in the early 1960's, hovering around 21% after peaking in the mid-1970's at 26% and falling to 17% in midst of the crisis in the mid-1980's. Growth in the Asian high-performing economies has also relied on high rates of total factor productivity growth which in turn depended, pure convergence apart, on openness and/or the weight of manufactured exports in total exports.⁶

Table 4
Population of growth paradigms and followers, 2003, in millions

| Followers | | Paradigms | |
|---|-------------|--|-------|
| Very large: | | Very large: | |
| Brazil | 177 | China | 1288 |
| Mexico | 102 | India | 1064 |
| Large: | | Large: | |
| Colombia | 44 | Korea | 48 |
| Argentina | 38 | Spain | 41 |
| | | Thailand | 62 |
| Middle sized: Ecuador, Guatemala, Venezuela, Peru | 10-26 | Middle sized: Chile, Malaysia, Portugal | 16-25 |
| Small: Bolivia, Dominican Republic, Haiti, Honduras, Jamaica, Trinidad and Tobago and Uruguay | 3-10 | Small: Costa Rica, Hong Kong, Finland, Ireland and Singapore | 4-7 |
| Very small: Eleven Caribbean islands | Less than 1 | | |

Source: World Bank Indicators.

⁶ World Bank (1993).

All these economies have substantially expanded their export to GDP ratios since the 1960's. Even latecomer economies such as Vietnam have already reached an export to GDP ratio of 56%. But it is only in Hong Kong and Singapore that the export to GDP ratio reached extremely high values (141% and 116%, respectively). The average in Latin America is 21% in contrast with only 9% in 1970. Many Asian economies have multiplied their share in world exports by a factor of 3 or 4 since 1970, as much as some of the extremely successful European economies, but Korea, the Asian success history, multiplied it by 8. On average LAC's shares of world exports decreased from 6% in 1960 to reach less than 4% in the 1990's. In 2002 it was 5%. FDI to GDP ratios have been very high – in the 10% range – only in Hong Kong and Singapore, and to a lesser extent in Malaysia in the early 1990's. It was not above 3-5% in the other Asian economies. In LAC this had been traditionally around 1% until 1993 then it rose to reach a peak of 5% in 1999 in the wake of sizeable acquisitions of privatized assets. In the early 2000's it was 3%. The share of manufactures in total exports in the Asian paradigm economies is above 80% in most cases. Even exceptions have rapidly increased their shares in the last thirty or some years: India from 52% in 1970 to 75%, natural resource-rich Thailand from 5% to 74% and Indonesia from 1% to 56%. For LAC this is around 48%. Research and development expenditures was and is relatively high – around 3% of GDP – only in Korea. In LAC it reaches levels near 1% only in few economies as Brazil and Chile.

The role of the Chinese diaspora has been crucial to the widespread success of growth histories in most Asian economies. Hong Kong, Singapore and India, moreover, had the advantage of being part of the English-speaking world. Asian economies have used a panoply of industrial policy instruments.⁷ Some of these are now banned by upgraded multilateral disciplines or made more difficult to use as global trade liberalization has been gaining ground. Such instruments have included subsidized credit targeting exporters, high protection of domestic markets and tax incentives to FDI conditional on export performance. An important aspect of the Asian success history has been openness to foreign technology in its several aspects: imports of capital goods, attraction of export-oriented of FDI or active technology licensing (in most success histories); active

⁷ This paragraph relies heavily on World Bank (1993).

technological policies concerning licensing, transfer of non-proprietary technology, enhancing the role of returning nationals and development of domestic research.

The Korean example is of great interest because the government played such an important role in selecting sectors as targets for its policies. And also because Korea took off in terms of sustained high growth while Brazil, its often mentioned counterpart in Latin America, practically ceased to grow after 1980. As shown by Moreira (1995) industrial policies in Korea have evolved over time. In the initial post-Korean war period there was significant financial support by the United States and easy access to the United States market but growth performance was mediocre. In the 1960s the emphasis was on outward-oriented policies. It was also possible to use export subsidies without facing multilateral constraints. Policies stressed industrial conglomeration, cross-subsidization was allowed, subsidies were conditional on export performance, there were significant FDI and import restrictions. Korea used comprehensive subsidization of selected sectors. This included: credit subsidies, foreign exchange rate-related subsidies, fiscal subsidies, input subsidies and administrative preferential treatment. It was as if the productive sector had been segmented into two parts. One geared to the domestic market under the umbrella of a selective and protectionist trade regime. The other directed to exports benefiting from a liberal trade regime with access to input and capital goods at world prices. In the 1970s emphasis was on the heavy and chemical industries and a greater stress was placed on science and technology and investment on human capital. The slowing down of export expansion as pointed out by Moreira (1995) is far from supporting an interpretation that there was any major lack of continuity in relation to the 1960s. There were only relatively minor adjustments to the high export and GDP growth cum high protection. A major trade liberalization strategy was adopted after the macroeconomic difficulties in the early 1980s and had been completed by the early 1990s.

By comparison Brazil failed in its attempt to cope with acceleration of inflation and a major balance of payments crisis in the late 1970s and faced recurrent macroeconomic crises between 1980 and 2002. Most of the microeconomic policies described above as

used in Korea have been adopted and the very active export subsidization policy in the 1970s and 1980s did not result in the emergence of many competitive exporters. In the foreign-owned auto industry in fact a new subsidization wave occurred after 1995 in marked contrast with the Asian experience of adhering to sunset provisions to withdraw subsidies after take off of competitive exporters. Industrial policies in Brazil tended to involve more or less permanent subsidization rather than Korean-type histories of success. It is difficult to see this export subsidization initial episode as a history of success.⁸ The share of Brazilian exports of manufactures in total exports rose from 3% in the early 1960's to 55–60% in the early 1980's and has been stable since then. Brazil's share of world exports in the period increased only from 0.67% to 0.89%, partly reflecting the weight of resource-based exports but also much less success in permanently stimulating exports. Other important contrasts between Brazil and Korea include knowledge-related variables such as labor force education and research and development expenditures. The permanent results in terms of growth were very disappointing after 1980 and Brazil has been unable to find again the way to steady high growth as it was able to do between the early 1940s and 1980. GDP per capita grew on average only 0.5% yearly in the last quarter of century.⁹

The Chinese success history has been based on different institutional and political features even if many of the industrial policies are similar to those adopted in other economies.¹⁰ The economy is segmented in two sectors. One is an export processing sector built on the experience of special export processing zones, geared to foreign markets and where FDI answers for 55% of investment. Its share in exports rose to 60% of the total in 2003 in contrast to a mere 20% of the mid-1980s. The other is the domestic export sector which had not access to world input prices and was heavily protected. Only in the 2000s average unweighted tariffs reached 12% and non-tariff barriers are being phased out. The economy has been able to accommodate a massive transfer of manpower from the more traditional sectors to the more dynamic export processing sector in an

⁸ Rodrik (1995) notwithstanding.

⁹ See Abreu (2004) for a survey of Brazil's policies before 1987 and Abreu (2004) for liberalizing policies after 1987.

¹⁰ This based in IDB (2004).

upgraded version of similar movements in the past which are also at the root of acceleration in rates of growth.

The policy package is familiar. “Strategic” sectors as software, integrated circuits and autos were targeted. A relatively prudent macroeconomic policy was implemented with a very low tax burden. Aggressive vertical industrial policies were based on familiar instruments such as cheap credits, tax breaks, export performance and local-content requirements. In line with the experience of other Asian economies policies are becoming increasingly horizontal as international constraints become binding. It may well be that China will have to face in the future problems raised by the accumulation of bad credits by its vulnerable state-owned banks and by the lack of a comprehensive and credible social security system but these problems are unlikely to affect the process of fast convergence to the GDP per capita levels of developed economies.

India

The improvement in India’s growth performance since the early 1980’s has perplexed most analysts. GDP-PPP per capita growth rates have only been exceeded by those of China and very few of the other Asian economies, especially South Korea and Taiwan (see Table 3). Rakshit (2004) has shown that there has been no spectacular increase in fixed capital formation between the 1970s and the 1980s and 1990s: from 18.3% of GDP to 22–23%. But there was a significant fall in the incremental capital output ratio from around 6 in the 1970’s to the 3.6–4.4 range in the 1990’s and afterwards.

In fact, factor productivity contribution to growth in India in 1980-1999 is higher than in most of the rest of Asia. To which policies was this due? Rodrik and Subramanian (2004) have tried to answer this question. They discard often advanced explanations such as favorable external environment, increased demand, external liberalization, the green revolution, internal liberalization and public investment. They suggest that in the early 1980s there was an “attitudinal change” towards the private sector by the national government. This was reflected in better growth performance of states allied with the

national government. In the states where the weight of formal manufacturing was greater, growth rates were higher. Growth occurred where previous investment had been made. Reforms in the 1980s were pro business rather than pro market “in the important sense that they served to boost the profits of existing firms without threatening them with real competition because external barriers remained largely in place.” Pro market reforms were adopted in the 1990s in response to the 1991 balance of payments.

There is also not much to be learned from the Indian experience in the 1990s in terms of specific industrial policies. The pro market reforms promoted by Manmohan Singh after 1991 seem rather mild by Latin American standards. The steadiness of Indian macroeconomic policies on the other hand is in contrast with the experience of many LAC economies. The outstanding sectoral example of success in recent Indian experience are the information technology-related industries and services. India has as main advantages a low-cost English-speaking labor force and a diaspora of IT skilled labor which is important to assure the flow of up to date technologies and can be attracted by domestic firms, especially when developed economies are facing recession. The IT sector as a whole in India (that is including hardware and software manufacturing and services) corresponded in 2000-2001 to rather less than 3% of GDP. With reasonable assumptions about future growth it will reach the United States level of 8% of GDP in 2006-2007. IT-related exports have expanded dramatically and since 1998-1999 have been more important than domestic sales. There is much controversy in India about the impact of the fast growth IT sector on the rest of the economy with some advantage for those arguing that spillovers on the rest of the economy would comfortably outweigh its unfavorable consequences such as, for instance, job losses in the banking sector.¹¹

Industrial policies in Asia have had the advantage of being implemented relatively early. Given the stricter present multilateral rules it is difficult to consider such success histories as a credible basis for extraction of lessons by Latin America. But somehow many Asian economies have controlled not only the “technology” of making “old fashioned” subsidy-based growth sustainable. They have also been successful in implementing performance-

¹¹ See Singh (2004) and www.nasscom.org.

based sunset clauses which have been important to foster adjustment in further stages of their growth model.

Spain and Portugal

The two Iberian economies have had an outstanding growth record, especially in the 25 years after the end of the Second World War, but also since 1970. This was partly related to the high level of investment in both economies. By the late 1970s gross fixed capital formation was in both cases near 30% of GDP. Recently it fell only modestly: in Portugal is still 27–28% and in Spain 25%. Both Spain and Portugal of course profited from the opportunities opened by an integrated Europe. This preceded their formal admission to the European Community in the 1980s as free trade agreements had been signed with the EEC and EFTA in the 1960s and 1970s. By 1960 they were rather closed economies: Spain's export to GDP ratio was only 8% compared to 15% in Portugal (and a 12% world average). Spain started to abandon its rather autarkic model in the late 1950s when negotiating entry into the OECD by cutting import tariffs which by 1980 were down to 6–8%. In the early 2000s the export-GDP ratio had risen in both cases to about 30%. In fact since 1960 Spain's export performance was similar to that of Ireland as its share of the world market increased from 0.63% to 2.28%. But, since the evolution of Spain's share was monotonic, if the mid-1970s are selected as origin the Irish export performance was much better since then as Ireland lost export market share until the mid-1970s.

There was also Iberian convergence in relation to most of the rest of Europe in terms of composition of exports as the share of manufactures in total exports increased to 78% in Spain and 87% in Portugal. Portugal paid the price of being an important exporter of textiles and apparel back in the 1960s so its world export market share increased more modestly from 0.29% in 1960 to 0.55% in 1990. This fell to 0.45% in the early 2000s as exports stagnated.

Iberian industrial policies in the past have relied on rather discretionary package of tax and non-tax incentives. In Spain incentives have included investment in certain regions,

in “special interest industries”(land cession, investment grants and preferential access to official credit) and in restructuring of existing industries. A complex system of tax credits and exemptions affected regional and sectoral investments covering fixed assets, advertising, marketing and R&D. It generally involved a tax credit of 10% capped to 20-30% of taxes due. Investment incentives in pre-1980 Portugal were also extremely discretionary. Investment subsidies and investment grants were distributed following a complex system of points based on criteria that included domestic content, employment generation, import substitution targets, sector and region affected. Export subsidies in the form of reimbursement of paid domestic taxes were extensively used in both economies in past but have been discontinued.¹²

The contrast between Spain and Portugal and the other similarly successful economies in Northern Europe like Ireland and Finland focuses on the role played by technology. In Ireland, at least since the late 1980s, the share of high-technology exports in total exports has fluctuated between 40–50% while in the Iberian economies it never exceeded 8% and in Finland, the intermediate case, it has been steadily growing from levels similar to those in Spain and Portugal in the late 1980s to typically 25% in recent years. The role of FDI has been also much more important in Ireland than in the Iberian economies where only recently the FDI-GDP ratio has reached figures beyond 5% in peak years contrasted to figures in Ireland above 9% in all years since 1998 and in some years above 20%. Finland is more akin to Spain and Portugal in spite of spikes approaching 10% in a couple of recent years. The good Finnish growth performance in spite of the relatively low FDI-GDP ratio and the low share of high-technology exports seems to be related to the level of R&D expenditures to GDP which is much higher than in the three other economies. Data on researchers and technicians engaged in R&D activities per million of population confirm this feature of the Finnish economy.

¹² Price Waterhouse (1982) and Price Waterhouse (1981).

Ireland

Recent analyses have stressed the importance of Ireland as a success growth history based on the sharp increase in the country's share in world total exports and in the recent spectacular increase in GDP per capita.¹³ A good sustained post-Second World War performance, especially after 1960 when GDP-PPP per capita increased more than 3% yearly, has culminated in the average yearly rate of more than 6% after 1990. There are some features of the Irish 'miracle', however, that make it rather peculiar and perhaps difficult to replicate. Ireland was already a rather open economy in 1960 with an export to GDP ratio of 30% compared to, for instance, 8% for Spain. Two thirds of total exports were food exports in the early 1960s compared to 90% of manufactured exports today. The British economy absorbed 75% of total Irish exports in 1960 compared to 18% in 2003. The whole European Union including Britain buys today 61% of Irish exports. Gross fixed capital formation fell from nearly 30% of GDP in the 1980s to the 23-24% range in the early 2000s.

There are many specificities in the Irish case. The Anglo-Irish Free Trade Agreement of 1965 and accession to the European Community in 1973 played an important role in opening markets for Ireland. European Union support rose to almost 6% of the Irish GDP in 1979, remained above 3.5% until 1997 and then started to fall. In 2003 Ireland still received almost 400 Euros per head of population from Brussels. There is a significant Irish diaspora in the United Kingdom and in the United States. Ireland was also the only English-speaking low-income economy to become a member of the European Union. It is not easy to find, say, a Central American or Caribbean small economy which could occupy a similar position in relation to the United States. The Irish economy is small: with a population of about 4 million, in spite of its excellent recent growth performance total GDP-PPP is still about 20% below that of, say, of Portugal.

In the background of the Irish miracle is the great success of macroeconomic policy. The often quoted evidence is the drastic fall in debt-GDP ratio from heights beyond 112% in

¹³ See Redrado and Lacunza (2004), pp. 12-14.

the early 1980s to a bit above 90% in 1990-1994, then monotonically to 32% in 2003 as the debt level remained stable and GDP growth was very significant.¹⁴ A succession of wage pacts promoted a profound reform in the Irish labor market. The most significant initiative in the early period was a three-year national wage pact, the Programme for National Recovery. Supported by employers, trade unions, and the government, the pact limited annual wage increases to 2.5% between 1988 and 1990. As part of the pact, the government agreed to offset the limits on wages by cutting income taxes and increasing spending for welfare, health, and housing services. Unemployment benefits were tightened. The Irish government increased spending on programs designed to mobilize labor supply, improve job skills, and increase the efficiency of labor markets to reach 1.8% of GDP. Unemployment fell from more than 17% to around 4%. The success of this initial pact led to five subsequent pacts.¹⁵ Success was also helped by a luckily timed educational reform which increased the supply of skilled labor.

Industrial policies in Ireland have evolved over time towards instruments compatible with international rules. Before entry in the European Community there were export-related exemptions from income tax. They were substituted by a 10% (now 12.5%) corporate income tax on manufacturing compared to a mid-30% corporate standard rate. In the late 1990s tax relief through differential corporate taxes and accelerated depreciation was equivalent to 4.3% of GDP. Industrial policies were rather comprehensive and also included active policies to support domestically-owned firms, trade intelligence support, training grants, interest subsidies, loan guarantees, R&D grants and fixed assets grants. IDA, the Industrial Development Authority, has traditionally used fixed assets grants as an instrument of industrial policy. In the early 1980s this could reach 45%–60% of eligible costs and was capped. Variables taken into account in the decision-making process include employment generation, skill content, value added, potential growth,

¹⁴ Data from National Treasury Management Agency site, www.ntma.ie. There is not very substantial distortion involved in using GDP rather than GNI as the gap between GDP and GNI widened overtime. In 2003 GDP was some 20% above GNI.

¹⁵ This paragraph is based on Tille and Yi (2001). There have been six successive national agreements: the 1988 Programme for National Recovery, the 1991 Programme for Economic and Social Progress, the 1994 Programme for Competitiveness and Work, the 1997 Partnership 2000, the 2000 Programme for Prosperity and Fairness and the 2003 Sustaining Progress. See also Baccaro and Simoni (2004).

linkages, location and export potential.¹⁶ Ireland has been extremely successful in attracting FDI especially after 1997: yearly flows in recent peak years reached 24% of GDP.

Finland

Finland, while a relatively latecomer in the process of European integration, having joined in 1995, had free access to the European Union market of industrial products since 1977 as a member of EFTA. It also had some benefits with its economic links with the Soviet Union before 1990 as these provided scale to selected branches of Finnish industry.¹⁷ But Finland has marginally lost world market share since 1960: 0.63% of world exports in 2002 compared to 0.7% in 1960. It almost doubled its export to GDP ratio – from 20% to 38% – but this was below the growth of the world aggregate ratio which rose from 12% to 24%. The size of the Finnish economy is similar to that of Ireland.

Finland is near the top of the OECD list with R&D expenditures of 3.5% as a share of GDP and at the top of the list in the 2004-2005 global competitiveness evaluation undertaken by the World Economic Forum. Successful industrial policies have played a key role in the good growth performance of the Finnish industry. Finland has used and uses industrial policies but the Nordic countries have always resisted to significant state intervention through industrial policies in spite of important state ownership in the past.¹⁸ In late 1980's extant incentives were rather conventional. Regional incentives based in accelerated depreciation and investment subsidies based in additional depreciation allowances as well as investment grants and start-up subsidies have been used. Tax legislation encouraged the building up of tax-exempt investment reserves which could also be used for R&D, training, promotion of exports and prevention of pollution.

¹⁶ It is important to note that such capital assets grants while not prohibited *in limine* by the WTO are actionable according to the agreement on subsidies. But there may a loophole for SMEs in the grey area surrounding interpretation of footnote 2 of article 2 of the Agreement on Subsidies and Countervailing Measures.

¹⁷ See Kokko and Haavisto (1990).

¹⁸ See Hajmarsson (1990).

Allowances related to R&D have been in existence. They cover a declining share of costs as these increase and are capped for each enterprise. Incentives targeted to ship owners and shipbuilding have also been used.¹⁹

An important role has been played by since the early 1980's by the National Technology Agency (Tekes). Tekes is the main public funding organization for research and development in Finland. It funds industrial projects as well as projects in research institutes, and especially promotes innovative, risk-intensive projects. It offers industrial grants (15 to 50 % of eligible costs) and loans (35 to 60 %) which can be combined. Research grants directed to the research work done at research institutes and universities can range from 50 to 100 % of eligible costs. Projects are usually conducted in cooperation with companies. Selective project funding is the basis of Tekes operations. Funding and expert services are channeled to technological R&D projects. Tekes assists companies in their search for ideas, the finalization of business plans, and their quest to conduct meaningful and valuable research.²⁰ It works in collaboration with several partners within the Finnish innovation environment. For basic research, the main agency of implementation is the Academy of Finland. At regional level, technology policy is implemented by Employment and Economic Development Centers distributed over the country. The main aim of these centers is to keep close to the entrepreneurs and innovative talent across Finland. The list offices abroad is suggestive: Beijing, Shanghai, Brussels, San José (California), and Tokyo.

Latin America: Chile and Costa Rica

In Latin America there has been less success in comparison with Asian and European success histories both in sustaining growth with old formulae and in the evolution to a less interventionist growth model. There are few exceptions such as Chile and a few economies in Central America and the Caribbean. There are two strong candidates to qualify as paradigms: Chile and Costa Rica. Chile is the only economy with a recent

¹⁹ See Price and Waterhouse (1989), chapter 4.

²⁰ See www.tekes.fi and OECD (1987).

history of high growth in which manufactured exports are a small share of total exports. Success has been concentrated in the 1990s while for most other experiences which may serve as example the high growth experience has been sustained during a longer period. In both cases gross fixed capital formation has remained not much above 20% in contrast with the Asian experience. In Chile it peaked at 23-26% in 1992-98 and in Costa Rica it has remained in the 18-20% range.

Chile's share of world exports fell significantly in the long-term: it was 0.36% in 1960 and continued to fall to reach 0.21% in 1984. But since then it has recovered a little of the lost ground reaching 0.29% of world exports. To do so Chile diversified its exports significantly with the share in total exports of food products and manufactures increasing to 26% and 18%, respectively, compared to only 5% and 4% thirty years ago. The share of high technology exports in manufactured exports remains low although there is much technological advance behind the increased competitiveness of its food exports. Chile has become the world's second-largest producer of farmed salmon after Norway with a world market share of 20%, and also a significant exporter of fruits and wine. As a result of success of its macroeconomic and microeconomic policies Chile has guaranteed attractive conditions of operation for FDI. Between 1994 and 2001 FDI inflows exceeded 5% of GDP, peaking at 12% in 1999.

Chile has important programs of regional and R&D incentives. ProChile, an agency under the Ministry of Foreign Affairs, operates various program aimed at broadening Chile's export base and increasing the competitiveness of exports mainly through co-financing. The National Fund for Technological and Productive Development, a subsidiary of CORFO, finances research and development projects proposed and implemented by private enterprises with the objective of promoting technological innovation and transfer. Fundación Chile, a private institution with governmental representation that promotes the development of firms and clusters, has played a major role in stimulating the building up of capacity in the salmon industry, the development of preserved meat and forestry technologies, the improvement of fruit quality control and the introduction in Chile of new fruit varieties. R&D expenditures as a share of GDP are still comparatively low at

around 1% and the number of R&D researchers per million inhabitants only something like 20% of that of Portugal.

Chile adopted in the past a system of deferred payment of customs duties and tax benefits with a view to promoting technological innovation and stimulating the purchase of capital goods. These have been phased out since 1998. In January 1996, Chile notified to the WTO the application of trade-related investment measures in the automotive sector. This has also been discontinued. Subsidies to forestry in the past have included investment grants (up to 75% of costs) and tax exemptions.

Costa Rica good recent growth performance has relied on its success in expanding high technology exports mainly, but not exclusively related to Intel's investment in 1997 of US\$300 million for the construction of processor assembly and testing plants. In 1999, Intel's exports accounted for 38 per cent of total exports. This has stimulated additional foreign investment by Intel's suppliers. The share of high-technology exports in total manufactured exports which was only 6% in 1994 peaked at 53% in 1999. But the electronic components industry still has few links with local businesses. Costa Rica's share of world exports had shown a downward trend between 1960 and 1990 (from 0.07% to 0.05%). With the new export-oriented industrial policy this share doubled in the 1990s to reach a peak 0.1% in the early 2000s. These spectacular results were, of course, made possible by the big size of Intel's investment in relation to the size of the Costa Rican economy.²¹

Costa Rica operated promotion programs which are applied in almost every sector. These included subsidized credit to SMEs and tax incentives for specific sectors. Some of the incentives were due to stop in 2003 in accordance with WTO commitments. The only trade-related investment incentive notified to the WTO was a domestic content requirement for subscribers to an export contract as an essential condition for receiving a tax credit certificate. This ceased to be applied in 1999.

²¹ For this and the next paragraphs on Costa Rica see WTO (1995b) and (2001).

There are many other tax privileges and incentives covering new investments in free zones including exemptions from import duties on inputs and capital goods and from sales and consumption tax; cooperatives; costs related to human and technical resources in favor of SMEs; additional concessions under the free zone regime for enterprises that set up in relatively underdeveloped areas. Research development expenditures in Costa Rica amount to roughly 0.3 per cent of GDP. The government co-finances projects but up to rather modest amounts and since 2000 may fund 100% of the costs of research, development and technological management by trade associations and Costa Rican SMEs. The development of Sectoral Business Committees (Comités Empresariales Sectoriales) consisting of businessmen (usually grouped together in a chamber or association) and government officials has been promoted since 1995.

4. Limits of the possible

Multilateral disciplines on industrial policies have been tightened in the Uruguay Round of trade negotiations. This affected the degrees of freedom enjoyed by many developing economies in implementing policies based on subsidies and preferential treatment of foreign direct investment. The successful growth history of many of the most often quoted paradigms relied on policies which became illegal under new multilateral disciplines.

One of the more significant results of the Uruguay Round of trade negotiations was the new set of rules on subsidies embodied in the Agreement on Subsidies and Countervailing Measures. Subsidies were classified as prohibited, actionable and non-actionable. Prohibited subsidies are those contingent on export performance or upon the use of domestic over imported goods. Actionable subsidies for industrial goods include those causing injury to the domestic industry, nullification or impairment of benefits accruing to other members under GATT 1994, and serious prejudice to the interests of other members. Non-actionable subsidies are those which are not specific and those which are specific but related to research activities, assistance to disadvantaged regions

and assistance to promote adaptation of existing facilities to new environmental requirements.

Subsidies to research activities by firms or conducted by higher education or research establishments on a contract basis with firms if assistance covers not more than 75% of the costs of industrial²² research or 50% of pre-competitive development activities. The nature of this assistance is detailed in the agreement (Article 8.1a).²³ Assistance to disadvantaged regions must be non-specific within eligible regions whose GDP per capita must not be above 85% of the national average (and the unemployment rate at least 110% of the national average). Environment-related assistance should be non-recurring and limited to 20% of the cost of the adaptation. There are complex exceptions to the prohibition of subsidies granting special and differentiated treatment to developing country members. But most developing economies have been graduated after 2002 as sunset provisions affected transitional S&D.

The Uruguay Round also established disciplines limiting domestic support measures and export subsidies related to agricultural products. But these were subjected to a “peace clause” to be applied for ten years. Since agricultural subsidization is a major feature of policies in developed economies and rather less significant in developing economies it is not likely – in contrast with industrial products – that the latter would be targeted by countervailing measures in the markets of developed economies.²⁴

The Agreement on Trade-Related Investment Measures (TRIMs) which resulted from the Uruguay Round stipulated that developing economies should discontinue any TRIM which violated GATT 1994 inconsistent with national treatment and with the obligation to eliminate quantitative restrictions.²⁵ This mainly affected schemes to attract foreign

²² Agricultural research as well as environment-related and regional assistance agricultural programs are treated as exemptions to domestic support reduction commitments under Annex 2 of the Agreement on Agriculture. See WTO (1995).

²³ See WTO (1995), pp. 264-314.

²⁴ See WTO (1995), pp. 39-68.

²⁵ See WTO (1995), pp. 163-7. Least developed economies were given seven years to adjust.

direct investment offering preferential treatment conditional on future export performance.

5. Institution building, macroeconomics and industrial policies

The discussion on the overhaul of industrial policies frequently takes place without taking into account constraints imposed by the pace of implementation of other reforms. Especially relevant are reforms related to institution-building and macroeconomic policies. Successful industrial policies depend on effective provision of public services including the effectiveness of government intervention in the provision of infrastructure. The establishment of an effective regulatory framework is especially important to assure the stable provision of such services without exploitation of market power. In most developing economies this task is made even more complex by macroeconomic instability and consequent fluctuations in the exchange rate. As much of their infrastructure is foreign-owned or foreign funded there are thorny problems raised by their objective of maximizing profits in foreign currency.

Macroeconomic management may also impose important constraints on industrial policies. In several LAC economies the 1980s were a period of severe financial crisis of the public sector with a sharp fall in public savings which in certain cases became negative. This affected overall levels of savings and of fixed capital formation. In Brazil, for instance, gross fixed capital formation as a share of GDP fell from peaks above 23% in the 1970s to under 17% in 1984–85. Even this low level of investment overestimated the effective increase in productive capacity. This was partly explained by increased investment costs as discussed below and also with the reversal of expectations related to the beginning of an extremely severe recession. As negative growth affected government revenues planned expenditures had to be cut. The government adjusted its planned expenditures by cutting investment over the board, that is affecting all projects in the government portfolio, rather than trying to minimize the damage by mothballing those projects with a lower rate of return and finishing those with higher rates of return. The

result, given the importance of public investment, was to delay the impact of aggregate investment on increased productive capacity.

Successful stabilization programs in many economies in LAC have been maintained only with the adoption of rather strict fiscal disciplines often in the context of IMF programs. This resulted in severe cuts in public expenditure and significant constraints on expanded expenditures or tax expenditures related to industrial policies. Indeed, in some economies, as in Brazil, success in reducing inflation has depended on maintaining a regime of real interest rates around 10% yearly. Long-term success of the stabilization policy depends on the ability to reduce debt-GDP ratios and real rates of interest. The slower is this process, which often depends on a combination of increased tax burden and expenditure cuts, the stronger the vested interests in maintaining alternative sources of long-term government finance at lower, subsidized interest rates. This is directed to run of the mill investment projects without any particular concern for the correction of market failures. During this hopefully transitional period there tends to exist a crowding out, everything else constant, of resources required to finance industrial policies.

Relatively bigger economies with a relevant domestic production of capital goods face problems concerning the cost of investment which do not arise in smaller economies. If most capital goods are imported, the cost of creating new productive capacity depends on the cost of imports of capital goods. But in economies where import substitution fostered the creation of a relevant capital goods sector any effort to liberalize trade policies is likely to meet with the resistance of domestic producers of such goods trying to protect their market share. A not uncommon result is that tariffs on capital goods are higher than average tariffs. Cost of investment will be higher in these economies than in economies with no tariffs on capital goods. Combined with the consequences of rising inflation on the price of capital goods and rising costs of construction – as part of increased demand for protection against inflation – this may lead to a severe weakening of the ability to transform savings into investment and real productive capacity. It makes more severe the

effects of rising inflation on investment as the fall of savings is aggravated by the rising cost of investment.²⁶

Many arguments on the links between capital goods and growth are also relevant for the links between human capital and growth. Quality and costs of production of human capital are relevant to explain growth. The composition of human capital (for instance, the share of science and technology students in tertiary education) may be important to qualify data on average years of schooling. Some countries may be more efficient than others in generating human capital much in the same way as this happens in the case of physical capital.

6. Policy alternatives

Taxonomies of industrial policies have tended to stress whether their application is universal or selective – horizontal or vertical in the trade jargon. Horizontal policies have been typically based on tax rebates for expenditures related to technological development or direct support of research and development activities following the lines of the waivers contained in the WTO rules on non-actionable subsidies.²⁷ The advantage of horizontal policies of course is that the dangers involved in discrimination of some economic agents to the detriment of others are avoided. One does not have to try to pick winners, a rather tricky activity and one in which specific national records of success vary quite substantially. Especially so in Latin America.

Even economists not well known for their orthodoxy – Paul Krugman comes to mind prominently – have after all decided to avoid policy prescription based on selective measures given the difficulties of gathering enough information to instruct the relevant decision-making processes. The bottom line is that while it is recognized that selective policies are very effective when market failure acts as a powerful wedge between social

²⁶ See Abreu (2004) pp. 17-19 for a more detailed discussion of the case of Brazil.

²⁷ Subsidized credit offered by state-owned banks as the Brazilian BNDES may be argued by some as a horizontal policy as it is in principle open to (almost) all sectors. But there is a grey area in the criteria

and private costs and benefits it is unlikely that policy-makers will be able to have access to the information required to select their targets wisely.

To restrict industrial policy to horizontal policies, however, waives the use of selective policies to redress market failures which may be extremely significant. There has been recently a revival of interest in such selective policies.²⁸ Rodríguez-Clare (2004) has stressed the importance of policies targeted at clusters as clusters reflect industry-specific regional externalities. Knowledge spillovers are stronger across firms in similar and related industries. Clusters may include not only targeted industries, their suppliers upstream and clients downstream sectors, but also specialized infrastructure (for instance certification institutions), technical training facilities, providers of scientific and technological services, publicly funded research institutions, tertiary education, targeted scholarship programs abroad and identification and consolidation of presence in foreign markets as information spillovers justify government intervention.

It has been proposed that industrial policies should focus on the strengthening of sector organizations through subsidization of their process of “self discovery” of new product lines and existing technologies abroad.²⁹ After economic agents have been stimulated to broaden their knowledge about alternative markets, technologies and methods of production conditions are mature to design clustering strategies and, finally, implement the selected strategy. Proposed instruments include production-related grants benefiting preferably young or new small and medium firms, something which has been successfully used in many successful growth experiences, the most recent example being Ireland.

The crucial question of course is which clusters to choose. It has been proposed that it would be reasonable to choose sectors in which the country has comparative advantage or

adopted by the bank to ration borrowers and a big gap between total investment and investment financed by the bank.

²⁸ See for instance Rodrik (2005) and Rodríguez-Clare (2004b). But spillovers for the latter are of the same magnitude in all sectors.

²⁹ See Rodríguez-Clare (2004b).

good export performance.³⁰ But surely this is a criterion which introduces a bias against the discovery of new opportunities. It is also unclear at which level of aggregation in the classification of activities should be the assessment of export performance or comparative advantage. Some of these criteria are “distorted” by former policies adopted before the new proposed policies were introduced. In large economies the scope for the choice of clusters will tend to be wider and the concentration of resources in a single cluster would tend to be more difficult due to opposing regional/sectoral lobbies. There is perhaps an argument for a strategy of multiple clusters reflecting different industry-specific regional externalities and consequently affecting different sectors. Perhaps it could be somewhat improved by establishing size-related rationing criteria for firms – and perhaps also for sectors – but it is unclear how this could be reconciled with the minimization of implementation costs. It is well known that the costs of implementing industrial policies rocket as the average size of affected firms decrease.

Policies designed to cope with difficulties faced by entrepreneurs in what has been termed their “self discovery” are controversial.³¹ “Self discovery” policies must be broadly based by their very nature. If not truly horizontal at least they should affect many sectors. There is in fact no very good reason to limit subsidies of “self discovery” to firms and not extend them to individuals. There is also no assurance that “self discovery” would only enhance positive aspects of entrepreneurship. It would certainly raise the rent-seeking capability of the sectors affected and require better institutions and decision-making to cope with this.

Rodrik’s (2004) belief that the “stunning success that Fundación Chile – a public agency – achieved with salmon can pay for many subsequent mistakes” in the process of project selection is conditional on picking up a case of hitting the jackpot in an early decision. Surely other national experiences come to mind as less likely to provide grounds for such optimism on the quality of decision-making. In many cases difficulties entailed by

³⁰ Rodríguez-Clare (2004b). This is based on Rodríguez-Clare (2004a). But some of the assumptions required for modelling are very restrictive such as those on economies of scale and dynamic internal economies.

³¹ See Rodrik (2004).

subsidization of investment in non-traditional industries are unlikely to be solved by any combination of performance requirements, close monitoring of use of resources or subsidy sunset clauses.³² The required “ability to cut losses once mistakes are recognized” sits badly with the historical evidence in most LAC economies which are very incompetent in the business of subsidy sunset clauses. In any case the often quoted example of the Chilean salmon is a counterexample of a strategy that would center on clusters in sectors or products for which it is possible to show that a country had comparative advantage in the past.

There has been strong and solid criticism of many, mainly horizontal policies focused on attraction of foreign direct investment, increasing exports or enhancing the role of SMEs as policies complementary to orthodox macroeconomic programs.³³ Somewhat less convincing are the criticisms of innovation policies based on general tax expenditures related to science and technology. This criticism is based on the argument that selective measures would be more effective. But general tax expenditure systems can be improved. If, for instance, university research demanded by a group of firms to university or autonomous research centers is preferable to intra-firm research this can be at least partly accommodated by a more sophisticated tax expenditure system offering diversified tax rebates. Once again the problem with a system based totally on selectivity is the lack of confidence that the relevant targets would be reached. The suggestion that tax expenditures should be discontinued seems also to be based on the questionable assumption that funds would thus be released in favor of programs which rely on selective policies. In real life it is to be doubted whether overall budget discussions including sectoral tax expenditures and tax expenditures are on a net basis; it may be difficult to assure that all R&D-related tax expenditure released by its abolition is used to increase expenditures in R&D vertical policies.

There are complications in making compatible centralized and decentralized policies. In most economies industrial policies are intertwined with regional policies. Moreover the

³² Export performance requirements related to subsidies are in any case prohibited by the WTO.

³³ Rodríguez (2004b), sections I and III, quoting Audretsch and Feldman (2003).

WTO most important waivers concerning non-actionable subsidies refer to science & technology and regional development. Science & technology tax expenditures often refer to central government taxation while regional development tax expenditures are frequently also distributed by other levels of government. FDI attraction justifies lower taxes or, more generally, reduced costs. But this is mainly because of technological externalities, an argument not often heard among those seeking to attract FDI. The traditional problem here is a run to the bottom as different states and municipalities compete to attract new investments.³⁴

7. Policy recommendations

First and foremost it is important to recognize that macroeconomic stability must be achieved and that this in general has preceded the histories of growth success propped by specific industrial policies. There is no case of an economy with chronic significant stabilization problems with a good growth performance. It may be possible of course to design and implement new industrial policies while stabilization policies still occupy a central role in the economic agenda. But as a rule fiscal constraints would significantly restrict the scope of industrial policies which require significant expenditures or entail reduction in revenues.

Only in rare cases there was significant and sustained growth without a substantial improvement of the previous record of investment and capacity of saving. This automatically raises issues related to the cost of investment which affects the costs of both capital goods and of construction. And also their quality. “Microeconomic” policies must target cost and quality to ensure that investment is cost-effective, that is, that addition to productive capacity is maximized given an investment ratio. This is no simple task, especially in the bigger economies where one would expect that it exists a significant domestic capacity to produce capital goods with political clout to fight trade liberalization. The other closely related issue is also a grey area between macro- and

³⁴ See Barreix and Villela (2003), section V, for a discussion of these problems in Mercosur. See also Fernández-Arias, Houseman and Stein (2001).

micro-policies. The lower is the variance in an economy's growth performance the lower the probability that investment plans will be affected by the economic cycle. Fluctuations in the rate of growth in the past have badly affected government savings and the level of public expenditure as they generate revenue shortfalls. Projected rates of return are adversely affected as the conclusion of the intended plants or of infrastructure is delayed. This may also affect private investment.

In the realm of industrial policies a good starting point is the recognition of that international constraints prevent in principle the use of many instruments which have been effective in past successful country experiences: preferential access to foreign exchange cover, subsidized credit, national content rules, export performance criteria, among others. This naturally brings the focus to policies which target market failures that are covered by WTO rules on non-actionable subsidies related to science & technology, at least some aspects of regional disparities and environment-related projects. On the other hand, since horizontal policies are non-specific in the WTO sense, there is a strong argument for their defense as there are not subsidies which can be targeted by dissatisfied trade partners.

There are other arguments that suggest that horizontal policies should not be totally discontinued in favor of horizontal industrial policies. Horizontal policies may lack focus and give room for merely disguising expenditures which are unrelated to science & technology development. But they avoid the difficulties related to specificity that characterize vertical policies even when they are targeted to address market failures. There is no simply golden rule to define the optimal balance between general and specific policies given these inherent limitations. In most economies there is certainly scope for a finer tuning of tax expenditures related to science and technology as well as for a much better system of monitoring of the quality of expenditures which qualify for tax expenditures. Information on how tax expenditures are distributed may be a useful tool to signal which sectors are crucial targets for vertical policies.

Between vertical policies targeting firms and horizontal policies there is scope for many policies at the intermediate level of aggregation which affect firms in specific sectors or regions. In this connection the concern with clusters is particularly relevant. One may think of long list of projects which generate powerful positive externalities and may make particular sense in the context of a cluster: specialized infrastructure, regulation-related issues with a sectoral focus, government-sponsored research in specialized research institutions, applied research commissioned by the private sector undertaken by universities, technical education and university training both domestically and abroad.

There is much to be said in favor of a coordination of the several layers of intervention prompted by market failures mentioned above, something which does not happen in many economies. This sectorially-based coordination process may include some private sector representation, but not in a dominant position. Brazil experimented in the 1950s with a rather successful administrative format during the implementation of the 1956-1961 *Plano de Metas* [Targets Plan]. As the government faced an obsolete and obstructive civil service, an ad hoc network of sectoral executive groups was created in an effort to circumvent the traditional decision-making process. This is in sharp contrast with the much less successful recent experience with the *câmaras setoriais* [sectorial chambers] of the 1980s and 1990s where representatives of firms and labor unions tended to hijack such sectorially organized gatherings purporting to represent all affected sectors. The end result took the form of policy packages that favored specific sectors without taking account overall public interest.

Opportunities created by WTO rules that allow regional subsidies should be used perhaps through a combination of science and technology and regional tax expenditures and vertical industrial policies. This is likely to be relatively more relevant in the larger economies as clustering is likely to be meaningful for a diversity of regions. It is also more likely that in the larger economies the interplay of the economics of agglomeration and diseconomies of congestion will induce the formation of new clusters.

In spite of all well known difficulties involved in gathering the required information vertical policies addressed to the improvement of distortions related to market failures still may have an important role in a comprehensive framework of industrial policies. Such vertical policies have been applied in Brazil in certain periods in the past taking into account a rational set of criteria targeting the risk entailed by specific projects, the importance of net externalities created, the ability of benefited firms to appropriate the results of their projects and the geographical location of projects in depressed areas.

It is important that this effort is undertaken by agencies with a high level of competence in the evaluation of technological alternatives and able to identify and mobilize state of the art technologies (adjusted to national conditions) on a global basis. It is essential that a robust evaluation machinery is put in place with the participation of acknowledged specialists recruited on a worldwide basis following transparent procedures. The objective would be to evaluate the results of previous efforts and offer a feedback that contributes to improve the “aim” of policy-makers in their selection of which market failures to aim at in the future.

Vertical policies aimed at market failures still involve picking winners. but based on much more defensible criteria than the traditional policies favoring of rent-seeking sectors with political clout and without any concern for market failure correction. It compares favorably with the plain subsidization which has been typical of most of Latin America in the past.

The implementation of a meaningful package of “industrial policies” requires a political commitment at the highest level on the blueprint of such a set of policies. It is important that the government opens a comprehensive debate on industrial policies and is able to win political support for rational policies. But it is debatable whether industrial policy implementation requires either continuous involvement of politicians at the highest level or a previously explicitly formulated strategic national social process.

The implementation of a package of horizontal and vertical industrial policies may require an overhaul of obsolescent government institutions. The Finnish experience may be particularly relevant here as it may be essential to transform purely financial agencies into TEKES-type technological and scientific agencies able to gather meaningful market information and undertake effective technological brokerage that will improve access of national industry to state of the art technologies adapted to their specificities. It is in this environment that “self discovery” should ideally take place involving full mobilization of science and technology institutions: government departments, academies of sciences, research institutions, universities, certification agencies, organizations of entrepreneurs and firms.

The success of China raises the issue of the links between growth and innovation. The World Bank has organized a large global data base on the knowledge economy.³⁵ This data base has been used by Chen and Dahlman (2004) for a cross-section study of the links between economic growth and a long list of variables. They come out with the conclusion that a major role in determining growth performance is played by human capital stock (measured by years of schooling with allowances for quality), domestic innovation and technological adaptation (measured by the number of patents normalized by population) and information and communications technology (measured by the number of telephones normalized by population). The impact of domestic innovation and technological adaptation is particularly powerful: a 1% increase in the number of patents is associated with increase of 0.19% in the annual rate of economic growth.

On the other hand, links between variations of an overall innovation index since 1990 – the Knowledge Economy Index – and the rate of growth of GDP-PPP per capita in 1990-2001 for the sample of paradigms and of Latin American followers are rather weak. The KEI is composed of variables covering the Economic Incentive Regime, Innovation, Education, and Information Infrastructure. China is a big exception showing a hefty rise in the KEI coupled with its high rate of growth of GDP-PPP per capita. But there is deviant behavior of economies that grow substantially without increase in the KEI

³⁵ The 2004 Knowledge Assessment Methodology. See <http://info.worldbank/etools/kam2004>.

(Ireland) and also of those with a big increase in the KEI and a stagnant growth performance (Brazil). It is reasonable to think of KEI time evolution as characterized by an exhaustion process as economies tend to become mature. And, in the case of Brazil, the suspicion is that besides possible problems with the absence of correction for quality in some of the measures, e.g. years of schooling, macroeconomic imbalances dominate the improvement in KEI.

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