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The Future of Industrial Policies in the New Millennium: Toward a Knowledge-Centered Development Agenda

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Abstract

The paper presents the conclusions to the book *The Political Economy of Capabilities Accumulation: the Past and Future of Policies for Industrial Development*, edited by M. Cimoli, G. Dosi and J. E. Stiglitz, Oxford University Press, forthcoming.

While it is futile to search for any 'magic policy recipe' automatically yielding industrialization, the contributions to the book, we argue, do indeed help in identifying some basic ingredients and principles that successful policy arrangements historically had and have in common.

In this concluding chapter we spell out some of them. They include:
(i) an 'emulation philosophy' vis-à-vis the most promising technological paradigms;
(ii) various measures safeguarding the possibility of 'infant industry learning', involving also the purposeful 'distortion' of market signals as they come from the international arena;
(iii) explicit policies of capability-building directed both at education and training but also at nurturing and shaping specific corporate actors;
(iv) a 'political economy of rent-management' favourable to learning and industrialization, while curbing the exploitation of monopolist positions;
(v) measures aimed to foster and exploit a weak Intellectual Property Rights regime, especially with respect to the companies of the developed world;
(vi) strategies aimed at avoiding the 'natural resource course';
(vii) 'virtuous' complementarities between industrial policies and macroeconomic management.

Further the chapter discusses the opportunities and constraints associated with the current regimes of trade and IPR governance and puts forward some basic building blocks of a proposed new pro-developmental consensus fostering knowledge accumulation and industrialization in catching-up countries.

Keywords:
Development, Industrial Policies, Knowledge Accumulation, Catching-up, New International Consensus

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A major thread running through this book has concerned the conditions hindering or fostering the process of knowledge accumulation and its effective economic exploitation, and the role in all that of policies and institution-building along the *great transformation* toward an industrial economy.

Some chapters have taken a centennial comparative perspective, other have investigated the experience of specific countries or the impact of specific policies. All add to the understanding of the mosaic of ingredients and processes which drive industrial catch-up.

Indeed, many lessons can be usefully drawn from the ways by which 'the West grew rich' (paraphrasing Rosenberg and Birdzell (1987)), including of course the package of policy instruments which allowed Western Europe, North America, Japan, and – more recently – a few developing countries to get out of the poverty trap and join the club of increasingly wealthy exploiters of new technologies.

The lessons from the past, however, are useful in so far as they apply also to the future. Hence, the normative conclusions of this book have to start with some words on the possible discontinuities that 'globalization' (with the meanings that one has tried to clarify in the chapter by Castaldi et al.) has implied vis-à-vis previous development patterns. In particular, what about the millenarist notion according to which discretionary industrial, technology, and trade policies *might have been necessary* in a world of nation states which constrained the full display of 'market forces', but are redundant or harmful nowadays? In fact, the evidence we review in more detail in Castaldi et al., above, and in Stiglitz (2006), suggests that the secular divergences in technological capabilities, growth rates, levels of per capita income (across and within countries), have continued, if not increased, under the last decades of globalization. Countries differ – possibly even more so than in the past – in their capabilities of absorption of production technologies and product design capabilities developed in 'frontier' countries. If anything has changed, it is that under multiple forms of localized increasing returns, greater degrees of international integration fostered by globalization – when left to themselves – may well lead to phenomena of increasing national and international differentiation with self-reinforcement and lock-in onto particular production activities, specialisation patterns and technological capabilities (or lack of them). Globalization is by itself no recipe for some sort of natural catch-up in technological capabilities and for easy convergence in incomes. On the contrary, more interdependent economies are likely to require *more* and *more sophisticated* measures of policy intervention by the weaker countries. It was already so when Hamilton was trying to design an industrialization strategy for the new-born United States in a world of British-dominated 'globalization', and it continues to be so nowadays.

Moreover, yet other aspects of unbridled 'globalization' which cannot be discussed at length here, add to the demands for policy governance. So, as we comment in Stiglitz (2006), in the new millennium, and in the last part of the previous one, income distribution has dramatically changed against wages and in favour of profits, with 59% of the world population living in countries with increasing inequality, while only 5% living in countries with increasing equality (ILO (2004), Cornia et al. (2003)). Further, 'globalization' has favoured the transformation of employment in both developed and developing countries working against organised labour and against employment guarantees; it has made acute the conflict between the requirements of 'international competitiveness' and social norms (e.g. on work safety, working hours, environmental protection, child labour, etc.); is has brought pressure on national government to dismantle social welfare system in countries which have them and against their establishment in countries which do not have them yet; and it has made harder to impose fiscal levies on 'mobile factors' – i.e. capital – as compared to 'immobile' ones – i.e. labour (on all these points, more in Stiglitz (2002) and (2006) and Rodrick (1997)).

Of course, the urgency to govern these consequences of the contemporary regime of international economic and political relations complement the more specifically 'developmental' reasons motivating industrialization policies. Concerning the latter, while the basic historical lessons, to repeat, continue to hold, the political and ideological context has indeed changed, entailing also the actual *or perceived* disempowerment of national or even supranational institutions (such as the European Union) of many of the policy instruments which historically allowed the governance of the political economy of industrial development. Needless to say, also the mechanisms and degrees of disempowerment are different across the world: in some cases, as mentioned in other chapters, it is an item of packages imposed at gun-point from the outside, in other (even less justifiable!) cases, it is a self-inflicted hardship paddled by 'market talibans'. Indeed, there is nothing new in the fact that countries, that have been successful in reaching the technological and income frontier, next tend to 'kick away the ladder' (Chang (2002) and Reinert (2007)) which allowed them to get there in the first place, and rebuild a free-market virginity. What is specific of this globalization wave is the formation of an increasingly 'globalized' ruling class, often with a degree in economics obtained in Anglo-Saxon countries (generally the USA) taking home also policy medicines which frequently the country of origin itself finds too unpalatable to swallow.

However, such disruptive sides of the current globalization mode luckily are short of the point of no return. Fortunately, policy making continues to have a lot of unexploited degrees of freedom, and in different ways this applies from Brasilia to Brussels to Washington. As the orgy of market fanaticism is wearing out, finally hit by the evidence of its failure, the book comes at a high time of renewed reflection and tries to offer a fresh look at the policies and institutions fostering technological and organizational learning and industrialization across and within countries.

In fact, most of the chapters discuss an extensive empirical evidence on development seen as a process that links micro learning dynamics, economy-wide accumulation of technological capabilities and industrial development. Different learning patterns and different national 'political economies' yield of course different patterns of industrialization. However, it happens that all the countries which are nowadays developed undertook indeed relatively high degrees of intervention to support the accumulation of technological capabilities and the transformation of their organization of production especially in the early period of industrialization.

We have emphasized from the start of this book the futility of the search of any 'magic bullet' driving industrialization. The process of accumulation of technological and organizational capabilities does play a crucial role – as highlighted by many contributions to this volume – but such process has to be matched, first, by a congruent 'political economy' offering incentive structures conducive to 'learning-based' rent-seeking while curbing rent-seeking *tout court*, and, second, by a congruent macroeconomic management. By the same token, it is futile to search for any 'magic policy recipe' automatically yielding industrialization and catching-up.

However, as one is able to identify some regularities in the ingredients and processes driving industrialization, so one can trace some basic ingredients and principles that *successful* policy arrangements historically had and have in common. Le us spell out some of them.

Emulation and, sometimes, leapfrogging as a general principle inspiring policies

Emulation – we borrow the term from Reinert, above – is the purposeful effort of imitation of 'frontier' technologies and production activities irrespectively of the incumbent profile of

'comparative advantages'. It often involves explicit public policies aimed at 'doing what rich countries are doing' in terms of production profile of the economy and it always involves microeconomic efforts – on the part of individuals and, more so, firms – to learn how to do things others in frontier countries are already able to do. It is a familiar story over the last three centuries. It dates back at least to the case of England vis-à-vis the Low Countries in the period preceding the Industrial Revolution, and it applies all the way to the contemporary Chinese industrialization.

Emulation concerns primarily - as it ought to – products and processes based on new technological paradigms. In one epoch it meant mechanized textile production and the construction of the related machines. Later it was steel production, electricity based products and machinery, and internal combustion engines. Nowadays it has to do first of all with information and telecommunication technologies.

In fact, it sometimes happened that catching-up countries not only emulated the leading ones, but 'leapfrogged' in some of the newest most promising technologies. It happened in the 19th century United States and Germany which forged ahead of England in electromechanical engineering, consumer durables, synthetic chemistry.

But why should everyone emulate frontier technologies in the first place, rather than being guided by one's own 'comparative advantages'? Or, as the skeptics often put it, isn't it absurd to suggest that everybody should specialize in ICT production?

This very question, in our view, reveals a dangerous albeit widespread confusion between absolute and comparative advantages (more in Dosi, Pavitt and Soete (1990)). Typically, relatively backward economies display an *absolute disadvantage in everything*, that is they are less efficient in the production of every commodity, and in fact the disadvantage in many commodities is likely to be infinite in the sense that they are not able to produce them at all. Catching-up entails closing the gap in production knowledge and learning how to produce novel goods (which at the beginning are generally novel only for the catching-up country, even if 'old' for the world). This is particularly important with respect to new technological paradigms because such technologies are most often *general purpose*: they influence directly or indirectly most production activities. For example, it was so in the past (and it continues to be so nowadays) in the case of mechanical engineering and electricity as it is today the case of ICT technologies.

Moreover, goods and pieces of equipment based on the new technological paradigms generally entail higher elasticity of demand and richer opportunities for further technological advance (cf. Dosi, Pavitt and Soete (1990) and the chapters by Castaldi et al. and Cimoli et al.). Hence emulation of frontier countries in these activities implies, other things being equal, higher growth possibilities and a greater potential for productivity growth and, eventually, domestic product innovation.

The issue of *comparative* advantage is a quite distinct one. The point is made also in Reinert's chapter. It is trivially true that any economy has comparative advantages in something or other. So, when comparing an advanced ICT economy and a stone-age one, it is straightforward that the latter is likely to have a 'comparative advantage' in stone-intensive products! However, the distribution of the overall ('world') income between the two depends in the first place on the magnitude of absolute advantages (i.e. seen the other way round of the *technological gaps*) between the two economies. Learning and catching-up affect precisely the profile of such advantages/gaps. In the process, changing comparative advantages are only the byproduct of the different rates at which learning occurs in different activities.

The complementarity between technological learning and the development of production capacity

We have already emphasized above (cf. the chapter by Cimoli et al.) the difference between technological knowledge and sheer information, bearing important implications in terms of 'stickiness' and difficulty in the transmission of the former – embodied as it generally is into specific people, organizations and local networks. A consequence is also that learning rarely occurs so to speak, 'off line', especially in the initial phases of industrialization. Rather it goes together with the acquisition of production equipment, and with the efforts of learning how to use it and how to adapt it to local conditions (more in Bell and Pavitt, 1993). In turn, this goes hand in hand with the training of workers and engineers and the formation of managers capable of efficiently running complex organizations. These are also the reasons why it dangerous to see industrialization – even in its early stages - simply as a matter of "diffusion" : the adoption and use of equipment also when acquired "turn key " from abroad, and more so when the technologies are in the form of "blueprints" or licenses require a lot of local painstaking learning efforts.

Of course, no policy maker is in the position to fine tune the details of the production activities and together of the patterns of learning which the economy has to exploit. Such details of the actual dynamics depend a good deal on the details of corporate strategies and, why not, on chance. So, just to give an example, there was no way that the Korean policy makers could know, or even less 'plan', say, a learning push in semiconductors memories rather than microprocessors. However policy making ought to be acutely aware of the fact that future capabilities build upon, refine and modify incumbent ones: hence the policy goal of building *good path-dependencies* (the point resonates with a similar advice by Hausmann and Rodrick (2006) when addressing the patterns of product diversification along the development process).

Moreover two fundamental caveats must be kept in mind.

First, a useful distinction can be made between *production capacity* - covering the knowledge and organizational routines apt to run, repair, incrementally improve existing equipment and products –, and *technological capabilities* - involving the skills, knowledge and organizational routines needed to manage and generate technical change (Bell and Pavitt (1993), p. 163).It increasingly happens that the kinds of activities which foster the accumulation of the latter, increasingly involving specialized R&D laboratories, design offices, production engineering departments, etc. . Second, and relatedly, "while various forms of 'doing ' are central to technological accumulation, learning should not be seen simply as a doing-based process that yields additional knowledge simply as the by-product of activities undertakes with other objectives. It may need to be undertaken as a costly, explicit activity in its own right: various forms of technological training and deliberately managed experience accumulation" (*ibid*. p.179) Interestingly, the transition from the production capacity phase to the technological capabilities phase has been managed superbly well by countries like Korea and Taiwan and it is where, on the contrary, most Latin American countries got stuck.

The necessity of nurturing infant industries

Consider again the caricature of a stone-age economy and an ICT economy, and allow them to interact. Two properties are quite straightforward. First, the patterns of economic signals will be quite biased in favor of stone-intensive product in one country, and ICT-intensive in the other (i.e. precisely their current 'comparative advantages'). Hence if the former wants to enter the ICT age has to purposefully *distort market signals* as they come from international exchanges (on the assumption that there are some: it could well be that the ICT economy is unwilling to

absorb any stone product!). Second, it is quite unlikely that the stone producers even under the 'right' kind of signal, will be able to instantly acquire the knowledge to produce competitively ICT products.

Certainly, all individuals take a long time to learn new skills. Turning violinists into football players and vice versa is rather hard, if at all possible. And, even more so, this applies to organizations and organization-building. Even when the transformations are possible, they require time, nurturing and care. If a newly born violinist, ex-football player, is made to compete with professional violinists, he will make a fool of himself. If a catching-up company is suddenly made to compete with the world leaders it will most likely disappear. Often, it is already a daunting task to learn how to make – no matter how inefficiently – a product which might indeed be rather standard in technologically more sophisticated economies: demanding also competitive efficiency is alike asking the violinist to run the 100 meters in around ten seconds after some quick training rounds.

Safeguarding the possibility of learning, is indeed the first basic pillar of the *infant industry logic*.

On the incentive side, to repeat, market signals left to themselves are often not enough and indeed frequently *discourage* the accumulation of technological capabilities in so far as they ought to occur in activities currently displaying significant comparative *disadvantages* and thus also unfavourable current profitabilities. Incidentally note, also, that the existence of financial markets are meagre instruments, if at all, for translating a future and uncertain potential for learning into current investment decisions (more in Stiglitz (1994)). Thus, there are also sound learning-related reasons why the historical evidence shows that, just prior to industrial catching-up, average industrial import tariffs are relatively low; they rise rapidly in the catching-up phase, and they fall after a mature industrialization. Indeed, it is during the catching-up phase that the requirement of distorting (international) market signals is more acute, precisely because there are young and still relatively fragile learning infants. Before there are no infants to speak of. After, there are adults able to swim into the wild international ocean by themselves.

Some decades ago, there was the old adagio 'what is good for General Motors is good for the United States'. Turning it upside down, the developmental policy heuristics is 'let us make "good" (that is viable, and in the future, profitable) for, Toyota, Sony, etc., and later Samsung, Lenovo, etc. what is good for Japan, Korea, China, etc.'. Doing that, however, does not involve only ' signal distortion'. As many of the Latin American experiences have shown, this is far from enough. Partly it has to do with the fact that many forms of protection entail the *possibility* of learning but not, in the language of Khan and Blankenburg (above), the 'compulsion' to innovate as distinct from the sheer incentive to just exploit a monopoly rent, no matter how inefficient and lazy is the potential 'learner' (more on this below). Partly, it has to do with the *conditions of capabilities accumulation and the characteristics of the actors involved* .

After all, even under the best intentions and incentives, our violinist not only will take time to learn but will be able to develop his/her football skills only in a team. In turn, most often, the team will not be the making of sheer self-organization, especially when production entails relatively complex products, as it usually does. At the same time, violin players might not be the best candidate to football playing, irrespectively of the incentive structure. Out of metaphor, and contrary to the 'De Soto conjecture', industrialization might have rather little to do with the sheer award of property rights and with the establishment of firms as legal entities (cf. Hobday and Perini, above). Of course, the legal context does matter and is likely to be a conducive condition (even if cases like China show the possibility of a fast take-off even under a regime of poor property right protection and a blurred rule of law) . However, this is far from sufficient. In fact, it is quite misleading to think that all over the world there

are plenty of sources of technological knowledge just awaiting to be exploited – the lag being due mainly to institutional and incentive-related forces. On the contrary, irrespectively of the opportunities for the entrepreneurial exploitation of technological knowledge which the 'international knowledge frontier' *notionally* offer, the fundamental gap regards precisely the *lack of capabilities* in exploring and exploiting them. This is a crucial bottleneck for development: such gaps apply to rather simple capabilities which even casual visitors of developing countries notice (whenever walking out of IMF paid hotels…), regarding - at early stages of development –even rather basic activities such as accessing internet or processing a credit card and applies, much more so, to firm-level capabilities such as drilling an oil well (or, at early stages, even keeping an existing well working). As discussed in the chapters by Cimoli et al and by Mazzoleni and Nelson, above, 'horizontal ' policies of education and training, together with the activities of technical support to firms by public institutions can go a long way in the capability-enhancing direction. But even that is not likely to be enough. In fact
policies are often bound to get their hands *explicitly* dirty with respect to the *nature, internal structure, strategies of few corporate agents* themselves.

Fostering the emergence and in a few occasions explicitly building technologically and organizationally competent firms are indeed fundamental *infant nurturing tasks*.

Needless to say the absence/existence of mature technological capabilities and 'dynamic capabilities' for changing them (cf. Teece, Pisano, and Schuen (1997)) in any one country is not a binary variable. However, the distribution is highly uneven. So, one could list several dozen countries which can hardly show any. Other countries do display some technologically progressive organizations in a bigger sea of less dynamic firms. In fact, even the most developed countries present only a fraction of technologically dynamic organizations within a much greater population of firms. (Note that all this applies to both 'high tech' and 'low tech' sectors as conventionally defined). In a sense, industrialization has to do with the properties of changing distributions between 'progressive' and 'backward' firms.

How do policies affect such dynamic ? The chapter by Dahlman, above, is quite revealing. He reports on China and India, but the historical lesson goes well beyond these two country cases. Policies happened to involve (i) state ownership; (ii) selective credit allocation; (iii) favourable tax treatment to selective industries; (iv) restrictions on foreign investment; (v) local context requirements; (vi) special IPR regimes; (vii) government procurement; (viii) promotion of large domestic firms. In a nutshell, this is the full list of the capital sins which the market faithful are supposed to avoid!

There is here again a widespread misunderstanding to be dispelled, which goes under the heading of 'picking-the-winner' or 'national champion' fallacies. Why should governments foster national oligopolists or monopolists in the first place? And how could governments be more 'competent' than markets in selecting who is technologically better or worse?

There certainly are unintentional or even counter-intentional outcomes of discretionary industrial policies. Of course, untainted pro-market advocates typically quote among OECD countries the failures of the computer support programmes and the Concord project in Europe as archetypes of such 'government failures' to be put down on the table against 'market failures'. Economists more sympathetic to the positive role of the public visible hand, including us, would find easy to offer the cases of Airbus or ST Microelectronics again in Europe, Petrobras and Embraer in Brazil, etc., among many others, as good counterexamples. However, our point goes well beyond this. The 'picking the winner idea' basically builds on the unwarranted myth that there are many 'competitors out there' in the market, and the government has the arrogance of 'knowing better' than the market in their selection. This is often far away from reality in developed countries and, even more so, in catching-up ones.

When the U.S. government sponsors Boeing, cutting every possible 'fair trade' corner, and the European Union matches-up with EADS/Airbus, there is little resembling governments messing around with the 'invisible hand of markets', selecting politically appointed winners out of a multitude candidates instead of letting 'competition work its way'. Rather we observe the 'public hand' shaking, twisting, helping a quite *visible* corporate hand, often represented by one or very few members of international oligopolies with their own capabilities and strategic orientations which might or might not match the long term interests of the countries where they are located. This applies, *much more so,* to developing countries where often governments face the task of helping the birth and growth of *one or very few* candidates to eventually join the same quite exclusive clubs.

And in fact it happens that the major vehicles of learning and catching-up in all episodes of successful industrialization, with the possible exception of little Singapore, have been *domestic* firms – sometimes alone, sometimes in joint-venture with foreign MNCs -, but rarely MNCs themselves. This holds from German and American industrialization all the way to current China – possibly the case nearest to a two-pronged strategy, both fostering the development of domestic firms and trying to squeeze out of foreign MNCs as much technological knowledge as possible.

An ensemble of 'infant nurturing' measures, we have suggested, has been a major ingredient of development policies throughout the history of industrialization, and it continues to be so today. Historically, the 'infant learners' had to be shielded or helped in the domestic and international markets essentially in their interactions with the more efficient and more innovative firms from 'frontier' countries. This happens to a large extent also today. However, the unique feature of the current 'Sino-centric' world - as Castro, above, puts it – is that many catching-up countries are, so to speak, caught between two fires: the developed world is still ahead of them, but at the same time China quickly reduces its absolute disadvantages across the board, in both more traditional productions and in activities based on the newest technological paradigms. And it does so at rates higher than its catching-up in wages (notwithstanding the fast growth of the latter). The outcome is an absolute *cost* advantage in an expanding set of goods including those which were/are central to industrial production of many low and middle income countries. In that respect the magnitude and the speed of Chinese industrialization risk exerting a sort of crowing out effect vis-à-vis the industrializing potential of many other countries. So, for example, Brazil – a country indeed on the upper tail of the distribution of industrializers in terms of technological capabilities – turns out to be a very 'high wage' country as compared to China, but so are also other less developed Latin America countries, and even African countries are losing cost-based international (and domestic) competitiveness vis-à-vis China. A reason to give up the 'infant nurturing' philosophy? In our view it is not: on the contrary, it adds to the reasons urging to practice various combinations of the 'capital policy sins' mentioned above. And it ought to push toward a more explicit use of the domestic or regional markets as venues of culture of an emerging national industry even when the latter tends to be squeezed on the international arena between 'advanced productions' and Chinese exports.

Infant industries under the new international Trade Regime

There is another big novelty in the current organization of international economic relations, namely the regulatory regime stemming from the World Trade Organization (WTO) and the TRIPS agreements (more on them below). This historically unprecedented regime indeed implies a significant reduction in the degrees of freedom developing countries can enjoy in their trade policies, while notably all catching-up countries in the preceding waves of

industrialization could exploit a large menu of quotas, tariffs, and other forms of non-tariff barriers. Just as an illustration note that in developing countries the average industrial tariffs have fallen from nearly 35% in the early 80's to 12% at the turn of the millennium (conversely, in developed countries the have halved from around 8% to 4%: *for industrial goods*; agriculture is quite a different matter…). Together, there are also stronger constraints on what is admissible in terms of subsidies and other discretionary forms of support to firms and industries. Countries members of WTO which do not comply may be hit by countervailing duties and other retaliatory measures. As a consequence, quite a few of the instruments for industrial policy which have been a common practice at least from the times of the U.S. declaration of independence all the way to the development of domestic technological capabilities in China and India have been outlawed in the new international trade regime. In turn this state of affairs makes more difficult for new players – new firms and new emerging economies – to enter existing industries.

What can be done?

Quite a few things can be done also within the incumbent agreements, full as they are of loopholes and of provisions for exceptions generally put there by the negotiators of developed countries with an eye on their special interests – ranging from dubiously defined 'anti-dumping measures' to national safety and security considerations. Developed countries (in fact, frequently, *the very representatives of special industrial interests* in person, mostly from the U.S., EU and Japan), have been quick in exploiting these provisions. Developing countries have rarely done so, overwhelmed by the power of the money, the political clout, the lawyers' sophistication, the power of blackmail by stronger States. At least equally common has been so far the unawareness of these opportunities for pragmatic management, certainly thickened – we caricature on purpose – by Chicago-trained ministers of the economy truly believing that all problems come from the fact that trade liberalization has not gone far enough, and directors-general of the ministry of trade who had been taught that the Heckscher-Ohlin-Samuelson theorem on gains-from-trade is the last word on the subject. In this respect, we believe that if catching-up countries could display the same amount of pragmatism (someone would say *cynicism*) currently practised by e.g. U.S. representatives at the WTO, many degrees of freedom could be regained *even under current rules*. In that BRIC countries (Brazil, Russia, India, China) and South Africa, could play a very important role. Notwithstanding the deep differences amongst these economies and political systems, they have the skills to negotiate, together with the sheer economic size, the technological capabilities to imitate (or even to forge ahead in new technological paradigms, as in the case of Russia). When (unfortunately too rarely) a BRIC country has put the cards on the table, it has been remarkably successful. Recall the example of the Brazilian negotiations with Big Pharma on the conditions of production and distribution of retroviral drugs. Indeed, this is a case to be studied, improved upon and repeated more often.

There are other things that must be avoided at all costs: among them, *shy away from 'bilateral' agreements.*

In brief, 'bilateral' agreements are WTO-plus, and, in terms of Intellectual Property Rights, 'TRIPS-plus' agreements, whose bottom line is to close the loopholes/exceptions/safeguard clauses of the original WTO and TRIPS agreements, freezing them in favour of the companies and industries from the developed world. So, a bilateral agreement, most often with the U.S., offers 'preferred country clauses', typically concerning textile exports and the like, which we know do not matter much, if at all, since Chinese exports are more competitive even if one takes away all tariff on the developing country's export. On the other more subtle side, the provisions of the bilateral agreement often involve the unconditional acceptance of the IPR regime imposed by the developed partner (we shall come back to that) and curbs on imports from third countries of commodities

produced under the various waivers still contemplated under the WTO. So for example, if the Brazilian government is able to have internationally recognized its possibility to produce and sell, say, a certain pharmaceutical drug, the bilateral agreement is generally preventing the signee from buying it, forcing the country to accept all the conditions (and prices!) of Pfizer, Glaxo, etc.. In the short term, the neglect of the issue of any minister of finance and trade of, say, Colombia, Morocco or Jordan – the names are from the list of countries which signed bilateral trade treaties with the U.S. – appears to be quite reasonable. No firm in these countries would be able in the near future to produce, say, any retroviral drug, but at the same time such deals increase the obstacles to catching up for the whole group of industrializing countries. Come as it may, bilateral agreements give very little to the country signing them, because in any case China tends to be better and cheaper in the productions concerning the 'upside' of the agreement, and puts in place many obstacles to the possibilities of technological learning ahead for the developing country. With added constraints to those countries already trying to catch-up.

While there are significant and still largely unexploited degrees of freedom unintentionally provided by the current international trade institutions and rules, the straightjacket is likely to remain too tight. As Dahlman, above, remarks, if China and India "had liberalized from the beginning it is unlikely that they would be the strong economic powers that they have become. To a large extent, some of the strengths of both countries are that they developed strong capabilities before they liberalized". The point applies of course also to the countries which are beginning now their process of capability accumulation. But then the conclusion is that some trade re-negotiation is going to be necessary.

It is reasonable for example to switch to a regime whereby the object of multilateral agreements are *average* industrial tariffs as distinct from tariffs that are line-by-line or apply to specific products and sectors (in which case the special corporate interests from developed countries are generally able to exert a much greater fire power).

The system is simpler than the current structure of tariff commitments and would also reconcile multilateral discipline with policy flexibility since countries would be able subject to an overall average ceiling while maintaining degrees of freedom for discretionary sectoral strategies. In practice it would have the effect of balancing tariff increases and reductions, since a country would need to lower its practiced tariffs on some products in order to be able to raise them on others. This would encourage governments to view tariffs as temporary instruments and focus the efforts to ensure that they effectively serve the purpose they are designed for, that is to provide a breathing space for infant industries before they mature and catch up with their counterparts in more advanced countries.

Moreover, within such a logic, the average ceiling itself ought to depend on the levels of technological and economic development, raising as the catching up process is put in motion and falling as industrialization become ripe.

A management of the distribution of rents favourable to learning and industrialization

The other side of 'infant nurturing' policies discussed above regards the rent distribution profile that they entail. We have already emphasized that offering an opportunity of learning via, say, a temporary trade barrier, does not imply *per se* the incentive to do so rather simply exploiting the rents stemming from the protection. As outlined above by Khan and Blankenburg, successful industrialization policies have all come with rent management strategies providing for *compulsions* for learning and accumulation of both technological capabilities and production capacity. There are three sides to such strategies.

First, on the 'carrot' side, policies must be able to transfer resources to the 'progressive actors' : fiscal policies, subsidies, preferential credits, grants are among the possible means. In fact, fiscal policies are particularly important in the transfer of resources from those activities which benefit from (cyclical or, even more so, trend) improvements in the terms of trade of natural resources - in the form of export levies, royalties indexed on the final price of the commodities, fines and taxes discouraging environmental damage. Moreover, the construction of industrialization-friendly financial institutions is of paramount importance . In some historical cases, it has meant steering in a pro-development fashion the financing strategies of large private conglomerates, like the Korean *chaebols*. In other historical examples it involves State-owned development banks like BNDES in Brazil. Conversely, the absence of 'industry-friendly' intermediation of finance is a major bottleneck for both learning and investment – as witnessed by most Latina American countries over the most recent decades.

Second, on the 'stick' side, governments must have the credibility to commit to developmental rents for periods that are sufficiently long but not too long (of course how long will depend on the sectors; the nature of the technologies; the distance from the international frontier; the initial capabilities of managers, technicians, workers, etc.). In that, of course, the critical requirement is the credible commitment to stop all rent-yielding measures after some time and, in any case, to withdraw them and impose sanctions on firms and industries failing to achieve technological investment or export targets. A good case to the point has been the 'stick-and-carrot' allocation of scarce foreign currency to firms in Korea in the first industrialization phase as a function of export targets.

Third, the nurturing of domestic oligopolists has to be matched by measures fostering competition. There is a general lesson coming from the experiences of Korea, and some decades before Japan, whereby quasi-monopolistic or oligopolistic domestic firms were forced, quite early on, to compete fiercely on the international markets. And, together, above some threshold of industrial development, anti-trust policies are an important deterrent against the lazy exploitation of 'infant protection'.

Indeed, the management of rent distribution in its relation with industrial learning is one of the most difficult and most crucial tasks of any industrialization strategy, as it concerns the overall distribution of income, wealth and political power across economic and social groups. So for example, well beyond the pitfalls of single policy measures, one of the deeper underlying weaknesses of the industrialization process in most Latin American countries has been the absence of 'pro-developmental' social coalitions with the strength of channelling resources toward industry (that is both industrial firms and urban workers). In this respect, the recent episodes of resistance to export levies by land owners in Argentina is just another symptom of a quite diffused anti-industrial political economy, often linking together agricultural, financial and mining interests.

Tight Intellectual Property Rights regimes never help industrialization and sometimes harm it

It has already been discussed in this book that all past episodes of successful industrialization have occurred under conditions of *weak* IPR protection. All catching-up countries – including, to repeat, at one time also the United States and Germany – have done so through a lot of imitation, reverse engineering, straightforward copying. But these activities are precisely what strong property right protection is meant to prevent. How effective IPR are in achieving this objective depends a lot on the technologies and the sectors (more in the chapter by Cimoli, Coriat and Primi and in Dosi, Marengo and Pasquali (2006)), but certainly when

they are effective they are likely to represent an obstacle to domestic technological learning. Conversely, if IPR protection *may* represent an incentive to innovate in *frontier* countries – a claim indeed quite controversial, not supported by particularly robust evidence (cf. again Dosi et al. (2006) for a discussion) -, there is no evidence that they have any positive effect in spurring innovative activities in catching-up countries. Certainly, successful industrializers at some point start innovating and also patenting, but typically – a century ago as well as today – they fill their patent claims in frontier countries where their strongest competitors are likely to be based. At the same time, the domestic IPR regime has been characteristically weak. The situation, however, has recently changed with TRIPS agreements which have basically extended the tightest IPRs rules of developed countries to all the signing countries, including developing ones, and has been made even worse by the already mentioned bilateral agreements. Further, TRIPS has taken away the possibility of differentiation the regime of protection across products and technologies. For example, even countries like Italy and Switzerland were not granting IPR protection to pharmaceuticals (indeed an area where patents are very effective appropriability devices) until the 1980's! This is not possible any longer under the new TRIPS rules. Finally, one is witnessing an unprecedented aggressiveness in IPR enforcement by developed world MNCs, even when the stakes are low and the moral outrage is rampant, like in the case of retroviral drugs to be used with third world patients.

What can catching-up countries do?

The first, in principle, easiest thing to do is *be aware* and never buy the story that 'IPR are good for development because they are good for innovation'. On the contrary, in many technological areas they are largely irrelevant for both innovation and technological catching-up. In other areas like, in primis, *drugs*, they are definitely harmful for imitation and capability building in catching-up countries (while they have indeed a dubious effect on the rates of innovation in frontier countries). A consequence of such an awareness is also the need of greater efforts to build institutional capabilities and a clear 'technology acquisition strategy' to orient negotiations and dispute settlements.

Second, and relatedly, TRIPS agreements contain a series of loopholes, safeguard clauses and exceptional provisions – for example concerning compulsory licensing – which catching-up countries have still to learn how to exploit.

Third, the most advanced among catching-up countries ought to strive to offer relatively less developed ones appealing regional agreements which could be viable alternatives to the bilateral agreements with the U.S. (and the EU) generally containing IPR provisions even stricter than TRIPS.

Last but not least, also in this case, alike in the trade of goods –already discussed – a new wave of multilateral negotiations are likely to be needed aimed at (i) reducing the breadth and width of IPR coverage; (ii) expanding the domain of *unpatentability* – from scientific knowledge to algorithms to data -; and, (iii) conditioning the degrees of IPR protection on the relative level of economic and technological development of each country.

After all, the current international IPR regime is largely the response to the special appropriability interest of a small *sub-set* of developed countries' firms – to simplify to the extreme, Big Pharma and biotech, Microsoft and Hollywood. A reform in the directions just indicated would benefit catching-up countries, but also the first-world consumers, without doing any harm to the overall rate of innovation.

Avoid the natural resource curse[1]

The availability of natural resources – from minerals to hydrocarbons to agricultural land and forestry - at a first look appears as a blessing, an easy shortcut to development, especially in times of rising terms of trade like the current ones. In fact, they may turn out in the long-run to be a curse. Exports of natural resources may induce the 'Dutch decrease': as it was noticed around forty years ago in the gas-exporting Netherlands, exchange rate appreciation was 'crowding out' industry by making it internationally less competitive. In turn, in so far as manufacturing and other increasing return activities such as knowledge-intensive services are at the core of technological learning, The 'Dutch disease' also reduces the future learning potential. Production activities in natural resources are typically capital-intensive with a reduced demand of skilled labour. They favour polarization in income distribution. The big stakes involved in exploration and mining rights is easily conducive to corruption among bureaucrats and politicians. And the problem has been recently compounded by privatization generally occurring under rapacious terms in favour of foreign mining companies and to the almost exclusive domestic benefit of few corrupt officials and middlemen. Of course in modern history resource-abundance has sometimes been conducive to growth, the most noticeable case being 19th century United States. However, this has occurred precisely through a capital-intensive and resource-intensive *industrialization* process (Rosenberg (1963), David and Wright (1997)). Without that, resource abundance can sustain growth for some time especially when terms of trade improve and sectoral productivity is rising, but in the long term the small size in terms of overall employment of the resource-exploiting sector, the failure to tackle income inequality and the scarce overall learning efforts tend to erode the economic benefits derived from natural resources exports. In fact, in order to avoid the resource curse, rents have to be purposefully distributed against comparative advantages, fostering diversification of production in knowledge intensive activities.

The necessary consistency between macroeconomic and industrial policies

As abundantly shown by all chapters above addressing the Latin American experience over the last two decades, there are macroeconomic policies which kill most learning efforts together with most firms carrying the related learning capabilities. The sudden and indiscriminate dismantling of trade barriers can easily do that, especially if it comes together with reckless (non) management of exchange rates, characterized by vicious cycles of appreciation followed by sudden devaluations. And the cycles have been only amplified by the stubborn refusal to utilize controls over capital movements, especially short-term movements. Blind trust in the 'magic of the market place' and the associated lack of fiscal policies and demand management increases output volatility. In turn, the latter, together with the endemic financial fragility of many developing countries' firms means induced waves of corporate mortality and with that also the disappearance of the capabilities of technological accumulation which the disappearing firms embodied . And even among surviving firms, behaviours tend to become more short-term and the economy tends to respond more to financial signals than to long term learning opportunities (more on the consequences of 'Whashington Consensus' macro policies in Ocampo and Taylor (1998) and Stiglitz et al. (2006)). The comparative tales of Latin American countries as compared to e.g. Korea or Malaysia, tell the importance of the vicious feedbacks between macro policy shocks prescribed by orthodox recipes and micro dynamics (in Latin America) vs. the virtuous

[1] We discuss this issue at greater length in Humphreys et al. (2008)

feedbacks between more interventionist and 'Keynesian' macro policies and the continuing industrial expansion even under severe financial crises (e.g. in Korea).

A new development pact: the courage of imagining a novel international 'consensus'

We began this book with the inevitable reference to the 'Washington Consensus' and the damages made by the almost religious implementation of such extremist version of economic orthodoxy. The times of the 'Consensus' are over, buried by the weights of its economic failures, in addition to its massive social disruptions. This book, rather than proposing amendments to the failed consensus, has tried to build on a different diagnosis of the obstacles to and drivers of development, centred on the conditions for the accumulation of technological and organizational knowledge and on the political economy sustaining or hindering it.

Far too much reliance has been put in the current analyses of development on a highly simplified and indeed misleading economic model whereby 'technology' is just information in principle freely available to every country and every economic agent all over the world. On the contrary, even a slightly more sophisticated understanding of the nature of productive knowledge has crucial economic ramifications which put in the forefront the enormous asymmetries in the international distribution of such knowledge, the difficulties in its accumulation and the interactions between what economic agents know how to produce and search for, the incentives they have to do so, and the role of public policies in shaping both.

The foregoing analyses, form different angles, offer a rich alternative menu of industrial policies – in their broadest definition. Many of such policies as we have discussed in these conclusions, may be implemented, albeit with daunting difficulties, even under the current regime o f international economic relations, largely built under the political atmosphere of the Washington Consensus. Developmental pragmatism is much better than nothing, and certainly better than anti-developmental fanatism! However, we would like to conclude this book with a more comprehensive and daring policy vision. This alternative view – we are tempted to call it the 'Rio Consensus', acknowledging the venue were we began discussing about this book - contains also plea for an alternative view governance of international economic relations. Indeed, a *new pact*, involving four major elements.

First, we have discussed it repeatedly above, on the 'take side' for developing countries there ought to be much greater provision for 'managed trade' – a word used for too long to protect rented interests of *first*-world lame ducks – in order to allow, on the contrary, *infant nurturing*, albeit with time limits and under transparent conditions. The higher the distance from the international technological frontier, the higher also the degrees of 'nurturing' that should be allowed. Together, the new WTO pact should prescribe much stringent conditions under which 'anti-doping' measures can be called for. (Notice that under current practices the punitive measures may be implemented first, while still awaiting for the definitive ruling, with the likely consequence that the developing country's firm dies before having its rights recognized).

Second, one must not be a development-friendly economist to acknowledge the profound anti-developmental bias of agricultural trade policies in all developed countries. There is a curious paradox here. Agriculture is the sector which most resembles textbook economics, made of many relatively small price-taking producers, with little possibility of exploiting monopolistic rents. This sector is indeed the one where all developed countries massively 'distort market signals', and with no gains in terms of learning opportunities of any kind: just a pure rent-extraction, with a huge loss by a multitude of developing countries' farmers and developed countries' consumers alike. Any new trade deal is bound to involve

the dismantling of arrangements which are massively damaging the cotton producer of West Africa, the Brazilian soya producer as well as the Detroit or London consumer, without any 'dynamic' benefit for any economy.

Third, we have already emphasized the need of a reform of Intellectual Property Right regimes at the international level, and domestically within developed countries, toward a *reduction* of IPR protection in terms of domains of patentability and patent scope. Add to that some proportionality between degrees of development and degrees of IPR protection that multilateral agreements should require. Again, it is a 'win-win' reform that finds an increasing number of advocates also in frontier countries and even among a part of *frontier firms*, worried that the current system might simply lead to 'patent arm races', stockpiling otherwise useless patent thickets, just awaiting to be used for threat or retaliation. And in fact the rates of innovation stagnate, while the cost of litigations roar: in the U.S. litigation costs are estimated to be around one third of the total R&D expenditure of the American industry !

Fourth, untamed globalization of production activities has been a powerful vehicle for a huge income transfer from labour to *first world* capital. The transfer of production, say within NAFTA, from the U.S. to Mexico, or from all of the OECD countries to China, has meant and means of course much lower wage costs. In the change, very little goes to the wage of the Mexican or Chinese worker, little becomes a price gain, say, for the U.S. shopper at Wal-Mart, most goes to the companies which dislocate the production of intermediate and/or final products. And the relocation has also indirect effects since it makes harder and harder for the first-world workers to negotiate on wages, working conditions, pensions or even to defend the status quo. Symmetrically, in most developing countries the nearly 'unlimited supply of labour' maintains the bargaining power of local workers to nearly zero. One of the overall outcomes have been wages that in the U.S. have stagnated for at least 15 years, despite steady productivity growth, and the widening gap between productivity and wages has certainly not gone to the workers of Tijuana or Shanghai. The new pact should correct for all that and allow for the possibility of developed countries to require for their imports the fulfilment of standards concerning child labour, work conditions and working hours, right to unionize, and environmental respect. Unconditional free-traders would certainly accuse these measures of being protectionism in disguise. On the contrary, in our view, they are going to be beneficial also to catching-up countries, to their workers and their environment.

In fact they would make a major contribution to re-dress a worldwide tendency toward ever-growing income inequalities, within a larger pro-development international deal fostering knowledge accumulation and industrialization in catching-up countries.

Bibliography

Bell, M., and Pavitt, K. (1993). 'Technological Accumulation and Industrial Growth: Contrasts Between Developed and Developing Countries'. *Industrial and Corporate Change*, 2: 157-210.

Chang, H.J., (2002). *Kicking away the Ladder: Development Strategy in Historical Perspective*. London: Anthem Press.

Cornia, G.A., Addison, T., and Kiiski, S. (2005). 'Income Distribution Changes and Their Impact in the Post-World War II period', in G.A. Cornia (ed.), I*nequality, Growth, and Poverty in an Era of Liberalization and Globalization*. New York/Oxford: Oxford University Press.

David,P.A. and Wright G.(1997), "Increasing Returns and the Genesis of American Resource Abundance", *Industrial and Corporate Change*, 6

Dosi, G. Marengo, L., and Pasquali, C. (2006). 'How much should society fuel the greed of innovators? On the Relations Between Appropriability, Opportunities and Rates of Innovation', *Research Policy*, 35-8: 1110-1121.

Dosi G., Pavitt K and Soete L (1990), *The Economics of Technological Change and International Trade*, Brighton :Wheatsheaf, and New York : New York University Press

Greenwald, B., and Stiglitz, J.E. (2006). 'Helping Infant Economies Grow: Foundations of Trade Policies for Developing Countries'. *The American Economic Review*, 96.2: 141-146

Hausmann, R., and Rodrik, D. (2006). 'Doomed to Choose: Industrial Policy as Predicament'. CID Working Paper. Center for International Development at Harvard University.

Hirschman, A.O. (1958). *The Strategy of Economic Development*. New Haven/ London: Yale University Press.

Hirschman, A.O. (1971). *A bias for hope*. New Haven: Yale University Press.

Humphreys, M., Sachs, J.D., and Stiglitz, J.E. (2008). *Escaping the Resource Curse*, New York: Columbia University Press.

ILO (2004). *A fair globalization: Creating opportunities for all*. Geneva: International Labor Office

Kim, L., and Nelson, R.R. (2000). *Technology Learning and Innovation: Experiences of Newly Industrializing Economies*. Cambridge: Cambridge University Press.

Ocampo, J. A. and Taylor, L. (1998), 'Trade liberalization in developing economies: modest benefits but problems with productivity growth, macro prices, and income distribution', *The Economic Journal*, 108, 1523-1546.

Reinert E. S. (2007). *How Rich Countries Got Rich … and Why Poor Countries Stay Poor*. London: Constable.

Rodrik, D. (1997). *Has Globalization Gone Too Far?*. Washington, DC: Institute for International Economics.

Rodrik, D. (2008), Goodbye Washington Consensus, Hello Washington Confusion?, *Journal of Economic Literature*, forthcoming.

Rosenberg, N. (1963), "Capital Goods, Technology and Economic Growth", *Oxford Economic Papers*,15, 217-227

Rosenberg, N., and Birdzell, L.E. (1986). *How the West Grew Rich: The Economic Transformation of the Industrial World*. New York: Basic Books.

Stiglitz, J.E. (1994). *Whither socialism?* Cambridge: MIT Press.

Stiglitz, J.E. (2002). *Globalization and its Discontents*. New York/London: W.W. Norton & Company.

Stiglitz, J.E. (2006). *Making Globalization Work*. New York/London: W.W. Norton & Company.
Stiglitz, J.E.,, Ocampo, J.A., Spiegel S., Ffrench-davis, R., and Nayyar, D. (2006). *Stability with Growth. Macroeconomics, liberalization and development*. New York/Oxford: Oxford University Press.
Teece, D., Pisano, G., and Shuen, A. (1997). 'Dynamic Capabilities and Strategic Management'. *Strategic Management Journal*, 18-7: 509-533.
Wright, G. (1997). 'Toward a more historical approach to technological change'. *The Economic Journal*, 107: 1560-1566.

The Political Economy of Capabilities Accumulation: the Past and Future of Policies for Industrial Development

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