studying motivational psychology, which was prompted by sheer curiosity and my dislike of the unrealistic assumptions on which so much economic reasoning is based. The fact that I did come upon it makes me feel that satisfying my idle curiosity was not only fun for me but of some social value as well.

Menlo Park, Ca.

TIBOR SCITOFSKY

Industrial Development in Developing Countries and the Role of Government Interventions *

I. Introduction

Over the past four decades or so, most developing countries have mounted sustained efforts to build up modern manufacturing industries. They have experienced dramatic successes (as in the newly industrializing economies, NIEs, of East Asia) as well as dismal failures (as in much of Sub-Saharan Africa). Many factors have contributed to this highly uneven record. Countries started (around the 1950s) from very different points on the industrial scale, some with well-established manufacturing bases, others with rudimentary manufacturing facilities (and little of the skills, institutions and infrastructure that go with industry). They were exposed to very different external economic environments and managed their macroeconomic policies with differing degrees of success. Political and natural events were conducive to some countries' development efforts and not to others.

Even if these differences are taken into account, there remains considerable variation in the efficiency with which industrialization has been carried out. Industrial success depends not only on the ability to buy the capital goods and know-how needed. It depends also on the ability to absorb and efficiently deploy the new technologies, adapt it to local conditions, improve upon it and ultimately create new knowledge, what may collectively be termed "techno-

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* This paper has benefited from comments by Tom Guarino and research assistance by Sri Dalsaloo. An earlier version of this paper was prepared for UNCTAD, but the responsibility for the views expressed here is only the author's.

logical or industrial dynamism. The real difference between the successful industrializers and others lies in this dynamism. Technological dynamism enables even resource-poor countries to invest their scarce resources effectively, enter export markets and substitute efficiently for imports, diversify their industrial and export structures and make manufacturing lead sustained structural transformation. What accounts for the uneven distribution of technological dynamism among developing countries?

The dominant explanation in the current literature is that industrial success is due to outward-oriented trade strategies. Such strategies are usually taken to involve, not just equal incentives to sell abroad as at home, but also "liberal" economic policies: low and uniform protection to domestic industries, free flows of foreign technologies and capital, investment patterns governed by market incentives, the absence of measures to promote local technologies or capacities and unrestrained domestic competition. This "liberal" interpretation of recent industrial experience leads to strong policy recommendations: reduce government interventions, especially in trade, liberalize direct investment and technology flows, promote internal competition, restructure or privatize enterprises, remove controls on the financial sector, and so on (generally described as "getting prices right"). The ideal role left for the government is the minimalist one, to provide physical infrastructure and set the legal rules of the game.

This paper argues that while export orientation (in the sense of providing neutral incentives between foreign and domestic markets) is desirable, the experience of successful industrializers does not support the minimalist government role prescribed. On the contrary, the most successful industrializers have been dynamic precisely because they intervened actively in the process of building up technological capabilities. Their interventions were both "functional" (to strengthen market forces without favouring particular activities) and "selective" (to promote particular activities or firms over others), though the extent and choice of intervention varied greatly. It is suggested that both sorts of intervention are necessary to overcome market failures associated with the liberal paradigm of optimal free markets. The nature of interventions needed may vary with the stage of development and national objectives, and with the ability of governments to mount interventions, but the need to intervene remains. This leads to very different policy implications from the undifferentiated "liberal" solutions now being imposed on a wide spectrum of developing countries.

II. The determinants of industrial dynamism

A country's technological dynamism in manufacturing has many elements. These can be grouped under two headings: first, the capabilities of its individual manufacturing enterprise; and second, the interactions between individual manufacturers and between them and the supporting environment. Firm-level capabilities consist of the skills, knowledge and institutional coherence which enable a manufacturer to do three things: first, to identify and engineer viable projects, purchase the relevant technology and capital goods, execute the investment efficiency (or "investment capabilities"); second, to master the process and product technology, achieve efficient levels of quality, maintenance and operating procedures, adapt the technologies to local materials and customer needs, improve the technology over time and diversify, innovate and add to the technological base ("production capabilities"); and third, to establish efficient flows of knowledge and information with suppliers, customers, consultants and science and technology institutions ("linkage capabilities").

Some of these capabilities can be acquired by an enterprise "ready made" from the market. However, most of the skills needed to handle new technologies do not exist in developing countries and have to be acquired by the firm. Once skills are created, an enterprise has to blend them together effectively in an institutional sense. All

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this entails a conscious (and often prolonged and expensive) process of training, acquiring new information, experimentation and interaction with other agents. Thus, even gaining mastery of a given technology is a “learning process” in developing countries. Requiring effort and investment at all levels of operation. Different firms achieve different levels of efficiency depending on their learning investments, the skills available on labour markets and the support provided externally. Technological mastery shades into improvement and, as the firm matures, into innovation (with formal R&D becoming prominent), but technological dynamism in essence is a process of constant capability building in every aspect of manufacturing activity.

As with any investment, that in acquiring capabilities is conditioned by incentives arising in the markets facing firms. Two aspects need mention here. First, the macroeconomic environment has strong effects. Stability, growth and a predictable policy structure are clearly conducive to investments in capability acquisition (just as they are to investments in physical capacity). A favourable growth setting also enables greater capability acquisition in a physical sense: enterprises have more opportunities and resources to repeat particular tasks and add to capacity. The economic stresses of the 1980s are likely to have been disruptive for technological development for a number of developing countries, apart from the larger problems they generated.

Second, competition, both domestic and international, provides a powerful stimulus to technological dynamism. However, it is a double-edged sword: the full force of external competition from mature enterprises can prevent new entrants from acquiring a base of capabilities and so retard capability development. This is the “infant industry” case for protecting the learning period, theoretically justifiable when firms cannot finance the learning process (capital market failures), cannot appropriate all its benefits (externalities) or

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3 A similar process occurs in enterprises in developed countries, with the important difference that most “routine” capabilities can be readily hired from the labour market and in-firm efforts can concentrate on mastering the more novel, innovative features of the technologies. Despite the broad availability of routine capabilities and open, competitive markets, however, individual enterprises in advanced industrial countries also display persistent differences in productivity (i.e. in technological mastery). See R.R. Nelson, “Research on Productivity Growth and Productivity Differences: Dead Ends and New Departures”, Journal of Economic Literature, 1982, 19. pp. 1028-64. On developing countries, see H. Pack, “Industrialization and Trade”, in N.B. Chenery and T.N. Srinivasan (eds.), Handbook of Development Economics, Vol. I, Amsterdam, N. Holland, 1988.

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development; a dense network of products, services and information flows, within which firms can specialize efficiently; and such “public goods” as standards, testing, basic R&D and other forms of institutional support that enable firms to conduct in-house technical work effectively. Thus, national technological dynamism is more than the sum of individual enterprises’ capabilities: it is the synergy arising from the interaction of enterprises, markets and a variety of institutions.

National technological dynamism is thus subject to policy interventions at three points. First, in the *incentive structures* that induce enterprises to build up capabilities, requiring sound macro management and the provision of selective infant industry protection to activities with costly “learning” periods. Secondly, in the development of *capabilities* to respond to incentives, requiring interventions to develop the skill (education and training) base, to induce appropriate technology inflows, and to promote domestic R&D activity. Thirdly, in supporting a variety of *institutions* to facilitate the functioning of markets, in particular the flow of information and skills and the development of inter-industry linkages. Moreover, it is the complex interaction of these three factors that determines technological dynamism: simply providing incentives without building up capabilities or institutions, or vice versa, may be ineffective, even counterproductive. This simplified framework for analyzing the process of industrial development yields useful insights into recent experience. It also yields rich policy implications, sometimes quite different from the prevalent “liberal” orthodoxy.

### III. Features of recent industrialization

The relative industrial and technological performance of developing countries can be gauged in many ways. Table 1 presents indicators of performance in 29 developing countries for 1970-1988. Some of the indicators are subdivided into two periods (1970-1980 and 1980-1988) to show the impact of the debt crisis and recent

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terms-of-trade shocks on the sample countries. These data need careful interpretation in order to arrive at some meaningful picture of recent performance, partly because there is no unambiguous measure of dynamism and partly because of the effects of the shocks of the 1980s.6

In terms of the levels of industrialization, the four NICs of East Asia (Hong Kong, Republic of Korea, Singapore and Taiwan), have the highest shares of manufacturing in GDP (27 to 43%). These NICs also record among the highest growth rates in manufacturing over 1970-87 (from 8-14% p.a.), though some of the "New NIEs" (Indonesia, Malaysia, Thailand) and Tunisia also fall in this range. The complexity of the manufacturing sector, as indicated by the share and growth of capital goods production, is also the highest in East Asia, though Hong Kong is distinctly below the others in level and is close to Argentina and Brazil, while Singapore shows slow growth in the 1980s. Capital employed per worker (calculated from data on domestic capital goods production and accumulated capital goods imports, net of exports, from 1960, depreciated over an assumed life of 13 years), has risen fastest in East Asia, and shows relatively high values for Singapore and Korea (Hong Kong and Taiwan data are not available) by 1988, but Argentina (with the longest established industrial base), Brazil, Venezuela and Turkey also show high levels.

Productivity growth, measured simply by value added per employee, is consistently high for Korea and Taiwan, with the latter in the lead. Data for Hong Kong are only available for the 1980s and are high, while Singapore performs well in the '80s but poorly in the '70s. The productivity performance of several other Asian countries (India, Malaysia, Pakistan, Philippines, Thailand and Turkey) improves significantly in the '80s, while Latin American and African countries have a relatively weak showing in both periods, suggesting a long term deficiency in industrial dynamism. ICORs tend to rise in most countries in the '80s (India is a major exception, because of strong agricultural growth and better utilization of previous capital stock due to some internal liberalization of industry) due to two different factors: first, the rising complexity of manufacturing activities (as in the East Asian NICs) or of worsening capacity utilization (Philippines and most African and Latin American countries).

Productivity and ICOR data may reflect, in large part, the impact of external shocks on investment and capacity utilization, and cannot be taken as straightforward indicators of the efficiency of the industrialization process. Since TFP (total factor productivity) estimates are not available on a comparable basis, we have to take recourse to other measures of efficiency. Manufactured export performance, as measured by market share and changes in these shares, is one indicator of the competitive strength. Here the East Asian NICs are the best performers (though Singapore lags behind the other three). This is well known; what is less well known is that all other Asian countries also record increases in market shares in 1980s, in contrast to most African and Latin American countries. Brazil, with its large industrial sector and enormous pressures to raise export to service its debt (enhanced by domestic recession) was able to raise its world market share in the 1980s, but to a much lower extent than the East Asian NICs. Finally, Table 1 gives data on patents taken out in the U.S. This is a very crude indicator of technological dynamism, since the true economic "value" of patents is difficult to judge, propensities to patent abroad may differ, and some national patents may in fact be taken out by resident foreigners. Nevertheless, the data (normalized by population in the last column) reinforce the impression of dynamism in the East Asian NICs, though Korea lags behind the other three. Some Latin American countries (Argentina, Costa Rica, Mexico and Venezuela) also have impressive patent records, perhaps testifying to latent capabilities that have not revealed themselves in industrial performance (see below).7

IV. Explaining contrasting experiences

While it is difficult to evaluate recent industrial performance because of the impact of external shocks, it appears nevertheless by

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5 It may be argued that the impact of the shocks on particular countries itself reflects, at least in part, past industrial dynamism: countries with undeveloped or inefficient industrial structures fared worse in the deteriorating international environment because of their inability to diversify and grow on the basis of manufactured exports.

6 ICORs for these East Asian NICs (Hong Kong, Korea and Taiwan) and three Latin American countries (Argentina, Brazil and Mexico) were used in a growth accounting exercise in a larger sample of (poorly developed) countries. The results suggested that the faster growth of the East Asian countries was largely due to their greater innovativeness as measured by patenting abroad. See J. EASTERLING, "Why Growth Rates Differ", in G. DATT, C. FOSSON, R. NELSON, G. SUTHERLAND and L. SOUTHE (eds.), Technical Change and Economic Theory, London, Palmer Publishers, 1988.

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many indicators that the NIEs of East Asia, and to a lesser extent, the
"new NIEs" of Asia, manifest greater and more sustained dynamism
than other developing countries. It is precisely this difference that has
formed the empirical basis of the current orthodoxy on industrializa-
tion; viz., industrial success is explained by liberal incentive struc-
tures, as manifested in outward-oriented trade regimes.

The "liberal" school argues that such regimes lead not only to
better export performance (i.e. the exploitation of existing com-
parative advantage) but also to greater technological dynamism (the
creation of new competitive advantages). In other words, providing a
neutral structure of incentives not only encourages competitive indus-
tries to export, but it also does more: it lowers ICORs by enforcing
efficient specialization over time (initially in labour-intensive ac-
ivities), leads to the realization of economies of scale (as capital-
intensive industries emerge), promotes faster and healthier accumu-
lation of skills and technological capabilities (by providing correct
signals and competition), and an additional (and largely free)
channel of information to exporters. In addition, by easing foreign
exchange constraints, it permits steadier growth and greater avail-
ability of imported equipment, inputs and technologies. Export-
orientation provides, in other words, static gains of specialization
according to given endowments, as well as dynamic gains from a
faster increase in those endowments. The case for free trade seems
doubly vindicated.

These arguments clearly have a lot of validity. Incentives do
matter, and specialization by comparative advantage does offer ben-
efits. International competition and contacts with world markets do
stimulate technological dynamism and a diversified export base does
help steady long-term development. The record of industrialization
supports a broad association between export orientation, export
growth and industrial development, though the relationship may not
hold for all periods or for the degree of export orientation (some
"moderately inward-oriented" countries do better than some "moder-
ately outward-oriented" ones). The East Asian NIEs are the best
performers and also the most outward-oriented regimes, and the new
NIEs appear set to follow them down the export-based growth path:
there is little reason to doubt these "stylized facts" that are the staple
of much of the industrial strategy literature.


The lessons that can be drawn from this are not, however, as
simple and straightforward as current orthodoxy suggests. "Export-
orientation" does not represent a uniform set of policies, nor does it
necessarily carry the "liberal" connotations noted earlier. There are
two major sets of qualifications to the liberal interpretation. The first
concerns incentive structures in product markets, the second the role of
intervention in factor markets. These are discussed in turn.

A neutral structure of incentives between domestic and foreign
product markets can coexist with liberal trade regimes (low and
uniform protection) or with highly variable protection for import-
substituting activities. Export success may be based on immediate
entry by producers into world markets, or it may derive from long
periods of "learning" based on serving protected domestic markets.
It is misleading to confuse "liberal" with "neutral" regimes and to ignore
differences between competitiveness that is attained quickly and that
calling for long learning periods.

The East Asian NIEs display a wide range of export-oriented
strategies. Hong Kong is the closest to the "liberal" paradigm: free
trade policies from the inception of industrialization. Korea is at the
other extreme: a high degree of selective intervention (to pick and
promote "winners", especially in heavy and high-technology ac-
tivities) and high rates of protection sustained for long periods for
new activities offset by export incentives, combined with low pro-
tection for mature industries. Singapore had an initial period of
import substitution followed by liberal trade policies. Taiwan is closer
to Korea with selective and often high rates of protection, but it has
been less interventionist in promoting heavy industry.

Each of these economies is successful and competitive, yet the
resulting industrial structures are vastly different. Hong Kong remains
specialized in light consumer goods, with a high reliance on foreign
equipment, complex intermediates and basic technology. Its technol-
ogical capabilities are largely in efficient assembly or last-stage manu-
facturing activity and the ability to respond rapidly to changing
consumer tastes overseas. Korea, at the other extreme, has built up a
diversified industrial base, with a range of efficient heavy and
technology-intensive industries, a high degree of local integration and

* This form of export-orientation is analyzed in detail for the Korean case by I.E.
Weinstein, "Industrial Policy in an Export-Propelled Economy: Lessons from South
well-developed local design and innovation capabilities that call for intense R&D activity. Singapore has entered into much heavier industry than Hong Kong by intervening in the direction of investment flows rather than via protection, but its product range is narrow and its technology is almost entirely provided from abroad by transnationals that dominate its manufacturing. Taiwan has a diversified structure, but less scale- and capital-intensive than Korea; the former’s strategy has been more incremental and less aimed at large leaps into heavy industry than the latter. It is Korea that has come closest to emulating the Japanese strategy, and it is indisputable that it was only its massive interventions, within an export-oriented framework, that made this possible.11

While export-orientation is compatible with interventions in incentive structures, the form of intervention differs significantly from intervention as practised in inward-oriented economies. The key differences lie in selectivity and offsetting safeguards. The two larger East Asian NIEs did not give widespread, protracted, haphazard protection to all industrial activities started in their markets. They promoted a few new activities at a given time, letting mature activities operate effectively in a free trade regime; they geared protection to the “learning” period involved and forced firms to enter export markets as soon as possible to reap the competitive benefits of world exposure; and the overall incentive structure always favoured exports.12 By contrast, most inward-oriented economies promoted industries with high, haphazard and widespread protection, giving net disincentives to exporting and sustaining activities regardless of their efficiency. It was not intervention (and protection) per se that was wrong, but the particular interventions utilized: the export-oriented interveners were truly selective, while the inward-oriented interveners were largely unselective and generally failed to offset the effects of protection.


The second major qualification to the “liberal” view on export orientation concerns the role of government interventions in factor markets. It seems to be generally assumed that the capability to respond to correct price incentives is present or can be developed fairly quickly without need for intervention (i.e. that factor markets are efficient). This may be unwarranted in theory; it is certainly untenable in practice. Each of the NIE governments intervened in a sustained manner to develop the capabilities and institutions necessary for technological dynamism. Some of this intervention was non-selective (or functional); but some was highly selective, aimed at promoting the growth of particular activities, particular capabilities, even particular enterprises. “Picking winners” was perhaps as common in factor markets as in product markets.

This can be partly illustrated (Table 2) for the sample countries with reference to the major components of national technological dynamism identified earlier: human capital or skills, imports of technology and domestic technological effort (institution building cannot be measured so is ignored for the present). The rate of investment in plant and equipment in manufacturing in the 1970s and 1980s is also shown. While such investment is governed to a large extent by exogenous macroeconomic factors beyond the concerns of this paper, it forms one of the necessary conditions for industrial growth (the data shown are of particular interest because they are calculated from actual production and import data on capital goods, rather than from national income statistics).

During the period 1972-88 the Asian NIEs and new NIEs had among the highest increases of equipment investment in manufacturing. What the data do not show is the role of government intervention in channelling those investments. With the exception of Hong Kong, each of the established East Asian NIEs influenced resource allocation in industry in ways distinct from interventions in the trade regime considered above. Singapore directed FDI inflows into more high value-added, high-tech activities, and set up a substantial public sector. Taiwan also directly took the public sector into heavy industry where private investment was reluctant to enter, and provided various inducements (such as government-foreign-local joint ventures, technological assistance and science parks) to attract private industry into areas of future competitiveness. Korea intervened most heavily of all, through its import-substitution programmes (accelerated in the 1970s in the “Heavy and Chemical Industries” drive), its
## Table 2

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<tr>
<th>Developing countries by geographical region</th>
<th>Total capital stock 1950-1953</th>
<th>Technology borrowed 1950-1953 (in $000)</th>
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<th>Human resources, 1980, as shown: percentage of total population 1980</th>
<th>Research and development as percentage of GDP 2000</th>
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sources may be traceable to such factors as inappropriate incentive structures (excessive protection in some, like Argentina, or insufficient protection for infant industries in others, like Chile), inadequate technological effort or institutional weaknesses. This point is borne out more strikingly by the record of Eastern Europe, where there has long existed an ample stock (even if of variable quality) of human capital and technical skills. Yet highly distorted incentives and factor markets, combined with institutional weaknesses and isolation from world technologies, led to very poor industrial performance.

Secondly, there are differences between the East Asian NICs. The two larger NICs appear to have a broadly stronger skill base than the smaller ones. Hong Kong appears weak in high-level technical skills. Singapore in vocational training. This difference may reflect the drive of the two larger NICs into technologically demanding activities as well as the utilization of high levels of skill in their mature industries (though Singapore's specialized high-tech industries are also very skill intensive). Some other countries, like Brazil and India, have even more complex, heavy industrial structures but have developed lower skill bases: one result is the lower competitive ability of many of their industries. Thirdly, enrollment figures have to be corrected for variation in dropout rates, overseas education, quality of training and relevance of curriculum content, to make them fully comparable. This is not always possible, but it is likely that such corrections would increase the observed lead of East Asia. The data also exclude employee training undertaken by firms here. (with 5% of sales of all larger firms required to be invested in training since the 1960s) is likely to lead the other sample countries. The growth of human resources for industrialization has been an essential precondition for export success, and this growth cannot be traced to outward-oriented incentive structures. The successful countries were strong in human resources at the start of modern industrialization. The "education market" subsequently required heavy intervention to provide the level, quality and technical orientation of the resource base to keep up the industrial drive. This point is strengthened if in-firm worker training is taken into account: firms tend to underinvest in such training when there is a risk of leakage (workers moving to other firms) and government direction and support is needed to ensure adequate investments. Human resource interventions were partly functional, to create general skills, and partly selective, to create the particular skills needed by the activities being promoted by the government. Education markets do not function efficiently in developing countries, but practically all the writing on industrial and trade strategy has tended to ignore the critical role of such intervention in the context of industrial policy and experience. The contribution of the intervention varied, of course. Human resources may not have been the binding constraint in the industrialization of some (mainly Latin American) countries, where other factors created earlier bottlenecks. They did, however, constitute major impediments to industrial development in others (mainly in Sub-Saharan Africa).

Technological imports and effort are also essential ingredients of technological dynamism. To a large extent, they complement each other. Developing countries need to import a great deal of embodied and disembodied technology; they also need to do a lot themselves to absorb it and build upon it. Technology imports in the form of capital goods are the most accessible, but require the greatest local capabilities and efforts to operate efficiently. Most complex technology transfers generally need infusions of disembodied know-how, training, patents and the like; these are available via foreign direct investment (FDI), licensing or other forms of contractual arrangement. International technology markets can be fragmented and oligopolistic, and may call for official intervention to strengthen the


informational and negotiating position of developing country buyers. They are, however, fairly open to all developing countries, with two qualifications: first, the more advanced, export-oriented enterprises may find it difficult to buy state-of-the-art technology at arms length because of the competitive threat they pose (the leading Korean chaebol now have to develop many of their own new products because of the reluctance of technological leaders to license them).

Secondly, some new technologies are very expensive to create and are being more tightly held than were earlier technologies. There is also a growing propensity for leading innovators to form "strategic alliances" in developing new technologies. These tendencies raise the cost of entry to all newcomers, in developed or developing countries, and further raise the need for indigenous efforts as industrial structures grow more complex.

Different forms of technology imports have differing implications for technological development. FDI may be a very effective means of transferring rapidly the results of new innovations as they appear. It may not, however, be equally effective in transferring innovative capabilities: transnationals generally find it economical to centralize R&D in developed countries with ample skill base and established linkage with highly advanced science and technology institutions. Thus, the building up of local innovative capabilities may require the promotion of indigenous firms by selective restrictions on FDI inflows. Experience shows that countries with technological ambitions have indeed been selective in allowing FDI at critical junctures. Korea is again a case in point. Table 2 shows that it has the lowest reliance on FDI of all the NICs, and one of the lowest in the developing world, despite its advanced industrial structure. The resulting "gap" between imported technologies and the needs of its export-oriented industries has been made up with its own intense technological effort (see below), and by the promotion of chaebol, large and diversified enough to bear the cost and risk of entry into high-tech activities. This strategy is directly descended from the Japanese strategy some time earlier.

Heavy reliance on FDI does not stifle industrial growth; it may only reduce the indigenous technological content of industrialization. In this sense, Singapore displays the weakest indigenous entrepreneurial and technological base of the East Asian NICs; whether this accounts for its rapidly rising ICORs and flagging growth and export performance relative to the other three is difficult to say. On the other hand, simply restricting FDI without providing the incentives or skills to develop local technologies can be very counterproductive, leading to inefficiency and obsolescence. If this is combined with restrictions on other forms of technology inflows and high inward-orientation, the cost can be compounded -- as happened in India in the 1970s.15

The import of technology by successful industrializers like Korea has been subject to considerable interventions by the government. In turnkey projects, it insisted that local engineers participate in all stages of design and engineering. In licensing, local firms were provided information, guidance and assistance in bargaining.20 "Reverse engineering" was encouraged and intellectual property laws were liberally interpreted (as also in Taiwan). Interventions with technology transfer were non-existent in Hong Kong and Singapore (though the latter strongly guided the nature and sophistication of FDI inflows), in keeping with their strategies to build up indigenous production rather than innovation capabilities.

Technical assistance inflows were mainly used by countries with low industrial capabilities and limited recourse to other forms of technology transfer. The experience of technical assistance has not been a happy one, especially when (as in Sub-Saharan Africa) absorptive capacities are low, and it is difficult to monitor the content of technical assistance. In these circumstances, technical assistance can become a substitute for local capabilities rather than a complement. It can also lead to poor selection of projects that do little to develop industrial competitiveness.

Formal R&D efforts are shown in the last two columns of Table 2. Total R&D figures include agricultural, defense, construction and other forms of effort, but it is not possible to obtain manufacturing R&D data on a comparable basis for all sample countries. The nearest approximation is R&D in the "productive sector" (which includes trading); this is shown where available. By this latter measure, Korea

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15 S. Lall, Learning to Industrialize, op. cit.

leads the field by far (1.5% of GNP), testifying to the needs generated by past policies to diversify and deepen industry and enter world markets. The bulk of Korean R&D, currently the highest in the developing world, emanates from its chaebol, themselves the result of highly selective intervention. Taiwan comes next (0.7%) followed by Turkey and Singapore (0.5% each). Brazil's total R&D has dropped sharply since the early 1980s (from 0.7% to 0.4% of GNP), presumably because of debt-induced problems, but its share of GNP going to productive sector R&D (0.2%) remains constant at low levels. Argentina, Chile or Mexico, despite their skill endowments, also spend little on productive sector research (0.2% or below); India is very similar (0.15%). Hong Kong data are not available, but impressionistic evidence suggest that its formal R&D is very low.

What accounts for these disparities in technological effort? Export orientation is part of the explanation, but it is not enough, in that export-oriented economies differ sharply among themselves (Korea is also far ahead of such open OECD economies as Spain). Clearly, government strategy has a lot to do with it, at several levels: deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate attempts to enter technologically demanding industry, deliberate 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V. Conclusions: Implications of past experience

Technological dynamism cannot be explained by partial theories that stress selected aspects of the incentives-capabilities-institutions nexus. In particular, the liberal interpretation, relying heavily on "getting prices right", has ignored the role of capabilities and institutions and has underemphasized the positive role of interventions, especially selective interventions, in the recent performance of industrializing countries.

The most successful industrializers, the East Asian NIEs, have all intervened in support of industrialization. Hong Kong has intervened to provide a broad base of skills, excellent infrastructure and institutional support of its industries. This low level of (essentially functional) intervention has enabled it to build a light, specialized and efficient manufacturing base which, despite past dynamism, lacks technological depth and is, therefore, vulnerable to rising costs. Korea, in contrast, has intervened very heavily, by protection, subsidies and direct instruction, in incentives and factor markets and in technology transfer, and has succeeded in establishing probably the most competitive and advanced industrial structure among developing countries. The depth of this structure renders it far less vulnerable to rising labour costs. The structure, capabilities and ownership of its industries largely reflect the pattern of strategic interventions undertaken to "pick winners" and promote them by a comprehensive battery of measures.

While interventions are necessary for sustained industrial development, however, not all interventions are efficient or desirable. Development experience is replete with cases of uneconomic interventions. Excessive, haphazard, across-the-board protection has bred, not technological dynamism, but many "infant" industries that have never matured. The setting up of heavy industrial structures without providing the capabilities needed (i.e. an adequate skill or institutional base) has often led to inefficiency. Creating skills, on the other hand, without proper incentives has wasted human resources, while "getting prices right" without offering infant industry protection or institutional or skill back-up has led to industrial stagnation. Chile seems to be an example of poor industrial and manufac-

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21 Hong Kong has survived by rapidly shifting its manufacturing offshore, mainly to China, because it could not diversify into more complex activities at home. Its own manufactured exports are now growing much slower than its exports from other bases. A similar phenomenon is observable for low-tech small and medium enterprises in Taiwan. By contrast, the Korean chaebol are investing abroad mainly in sophisticated activities (and mainly in developed countries) to serve local markets, while upgrading into higher technology activities at home to cope with rising wages.
tured export performance despite many years of "right" prices, outward orientation (with very low uniform tariffs), and high levels of skill, because of its lack of selective promotion of activities, firms or supporting institutions, while African countries are examples of failure due mainly to lack of skills and institutions. The secret of success has been combining incentives with adequate capabilities and institutions, each supported by a proper mix of selective and functional interventions. The poor performers have often intervened in the wrong way, and many have intervened too much while some have intervened too little. This does not deny the need for interventions (of the right sort) in the future. What it does suggest is that the pattern of interventions be changed.

The proper mix of interventions varies over time and by national context. As markets and capabilities develop, the need for interventions declines and the mix changes. The availability of capabilities to design and implement interventions itself affects feasible policy options. These considerations lead to a very different set of recommendations, more differentiated and more directed to helping governments to intervene, than current orthodoxy. It is beyond the scope of this paper to consider the political economy issues involved, but the economic reasoning underlying current structural adjustments and other liberalisation measures needs serious reconsideration.

Sanjay Lall and Georg Kell

Contractive Adjustment in Mexico, 1982-1989 *

To cope with the debt crisis, the IMF and other international agencies have prescribed an economic policy for Latin America which has been partly or wholly implemented in most of these countries. Since its emphasis lies in the reduction of domestic demand – coupled with drastic changes in relative prices – analysts have labelled the strategy contractive adjustment. ¹

The purpose of this paper is twofold. Firstly, I would like to make an assessment of the macroeconomic effects of this strategy in Mexico’s recent evolution.² However, rather than a detailed account of that evolution, I will present an overall picture of its most relevant aspects. On the other hand, I would like to raise some theoretical challenges to several of the underlying assumptions that have sustained the Mexican government’s recent economic policies.

Thus the paper is organized as follows. Section I presents an overview of the strategy and of Mexico’s main economic policy measures. Section II deals with the evolution of effective demand. Section III appraises the effects of contractive adjustment on Mexico’s growth performance. Section IV concludes with a general discussion of the problems related to this strategy.

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² Although the label may be not very precise, for the sake of brevity it will be adopted in this paper.

³ In order to concentrate on the growth performance and due to space limitations, I will not deal with inflation here.