

Export Growth and Industrial Policy: Lessons from the East Asian Miracle experience

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Introduction

The lessons from the high growth or 'Miracle' experience of the newly industrialized economies (NIEs) have been discussed extensively. This paper focuses on a particular and controversial aspect of this story – the role of export growth and industrial policy – with the latter defined broadly to cover a range of interventions to change the structure of production and raise the growth of exports. It asks what are the lessons for today's policy-makers in the Asia region and beyond, in Latin America and elsewhere, from this experience. The international environment is now very different from the early 1960's, when the rapid growth of manufactured exports from the first tier NIEs started to arrive on world markets. Forces of globalization of both trade and capital flows are now much stronger, intra-regional trade is now far more significant and transnational firms have now established elaborate production networks, both globally and within the region. The rules and dispute procedures governing international trade have been strengthened by the emergence of the World Trade Organization (WTO). Also ideas relating to economic policy and the most effective means of stimulating economic development are now very different with a greater awareness of the potential costs of interventions to control or over-ride markets. Nonetheless the paper suggests there are some policy lessons from this look at recent economic history.

Industrial policy was for many years associated in policy discourse with failed interventionist import substitution strategies despite its apparent success in East Asia. Further despite the obvious point that in the real world 'markets fail' and enterprises impinge on each other, so that inevitably private and social returns deviate, public policy interventions to try to address these issues in the context of manufacturing have been treated with considerable suspicion. Industrial policy has seen a minor revival in recent times, however, stimulated in part by new theorizing (such as Hausman and Rodrik, 2003) and in part by ongoing debates on 'national competitiveness' strategies which have offered a new entrée in the context of globalization.

The paper commences with a survey of the evidence on export growth and industrial policy in the NIEs, before turning to lessons for contemporary policy.

Export Growth and Movements up the Ladder of Comparative Advantage

A vast literature has assessed causes of the East Asian Miracle (see, for example, World Bank 1993, Rodrik 1994, Leipziger 1997, Stiglitz and Yusuf 2001, Quibria 2002) with the general conclusion that simple single factor explanations for a diverse range of experience are not helpful. However, equally it is an obvious and outstanding fact that the Miracle economies experienced extremely rapid manufactured export growth, which can be seen as a critical variable in 'economic take-off' circa 1960 for the initial 'Gang of Four' NIEs (the Republic of Korea, Taipei, China, Hong Kong, China, and Singapore). Subsequent to this the second tier NIEs (Malaysia, Thailand and Indonesia) also experienced rapid growth in the 1980's to be followed in the 1990's by the People's Republic of China (PRC), and to a lesser extent Viet Nam.¹ For example, the share of the Gang of Four in world exports of

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¹ Indonesia was included in the original list of second tier NIEs in World Bank (1993) although this was controversial at the time and its subsequent weak recovery from the 1997 Financial Crisis confirms this skepticism. Here we continue to discuss Indonesia as one of the second tier NIEs, but also highlight its poorer

manufactures rose from 1.5 % in 1965, to 5.3 % in 1980 and to 7.9% in 1990; the combined share of Malaysia, Thailand and Indonesia rose from 0.4% in 1980 to 1.5% a decade later (World Bank 1993, table 1.5).

As implied by the well-known ‘flying geese pattern’ there is a broad similarity in the types of export industries in which countries in the region specialized, at comparable stages in their development. All countries started with a focus on technologically simple labor-intensive goods – clothing, sports goods, toys, processed foods and so forth. Although the speed of graduation from these varied, moves into a range of more capital-intensive, technologically sophisticated items always followed with the four first tier NIEs vacating export markets, which were then filled by the second tier group. This common pattern of initial specialization on labor-intensive or resource-intensive activities followed by a move up the ladder of comparative advantage, as relative resource endowments change, is precisely the sequence envisaged in the ‘stages of comparative advantage’ (Balassa, 1977).²

As discussed below the institutional mechanisms to support this export growth have varied. Table 1 summarizes the shifts in trade policy in the NIEs (excluding Hong Kong, China. An examination of export data by commodity category for these economies from the mid 1960’s to mid 1990’s reveals some clear trends (see UNCTAD 1996 table 33).

Table 1: NIEs: Timing of shifts in trade policy

Indonesia	The Republic of Korea	Malaysia	Taipei,China	Thailand	Singapore
1950-66 Economic nationalism; nationalization of Dutch enterprises	1961-73 Initial export take-off	1950-70 Natural resource based exports	1953-57 Import substitution	1955-70 Natural resource based exports	1959-64 Labor-intensive import substitution
1967-73 Some trade and FDI liberalization	1973-79 Heavy and Chemical Industry Drive: selective promotion	1971-85 Import substitution and export promotion through EPZs	1958-72 Export promotion	1971-80 Import substitution	1967-73 Labor-intensive export promotion
1974-81	1980-90	1986-	1973- 76	1980-	1973-84

performance than the rest of the group. The Philippines is also a weak performer in the region and was not one of the original list of second tier NIEs. It is sometimes described as ‘the most Latin’ of the regional economies. We do not address recent experience in the People’s Republic of China (PRC) and Viet Nam. In PRC foreign investment has been a driving force for economic upgrading but there has also been a conscious policy to build up large national champion domestic firms (Nolan 2001). The exact role of industrial policy in PRC in the post ‘opening-up’ period remains poorly understood.

² The move of the ladder of comparative advantage can be illustrated simply with data from the Republic of Korea. In 1961 the single largest export item was iron ore (13% of total exports); in 1980 it was textiles and garments (29% of the total) and in 1989 it was electronics (also 29%) (Kim and Leipziger 1997 table 3.1).

Oil boom	Gradual trade liberalization and move to less selectivity	onwards Gradual trade liberalization and export promotion	Industrial consolidation	onwards Trade liberalization and export promotion	Upgrading export structure
1986- onwards Gradual trade liberalization and export promotion	1990- onwards Trade liberalization and high-tech exports		1981 – onwards High tech industrialization		1985- onwards Export promotion of high tech and services

Source: adapted from World Bank (1993) table 3.5 and appendix 3.1

- for the first tier NIEs from the mid –1960’s there is a clear the decline in the relative importance of primary product exports (principally food), which were important initially in all cases, except Hong Kong, China.

- although initially important there was subsequently a large relative decline in textile, clothing and footwear exports from these economies.

-a key trend in the first tier NIEs was the emergence during the 1980’s of substantial exports of more capital and technology-intensive goods, such as electrical machinery, chemicals and pharmaceuticals, computers and communications equipment; some of these goods embodied advanced, international best-practice technology.

- a broadly similar pattern is observed for the second tier NIEs with some differences of timing and content; textile, clothing and footwear exports became important as a proportion of exports approximately 20 years later than in the case of the first tier group, in the late 1980’s rather than late 1960’s (although they have not become of major importance in Malaysia).

- for the second tier NIEs (Malaysia and Thailand, but to a much lesser extent Indonesia) in the 1990’s there was a rapid rise in the export share of some of the more skill-intensive and technology intensive products, like computers and communication equipment; by the end of the 1990’s high technology products were over 50% of exports from Malaysia and over one-third of exports from Thailand (Lall, 2000).

In the second tier economies moves into the high technology sectors during the 1990’s were driven by FDI activities, as international firms shifted parts of their value chain to low wage locations. Outputs of these sectors have been amongst some of the most dynamic products in world trade in recent decades. By the late 1990’s these economies had seen a major diversification of their exports and a move into increasingly sophisticated products lines (even if this was due their incorporation into global value chains at the low skill or assembly end of the chain). Lall et al (2005) and Lall and Albaladejo (2004) give more recent comparisons (for 1990 and 2000) of export structure in these East Asian economies and Latin America in the context of the competitive threat to both regions posed by exports from the PRC.

Dynamic Role of Exports

In most interpretations of the Miracle story this rapid growth of exports is seen as providing the key demand stimulus to set in train a cumulative process of high investment, high profits, high savings and high growth. What precisely constitutes export-led growth is ambiguous. Intuitively it can be thought of as a situation in which exports constitute a substantial proportion of incremental demand. Rodrik (1999) has questioned whether manufactured exports were a large enough share of total economic activity in the Republic of Korea and Taipei, China for them to have played this type of role at the start of the high growth period in the early 1960's.³ In his view the key growth spurt was due to a rise in investment, although even in this interpretation rising export demand could have provided part of the incentive for higher investment.⁴ In the smaller, more open, economies of Hong Kong, China and Singapore such qualifications are unnecessary given the large relative size of exports in GDP in the early 1960's. Also in the early 1980's at the start of their high growth periods in Indonesia, Thailand and Malaysia export to GDP ratios were much higher than in the Republic of Korea and Taipei, China in the early 1960's, so that the macro impact of export expansion there would have been comparatively greater. Not all of these high export shares were due to manufactures. In Indonesia for example the rising export to GDP ratio in the early 1980s was due to high oil prices and manufactured exports only became significant in the latter part of the decade after the trade reforms of 1986 (see table 1).

Evidence on the role of exports in manufacturing expansion can be obtained from a simple demand decomposition exercise that breaks down output expansion into domestic demand growth (holding import share constant), import substitution and export expansion. For 1985-89 in the first tier NIEs export expansion accounted for 75% of manufacturing growth for simple low technology goods and nearly 45% for medium and high technology goods. For the second tier NIEs (here including the Philippines) the comparable shares were 28% and 81%. In the 1990's export expansion became more significant in the second tier group compared with the first tier, particularly in the second half of the decade where the impact of the Financial Crisis meant that domestic demand was relatively sluggish. In contrast, as might be expected, in Latin America domestic demand was relatively more important than in the NIEs, particularly in the 1980's (see Weiss and Jalilian 2004 table 5).

The precise mechanism through which countries commencing on a path of rapid growth can benefit from 'openness' to trade and rising exports has been the subject of much discussion. Several possible mechanisms have been identified;

- (1) First, there is the route of demand expansion noted above. The importance of this is that if economies can break into export markets they will be able to overcome the constraints on sales imposed by the absolute size and dynamism of the domestic market. In terms of manufactures it is often pointed out that there is an 'easy' stage of import substitution when domestic production can capture the market served initially by imports. Beyond this the expansion of sales will be determined by the growth of that domestic market, which may be relatively low.⁵ Insofar as increasing returns to scale in production are important this will reinforce the advantage of operating at

³ "Exports were less than 5% of GDP in the Republic of Korea around 1960 and barely over 10% in Taipei, China. In a pure accounting sense exports could not have been responsible for more than a small fraction of the initial growth spurt in both countries, in view of the small base that they constituted" (Rodrik 1999:51).

⁴ For example, Quibria (2002:27) cites a study on the Republic of Korea, which claims that in the 1960's domestic investment, on which Rodrik places a key emphasis in his explanation of Korean growth, only grew strongly after the shift to a greater export orientation.

⁵ Bhagwati has contrasted East Asian experience with that of India, where the growth of the domestic market was constrained by the expansion of agriculture, which it is suggested cannot grow beyond about 4% a year for any sustained period (cited in Quibria 2002:28).

higher output levels due to exporting and subsequent cost reductions due to specialization can lead to further cumulative gains in export market share.

- (2) Second, exporting, by exposing firms to foreign competition, technology and marketing, can lead to productivity gains that would not be obtainable from sales in the domestic market. Contacts with foreign buyers, for example in the clothing sector and more recently in branches of electronics, have meant that East Asian firms received access to foreign designs or technologies that allowed them to upgrade their production to international standards, thus enhancing productivity.⁶ Further, strong competitive pressure was exerted on domestic suppliers producing under contract to buyers abroad since to maintain their contracts they had to constantly monitor costs as foreign buyers were 'constantly seeking newer, lower cost sources' (Pack 2001:127).
- (3) Third, exports allow access to imports that can be purchased with the foreign exchange they generate. For individual producers gains from imports can be both static, if they cost less than competing domestic production, and dynamic where capital and intermediate imports embody superior technology that allows productivity gains. Consumers will also gain from access to newer or cheaper products.⁷
- (4) Fourth, insofar as there is validity in the case that the increase in manufacturing output is more valuable at the margin than the same increase of agriculture or services, due to externalities, dynamic increasing returns to scale, or income elasticities of demand, the shift in the composition of exports in the NIEs (particularly Malaysia, Thailand and Indonesia where primary exports were important initially) would in itself have had positive short-term growth effects.

Empirical studies to link export growth with growth of GDP have been plagued by problems of causality and endogeneity. Work on East Asia surveyed by Quibria (2002:26-32) tends to suggest an important independent causal role for high export growth, thus substantiating the a-priori arguments noted above. However, whilst in general high GDP growth tends to be associated with fast growth of foreign trade and exports, not all economies where exports are a rising share in total activity grow rapidly. For example, there were a number of least developed countries that experienced rising export to GDP ratios in the 1990's, which grew only slowly in per capita GDP terms (UNCTAD 2002:119). Hence what matters are the accompanying domestic policy environment and the composition of exports, with in general manufacturing exports offering more dynamic potential than many primary goods.

The question of how rapid export growth was generated initially in the NIEs raises the question of whether there were in fact favorable preconditions in these economies. Two aspects in particular have received considerable attention – the education base and the domestic savings rate – and we discuss these briefly before turning to the role of public policy.

Preconditions for Rapid Growth?

It is a widely held view that having a relatively well trained and educated labor force was a critical element in the rapid export growth of these economies and that in general education

⁶ This argument on the links between exports and productivity growth cannot be pushed too far however, since there is a substantial body of firm-level evidence which shows that although exporting firms tend to have higher productivity levels than domestic oriented firms, in many cases causation may run from high productivity to exporting rather than in the opposite direction.

⁷ The role of imports, particularly of capital equipment, is the mechanism stressed by Rodrik (1999:27). Lawrence and Weinstein (2001) find support for this view in their analysis of Japan, although they stress the competitive impact of imports on productivity rather than the role of technology embodied in imported capital goods. Also from a theoretical point of view if openness to trade allows more rapid technological catch-up then in endogenous growth models openness can be shown to accelerate growth (Edwards 1992).

plays critical role in growth.⁸ Education can provide a skilled and flexible work force and high growth raises the private returns to investments in education, encouraging private initiatives. The initial expansion of simple labor intensive activities may have required more labor market flexibility and discipline than high education attainment, but subsequent moves up the ladder of comparative advantage clearly needed a strong education base. However whilst this is intuitively plausible, it is clearly not a simple case of high education attainments being a catalyst for strong export growth, since the Philippines, whose achievements in the education sphere are widely recognized has had the most disappointing growth performance of the region and has only experienced rapid export growth relatively recently. This implies that on its own in the absence of more direct measures to support export growth high education investment will be unlikely to be very effective. Hence education attainment can be seen as a critical facilitating mechanism where other appropriate stimuli are in operation.

One of the major initial advantages of the NIEs was their comparatively high education standards. Rodrik (1994) provides convincing evidence that relative to their income levels, both the first and second tier NIEs had high educational attainments in 1960. In all but the case of Hong Kong, China, primary enrollment was well above that predicted for the countries' income levels and for Hong Kong, China enrollment was already high. A similar pattern applied for secondary enrollment, with the exception that it was slightly below the predicted level for Indonesia, but well above for the Republic of Korea and Singapore. Even in the case of Indonesia the low literacy rate was higher than predicted for the country's low-income level, although substantial progress in primary education did not come until the 1970's with a significant increase in government spending on the sector.

Government policy in the NIEs built on this initial advantage. Aggregate government expenditure on education in the NIEs relative to GDP did not differ significantly from the emerging economy average (Thomas and Wang 1997). However education expenditure per pupil rose in line with rapid GDP growth and due to the impact of a slowing of the population growth in East Asia as compared with other regions the 1980's saw a much lower increase in the number of children entering school in these economies, allowing rising expenditures per child.⁹

The role of high domestic savings, and subsequent high investment rates, in the high growth economies has also often been commented on. However, cultural explanations that focus on a natural sense of thrift in East Asia have been found not to match the facts, since rather than being a precondition for high growth, high domestic savings is more readily explained as an outcome of the high growth process. Low national savings rates at low income levels is a well established pattern empirically. From a theoretical point of view recent work has stressed that savings rates may be positively related to income growth as opposed to income level, and that in some circumstances reductions in risk may have a larger impact than on savings decisions than changes in real returns (Hoff and Stiglitz 2001). The link between savings and growth with causation running from the latter to the former has been established in recent empirical work, so that there is strong reason to believe that high savings are principally an outcome of the growth process rather an independent causal factor.¹⁰

⁸ Use of an education variable in cross-country growth analyses is now standard. For example, Barro (1999:19-21) reports a positive and significant coefficient for the variable male secondary schooling, but not for male primary schooling nor for any female schooling variable. Also cross-country analyses of the impact of FDI on growth have found it only to be significant in a high education environment (Borenzstein et al 1998).

⁹ The growth impact of the implied increase in human capital over this period (labor inputs adjusted for the change in quality of the workforce) has been approximated in growth accounting studies. One of the most authoritative of these by Bosworth and Collins (2000) shows that approximately 15% of the growth of output per worker in East Asia (1960-96) is accounted for by human capital inputs, with the bulk around 60% due to physical capital accumulation and the residual attributed to TFP growth.

¹⁰ World Bank (1993: 204) carried out formal tests for the direction of causation between savings and growth in the Miracle economies and concluded that income growth has been a strong predictor of savings in Indonesia, the

In the early stages of the high growth period domestic savings rates averaged below 10% in the Republic of Korea and Singapore. In 1960 they were 11% in Taipei, China (Dahlman and Sananikone 1997 table A.2.4). In terms of saving at the take-off period, the outlier of the first tier group is Hong Kong, China, where a well developed banking sector with a stable and convertible currency, at the time backed by sterling, may be the key explanation for the much higher savings rate. In the second tier NIEs savings rates were much higher than in the first tier at the onset of their export booms, but they nonetheless rose over the boom periods. The much lower savings rate in the slower growing Philippines of around 20% in the 1980's compared with 33% in Malaysia and Indonesia is a clear contrast (Leipziger and Thomas, 1997: Appendix).¹¹

High domestic savings allowed the financing of high rates of domestic investment and recent interpretations of the Miracle experience have placed great emphasis on a 'high investment-high export-high savings nexus' that drove the growth process (Rodrik 1999, Akyuz et al 1999). In this view all three elements interact to generate high growth. Domestic investment and exports thus combine to provide the demand stimulus, with domestic savings out of profits providing the bulk of the resources for investment. The key role of investment as a source of growth was also highlighted in studies that demonstrated the relatively modest role of efficiency gains as compared with factor accumulation (Krugman 1994).¹² The export market provides a key incentive for higher investment, but the link between higher exports and higher investment is not guaranteed, since there are examples in recent experience of export booms failing to stimulate significantly higher domestic investment.¹³ From this perspective the key therefore in explaining the initial high growth phase in these economies is in establishing why high rates of domestic investment were sustained as part of the export expansion.

However, the high investment and savings levels do not appear to capture the full story. The growth of these economies was still higher than predicted from regression analysis that allows for their actual investment rates and other characteristics. For example, Nelson and Pack (1999) show this for the Gang of Four over the period 1960-89 with the deviation of actual from predicted GDP per capita growth as much as 4.7% annually for Taipei, China and 3.2% for the Republic of Korea. This is put down to the process of technological catch-up or

Republic of Korea, Thailand and Taipei, China. In Hong Kong, China and Malaysia the results are more ambiguous and causation could run either way. In Singapore income changes appear unrelated to the rapid rise in savings, which is explained principally by demographic factors. This latter effect arises when with falling birth rates the share of the working age population in total population rises. This factor was also at work in other countries. Bloom and Williamson (1999) have suggested that through its impact on savings and labor supplies the demographic transition could have added up to 2 percentage points to the annual growth rate in the NIEs from the early 1970's to early 1990's.

¹¹ Nonetheless despite the bulk of causation running from growth to savings, Government policy may also have had some impact. For example a policy of 'financial restraint' by restricting competition between banks and lowering nominal interest rates paid to depositors, it has been argued, kept banking profitability up and rates charged to borrowers relatively low, thus raising corporate profits. As the marginal propensity to save for corporations was higher than for households and as the savings of the latter were interest inelastic, this raised the overall rate of savings, as well as contributing to higher growth (Stiglitz 2001:514-5).

¹² Despite the uncertainty attached to various estimates of total factor productivity growth (TFP) there does appear to be a consensus emerging in the literature that whilst TFP rates may not have been as large as in the now developed economies at their peak growth periods in the first tier NIEs, they were none the less far higher than those recorded in economies in South Asia, Latin America and Africa (Crafts 1998). This work is controversial, however. For a discussion of the limitations of empirical estimates of TFP and the concept of an aggregate economy-wide production function, see Felipe (1999).

¹³ Rodrik (1999:51) cites the examples of Turkey and Chile in the 1980's, but the illustrations can be extended to a number of countries undergoing structural adjustment reforms in the 1980's and 1990's where the export to GDP ratio rose, but private investment contracted or grew only sluggishly. In their analysis of the effects of structural adjustment programs Corbo and Rojas (1992) report positive effects for the export to GDP ratio, but negative ones for the investment to GDP ratio.

'assimilation' as firms in these economies mastered, adapted and in some case improved upon foreign technologies, new to them, but not to the world. Nelson and Pack (1999) argue that conventional TFP estimates will not pick up accurately the impact of this assimilation process, so that this type of evidence understates the dynamism and efficiency of these economies. Closure of the technology gap with the developed economies was clearly a major part of the explanation for the high growth years in these economies, although as yet Malaysia, Thailand and Indonesia have much further to go in closing this gap than have the first tier NIEs; see Thee (2005) for a discussion of the Indonesian case.

Successful diffusion and assimilation of foreign technology requires not just a transfer of knowledge in a passive sense, but also the active engagement of local firms in the mastery and adaptation of foreign technology (Matthews and Cho 2000:80). In the NIEs a variety of means were used to access foreign technology including technology licensing, various contracting arrangements with foreign firms such as sub-contracting and own equipment manufacture, and joint ventures with foreign investors. As we discuss below, in the Republic of Korea, Taipei, China and Singapore, rather more than in the second tier NIEs, the mastery of foreign technology and the development of local variants was helped by active state support.

Moving Beyond Initial Take-off –the Role of Government

Precisely how these economies moved beyond the stage of an initial spurt of exports, investment and GDP growth to a period of sustained expansion is one of the key policy questions of the East Asian Miracle experience. The basic facts as set out above indicate clearly that they underwent a major process of export upgrading in a move up the ladder of comparative advantage away from labor and resource-intensive goods with mature technologies into more skill and knowledge intensive products, with more dynamic demand prospects. The initial Gang of Four economies were helped by the rapid expansion of world trade in the 1960's, but nonetheless the increase in their share in this trade was also impressive. Explaining the success of these economies is not simple since no single common pattern (or East Asian model) exists, however, some generalizations are possible.

A generally supportive environment for private investment, due to factors like support for property rights, macro stability, and general 'openness to trade', foreign investment and foreign technology has been stressed (Quibria 2002). However, the role of government in providing support for industrialization in the formative stages of export take-off must be recognized, although policy intervention took different forms in different economies. Apart from macro economic management that avoided serious imbalances, a critical factor was intervention to create rents (that is super-normal profits) for exporters in the manufacturing sector, which provided the incentive for reinvestment and further export expansion. The creation of rents through a variety of mechanisms is 'industrial policy' and experience in East Asia is always referred to when interventionist solutions are discussed (UNIDO 2002). The precise range of interventions used to generate rents has varied considerably, as have the main types of recipients. Of the countries concerned aspects of industrial policy were found in all cases except Hong Kong, China, with the most extensive set of interventions in the Republic of Korea and Taipei, China. The result in all cases was that profitability in manufacturing was raised relative to services and in most cases also relative to agriculture. This is far from unusual, since it is the standard outcome under import substitution regimes. What differed in the region was the strong focus on exports with the beneficial results noted above.

In part drawing on the experience of the NIEs, there is now general agreement on the standard package recommended to countries wishing to raise their export growth. This is based on a combination of

- adequate price incentives, defined as a competitive real exchange rate and measures to ensure that levels of anti-export bias, arising from import protection, are kept low;
- access to imported inputs required for export production at world prices, either through measures such as the removal of import tariffs, the use of a drawback system or the establishment of duty-free export processing zones (duty-free access to imports of capital goods are seen as particularly important in keeping down the cost of investment and allowing access to foreign technology);
- a sound base of physical infrastructure (ports, roads, power supplies), and social infrastructure (a well educated labor force)
- adequate finance for export trade credits and to support export production.

Policy advice based on this package is now common and these measures are widely seen as broadly reflecting the situation in the NIEs during their export booms. However, this set of measures does not reveal the full story and with some national variations (and excluding Hong Kong, China) governments of the NIEs used a range of additional measures to raise the profitability of exporting and to encourage industrialization. These included

- selective import tariff protection for home market sales, the profits from which could be used to cross-subsidize exports (the Republic of Korea, Taipei,China);
- access to credits for exporters either for investment or export trade financing at subsidized interest rates (all NIEs, except Indonesia);
- tax concessions to investors in the form of tax holidays or accelerated depreciation allowances (all NIEs, except Indonesia);
- where direct control systems were used, preferential allocation of licenses to exporters, for example for technology imports or investment (the Republic of Korea, Taipei,China);
- directed finance to strengthen the position of selected and favored enterprises (all NIEs at some stage);
- provision of subsidized infrastructure and factory space, for example as part of export processing zones (Malaysia, Thailand, Taipei,China);
- provision of R and D facilities in government institutes, as well as tax credits for private R and D (the Republic of Korea, Taipei,China, Singapore);
- repression of real wages through restrictions on labor bargaining and union activity (the Republic of Korea, Taipei,China, Malaysia, Indonesia) or subsidization of wages through public housing programs (Singapore);
- strong encouragement to FDI via tax and other incentives (principally Singapore, the Philippines, Malaysia, Thailand), although the role of FDI was less much less significant in the Republic of Korea and Taipei,China).¹⁴

Sometimes these measures were 'functional', in the sense of being available to all firms or to all firms in a particular line of activity. In other cases they were explicitly selective with some firms out of a sector selected for special support. In some instances it is difficult to argue that such measures were part of a coherent overall strategy, as they were added incrementally with incentive effects that were not always foreseen. Chang (2002) reminds us that a range of similar measures were common in today's rich countries at earlier stages of their development as they supported their own nascent industries in a 'catch-up' strategy.

In other emerging economies experience with these types of measures has been disappointing with rent-seeking and high cost, uncompetitive producers often the outcome (Weiss 2002). Further as we discuss below within the group of first and second tier NIEs results from some of these policies appear to have been far much more favorable in the

¹⁴ Hill and Athukorola (1998) cite estimates of the share of TNCs in manufactured exports for the late 1980's and early 1990's of 92% for Singapore (1991), 76% for Malaysia (1991), 58% for the Philippines (1983), as compared with 26% for the Republic of Korea (1986), 33% for Thailand (1988) and 18% for Taipei,China (1989).

Republic of Korea and Taipei, China than in the second-tier followers. Explanations for success single out two important aspects of the implementation of policy (with the Republic of Korea normally taken as the exemplar around which an abstract model of East Asian industrial policy is based). One is the time-bound nature of support, which was deliberately put forward as transitory to give firms an incentive to develop competitiveness over time. This is perhaps clearest in the case of special import tariff protection on infant industry grounds. This is in direct contrast with the blanket semi-permanent protection perceived to be on offer in import substitution programs applied elsewhere (Lall 1994). The other explanation relates to the idea that rents were not given without constraints, but had to be competed for through a series of 'contests' which mimicked a form of competition (World Bank 1993). The obvious example here is the export targeting system of the Republic of Korea where rents through access to scarce licenses or concessional credit were given in return for the achievement of specific export sales figures. Contests, under the label of 'performance requirements' have been widely used in the region and elsewhere and what is singular about the Korean case (and also that of Taipei, China) is its apparent success, although this also raises questions about governance in these economies. The standard explanation for the success of bureaucratic intervention in these economies due to the calibre of the public bureaucracy and more generally the relative autonomy of the state from the influence of class and sectional interests still leaves the question unanswered as to why these conditions were present in the Republic of Korea and not elsewhere.

Finally one can add that in the more successful cases (the Republic of Korea, Taipei, China and Singapore) governments seem to have operated industrial policy interventions more coherently in relation to the clear objectives of export growth and structural transformation. Elsewhere (Indonesia, Malaysia, Thailand) interventions were less thought through and less clearly linked with efficiency criteria, arguably reflecting a multiplicity of objectives, often related to transferring rents to particular groups either on an ethnic, family or interest group basis.

Economic analyses of this experience with export promotion have focused attention on the relative incentive structure generated by these measures. In terms of the balance of incentives between tradables and non-tradables, in several countries reference to a 'competitive exchange rate' can be interpreted as a deliberate policy of under-valuation (or 'exchange rate protection') to encourage non-traditional, that is manufactured, exports. This strategy was identified in Taipei, China and the Republic of Korea in the 1980's, when both ran large current account surpluses, and in Indonesia in the late 1970's and early 1980's (World Bank 1993:125-126). Elsewhere whilst over-valued exchange rates were generally avoided and devaluations were used frequently, explicit attempts to manage the exchange rate to encourage manufactured exports through under-valuation were not followed. The degree of real exchange rate variability during the periods of high export growth appears to have varied significantly between countries being low in the Republic of Korea, Thailand and Taipei, China and Malaysia, but relatively high in Indonesia and Hong Kong, China.¹⁵ In general, however, the main point is that significant real exchange rate over-valuation was avoided for most of the high growth period.¹⁶

Considerable emphasis has been placed in the literature on the avoidance in these economies of the problem of anti-export bias, which arises whenever the relative profitability of home market as opposed to export sales is raised as a result of policy intervention. In the presence of protection against imports such a bias will be inevitable, unless export subsidies

¹⁵ These figures are based on the measure of real exchange rate divergence of Dollar (1992) rather than on conventional real effective exchange rates and cover the period 1986-95; see Rodrik (1994) table 5.

¹⁶ It is only in the mid-1990's that evidence of significant real over-valuation (principally in the case of Thailand) began to emerge.

are used.¹⁷ In general, such subsidies were used widely in these economies, since the international trade system at that time allowed a number of export promotion measures that as we discuss below would be judged to be trade distorting for all but least developed countries under contemporary WTO rules.

Detailed empirical work revealed that in the Republic of Korea, Taipei, China and Singapore in the late 1960's on average within manufacturing, such a bias was absent due to a variety of export support measures; in fact in the first two of these economies there was a slight bias in favor of exports. Given the virtual absence of import protection in Hong Kong, China anti-export bias was never an issue there. It is this evidence that forms the basis for the frequently heard argument that neutrality of incentives was critical to export success in these economies and for the comparison that is often made with other regions such as Latin America and South Asia, where anti-export bias, by this definition, was widely prevalent. This view needs to be qualified however.

The ratios cited (of effective protection for importables to effective subsidy for exportables) are averages, so that given the selective nature of policies in the Republic of Korea and Taipei, China within manufacturing as a whole it is likely that there were particular branches where relatively high domestic protection was not offset fully by subsidies to exporters. For example, there are estimates for the late 1960's which indicate that whilst protection in Taipei, China for manufacturing as whole was low it was relatively high for durable consumer goods and transport equipment, where there was an anti-export bias (Weiss 1990, table 5.3). Hence even in the first tier NIEs in the 1960's and 1970's there was still a dual industrial structure with export oriented and import-competing branches. Nonetheless despite an anti-export bias in some of these latter branches protected import-competing firms were 'encouraged', through government pressure, to break into export markets. Financially this was feasible due to the cross-subsidization of exports from the rents generated in the domestic market.¹⁸

In the second tier NIEs the dualistic manufacturing structure was even more dominant with one segment serving the protected domestic market and the other driven by FDI, and often based in processing zones, serving the international market. In this fragmented structure the issue of anti-export bias was less significant, since switching of sales between the two segments was rare.¹⁹ Hence the type of cross-subsidization with sales in the protected domestic market partially subsidizing exports, found in the Republic of Korea and Taipei, China, did not occur to any major extent in these economies.

The important general point as far as incentives are concerned is that the profitability of manufacturing was raised relative to that of other sectors with different instruments important in different economies and at different times. Hence whether the mechanism was exchange rate under-valuation, tariff protection, subsidized credit, or access to the rents associated

¹⁷ A more formal definition of anti-export bias is where the effective rate of protection for importables exceeds the effective rate of subsidy for exportables. This is definition put forward by Bhagwati (1988) and is generally what is meant in discussions of neutrality of trade incentives. Balassa (1982) table 2.4 (cited in Weiss 1990) reported the original estimates for these economies that compared effective rates of import protection and export subsidy.

¹⁸ Westphal (1981) has suggested that the Republic of Korea practice of encouraging protected industries to export at an early stage and to cross-subsidize initially uncompetitive exports from sales made at higher prices in the protected domestic market turned the conventional infant industry sequence on its head. The early competitive pressure from entering export markets is seen as a critical distinguishing feature of the Korean experience as compared with conventional import substitution; see also Westphal (1998).

¹⁹ This is the interpretation of export promotion policies in Malaysia in Jomo (1997:109). Evidence on the continued existence of anti-export bias in Malaysia, Indonesia and Thailand is given in World Bank (1993) figure 3.4, where effective rates of protection for import substitution activities are shown to be higher than those for 'export push' activities. However from the figure the divergence appears only modest. For Indonesia much higher estimates of anti-export bias are implied in Bhattacharya and Pangestu (1997), table 7.11 .

with licensing or other controls, the consequence was higher profitability for manufacturing. This broad incentive effect combined with a general stimulus to exports, whether through financial incentives or direct 'encouragement,' yielded rapid growth.²⁰

Country Experiences

In considering experiences within the NIEs it is important to note country differences, particularly since not only did the instruments used vary to some degree between countries, but so did the beneficiaries of the rents they created. In the Republic of Korea the beneficiaries were the large conglomerates the chaebol, in Taipei, China small and medium national firms were the main recipients, and in Malaysia Malay-owned firms and to some extent TNCs were the main beneficiaries. In Indonesia, where cronyism was particularly rife, political and family connections determined access to rents. In Singapore foreign firms were the principal beneficiaries. Given this diversity it is not surprising that the use to which the rents themselves were put varied, as did their effectiveness in generating further exports and investment.

We commence a brief survey of experiences with a focus on the Republic of Korea and Taipei, China and Singapore. In these countries, although industrial policy went through various phases and was wound down in the 1990's, there is clear evidence of not just a focus on exporting, but a systematic attempt to alter the pattern of specialization of the economy and to move up the ladder of comparative advantage. Some similarities are found in the other NIEs (apart from Hong Kong, China), but there policy intervention was both less systematic and less extensive.

The Republic of Korea

In relation to the Republic of Korea it is conventional to discuss industrial policy in terms of distinct phases (see table 1) (Kim and Leipziger 1997). Initial efforts at industrialization from the early 1960's focused on building up and expanding manufacturing exports, principally in labor-intensive technologically simple goods, such as processed foods, clothing, footwear, sports goods, and toys. During this period there was protection of the domestic market and a quantitative control system for imports and foreign exchange allocation. Government direction of the banking sector also ensured that credit went to priority areas, of which exports became the most important. Export promotion measures included subsidized credit for working and investment capital, preferential access to licences for imports and foreign exchange, direct cash payments, and duty-free access to imported inputs used in exports (this latter facility was also extended to indirect exporters – that is local suppliers of inputs to exporters). From the mid-1960's onwards firms were set specific export targets and receipt of long-term credit was linked directly with past achievements in meeting these. This array of incentives was available for firms whose domestic sales were protected by import tariffs and as discussed above, this often offset the impact of import protection to avoid or reduce anti-export bias.²¹ Even where more capital-intensive, import-competing industries had strong positive protection in the domestic market, there was government pressure for these import-

²⁰ Weiss (1990) tables 5.4 and 5.5 reports effective protection estimates for manufacturing and agriculture for the 1960's and 1970's. In all cases except the Republic of Korea protection was higher for manufacturing. However these figures, which are from different original sources will normally be based on tariff rates and may not incorporate the full incentives available (for example the impact on value-added of access to licenses). This omission is more likely to be greater source of bias for manufacturing, hence the Republic of Korea data may not reflect the true picture at this period.

²¹ Although the results of Balassa (1982) are always cited to support the absence of anti-export bias, other estimates give a different picture. Smith (2000) table 3.4 reports results, which show anti-export bias in the Republic of Korea in 1975, 1980, 1985 and as late as 1990.

competing firms to break into export markets. At this stage it was exports in general rather than particular firms or sectors that were being targeted, so that interventions were largely functional rather than selective.

From the late 1960's policy discussions in the Republic of Korea shifted to a concern to broaden the industrial base of the country by moving into the production of industrial intermediates and capital-intensive industries in the 'Heavy and Chemical Industry Drive' formalized in a Presidential decree of 1973. This was part of a move to diversify and radically upgrade the structure of exports. Six sectors were singled out for promotion – steel, petrochemicals, nonferrous metals, shipbuilding, electronics and machinery. These were given short-term export targets and official statements were clear that international competitiveness was expected within a brief ten-year period. At this stage government interventions became more selective than earlier, with individual chaebol promoted on the grounds that large firms were required to support production at a competitive scale.²² Policy loans –the directed credit mechanism for channeling funds to priority sectors – were used extensively at this time and at their height in 1978 were just over half of all credit in the economy (Kim and Leipziger 1997:183). Loans for working capital at subsidized rates were available to any exporter, but only priority firms and sectors could obtain long-term funding at these rates. The deliberate measures to direct large groups into particular sectors and to support them financially if their projects ran into difficulties created the 'Too-Big-Too-Fail' concept which was to play an important role in the Republic of Korea in the 1997 Financial Crisis.²³

Starting around 1980 the highly selective measures noted above came to be relaxed and a more functional, but nonetheless interventionist government strategy was followed. The 'Comprehensive Stabilization Program' was announced at the time as the pursuit of a 'private-sector-led economy' (Smith 2000:93), although government involvement remained much higher than in many other economies. During the 1980's there was a gradual and staged process of import liberalization involving the phasing out of import licensing and the reduction in import tariffs. Export incentives of the type used earlier were reduced, as was the bias in favor of priority activities and firms. The focus of fiscal incentives gradually shifted to a non-discriminatory basis aimed at specific types of investment, such as R and D expenditure. Emphasis on the latter was part of a drive in the 1980's to foster high technology activities, which became the new priority after the heavy and chemical industry phase. FDI restrictions were eased during the 1980's as a means of access to foreign technology. Bank credit allocation at this time was still influenced by government, although the role of policy loans was scaled down. Loans were still channeled to certain priority areas and firms however, although in the 1980's priorities shifted, with a new focus on small and medium enterprises, high technology activities and firms in need of restructuring. In the 'Industrial Development Law' that became effective in 1986 the industries shipping, foreign construction, textiles, ferro-alloys, dyes and fertilizers were designated for rationalization. Packages available to such firms included subsidized credit for upgrading equipment and financing mergers, as well as the imposition of further entry restrictions into the sectors concerned.

It was not until the early 1990s that substantial government withdrawal from economic activity and the ending of 'old-style' industrial policy actually took place, although some of the

²² Amsden (1989:73) cites the cases of the Ssangyong group in cement, the state-owned Pohang Iron and Steel Company, the Hyundai group in shipbuilding and the Hyundai, Samsung and Daewoo groups in machinery, all of which received favorable treatment in comparison with smaller and sometimes more experienced competitors. Lim (2001) stresses that government guarantees of foreign borrowing by these large groups were a particularly important form of support at this time.

²³ For example the government asked Daewoo, then a textile and trading company, to take over a machine tool manufacturer and a shipyard, as well as invest in automobile production. When Daewoo responded to these requests it was forced to borrow heavily (its debt-equity ratio reaching 900%) and when these loans could not be serviced the government had to bail it out (Lim 2001:14).

measures undertaken after the 1997 Crisis, in forcing chaebol to give up certain lines of activity to concentrate on their core areas, demonstrate aspects of earlier industrial interventionism. Table 2 summarizes key features of industrial policy in the Republic of Korea.

Table 2 The Republic of Korea: Industrial Policy

Period	Priority activities	Main instruments
1960-73	Exports in general- key sectors labor-intensive manufactures	Import protection, export subsidies including duty drawbacks, subsidized credit allocations, export targeting.
1973-1980	Heavy and Chemical Industries – priority sectors steel, petrochemicals. nonferrous metals, shipbuilding, electronics and machinery; priority firms selected large enterprises	Import protection, export subsidies including duty drawbacks, subsidized credit allocations, export targeting. Widespread use of policy loans to channel funds to priority firms and sectors. Investment incentives through tax credits.
1980-90	Manufactured Exports, firms needing restructuring, small and medium enterprises. High technology activities now priority.	Phased import liberalization, ending of policy loans. Still government influence over allocation of credit. Investment incentives for R and D. Easing of restrictions on FDI.
1990 onwards	Private sector-led development; restructuring of chaebol after 1997 Crisis	Financial sector liberalization; open capital account;

Source: adapted from Kim and Leipziger (1997)

Taipei, China

If the Republic of Korea, is often taken as the archetypal illustration of industrial policy there are many broad similarities with experiences in Taipei, China. In the latter there was also a strong focus on exports combined with early protection in the domestic market and subsequent measures by government to upgrade the industrial structure. The major difference is the relatively much greater role in Taipei, China of small and medium enterprises

and public enterprises as opposed to large private conglomerates and a significant, but less dominant, role for directed lending in the form of policy loans. In Taipei, China most discussions of industrial policy suggest a sequence commencing with a short period of import substitution in the 1950's (1953-57) (Dahlman and Sananikone 1997). This involved the combination of quantitative import restrictions and import tariffs to protect the domestic market, as well as the use of a multiple exchange rate system with the value of foreign currency set differently for exports and imports, with the former penalized. The main beneficiaries were simple labor-intensive activities, such as textiles and clothing, wood and leather products.

In most interpretations, in the late 1950's a critical choice was made to shift towards greater export promotion; what has been termed an 'export substitution' phase (1958-72), in which the composition of exports shifted dramatically to labor-intensive manufactures (Ranis 1985). Policy instruments used included a rebate system to allow duty-free access to imported inputs needed by exporters, subsidized loans available only to exporters, a unified and undervalued exchange rate, and for certain industries an export targeting system (although not as widespread as the practice in the Republic of Korea). In addition, measures were taken to encourage export-oriented FDI including tax holidays and freedom to repatriate profits. However, local content requirements (up to a maximum of 70% of value-added) were imposed on foreign firms in some sectors to develop local linkages. In 1965 as part of this drive the statute setting up export processing zones was passed. By 1970 these zones were already accounting for 10% of total exports. Export growth during this phase was still in relatively labor-intensive technologically simple goods, but had broadened beyond textiles, garments and agro-processing activities to include simple consumer electronics, like radios and refrigerators, as well as goods like watches, clocks and toys. It appears that export promotion was generally functional rather than selective, although there was some selectivity in terms of credit allocations between sectors. However protection of the domestic market remained substantial, so that as in the Republic of Korea a dualistic structure of exporting and import-competing firms emerged.

As in the Republic of Korea during the 1970's the need for industrial upgrading was perceived as important by policy makers, which led to a phase of 'industrial consolidation' (1973-80). This involved a shift in strategy in what has been seen as a phase of 'secondary import substitution' with local production of industrial intermediates and capital goods – such as iron and steel, petrochemicals, machine tools and electrical machinery - for use by export industries. Given the capital-intensive nature of many of these activities public enterprises were given an important role. In addition, there was heavy public investment in large infrastructure projects (principally highways, railways, ports and airports). The subsidy element in loans to exporters was very high in the 1970's at around 20% of the value of exports in the mid 1970's falling to 5% in 1980 (Smith 2000 table 2.7). Although the previous export promotion measures from the 1960's remained in force, import protection and the use of directed credit were used to encourage import-competing activities.²⁴ Also at this time government support for new high technology activities began; as manifested, for example, in the creation of public research institutions, like the Information Industry Institute.

The 1980's saw a gradual trade liberalization and with the emergence of low wage competition elsewhere the government, again as in the Republic of Korea, targeted high technology activities as new export priorities. Strategic areas receiving priority support were information technology, machinery, precision instruments, biotechnology, electro-optics and environmental technology industries. Their identification was justified by a list of criteria,

²⁴ The average nominal tariff in 1974 was as high as 55% falling to 39% in 1979 (cited in Smith 2000, table 2.2). Wade (1990:166-7) draws attention to the role of government directives to banks to lend in support of particular sectors (and firms within these). In the 1970's part of this lending bias was in favor of exporters, but part also was in favor of heavy industry.

which included not just their high technological intensity, but also their low pollution levels, their low energy use, their high value added and their market potential (Dahlman and Sananikone 1997). This restructuring was encouraged by the use of preferential loans at subsidized interest rates available for broad categories of activity rather than individual firms.²⁵ In addition, support of domestic R and D came from a combination of tax credits for this form of expenditure, government investment in public laboratories and the establishment of science parks close to Universities and technical centers. Exporters in general continued to receive preferential access to credit during the 1980's, but the subsidy component in this financing declined substantially over the decade. However, they also continued to received tax credits unavailable for domestic sales.

As in the Republic of Korea, the 1990's saw the end of most elements of selectivity in industrial policy. Import and foreign exchange liberalization was largely completed; the financial sector was largely liberalized with a decontrol of interest rates and an ending of directed credit; tax incentives were made neutral as between sectors being granted for generic activities such as R and D, pollution control and energy conservation, rather than for investment in particular sectors. Government support for high technology initiatives, in terms of public expenditure on new technologies and in the creation of new science parks became the focus of industrial policy.

Table 3 Taipei,China: Industrial Policy.

Period	Priority activities	Main instruments
1953-57	Import substitutes- key sectors textiles, clothing and other labor-intensive manufactures	Import protection through tariffs and import quotas.
1958-72	Export promotion/substitution – key sectors labor-intensive manufactures particularly garments, consumer electronics. Some import substitution in intermediates –basic metals, chemicals	Unified competitive exchange rate; rebates of import duties; tax credits; subsidized loans; EPZs; encouragement to FDI; export targeting. Import protection through tariffs and import quotas.
1973-1980	Import substitution of intermediate and capital goods plus exports – key sectors petrochemicals, steel, shipbuilding, automobiles, machine tools, electrical machinery, consumer electronics	Public investment in state enterprises; tax credits; policy loans; import tariff rebates. Selected import protection

²⁵ The subsidy rate defined as the difference between the rate on strategic loans and the prime rate was only around 1.75%-2.75% at this time. It appears that these strategic loans were relatively widely available for new investments and that only about one-third actually went to 'strategic' industries (Smith 2000).

1981- 1990	High technology activities and exports; strategic sectors - information technology, machinery, precision instruments, bio-technology, electro-optics, environmental technology	Trade liberalization; policy loans for strategic industries; tax credits; public investment in infrastructure and research facilities; science parks; encouragement to FDI.
1990 onwards	Private sector-led development	Financial liberalization – interest rate decontrol; ending of policy loans; public investment for science and technology; encouragement to FDI; education investment.

Source: adapted from Dahlman and Sananikone (1997)

In both of these economies state support for technological upgrading through the development of ‘national systems of innovation’ has been highlighted as a key aspect of industrial policy. One crude indicator of the extent of such support is the ratio of R and D expenditure to GDP, and both economies have had values for this ratio much higher than in other emerging economies.²⁶ In the Republic of Korea the building of technological capability was concentrated in the chaebol. Public support was provided by subsidies for enterprises’ own R and D, by the flow of knowledge and personnel between public sector research laboratories and these firms and by public education investment in applied technical subjects. For example, over the period from 1960 to the mid-1980s it is estimated that roughly two-thirds of private sector R and D was financed by state subsidized credit (Amsden 2001:244-5). Also, as a simple example of the degree of support from education investment when the national system of innovation was being created in the 1980’s, the share of engineering students in the total population was four times higher in the Republic of Korea than in Brazil, an emerging economy with which the Republic of Korea has often been compared (Freeman 1995 table 4).

In Taipei, China the key private sector actors were small to medium enterprises, many of whom were successful in establishing market niches in high technology activities and in conducting R and D in relation to these.²⁷ Here public research institutions had a more active role in both the diffusion and adaptation of imported technology, and publicly-owned pilot plants in new lines of activity played a catalytic role in the development of new local technologies, before these plants were later sold to the private sector. In the early years of semi-conductor industry it was public not private firms that entered into joint ventures with foreign partners like Motorola, Phillips and IBM.

South-East Asia

²⁶ For the late 1990’s the ratio of R and D expenditure to GDP was 2.9% for the Republic of Korea, and 1.9% for Taipei, China, compared with 2.9% for Japan, 2.6% for the US and 1.5% for Singapore (Yusuf 2002, table 3). For Malaysia, Thailand and Indonesia the ratio was below 0.5%.

²⁷ Gee and Kuo (1998) compare the approaches to R and D in the electronics sector in the Republic of Korea and Taipei, China and suggests that more flexible decentralized approach in the latter offers greater dynamism.

As a small city-state with an historic entrepot function Singapore always had many distinctive features. Although it has been much more heavily dependent on FDI than either the Republic of Korea or Taipei, China and has been virtually a free trade regime since the early 1970's there are some elements of similarity in the attempt of the government to alter the composition of exports and the pattern of comparative advantage. This has been pursued essentially by tax credits, which have been differentiated between sectors giving preference to skill and knowledge-based, higher technology activities. Directed and subsidized credit was not used widely as a policy instrument, although the Economic Development Board did establish a Venture Capital Fund to finance co-investments in new technology-intensive activities (Soon and Tan 1997:232).²⁸ Chia (2005) has a detailed discussion of the evolution of industrial policy in Singapore.

In terms of policy on technology Singapore offers a distinct model. Here transnational firms have been the key private actors and the role of government has been to induce these firms to conduct R and D and various technological adaptations in Singapore rather elsewhere in their global network. This has required a combination of heavy subsidies for R and D - for every dollar of private R and D expenditure it is estimated that the government has provided roughly 30 cents – heavy public investment in higher education and the establishment of high standard public research institutes that provide support services to the private sector laboratories. Much of the local R and D by transnationals has been production and market-oriented, rather than geared to the development of intellectual property through basic research, but nonetheless the success of the government in stimulating local R and D clearly differentiates Singapore from other economies with a strong FDI presence (Amsden et al 2001).²⁹

Elsewhere in the region, although industrial policy has been used extensively its impact is judged to be less impressive and lacking a clear economic rationale. Malaysia has used some aspects of industrial policy although observers suggest that this has not been in a systematic or coherent manner (Jomo 1997). There after a period in the 1960's in which industrial import substitution was the main focus, export promotion became the primary concern. To achieve this a range of incentives, including the establishment of export processing zones, were used to attract foreign capital, so that since the 1970's foreign firms have dominated manufactured exports, particularly in electronics. At one time the allocation of rents from government intervention was closely linked with ethnic distributional issues, rather than economic efficiency, as the New Economic Policy of 1970 sought to alter the balance of wealth and economic power between the Malay and Chinese communities.³⁰ This policy, which was largely abandoned in the mid-1980's, has been seen as interventionism without a clear economic rationale. Malaysia, in the early 1980's, also had its own equivalent of the Korean Heavy and Chemical Industry Drive with an attempt to deepen the industrial structure through import substitution in capital and intermediate goods and thus increase linkages within manufacturing between the exporting and import-competing sectors. This strategy involved chiefly public investments in iron and steel, cement, the Proton car project, motorcycle engines, petrochemicals and pulp and paper. Results here were generally much more disappointing than in the Republic of Korea, with the public sector enterprises concerned experiencing financial losses and being slow to generate exports. Many of these

²⁸ The provision of good public housing has been identified as an important factor in keeping down labor costs at early stages of the export boom period in Singapore. Wage repression through direct intervention in the wage bargaining process was also an important factor chiefly in the 1970's (World Bank 1993).

²⁹ To illustrate these local initiatives Amsden et al (2001:8) cite the case of Hewlett-Packard Singapore, whose printing division was given operational autonomy from the US headquarters. It had "only moved into the most preliminary stage of applied research. It began to modify in a limited way the basic designs provided by Palo Alto in order to build and sell a differentiated product that was more cost-effective and suited to the Asian market (a low-end, portable jet printer)."

³⁰ For example, under the 'Investment Coordination Act' of 1975 an investment licensing system was introduced which was designed to implement the redistributional goals of the New Economic Policy which were to ensure that the Malay community owned a certain proportion of enterprises (Salleh and Meyanathan 1997).

enterprises operated behind high protective barriers, the effective protection for the iron and steel complex was estimated at 131% in 1987 (Jomo 1997: 102), and many were privatized in the 1990's.

The current role of the Malaysian Investment Development Agency (MIDA) in promoting inward FDI in priority high value areas, such as electronics, and in creating geographical clusters of local suppliers around these foreign firms has been praised (UNIDO 2002:120). However, others have argued that despite the impressive growth of manufactured exports from Malaysia over the last 15 years lack of a sound industrial policy has created an excessive reliance on TNC-dominated electronics exports, a shallow industrial structure with few local linkages between the export sectors and the local economy and a weak national technological base (Lall 1995). Experience with clusters in Malaysia is discussed in detail in Rasiah (2005).

Thailand has also built its industrialization since around 1980 on export promotion with a heavy presence of TNCs. Whilst a competitive exchange rate policy and sound macro management appear to have fostered high export growth, industrial policy interventions have been described as marked by 'patronage and rent-seeking' rather than by a clear strategy for industrial upgrading (Christensen et al 1997). Various export incentives such as tax holidays, import-duty drawbacks and the establishment of processing zones have been used, but not apparently very selectively.³¹ Subsidized credits were also available for exporters but not it appears on a large scale and not linked closely with performance criteria. However, privileged access to licensing helped large local private groups to expand (Rock 1995, Jomo 1997).³²

Indonesia is perhaps the clearest case where selective policy interventions have been closely associated with 'cronyism' and rent seeking. As noted above elements of the policy package differed from those used by other countries. Export finance and tax credits for exporters were unimportant. R and D linked tax incentives were available but had little quantitative impact. Subsidized funds were made available for specific enterprises, however credit allocations were received by politically favored groups and efforts to upgrade technological capability, though investments in high technology activity – most notably the national aircraft project – have been judged by observers to be a high cost failure (Hill 1995). Thee (2005) discusses key aspects of industrial policy in Indonesia.

For South East Asia in general then, even observers sympathetic to industrial policy concede a disappointment with its impact in these economies, as compared with the more positive results in the Republic of Korea and Taipei,China. State intervention is seen as mainly at the behest of politically connected groups in support of either their own narrow interests or the goal of inter-ethnic redistribution. Unlike Singapore governments elsewhere have been unable to induce transnationals to upgrade their activities.

Assessing the Impact of Industrial Policy

Can we be sure, however, that industrial policy interventions worked effectively in the Republic of Korea, Taipei,China and Singapore, even if few claim significant success for these measures elsewhere? Rigorous attempts to assess the impact of industrial policy ask if it altered the efficiency and, by implication, the long-run growth prospects of industry. Detailed analyses are available principally for the Republic of Korea and Taipei,China, which

³¹ In discussing approvingly the work of the Board of Investment (BOI) in Thailand, Amsden (2001:26) notes in passing that "On average only 15% of applications were rejected, but only companies that fit BOI criteria tend to apply". Her verdict on the BOI and its role in industrialization is generally favorable.

³² Reinhardt (2000) comments on the lack of domestic linkages in Malaysia and Thailand between export sectors and local small and medium enterprises as input suppliers.

are the cases where anecdotal and descriptive evidence suggests that its effects have been most significant.

Initial tests for the impact of industrial policy assessed three main things – first, whether priority industries actually received the bulk of financial assistance from the government, second whether actual industrial structure differed from that predicted for an economy's income and population level and third whether promoted industries experienced more rapid productivity growth than others (World Bank 1993, Smith 2000). None of these tests are actually conclusive.

In terms of the allocation of preferential credits in the Republic of Korea, it appears that certainly in the 1960's and 1970's these flowed to priority sectors – initially exporters in general and then heavy and chemical industries. In Taipei, China, however, data for the 1980's show that the so-called 'strategic' industries did not actually receive the majority of funding which rather went to declining industries in need of restructuring. There by the effective rate of subsidy measure key priority activities such as machinery, information and electronics industries had low rates relative to other activities (Smith 2000:156). In some instances however it maybe not have been the case that the actual sums of money transferred captured the extent to preference granted to particular activities (for example priority in licensing would not be picked up by this data, unless a very sophisticated subsidy equivalent calculation were carried out).

Comparisons of industrial structure between the Republic of Korea and the norm derived from a regression model show a pattern of industrialization that is not very different from that expected for the population size and income level of the Republic of Korea, with important exceptions being that the shares of textiles, garment and footwear and metal products and machinery were nearly three times as large as predicted. For the Republic of Korea the former group was promoted strongly in the 1960's and the latter in the 1970's. The main surprise is that the share of the chemicals sector is exactly as predicted.

Critics have pointed out inherent limitations of these tests. The use of cross-country norms that aggregate different types of economy in the control group is recognized as too crude to put a great deal of weight on the results. The implicit assumption in such comparisons is that the Republic of Korea and Taipei, China would have reached their actual levels of income and their actual industrial structures, at the time they did, without government intervention; in other words it is assumed that there is no catch-up effect accelerated by government, which is the hypothesis to be tested (Wade 1994).

Much weight is placed on the tests that link productivity growth with whether or not a sector was promoted. For both the Republic of Korea (World Bank 1993) and Taipei, China (Smith 2000) studies have found that if the analysis is at the fairly aggregate 2-digit level, at which TFP estimates are available, there is no clear correlation between a sector's TFP growth and its status as a priority activity. However there is a basic problem with the data available. Aggregations of manufacturing (for example at the 2-digit level) will be too broad to capture the performance of promoted firms or branches, but too narrow to pick up the impact of economy-wide externalities. The test outlined that contrasts productivity growth in promoted and non-promoted sectors is conceptually inappropriate, since what is required is a comparison of the international competitiveness of an activity with and without government intervention. Although this will be influenced by the activity's own TFP growth its competitiveness relative to non-promoted domestic sectors is not relevant (Rodrik 1994). For traded good manufactures the relevant test is competitiveness relative to international competitors and even then there is the added comparison of the without-intervention counterfactual.

Estimates of changing international competitiveness of manufacturing are available; for example, for the Republic of Korea Lee (1997) reports 8 out of 12 infant industry promoted sectors becoming competitive in the 1980's, although this does not provide a counterfactual test of what would have happened without promotion. Assessments of the role of any individual policy on overall GDP growth are generally speculative and the most detailed tend to find positive but only modest impacts for industrial policy. Pack (2001) examining inter-industry input-output relations and making simple assumptions about productivity effects and knowledge transfers, comes up with an approximate estimate that due to its impact on investment and productivity industrial policy in the Republic of Korea might have added 0.5% annually to the growth rate; which he describes as "hardly trivial, but not the secret of success." A similar approach for Taipei, China suggests a lower growth impact of 0.3% annually (Noland and Pack 2003:57).

For Singapore evidence on industrial policy has been provided at least indirectly by estimates of total factor productivity growth (TFP). Young (1992) argued for example that TFP was close to zero in Singapore (compared with positive TFP in Hong Kong, China, the Republic of Korea and Taipei, China) with the implication that the economy moved too quickly up the ladder of comparative advantage, through its targeting policies for higher technology activities, without fully realizing the benefits of learning at earlier stages. However such estimates are plagued by conceptual and empirical uncertainties and a number of subsequent studies have found positive TFP growth for Singapore (Felipe 1999). Further even if a particular figure can be agreed there is still the counterfactual problem of what TFP would have been achieved in the absence of interventionist targeting policies.

Given this empirical ambiguity advocates of industrial policy base their case on the simple association in these economies between government support of various kinds and subsequent exports from promoted activities (Westphal 1998). As Stiglitz (2001:519) puts it

"The fact that almost *all* of the economies of the region had industrial policies (with the exception of Hong Kong, China, which benefited from the industrial policies of its neighbor, mainland China) *suggests* that such policies were an important part of their growth strategies, whether or not the highly imperfect econometric techniques for quantifying such impacts succeeded in verifying such claims" (emphasis in the original).

In attempting to assess this debate the ability of policy to stimulate high private investment in new manufacturing, which subsequently led to productivity improvements and exports is perhaps the key. No one could claim that the interventions used were optimal 'first-best' measures. Individual promotional policies may have been misplaced and led to resource misuse in high cost production (for example, not all of the investment in the Heavy and Chemical Industry Drive in the Republic of Korea could be judged successful). Furthermore theoretically, as Rodrik (2004:12) reminds us, an optimal intervention strategy would equate the marginal cost of funds to expected returns on new investments. As projects in the real world are inherently risky there will inevitably be some failed projects in an investment portfolio. In the optimal case the positive returns are sufficiently high or there are a large enough number of successful projects to offset the failures and bring the weighted average return up to the cost of capital. Hence failed projects per se are not evidence of a failed strategy.

In these countries there was a strong stimulus to private manufacturing investment since regardless of the precise impact of industrial policy interventions collectively they would have raised the profitability of manufacturing relative to other sectors. Further, even if anti-export bias was not wholly removed, the export incentive measures that were introduced widely in the NIEs would have improved the relative profitability of exports as compared to the initial

import substitution situation and created a different set of relative incentives to that available in other emerging economies at this time.³³

A further feature worth stressing is the flexible nature of industrial policy, in both the Republic of Korea and Taipei, China, which meant that policy objectives and the instruments to achieve them were adapted over time to fit new sets of circumstances. The targeting of specific industries or firms in the 1960's and 1970's, for example, when the economies' industrial structures relatively simple, was replaced in the 1980's and 1990's by a more functional, less directive, approach more supportive of the decisions of individual firms, reflecting the growing diversity and technological complexity of manufacturing. The use of directed and subsidized credit to priority activities was also phased out in the 1990's. At a relatively early stage of industrialization, when a certain regularity in demand patterns can be detected, it may make sense to target broad sectors, for example at the level of the two-digit classification, as means of building up manufacturing capacity.³⁴ Hence in the 1960s planners in the Republic of Korea could take Japan's industrial structure as a model and attempt to sequence investment to replicate this structure. However, this argument loses its validity once an economy develops industries at the frontiers of international technology and the meaning of a priority activity will be difficult to establish.³⁵

The role of the directed credit policy has been much debated. World Bank (1993:291) suggested that it had worked effectively in the Republic of Korea, but not in Indonesia, Malaysia and Thailand, where as we have noted criteria other than efficiency determined allocations. Theory can also be brought to bear to explain why, due to market failures, modest levels of 'financial restraint' combined with credit targeted at activities with externalities and dynamic increasing returns, may be a good policy. Recent models of multiple equilibria and co-ordination failures demonstrate that in an imperfect world government co-ordination of private investment, if well done, can put an economy on a higher growth path (Hoff and Stiglitz 2001). However, the key problem, as evidenced by experience in the Republic of Korea in the 1990's, is that too intrusive a policy in terms of financial sector intervention can block the development of a system of financial intermediation that is more suited to the needs of a technologically sophisticated economy. Whilst directed credit may work effectively at certain stages of development, again it may become dated once investment priorities become more difficult to establish. The charge against the Korean policy (and to a lesser extent that in Taipei, China) is that by intervening in the process of credit allocation the government delayed the important financial sector reforms needed for commercial banks to be able to allocate long-term funds in response to enterprises' demand for capital based on their own perceptions of profit opportunities (Nam 2001). This is an argument, not that interventionist industrial policy based on a controlled credit market was wrong for its time, but that it was persisted with for too long.

³³ Amsden (2001:28) in support of general industrial policy argues that all successful emerging economies had to pursue a version of this policy with a focus on "getting the job done" (i.e stimulating new investment) rather than on "getting the prices right". In terms simply of raising levels of industrial investment probably all of the NIEs achieved this to some degree through industrial policy.

³⁴ Wade (1994:59) explains this point as follows " .. because of these cross national regularities in changes in final demand and technology, it is not difficult for well-informed government officials to identify which families of industries will next have fast demand and productivity growth, and which ones will have increasing (static or dynamic) returns." This argument may still have some relevance for today's least developed countries.

³⁵ As evidence of the difficulty for planners in establishing priorities in an age of rapid technical change and in high technology activities, Smith (2000) Appendix D list the wide range of products identified as strategic in Taipei, China (199 by 1987), although less than half of these had actually asked for special assistance.

What is the Contemporary Version of Industrial Policy?

The world has changed since the heyday of industrial policy in the first-tier NIEs and some feel that their experience with it has little to offer today's lower income and emerging economies.³⁶ In addition there is the question of how far such measures are compatible with the new international trading and investment environment. Although initially a lot of attention was given to the restrictions on policy autonomy in the area of industrial policy created by WTO or free trade area agreements, current thinking now downplays the role of formal restrictions with the consensus being that if countries wish (rightly or wrongly) to pursue a form of selective intervention, within limits they retain the policy autonomy to do so (Amsden 2000).

On imports, WTO membership rules out quantitative restrictions and involves a general lowering of rates and a setting of a maximum bound rate for different products. However many countries have set bound rates higher than their actual applied rates, which gives the option of increasing protection for specific goods.³⁷ Furthermore temporary quantitative safeguards for balance of payments purposes (in relation to aggregate imports) or to protect individual industries, can also be invoked, where temporary can be up to eight years. Anti-dumping duties also provide a mechanism that developing as well as developed countries can use.

There are some restrictions that were not present in the past however. Bilateral or regional free trade arrangements are more restrictive than WTO rules as they limit the scope to impose tariffs on imports from member countries. Subsidies that distort trade, either by promoting exports or supporting import substitutes, are ruled out by the WTO, for all but least developed countries. However subsidies are allowable for certain categories of expenditures, R and D, regional development and environmental protection. These are fairly broad categories and this offers considerable scope for discretionary public policy, offering varying subsidy rate. Specific subsidies that differentiate support for R and D between firms became 'actionable' in 1999, which means that although they are not strictly prohibited they can be challenged and ruled out if damage to trading partners can be proved (English and Wulf 2002:168). However even where formal WTO rules on subsidies are flaunted by a developing country (so their activity is formally actionable) action is only taken if there is proof of serious injury to trading partners. Where the offending country is small player in world trade of the commodity concerned this will be unlikely (Pangestu 2002).

The so-called TRIMs and TRIPs agreements under the WTO are potentially restrictive. The Trade Related Industrial Measures (TRIMs) agreement prohibits the imposition of export or local content targets on firms (typically transnationals) and although there have been many delays in the implementation of this agreement with a number of developing countries requesting extensions of the transition period in principle this rules out one form of control used in the past (particularly in the automobile sector). Similarly the Trade Related Intellectual Property (TRIPs) agreement imposes developed economy standards for patent protection and restricts the scope for copying and reverse engineering. Hence although

³⁶ See Perkins (2001), for example, who argues against such a policy for PRC and Viet Nam; see also Yusuf (2001). One reason for this is lack of bureaucratic capacity, although this (and the risk of capture by vested interests) is an issue in relation to a range of economic policies (such as competition policy and privatization), since market liberalization requires a matching rise in regulatory oversight. It is not obvious that the requirements of industrial policy (at least in a less directive version) are uniquely demanding.

³⁷ For example, for the recent WTO entrant Cambodia for agricultural goods the simple average bound rate was 30% compared with the average of actual rates applied in 2003 (pre WTO entry) of 19%. Peak bound rates for the most sensitive agricultural products were 50-60% and the lowest bound rates were 5%. For industrial goods the average bound rate 18%, compared with the average actual in 2003 of 16%. As a least developed country Cambodia waived its right to apply agricultural export subsidies on the grounds that they were either undesirable or unaffordable (Siphana 2005).

selective import protection and a range of possible subsidies remain formally permissible, the TRIMs and TRIPs and separate agreements as part of free trade arrangements, such as NAFTA, do create limits on policy discretion. For example, the US and Japan successfully challenged Indonesia at the WTO on some of its automobile promotion policies (Noland and Pack 2003: 90).

It is significant that the WTO rules appear to prohibit the use of export performance as a criterion for receipt of public support. A key lesson from industrial policy a la East Asia is that export performance can be a transparent criteria to apply as part of a control mechanism that allocates public funds to selected firms on the basis of some agreed measure of success (in this case sales in foreign markets). Use of export data in this way is unlikely to be WTO-compatible. Of the alternative, criteria employment is unlikely to be a wholly satisfactory indicator (as one needs an indication of the competitiveness and stability of the jobs created) and cost reductions or technological improvements are likely to be much more difficult (although not impossible) to operationalize (Noland and Pack 2003: 91).

However whilst noting these restrictions, it is important to stress that public policy can and in many countries still does support a range of initiatives that would fall under the heading of industrial policy and in particular there are many examples of governments working with transnational firms.

The more successful of the East Asian experiences surveyed here have provided the basis for contemporary arguments of the case for industrial policy. We can see this from the work of three of the best-known current academic advocates of this case, Sanjaya Lall, Dani Rodrik and Ha-Joon Chang.

For example, Lall (2003) writes of the importance of country's taking a strategic view how to build up technological capability in new and complex products. He identifies a number of alternative technology strategies of which the two most successful are the 'autonomous' (based on the Republic of Korea and Taipei, China), and the 'strategic FDI-dependent' (based on Singapore). These are contrasted with the less successful 'passive FDI-dependent' (in the rest of S.E Asia) and 'ISI restructuring' (in much of Latin America). What is missing in the less successful cases is a lack of a strategic vision of what dynamic sectors (with strong externalities and high growth prospects) to promote and "a clear and co-ordinated industrial policy" for shifting resources to these.

Rodrik (2004) takes a different perspective arguing that public support should be directed at types of activities (such as training, marketing and research), where externalities can be identified, rather than at particular 'strategic' sectors. He notes that a broad version of industrial policy (defined as selective support for particular activities) is widely employed and the focus on exports and foreign investment as key drivers of growth is misplaced.³⁸

He favors a narrowing and targeting of existing policies at new activities that will generate informational externalities. The process of co-ordination and mutual support between public and private sectors is more important than the detail of how it is done. Again he cites East Asian experience approvingly as there an effective carrot and stick strategy based on tough performance requirements was employed, whilst in Latin America "industrial policies typically have used too much of the carrot and too little of the stick."

³⁸ In his view the use selective credit and fiscal policies in support of particular sectors, activities or firms currently remains widespread. "If this fact has escaped attention it is only because the preferential policies in question have privileged exports and foreign investment – the two fetishes of the Washington Consensus era – and because their advocates have called them strategies of 'outward orientation' and other similar sounding names instead of industrial policies" (Rodrik 2004:29).

Similarly when Chang (2003) in his analysis of the state in development writes of 'the industrial policy state' he cites the Republic of Korea and Taipei, China along with Japan and France, as exemplars. He does not cite any the second tiers NIEs nor any Latin American economies in this category. Provocatively he argues that even though the 'bad' policies (activist industrial trade and technology policies) worked in East Asia in the recent past and earlier in today's developed countries it is the 'good' (but less successful) policies of market liberalization that are now urged on follower economies (Chang 2002).

In terms of guidance for countries today wishing to apply an activist agenda key features of the East Asian experience can provide simple general principles; these are an export orientation (although in principle modest import protection or support for domestic sales on infant grounds need not be ruled out); support that is time-bound, not open-ended; support only in relation to well defined performance criteria; a focus on innovation and technological upgrading; co-ordination of public and private initiatives; flexibility in adapting policy instruments to changing circumstances; and in general support for, not attempts to second-guess, the private sector. In technological terms in middle-income countries the aim must be to strengthen technological capability, and to encourage the adaptation and improvement of international technology. For poorer countries firms will be well within the international technology frontier and public support is likely to have to be focused more on export upgrading using imported technology and the fostering of efficient local linkages.

Beyond these general principles there are two alternative approaches. One (a la Rodrik) is to support a limited number of activities that have key externality characteristics (such as research, training, and more generally product innovation and risk-taking that can be emulated). The other (a la Lall) is to take a broader view and try to promote sectors (which can be defined broadly) in which a dynamic comparative advantage may be created. In neither instance should this be a case of promoting individual firms, with the risk of capture that this creates. Support should be for any firm that is eligible under either criteria and winners should emerge, not be identified ex ante for special treatment. In part this choice relates to how interventionist a government can be or wishes to be. In part also it will depend on the sophistication and structure of an economy with the more broadly based approach more relevant in economies in which lack of financial sector development means that without additional promotion private investment will not flow into sectors with a potential for long-run competitiveness.

In terms of specific policy instruments much of the recent discussion is in the context of 'competitiveness strategies' that seek to identify the public support required for innovation, export diversification and upgrading (Lall and Weiss 2004). Measures that are discussed cover tax credits for R and D, public investment in basic but commercially relevant research, education and training initiatives, encouragement of location 'clusters', establishment of standards bodies, and the provision of risk capital.³⁹ Support could also come in the form of conventional measures like low cost finance and even short-term import protection, where the market is for domestic sales. As we have seen much of the rationale for these measures comes from familiar arguments relating to externalities, but recent work on developed economies and the process of technological change provides a rationale for public support for clustering in the context of locally-based knowledge creation and transfer.⁴⁰ The list of instruments put forward in these discussions sounds similar to the policy interventions in Singapore and Taipei, China and the Republic of Korea, although in the latter two cases in

³⁹ Venture capital could be publicly provided even if it is privately managed to utilize the expertise of the private sector; Yusuf (2002:12) argues for the importance of venture capitalists who "perform the role of coaches, selecting, motivating and training budding entrepreneurs".

⁴⁰ Information can be codified, standardized and provided at close to zero marginal cost, and knowledge, which is tacit and transmitted through direct contact and local proximity. The marginal cost of supplying knowledge can rise significantly with distance and a knowledge spillover externality provides a clear economic rationale for public support for clustering (Audretsch 1998).

their more mature industrial policy phases (from the 1990's onwards) rather than in their more directive phases in the 1960's and 1970's.

In summary, East Asian experience of the last few decades demonstrates the simple point that strong manufactured export growth combined with the absence of macro imbalances can generate a positive cumulative process of high exports- high profits- high savings- high investment – high exports. A wide range of measures raised the profitability of manufacturing, whilst avoiding serious anti-export bias. In the competitive environment created by a focus on world markets it seems that the important process of product and technological upgrading was supported, not hindered by public policy interventions. This experience is no guarantee that such interventions will always work well, and there is no simple blueprint for success, but it provide a reminder that sensible policy interventions in support of new activities are an important part of the policymaking toolkit.

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