

Chapter 5

Industrial Policy Design and Implementation Challenges

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5.1 Introduction

The design of industrial policies depends on three interrelated issues. First, industrial policy can be designed to address very different economic and social objectives in different countries. However, clarity about objectives and priorities is important to avoid addressing contradictory objectives with the same policy. Second, the design of industrial policy depends on identifying the constraints and contracting failures that may be preventing the achievement of particular objectives. And third, appropriate policy design depends on initial institutional and political conditions, since all instruments may not be equally effective in different contexts, and success requires selecting instruments that are most likely to be effective in specific country contexts.

The achievement of most economic and social objectives, such as employment generation, wage growth and the financing of public goods, requires the growth of a diversified base of competitive industries, broadly defined to include all modern high-productivity sectors.

This chapter discusses coordination and externality-related contracting issues that can affect the development of a broad base of competitive industries. Many contracting failures can stall the emergence and growth of a diversified competitive sector, but one of the most important is often given very little attention in the design of industrial policy. Competitive industries often do not emerge in developing countries, because firms lack the organizational and technical capabilities to achieve competitiveness using known technologies. These capabilities are not based on formal knowledge that can be learned in colleges or schools. They are largely tacit knowledge that is only acquired through learning-by-doing. We can therefore also describe these capabilities as tacit productive capabilities. Developing these capabilities requires financing learning. This is the only way in which firms will begin to operate and if their learning is successful they will eventually become competitive. But these investments are potentially subject to significant contracting failures. Solving these is a necessary condition, possibly more important than other externalities and coordination problems affecting competitiveness.

The East Asian countries that implemented successful industrial policies did so by developing effective strategies for financing learning-by-doing. Governments financed this, but imposed conditions that ensured that firms put in high levels of effort. In countries without a strong developmental state, on the other hand, ambitious industrial

policies often failed because financing strategies could not induce a high learning effort. As a result, many of their infant industries failed to become competitive. The design of an effective industrial policy has to ensure that, given the enforcement capabilities of the state, the financing instruments for supporting capability development do actually result in high effort so that competitive firms emerge. This is the key argument this chapter develops.

Most contracting failures require policy solutions that involve external financing or subsidies that can be described as rents for the firms supported. Successful outcomes require that these rents are provided with conditions, and are withdrawn if the conditions are not met. Permanent subsidies for firms that fail to become competitive (such as those that do not meet agreed export or quality targets) are clearly not sustainable. Moreover, subsidies perceived as permanent (that is, provided without sunset clauses) are not likely to result in a high learning effort that translates into gains in competitiveness. Given these considerations, it is not surprising that the design of the financing instruments, the selection of firms and sectors to be supported, the co-investment by other stakeholders and the compatibility of the financing conditions with the enforcement capacities of the state all determine the likelihood of success. Financing strategies that worked for firms and sectors in one country can fail in another if the ability of firms of a particular type to capture these rents (without meeting conditions for achieving competitiveness) or the capacity of the state to enforce conditions on particular types of firms is significantly different.

When a country has a potential competitive advantage in a new sector, private market contracting should be able to organize the necessary investment in equipment and capability development. If a sector is potentially profitable, it should be possible to borrow against its future profits to invest in the machinery and technologies of production and to invest in learning-by-doing. In theory, with efficient markets and low transaction and enforcement costs, private contracts between different beneficiaries should enable these types of investments. However, private contracting frequently fails to organize these investments because of a wide range of contracting failures.

Industrial policy recognizes these problems, but, often, differences between contracting failures and the conditions required to solve them are not properly identified. All contracting failures involve some level of explicit or implicit support to be provided to firms. But the solution of a specific contracting problem requires not only financial support, but also the enforcement of very specific conditions on firms to ensure that the problem is overcome. The design of the support and the associated monitoring, evaluation and governance structures required are therefore likely to vary given the contracting constraint perceived as most important in each case. The absence of appropriate structures to enforce these conditions is the most common cause of poor performance associated with specific industrial policy strategies. A holistic industrial policy strategy has to recognize the interrelationships between objectives, contracting constraints, and the institutional and governance conditions to maximize the chances of success.

5.2 Contracting failures in technology acquisition

Table 5.1 shows the main types of contracting failures that can affect the acquisition and adoption of new technology in developing countries, which, in turn, can constrain the development of new sectors and the upgrading of existing ones. The third column is particularly important because it identifies the critical governance capabilities required for effectively implementing the necessary conditions associated with the provision of support. A policy that is effective in theory can be useless in practice if the agencies charged with its implementation are unable to identify and enforce the conditions required for its success. Moreover, poorly designed and implemented policies can be worse than useless if the net effect is further resource misallocation through rent seeking (Krueger 1990). Unlike Krueger and the standard neoclassical approach to rent seeking, however, we argue that policy-induced rents provided under the appropriate conditions can solve important contracting failures even in the presence of rent seeking (Khan 2000a; Khan and Blankenburg 2009).

The solutions to specific contracting failures require monitoring, evaluating and enforcing particular sets of conditions. Because the broad governance capabilities of states and their political constraints are difficult to change in the short to medium term, it is important to design policies that can address the most important contracting failures given the current institutional and political context. Any particular contracting failure can be addressed with different types of policies and the range of sectors and technologies being adopted can be more or less ambitious. Just as an environmental externality can be addressed with taxes, subsidies, regulation or property right solutions, each of the contracting failures in Table 5.1 can be addressed with different instruments. Some policy responses may have conditions for success that are enforceable in the current political context, while others may not be feasible. The policy task is to remain within the bounds of the feasible. It is important to precisely identify the most important contracting failures and design policies that have the greatest chance of implementation given the existing governance and enforcement capabilities of the state. The presence or absence of a good fit between problems, policies and capabilities explains why some countries or sectors can do well with industrial policies, even when many aspects of their overall governance capabilities appear weak.

The following discussion on the sources and effects of contracting failures will hopefully be useful for decision makers facing these issues. We argue that while each of these contracting failures is potentially important, the last one is the most important. Without an effective strategy that can support firms in their acquisition of the tacit production capabilities required for using existing production technologies competitively, other parts of an industrial policy package are not likely to be effective.

Table 5.1 Major contracting failures affecting technology acquisition

| Contracting failures affecting investment | Likely policy instruments | Governance capabilities required for implementation |
|--|--|--|
| Appropriability problems facing investments in formal skills: Investors cannot capture the full benefits of training | Public co-financing of labor training and investments in skills | Capabilities in relevant agencies to ensure that the investment develops skills that are actually in demand and that the skill quality is high |
| Appropriability problems facing innovators: Poor protection of innovation rents can discourage advanced technology investors | Protection of IPRs. But TRIPS may prevent technology transfer and foreign investors may have weak incentives to transfer technologies | Enforcement capabilities for protecting IPRs but also policies and capabilities to encourage technology transfer by foreign investors |
| Appropriability problems facing 'discovery': First movers do not capture full benefits of discovering comparative advantage | Subsidies for first-movers and start-up companies in new sectors | Capability to make subsidies time limited |
| Coordination failures: Complementary supporting sectors do not develop, constraining investment | Indicative planning or incentivized strategies for coordinating investments | Significant governance capabilities required to coordinate and discipline investments across sectors |
| Contracting failures in learning organizational capabilities: Firm-level competitiveness remains low because of low effort when learning-by-doing is financed | Public co-financing or risk-sharing is required to finance learning-by-doing for acquiring organizational and technological capabilities | Financing instruments supporting learning must have credible incentives and compulsions for stakeholders to put in high effort in learning given the institutional and political context |

IPR = intellectual property right, TRIPS = Trade-Related Aspects of Intellectual Property Rights.

Note: Appropriability problems are a general type of contracting failure that emerge when investment in a particular activity is potentially profitable, but investors fear that they will not be able to capture or "appropriate" enough of the returns on these investments and so fail to engage in private contracting. Source: Author.

5.3 Investment in formal skills and appropriability problems

Appropriability problems are a general type of contracting failure that emerge when investment in a particular activity is potentially profitable, but investors fear they will be unable to capture or appropriate enough of the returns on these investments and, as a result, the investment undertaken is below the optimal level. The failure of new sectors to become competitive or existing sectors to improve competitiveness is often attributed to missing formal skills of the type that can be acquired in training programs. Indeed, missing formal skills can often be a serious constraint to achieving competitiveness in new sectors. Contracting problems can often prevent high levels of investment in formal skills. This is because there is no credible mechanism to ensure that workers will remain with a firm after it has invested in enhancing their formal skills. If workers could credibly promise to stay on long enough after their training to enable firms to recover their investment, then skills training could be privately financed.

The appropriability problem results because such a promise may not be enforceable in a contract and employers may, consequently, not invest in training their workforce. Similarly, if the skills are very specific to working in a particular sector or firm, workers may be reluctant to pay for it themselves unless the employer guarantees employment—and this, too, may not be enforceable in a contract. The result can be low investment in productivity-enhancing education and skills development. This is essentially a problem of positive externalities or spillover associated with investments in formal skills. The obvious policy response is for the state to share some of the training costs or provide training through publicly funded training organizations. Getting the right outcome, however, is by no means simple and requires careful policy design and governance capabilities to monitor outcomes and, if necessary, to withdraw support for programs falling short of the mark.

Subsidies for companies to invest in training may be wasted if firms provide poor quality training, and this can happen if the subsidy is poorly designed. If a skills training subsidy is provided to a firm, the governance requirement is to ensure that employers are not using the assistance to simply reduce employment costs without providing the training. Support to firms therefore has to be effectively monitored with observable conditions that can be enforced. If training institutes are subsidized, the requirement is to ensure that the courses taught have a market value for future employers. In this case, coordination with the private sector is necessary, together with appropriate incentives and sanctions for training providers. These are difficult governance requirements even for developed countries, and public money is often wasted in poorly designed training support schemes. The appropriate mechanism for delivering public support for training therefore needs to be carefully considered in the context of the governance capabilities available to developing countries.

However, formal skills shortages may not be the primary cause of low productivity and competitiveness in all sectors and countries. The low productivity and competitiveness of a firm can indeed sometimes be due to missing formal skills, and this is most likely because of gaps in filling skill-intensive jobs such as accountancy, engineering and computing. A much more important and widespread problem is that

workers with the appropriate formal skills may still have low productivity in developing countries because firms collectively lack the tacit knowledge necessary to organize high productivity production routines. These organizational capabilities are also skills, but they are informal or tacit knowledge skills that cannot be learned in formal training programs—and they have to be acquired through learning-by-doing processes, which are discussed later in this chapter. Most manufacturing processes in developing countries actually require fairly basic prior knowledge of the technology of production by the majority of the workforce. That has been the case for blue collar workers in sectors like textiles, electronics and light-to-moderately-heavy engineering. What is usually required is not the acquisition of formal skills through training in external institutes, but the development of the productivity of the workforce through the acquisition of tacit productive capabilities learned through firm-level experimentation.

Developing countries often make the mistake of responding to low competitiveness by assuming that the problem can be solved by investing more and more in formal skills training, only to find that the expected improvement in productivity and competitiveness does not materialize. Indeed, most developing countries have an excess supply of formally skilled workers in most skill categories. In general, increasing this supply will not solve the problem of low productivity and competitiveness, and may simply cause formally skilled workers to emigrate. One of the paradoxes of developing countries is that they regularly export skilled workers who could not be competitively employed in their own countries.

The answer to the paradox of migration is that workers have low productivity in their home countries because they are working in firms that lack organizational capabilities and routines for organizing efficient production. But as soon as these formally trained workers migrate and join an efficiently run organization in another country, they quickly learn on the job and their productivity jumps several times, showing that the problem was in many cases not the absence of *formal* training, but of knowledge and know-how of a different kind.

As emigration becomes more difficult, many developing countries face a crisis in providing jobs for the large numbers of students being churned out every year by their higher education facilities. Attempting to tackle the problem of low productivity and competitiveness in these contexts by further increasing the supply of formal skills, without addressing the problem of creating competitive firms, may simply result in even higher levels of unemployment and underemployment of skilled workers. Of course, once competitive sectors begin to take off, formal skills shortages of specific types soon emerge that will have to be addressed. Indeed, for some categories of formal skills, such as accountancy, computing skills or mechanical engineering, there may be genuine shortages even at the initial stages of sectoral development, depending on the types of industrial processes being attempted.

It is therefore important to identify the main causes of low competitiveness. If a wide range of competitive enterprises struggle to find skilled workers, the problem could be one of formal skills shortage. But this is not typical in a developing country. The low productivity problem in most developing countries is not primarily due to the limited supply of formal skills, but to the limited capacity of enterprises to use the

existing supply of skills competitively. This problem is not likely to be solved by accelerating the rate at which the supply of formal skills is increasing. Obviously, genuine pockets of formal skills shortages may exist in emerging enterprises that are otherwise competitive. In these areas, the policies for supporting formal skills development discussed in this section are relevant.

5.4 The appropriability problems that innovators face

It is widely recognized that investment in innovation may be constrained if the returns on these investments cannot be appropriated. The problem here is that innovation can be imitated and, if this happens too rapidly, the innovator could earn an insufficient prize, which may deter further investments in innovation. Private contracting between the innovator and imitators to prevent imitation is unlikely and this appropriability problem therefore requires public policy. There is extensive literature on the benefits of temporarily protecting the high profits of innovators by preventing imitation or otherwise providing large profits to innovators to provide incentives for more innovation. These high profits are known as Schumpeterian or technology rents and are often based on the enforcement of intellectual property rights for particular periods after an innovation is declared (Dosi 1988; Khan 2000a). The implications of preventing imitation are obviously different for innovators, imitators and consumers. Long periods of protection can hurt consumers and imitators and so there is a trade-off between the immediate costs of preventing imitation and the long-term benefits of faster innovation. Moreover, very long periods of protection can even slow the pace of innovation by making it difficult for new innovators to build on previous innovations.

While advanced countries largely rely on innovation to drive growth, a significant part of growth in developing countries is based on the adoption and adaptation of existing technologies. Although innovation is undoubtedly happening in many developing countries, most growth comes from adopting and adapting known technologies. East Asia's high growth in the 1960s and 1970s was based on rapid technology transfer and imitation, primarily of Japanese and American technologies. The emergence of trade-related aspects of intellectual property rights under the World Trade Organization and other intellectual property rights protection agreements means that strategies of catching up now have to be very different. Given the international architecture protecting technology rents, it is now argued that to attract foreign technology providers, developing countries have to credibly protect their intellectual property rights since global companies are likely to choose production locations where illegal imitation is least likely.

Strong protection of intellectual property rights is therefore often recommended for middle-income developing countries to attract high-technology foreign direct investment (Hoekman, et al. 2004). Here too, however, important governance questions are at stake. Effective protection of intellectual property rights is not enough. Developing countries have to be able to select the technologies that are most attractive for them and create appropriate incentives to attract these technologies. Governments need specific negotiating skills and knowledge of World Trade Organization rules to negotiate incentives and contracts with multinationals so that the most desirable

technologies (those with the highest spillover for domestic companies) are transferred to their countries.

The current system of global intellectual property rights is not necessarily immutable and there are many questions about how desirable this architecture is for both developing and developed countries. We do not have the space to review these questions here, but there is a strong case to be made that the definition of intellectual property rights in international agreements, such as the 1994 agreement on trade-related aspects of intellectual property rights, is detrimental to the interests of developing countries. The high level of protection has arguably made it more difficult for developing countries to imitate, engage in backward engineering or develop their own component supply industries independently of the locational decisions of global multinationals. Developing countries have much less freedom now to improve their position in the global value chain by attempting to catch up independently of the locational decisions of global multinational companies.

Ironically, the high level of protection for innovators may also be slowing innovation in advanced countries (Stiglitz 2007: 103-32). Long periods of protection of technology rents can harm innovation in advanced countries because they can slow the flow of knowledge to new innovators. Innovations are obviously built on previous ones, but if the latter remain protected for long periods, innovators require complex and expensive licensing arrangements with previous patent holders, which can slow the flow of innovations.

Given that the current international agreements are here for now, the protection of intellectual property rights to attract higher-technology foreign investment creates opportunities and challenges for developing countries. With accession to the World Trade Organization, developing countries cannot just copy advanced technologies or even set domestic content requirements that induce foreign technology owners to transfer technological knowledge to local companies. At the same time, the importance of technology transfer to domestic companies remains just as important for sustaining broad-based national development (Cimoli, et al. 2009; Stiglitz 2007). A more complex structure of incentives and strategies is now required to attract the desired technologies and induce technology transfer to domestic firms. A failure of policy in this area can result in a reduction in growth, particularly in middle-income countries. In the longer term, the architecture of trade and intellectual property rights may also need revisiting to develop a more equitable set of global rules that protects the interests of different countries more fairly.

5.5 “Discovery” and appropriability problems

Investments to discover activities that are profitable in developing countries can also face appropriability problems (Hausmann and Rodrik 2003). The issue here is that countries may be good at making some products, but this may not be known to the investment community. Investors putting their money into different production activities will sometimes lose, but they will occasionally discover products that can be profitably made. If other investors can easily imitate this discovery, the original investor

could even lose money (for instance, if wages go up as a result of rapid imitation and the initial investors cannot recover their investments in discovery). Put another way, the first mover's projected profits may be too low to warrant investing in discovery. This contracting problem can result in underinvestment in discovery, which public policy needs to address with appropriate tools. Unlike innovation, the policy of preventing imitation through patents will not work in this instance because there cannot be a patent for discovering the products that can be profitably produced in a country.

The discovery argument is compelling in theory, but the proposition that countries have hidden comparative advantages that need to be discovered is not particularly convincing (Khan 2009). For one thing, countries are unlikely to have "hidden" comparative advantages that they are unaware of. It is implausible that some developing countries have an innate advantage in producing, say, hats rather than bed sheets, and that the task is simply to discover the latter. It is more likely that countries are not competitive in sectors in which they *should* have comparative advantage due to lack of the tacit organizational knowledge required to organize production competitively. If so, then without a solution to the problem of how to acquire this organizational knowledge, investments in discovering new sectors will fail because there may be no hidden and ready-made sectors with comparative advantage waiting to be discovered. In general, however, the possibility that first movers may be unable to capture the full benefits of their investment can sometimes justify subsidizing investments in new sectors.

If the development of new sectors is indeed impeded by contracting failures in financing investments in discovery, the appropriate policy would be to subsidize experimental investments in new sectors. The governance capability required to ensure that these investments are not wasted is quite simple. Governance agencies would have to ensure that subsidies are only available for start-ups in new sectors and that the financing is time bound; that is, just long enough to discover whether or not hidden comparative advantage exists in a particular sector. The important governance capability here is to identify what counts as a new sector and to ensure strict time limits for subsidizing trials in new sectors. In other words, if discovery were the primary problem, the monitoring and evaluation requirements for industrial policy solutions would be straightforward. Unfortunately, this is unlikely to be the main contracting failure preventing the emergence of new competitive sectors in developing countries. In reality, the task of entrepreneurs in developing countries is generally not to *discover* the hidden comparative advantages of the country, but to *create* comparative advantage by building efficient organizations. This requires the acquisition of firm-level organizational and technical capabilities in ways that will be discussed later.

While the discovery problem is unlikely to be the primary barrier to the growth of modern sectors in developing countries, there may nevertheless be significant positive spillovers associated with investments in new sectors. The first investors in a sector that is not yet competitive may have to grapple with correcting government policies in appropriate ways, and to acquire organizational and technological capabilities. This may then make investment easier for followers, whose task is then the simpler one of imitating the organizational design of the first-movers. Follower firms would still have to do some organizational learning, but the time and risk involved

would be less if the successful organizational design of the first firms could be observed and if managers and supervisors from the first firms could be persuaded to migrate to new firms.

If the lower rate of return that the first mover gets as a result of this imitation is insufficient to induce the initial investments in capability development, then, in addition to the learning problem, there may also be a spillover problem for the first mover that policy has to address. If investments in new sectors are judged to be constrained by these spillovers (in addition to low competitiveness due to missing organizational capabilities), additional public subsidies for investments by first movers may be justified. However, we will see later that ensuring high effort in learning can be a problem even if there are no spillovers that deter first movers from investing.

5.6 Coordination failures

Development economists have long recognized that private contracting may fail to coordinate investments across sectors; this can be a problem in some contexts (Murphy, et al. 1989; Nurkse 1953; Rosenstein-Rodan 1943; Scitovsky 1954). Moreover, in the presence of “lumpiness”, investments in one sector or firm can have more than a marginal effect on the profitability of other sectors by raising the demand for their products or by cheapening the price of their inputs.¹ The efficiency attributes of market prices as signals of social costs and benefits can break down in this context, making private contracting based on existing prices inefficient.

It is theoretically possible that an unprofitable investment in a particular firm or sector can become profitable if there are complementary investments in other sectors. In developing countries, this has been the justification for planning exercises and even for state-coordinated “big-push” industrialization. This could involve the coordination of investments across sectors enjoying complementarities and external economies. The problem is that the governance requirements for achieving successful big-push industrialization are very significant and few developing countries have the governance capabilities to identify and implement coordinated industrial policy of this type.

To achieve successful coordination, government agencies must be able to identify the sectors for inclusion in a big push or coordinated plan on the basis of objective data and analysis, without being overly influenced by special interests. Otherwise, sectors that cannot be justified on economic grounds may be included for promotion. Furthermore, to effectively coordinate investments, the state’s planning exercise has to be aligned with the interests and capabilities of the private sector. Incentives and instruments supporting investments have to be effective for achieving the desired resource allocations, or the desired coordination will not be achieved. The capacity to monitor and identify mistakes early on, so that policy can be changed or abandoned quickly, is also required.

¹ Lumpiness refers to large fixed costs that result in scale economies.

Without these conditions, there is not much point in spending public resources on constructing and publishing detailed plans that only get ignored. Unfortunately, this frequently happens in developing countries, particularly because constructing detailed plans can serve to employ large numbers of economists and officials in an apparently useful activity. In reality, plans of this type are rarely implemented. Without very significant implementation capabilities, a broad, indicative plan setting out a government's plan for investment in infrastructure and the policy framework may be all that is required.

It should be noted that there is a separate requirement for governments to coordinate their own agencies to ensure that policy and service delivery tasks are adequately coordinated and financed. At the simplest level, government agencies have to ensure that different policies and incentives are coordinated so that they do not cancel each other out. It often happens, for instance, that taxes on the inputs used by a firm can wipe out the implicit subsidy the firm gets as a result of tariff protection. Coordination within government is essential for delivering services and policies effectively, but this is not what is referred to as investment coordination in the literature. The latter refers to the coordination of sectoral investments in contexts where contracting failures prevent investment coordination by private firms. This is a much more ambitious objective requiring governance and implementation capabilities that most developing countries lack.

However, as countries progress from lower to higher levels of middle income, and move toward increasingly complex industrial clustering, there is an increasing need for complementing market coordination with industrial policy. For instance, policy may attempt to coordinate sectoral investments to promote the emergence of viable production clusters; for instance, in electronics or automobiles. The emergence of competitive industrial clusters may require the presence of a variety of suppliers of components. This, in turn, may require policy-induced incentives to achieve coordinated investments to support the clustering. Industrial policy of this type can reduce the long-term costs of firms, and thereby increase their competitiveness by encouraging the clustering of complementary suppliers in industrial parks. But governance capabilities to ensure coordination are critical and in their absence resources invested in coordination can be wasted.

The risk of wasting resources can be reduced if governments follow the demand coming from private investors rather than attempting to direct investors to locate in sectors the government chooses. There have been many failed attempts to develop clusters and special economic zones in developing countries, and much successful clustering has happened through natural processes of private location without much government assistance. To ensure that public money is not wasted, coordination attempts should start off as small-scale trials, but even these may require quite significant agency capabilities. Financing arrangements, again, are important, and industrial parks are much more likely to be successful if government support complements private investments so that private investors pre-commit their own funds at the outset of such a development. This ensures that the right firms and locations are selected. It may also help to have dedicated agencies responsible for delivering the coordination, in independent parks, say. Competition between different regions, each

with their own budget for setting up clusters, can also result in effective outcomes, as the experience in the People's Republic of China shows.

An important advantage of competition between experiments is that it is possible to try several experiments simultaneously with different financing instruments and conditions in different sectors or regions to see what is likely to work in the local context. Ultimately, it is this type of pragmatic strategy that the Chinese call "crossing the river by feeling the stones" that has delivered results in the most successful countries. Follower countries have to learn to devise their own strategies based on an understanding of the problems that they are trying to solve and their own institutional and political constraints in implementing particular solutions.

5.7 Learning organizational capabilities and related contracting failures

The most important constraint to the development of modern sectors in developing countries is frequently the absence of a broad base of firms that have the technological and organizational capabilities to adopt, adapt and use available technologies profitably. The technological capabilities of workers and managers refer to their abilities to use particular machines and technologies. These are acquired partly through formal education and training, but often the acquisition of the missing tacit knowledge by doing and experimentation is more important. Consider the technical capabilities required to drive a car. Classroom instruction on driving is helpful, but it does not provide the required tacit knowledge; gaining it involves actually driving. Driving capabilities can take a longer or shorter period to acquire, depending on how committed the learner is, the effort he or she puts in, and the initial level of formal skills. The same is true for operating many machines and production processes, including sophisticated machines that workers with limited formal education can operate.

While the technological capabilities of individuals within a firm are important, firm competitiveness depends even more on the whole firm working together as a team. The critical characteristic of a team is that the productivity of individuals in the team is not entirely determined by individual skills or effort, but depends on the collective organization of the team (Alchian and Demsetz 1972). An individual's productivity can be high or low depending on the type of team that the individual is in. Think of the productivity of a single worker on a production line; how well a firm is organized is a function of the tacit production capabilities that have been gradually acquired and that are embedded in the routines of the firm. These routines do not just describe how particular processes are carried out, but also how the firm responds to new challenges to change existing routines. The organization of a firm describes its internal management systems, incentive structures and systems for monitoring work, ensuring quality control, reducing input wastage and effective inventory management. These organizational systems are critical determinants of the productivity and competitiveness of a firm as a whole as well as the productivity of its individual workers. The organizational structure that achieves competitiveness cannot simply be a copy of the organizational structures of competitive firms producing similar products in more advanced countries. Each country has specific initial conditions that determine the organizational structures that work best, and this has to emerge through

experimentation and the acquisition of tacit knowledge through high-effort learning-by-doing.

The critical point is that the productivity of individual workers depends not just on their own technological capabilities (both formal and tacit), but also on the organization of the firm they are working in, which we describe as its tacit productive capability. A worker with high technological capabilities will register low productivity if poor inventory management or bottlenecks elsewhere in the firm result in long periods of idle time. Similarly, input productivity depends on input wastage and product rejection rates that can be attributed to poor organizational design; and capital productivity depends on capacity utilization, downtime and so on, which are in turn functions of successful organizational design. Thus, all the critical productivities that determine competitiveness are functions of a firm's tacit productive capabilities, which are embedded in its production routines. Because new firms in developing countries typically have low organizational capabilities, they tend to have low competitiveness even if they acquire the most appropriate machines and have workers and managers with the formal knowledge required to use this technology. This is true even for low-technology production processes such as garments manufacturing, and much more so for sophisticated products. The acquisition of the required tacit productive capabilities is one of the most general problems that affect almost all areas of technology acquisition in developing countries, and is subject to important contracting failures. In the absence of solutions to these problems, a new firm or an entire country can find its technology acquisition strategies unsuccessful as competitive firms will fail to emerge.

Countries that have few firms with the appropriate tacit productive capabilities will fail to benefit from industrial policy strategies that address other problems. For example, strategies to increase the supply of skilled workers to firms or to support first-mover investments assume that there is a base of firms that can potentially benefit from these strategies because they already have the tacit productive capabilities to organize competitive production if these other problems could be addressed. In reality, capabilities are typically missing and require the acquisition of tacit knowledge about routines and processes. Tacit knowledge cannot be acquired through formal education, but has to be acquired through experimentation and doing. As a result, progress is difficult to test using formal means like examinations. Yet this process of capability development has to be financed, even if progress is hard to monitor, evaluate and control. The problem is that financing "doing" without a large effort is unlikely to generate much "learning". Effort is particularly important for developing organizational capabilities because it involves continuous changes in firm organization that involves adjustment costs and is often likely to face internal resistance. Managers and other stakeholders therefore have to assume risks and costs during this process. They would, quite rationally, want to avoid this unless they had a strong compulsion to increase their competitiveness. Given the high internal costs of continuous adjustments to acquire productive capabilities, effective learning requires pressure or compulsion on managers and workers to achieve competitiveness rapidly.

This brings us to the contracting problem that these investments face. Investors in developing country firms that are initially uncompetitive have to take significant risks to finance this process on their own. The difficulty of monitoring effort means that

external financiers are exposed to significant contracting risks. Since it is not possible to directly observe the effort put into learning, evaluating it by looking at intermediate outcomes sometimes gives the wrong answers. On the other hand, if the effort is too low, the entire investment in plant, machinery *and* learning can be unprofitable.

The policy response to this contracting failure is for the government to share some of the risks and costs of this financing. Protecting domestic markets, providing export subsidies and other types of explicit and implicit subsidies can assist infant industries engaged in developing their productive capabilities. Yet, public financing is likely to be wasted if it does not address the underlying problem of how to ensure a high level of effort. Unless the financing comes with conditions that induce high effort, competitiveness will not improve rapidly enough and the industrial policy can become unsustainable due to the fiscal burden of growing subsidies. When infant industries fail to become competitive despite decades of subsidies, it is almost always due to a failure of ensuring effort to become competitive.

This is the most general contracting problem affecting technology adoption. If a firm lacks these tacit productive capabilities, it will not become competitive even if other problems constraining its competitiveness are solved. Strategies for developing organizational and technological capabilities are therefore an essential component of successful industrial policies. The problem for policy design is that the strategies for supporting effective learning have differed greatly across countries because states differ a lot in their monitoring and enforcement capabilities. As a result, financing strategies that worked in one context have frequently failed in others.

Historical experience suggests that supporting capability development using the top-down industrial policy of the type seen in the Republic of Korea requires very strong monitoring and enforcement capabilities on the part of government agencies. The political economy underpinning this enforcement is typically missing in most developing countries (Khan and Blankenburg 2009). Without the requisite institutional and political capabilities, top-down industrial policy is likely to allocate resources to firms without achieving high effort, and competitive firms are unlikely to emerge. However, the experience of other developing countries with weaker state enforcement capacities shows that productive capabilities can still be developed if the industrial policy instruments are designed differently and the conditions that induce high effort can be enforced given the institutional and political capabilities of the state.

5.8 Learning, catching-up and policy

The essential features of the catching-up problem can be made explicit using a simple mark-up pricing model for products of defined qualities. The model helps explain why low wages are insufficient to achieve competitiveness in developing countries even if they are adopting simple labor-intensive technologies. By decomposing the components of competitiveness, it can be seen that firm-level organizational capabilities are vital for raising all the productivities that determine competitiveness. The global price of a particular product of quality Q is set by its cost of production in the most competitive country producing that product. The price can be arithmetically broken down into a unit labor cost component, unit input costs and the amortized unit capital costs representing the unit costs of machinery and buildings:

$$P_Q^{global} = \left[\frac{W_Q^{leader}}{\Pi_Q^{leader}} + \sum_i \frac{P_{Qi}}{\alpha_{Qi}^{leader}} + \sum_k \frac{P_{Qk}}{\beta_{Qk}^{leader}} \right] (1 + \bar{n}) \quad [1]$$

(unit labor cost) (unit input cost) (unit capital cost) (markup)

To simplify the notation, we do not denote products and simply refer to a particular quality of a product indexed by Q , so that $Q+1$ represents a product with a higher-quality than that of product Q . P_Q^{global} is the international price of a particular product of quality Q . W_Q^{leader} is the wage level in the leading country in the industry producing the product of quality Q . Π_Q^{leader} is the productivity of labor in this sector in the leader country, measured by the output per person in this activity. The first term on the right hand side of the equation is therefore the unit labor cost. The second term is the unit input cost. The production of the product requires i inputs such as raw materials or semi-manufactured inputs. To simplify, we assume that these inputs are globally traded, each with a global price of P_{Qi} . The efficiency with which inputs are used is measured by the productivity of input use (output per unit input). In the leader country, the input productivities of each of the i inputs are represented by α_{Qi}^{leader} . Input productivity primarily measures input wastage due to poor skills and management processes as well as input losses due to rejected final products. Both depend on the efficiency of the organization of production within the plant. In many production processes, levels of input wastage are a critical determinant of competitiveness.

The third term refers to the unit capital cost attributable to the cost of machinery and buildings. The firm uses k types of capital inputs, the most important usually being machines with a globally traded price, though land and buildings can also be significant in some cases. The unit cost of capital is determined by the fraction of each component of the capital cost attributed to the particular period of production, represented by P_{Qk} , divided by the output-capital ratio for each type of capital (the productivity of capital) measured by β_{Qk}^{leader} . The output-capital ratios or capital

productivities depend critically on capacity utilization, which depends on how successful the organization is in preventing production bottlenecks, enhancing sales and reducing machine down time. The mark-up is set at m_Q .

In the same way, the cost of production in the catching-up country (in a common currency) is the domestic cost $C_Q^{domestic}$ for the product of quality Q, given by an exactly equivalent equation, but with the appropriate domestic productivities and prices:

$$C_Q^{domestic} = \left[\frac{W_Q^{domestic}}{\Pi_Q^{domestic}} + \sum_i \frac{P_{Qi}}{\alpha_{Qi}^{domestic}} + \sum_k \frac{P_{Qk}}{\beta_{Qk}^{domestic}} \right] (1 + m_Q) \quad [2]$$

The follower country becomes competitive when $C_Q^{domestic} \leq P_Q^{global}$. The decomposition shows that wages are potentially a small contributor to the competitiveness of a firm. The problem of missing tacit knowledge is that the productivities of labor, inputs and capital are likely to be significantly lower in follower countries. Typically, this makes the domestic cost of production higher than the world market price, even for relatively low technology products *and despite lower wages*. It may appear that a low enough wage level can compensate for these productivity differentials, but this may not be feasible in reality. Indeed, in many cases, even zero wages may not be able to compensate for lower input and capital productivity even in labor-intensive technologies. This is because inputs and capital equipment have global prices that have to be paid. If $\alpha_{Qi}^{domestic} < \alpha_{Qi}^{leader}$ for globally traded inputs, the greater wastage of inputs alone could result in a higher domestic cost of production even if the domestic unit labor cost could be reduced to zero. This is why efficiency in controlling the wastage of inputs and reducing product rejection rates is often a critical variable in achieving competitiveness.

In addition, the productivity of capital equipment is also often lower in the catching-up country, with $\beta_{Qk}^{domestic} < \beta_{Qk}^{leader}$ as a result of machinery not being properly set up or the scale of production being too low. Indeed, a small disadvantage in these input and capital productivities could mean that even with low or zero wages, the cost of production in a developing country may be higher even in technologies in which it should theoretically have comparative advantage. For countries where wages are not that low, the need to increase productivity through the acquisition of tacit productive capabilities is even more pressing.

(a) The sources of productivity

The productivity of inputs including labor depends on various economy-wide and firm-level factors. The economy-wide determinants of a firm's productivities include the quality of public goods, the supply of utilities, formal education quality in that society and infrastructure. Input productivities are also determined by firm-level variables such as the capital equipment used and the technological capabilities of the workforce.

The latter depends partly on their formal training and education and on their tacit knowledge of operating the equipment efficiently. An even more important determinant of firm-level productivity is the firm's organization: how the production team is set up to ensure a smooth flow of production, how machinery is set up to reduce bottlenecks and how management systems are set up to reduce input wastage, maintain quality and respond to challenges. These tacit productive capabilities of the firm are embedded in the internal routines of the firm and learned through continuous experimentation with firm organization to enhance high productivity.

Huge differences in productivity persist across firms in different countries even when they use identical machinery (Clark and Wolcott 2012; Sutton 2007). The importance of firm-level organizational capabilities as the critical determinant of competitiveness is supported by many observers of technological capabilities. They point out that the technological and organizational knowledge necessary for the success of firms is tacit knowledge embedded in routines (Dosi 1988; Nelson and Winter 1982; Pelikan 1988; Perez and Soete 1988). Developing efficient routines inevitably involves experimentation and the adaptation of practice to local conditions and not just the implementation of blueprints from a manual (Lall 1992, 2000a, 2000b, 2003).

The importance of organizational capabilities becomes obvious when individual workers migrate from developing countries to more advanced ones. In migrating to join an already efficient organization, an individual worker slots into existing routines and thereby rapidly improves productivity. In contrast, if the production team as a whole is experimenting with routines, the achievement of effective individual work routines can take a long time and, until then, the individual productivities of each worker remain low, as do those of other inputs and capital.

Thinking about competitiveness and productivity in this way also underlines a further problem. If organizational know-how is largely tacit knowledge, then a firm has to engage in learning-by-doing *before* it has achieved competitiveness. This implies that a firm in a new sector in a developing country will require a period of loss-financing as it engages in capability development. But the loss financing will only be validated if stakeholders within the organization put in high levels of effort and actually achieve competitiveness.

(b) Loss-financing for learning

Figure 5.1 shows some of the fundamental issues that developing countries face in catching up with the leaders and in acquiring and absorbing technology. The competitiveness curve for a country summarizes its distance from global competitiveness across different qualities of the product. The x-axis measures the quality of the product, and the y-axis the follower's competitiveness in producing that quality. Competitiveness

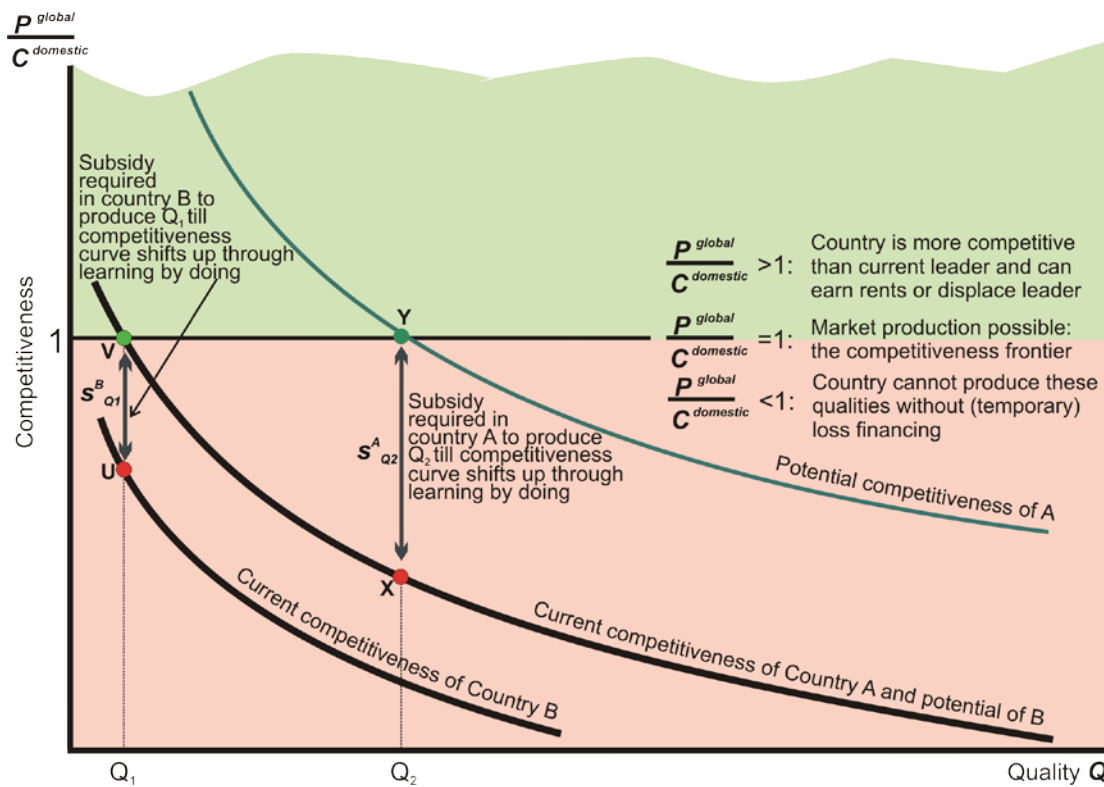
is measured by the ratio $\frac{P_Q^{global}}{C_Q^{domestic}}$. The closer this ratio is to unity, the closer the

competitiveness of the firms in the follower country to those in the leader country. When this ratio is 1 or higher a country can sell a product of this quality in global markets and therefore the horizontal line at 1 can be read as the global competitiveness frontier for

the follower country. When the ratio is less than 1 for a particular quality, a country will either be unable to produce that quality or will require temporary loss-financing to allow production. The required rate of “subsidy”, s_Q , equals $1 - \frac{P_Q^{global}}{C_Q^{domestic}}$ and is shown in Figure

5.1 as the gap between the global competitiveness frontier (the horizontal line at $P/C=1$) and current competitiveness at quality Q , defined by the current competitiveness curve.

Figure 5.1 The competitiveness curve: Catching up and technology absorption



Source: Khan (2009).

The loss-financing required to engage in learning-by-doing at quality Q depends on the gap between the domestic cost of production and the global price for products of that quality. Products of higher quality generally require more sophisticated organizations and technical capabilities to produce, and so the gap that the developing country has to jump becomes wider as product quality increases. The competitiveness curve can be extended to apply to related products of different complexity. For instance, different “qualities” could be seen as components of a product in a vertically organized value chain. Low qualities could be low value-added parts of the value chain, such as packing and assembling; medium qualities could be intermediate products involving assembly; and higher qualities could be design, product development, and marketing.

Absent financing for capability development, the wider productivity gap in higher qualities forces market-reliant developing countries to specialize in low-quality products. This may have nothing to do with the relative price of labor and capital, as in standard neoclassical theory. It is possible for a developing country similar to B in

Figure 5.1 to have organizational capabilities that are so low that it cannot even produce the lowest qualities of most products.

The loss financing necessary to allow production to commence can be measured as a per unit “subsidy”, s_Q , which brings the initially higher domestic cost of production $C_Q^{domestic}$ into line with the global price P_Q^{global} . The subsidy need not be a government transfer. It could be private loss-financing in the form of investors accepting a lower mark-up or providing additional cash to cover a period of loss-making. Public subsidies can also be delivered in a variety of ways; some explicit, others more subtle. They include export subsidies, import protection, subsidized interest rates, subsidized inputs or infrastructure or a cash subsidy. Thus, many different financing instruments are available and these can broadly be described as ways of providing “rents for learning” (Khan 2000a).

An important consideration for industrial policy is the determination of the levels of quality of the products at which capability development is attempted. Under the plausible assumption that $s_{Q+1} > s_Q$, a higher subsidy is required if a firm wants to engage in producing higher-quality products. A number of propositions are relevant for policymakers to consider when making decisions about the types of products and qualities that should be supported by industrial policy.

Proposition 1. The loss-financing required for enabling learning-by-doing is, in general, higher the higher the quality of the product. This is because the competitiveness curve slopes downwards with higher quality because although the world prices of higher-quality products are higher (which is why they are more desirable to produce), the productivity gap between follower and leader countries is likely to be even greater at higher qualities, implying that the follower country is less competitive in higher-quality products (Khan 2009). Moreover, the subsidy will be required for longer if the gap in competitiveness is greater to begin with, as more complex organizational capabilities have to be developed. Attempting to move too far up the quality ladder too fast therefore has costs in terms of the size of the financing and the period for which it is required.

Proposition 2. It is more desirable to produce higher-quality products because they add more value to the economy than lower-quality products. Furthermore, success in higher-quality products is likely to make the future adoption of superior technologies easier since sophisticated organizational capabilities would already have been acquired in some firms. The acquisition of tacit productive capabilities at a particular level by firms in a country explains why countries specialize in clusters of related qualities. Once firms with particular organizational capabilities emerge, they are likely to diversify into areas where similar capabilities are required. Innovation in advanced countries is also more likely in higher-quality products, such as electronics, than in lower quality ones, such as garments, and within the higher-quality segments of these sectors. A follower country with firms capable of producing higher-quality products is more likely to benefit from future innovations by being able to adopt these innovations as they happen in more advanced countries.

Proposition 3. The trade-offs between these considerations affect the choice of quality to aim at. The aim should be to achieve the highest value-added, and therefore

quality, that is feasible, given the initial organizational and technological capabilities of firms and the governance capabilities of policymakers to manage and impose conditions on the financing. While higher qualities are more desirable, the higher the targeted quality, the bigger the immediate subsidy required and the longer it has to be managed. The governance requirements of monitoring and evaluation are therefore greater for a policy that targets higher qualities; and if the gap in initial productivities is too great, traversing it in a feasible timeframe may not be possible for domestic firms. Moreover, the competitiveness gap is only partially due to the absence of tacit knowledge. Part of the gap could also be due to low levels of formal education and skills, and to the poor quality of economy-level public goods. If the initial gap is too big, no amount of firm-level capability development is likely to remove it entirely. Given the costs and risks of aiming too high, there is a limit to how high up the quality ladder it is feasible to go. An excessively ambitious strategy can fail to achieve the desired results and may be less desirable than a less ambitious strategy.

Figure 5.1 suggests that a country like B will need loss-financing of s^B_{Q1} from the outset to begin production even of the lower-quality product Q_1 at point U. The success of a strategy of loss-financing is measured by the pace at which productivity increases. Success should result in the competitiveness curve rapidly moving up until the loss-financing is no longer required at V. For country A, which can produce Q_1 competitively, the imperative may be to move to a higher quality, not only to prepare for future competition from B, but also to benefit from faster productivity growth clustered around quality Q_2 . Thus, for country A, there may be a policy justification to assist learning-by-doing around quality Q_2 by organizing temporary loss-financing of s^A_{Q2} . The challenge for A would be to go from point X to point Y to achieve competitiveness at this higher-quality level. This would not only allow the country to raise its domestic value-added and living standards, but also to ensure faster productivity growth in the future.

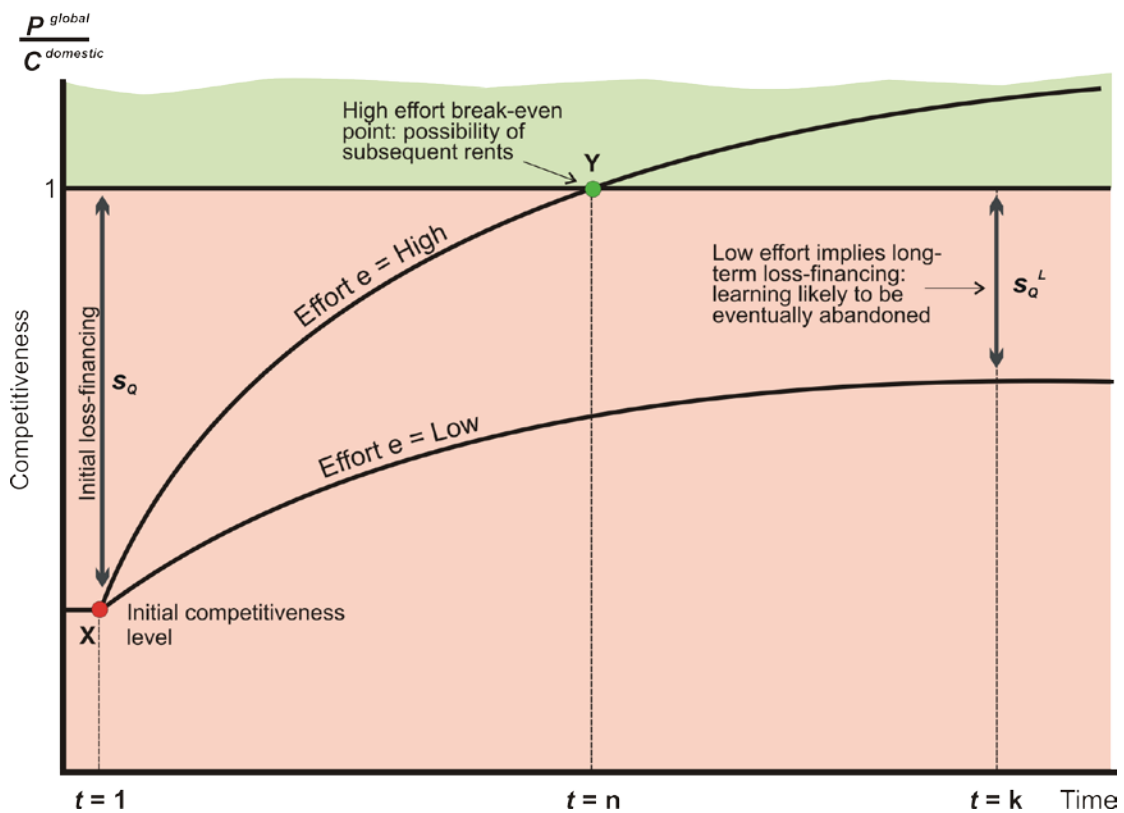
(c) Effort levels and learning success

Time and effort are inversely related in the development of technological and organizational capabilities. The lower the effort, the longer it takes to achieve competitiveness. The rate at which the competitiveness curve rises is critical for the success of the financing strategy and depends on the degree of effort in developing competitiveness through organizational experimentation with new routines. Unfortunately, disciplining the learning process to ensure consistently high levels of effort is very difficult. Effort cannot be directly observed and intermediate levels of productivity growth are hard to measure unless a firm is already close to the competitiveness threshold, in which case market tests like export growth can be used as proxies for effort. If the firms being supported have not yet achieved a significant level of export, or if variations in exchange rates create too much interference to assess underlying competitiveness fairly, looking at export performance or any single indicator may fail to give a fair idea of effort.

Even if proxies were available to measure how competitiveness was improving, a credible contract for financing effort would also require compulsions for the production team to put in high levels of effort in a sustained way. Without this pressure,

a production team receiving a subsidy that allows it to produce could simply replicate its existing routines without experimenting to improve its productivity. Given that raising productivity involves costs and risks for the management teams of a firm, it may be rational for them to try and live off the subsidies. Management effort could then go into sustaining the subsidies by making political alliances or sharing some of the rents with factions within government and the bureaucracy. The political links of firms can make subsidy withdrawal too costly for many governments, and firms with such links are unlikely to put in high levels of effort in the process even if performance could be measured. The characteristics of firms, the types of markets they operate in and the institutional and political context can each define constraints on measuring and ensuring high levels of effort in learning.

Figure 5.2 Effort levels and the viability of the learning process



Source: Khan (2009).

Figure 5.2 shows what happens to competitiveness over time with different levels of effort. Firms begin at point X where they require an initial loss-financing of s_a to produce a product of quality Q . With high effort, firms can increase their productive capabilities to become competitive at time $t=n$. But with low effort, their productivity growth is not high enough to catch up with the leaders (whose productivity is also growing), and in this case the continuation of production will require indefinite loss-financing. An important consideration, often not recognized, is that when governments provide the financing for learning, firms face adverse incentives for putting in high

effort. The “prize” for firms that put in high effort and become competitive is the loss of their financing! Successful firms effectively substitute uncertain market profits for the subsidies that allowed them to operate with much lower levels of uncertainty.

The result is often a serious incentive compatibility problem in a context of uncertainty that can induce “satisficing” behavior from management.² The existing routines of production within such firms may be difficult to change and it may be easier to expend management effort on “political activity” to protect subsidies. Not surprisingly, managers are only likely to put a lot of effort into developing organizational capability and competitiveness when there are credible pressures on them from outside, such as from financing agencies or the state. Otherwise, satisficing strategies may emerge, with low effort in raising competitiveness and more effort in protecting subsidies. Even if there is productivity growth, if this is too low the competitiveness threshold may never be achieved if productivity is also increasing in the leader country. The infant industry will fail to grow up and eventually catching-up strategies will have to be abandoned, but this may be years later and managers and workers may not be too concerned about this right away.

5.9 Capability developments in Asia

Most of the literature on industrial policy refers to the East Asian experience, particularly the Republic of Korea, during the 1960s and 1970s, when the financing of organizational capability development took place through significant ex-ante rents to firms, with enforceable conditions that ensured high effort in raising competitiveness. However, for historical reasons, the East Asian economies were unusual in that they had political settlements that allowed the enforcement of tough conditions on the domestic firms that received this type of support (Khan 2009; Khan and Blankenburg 2009). In the Republic of Korea, significant rents were allocated ex ante to large firms to provide time and resources for learning-by-doing. The financing provided to the *chaebols* through low-interest loans, protected domestic markets and export subsidies came with credible sanctions if export targets were not met. The buoyant global markets at that time and the ability of diversified *chaebols* to start exporting quickly meant that export performance was a good indicator of effort. The political and institutional conditions in the Republic of Korea also allowed corrective and sometimes punitive action to be taken against recipients of subsidies if export and other evidence suggested low effort. For instance, the state could not only withhold export subsidies if export growth was not achieved, it could also reallocate the ownership of plants to different *chaebols* if they were more likely to acquire the necessary organizational capabilities. Not surprisingly, this ensured high effort in acquiring the requisite productive capabilities by all the organizations receiving support.

When other developing countries, such as India and Pakistan, attempted broadly similar types of industrial policy support for infant industries in the 1950s and 1960s,

² Herbert Simon argued that in contexts of bounded rationality, where it is not possible to know all the consequences of actions, decision makers will not necessarily maximize. Instead, satisficing can be a sensible strategy whereby the aim is to achieve satisfactory levels of returns, without exposing firms to uncertain outcomes (Simon 1956).

they did not have the institutional and political conditions that could define and impose credible conditions for ensuring high levels of effort. As a result, effort was often low and technological and organizational capabilities developed much more slowly. Indeed, many firms and sectors that were supported at that time never became competitive (Khan 1999, 2011, 2013a).

Today, these instruments for financing capability development would only make sense if market conditions for a contemporary late developer allowed a similar export-oriented manufacturing growth strategy, and if the political and institutional conditions allowed the enforcement of similar conditions on firms receiving support. Not only have the rules for participating in global trade changed, but the relevant features of the political settlement in the Republic of Korea that allowed its state to monitor and discipline particular types of rents were very different than political settlements today in most developing countries (Khan 2010, 2012a). If the only instruments available for financing the development of organizational capabilities were the ones the Republic of Korea used, most developing countries' industrial policies would fail because they typically lack the institutional and political capabilities to monitor and police significant rents allocated ex ante to large firms in this way.

Fortunately, the Republic of Korea's model of centralized subsidy allocation is not the only one for addressing contracting failures affecting learning (Khan 2000a, 2000b). The experience of successful sectors in developing countries with very different political settlements shows that other types of financing instruments can be effective even when governance conditions appear to be adverse for the type of industrial policy used in the Republic of Korea (Khan 2013b). The critical requirement is only that the institutional and political conditions have to be appropriate for creating credible incentives and compulsions for high effort given the financing instruments that are being used. This is borne out by examples of successful technology adoption in *some* sectors in Bangladesh, India and Thailand (Khan 2009, 2011, 2012a, 2012b).

Effort can be forthcoming if the financing instruments not only provide the resources for financing learning, but also create compulsions on firms by imposing conditions for high effort that are credible given the enforcement capacities of the state. Where this happened, the state still had to do some monitoring and enforcement, but this was successful if it was restricted to conditions that the state could credibly monitor and enforce. The development of India's automobile sector provides one such example.

In the 1980s and 1990s, it made the transition from a protected and largely inefficient sector producing low-quality cars for the domestic market to become a major global player. This was made possible by a unique combination of industrial policy instruments that financed capability development in the 1980s in the automobile sector based on a combination of public and private financing instruments (Khan 2009, 2011). Under the earlier strategies of centrally administered protection, there was no compulsion on India's protected automobile manufacturers to make the effort to achieve competitiveness in global markets. But the new strategies in the 1980s provided public rents with conditions attached that resulted in credible compulsion for high effort in building the organizational capabilities of producers.

When domestic companies were the only producers that received rents, the state failed to impose effective conditions on them. The learning effort, and therefore productivity growth, was low, resulting in the production of globally uncompetitive cars. Change came in the 1980s when Japan's Suzuki became a joint venture partner in a public sector Indian automobile company, and Maruti-Suzuki was born. In contrast to previous strategies for financing, this time there were credible conditions that induced high effort. Suzuki was given access to the significant rents in the protected domestic market, where tariff protection was still around 85% in the 1980s, but it had to achieve 60% local content within five years. Denying Suzuki access to the domestic market if the target was not met was a credible threat that forced Suzuki to transfer organizational and technological capabilities to local component suppliers. Clearly, this instrument cannot be used for countries that have already joined the World Trade Organization, which generally does not allow domestic content conditions. But this example shows how the design of financing conditions that are credible can have a remarkable effect on effort in countries where standard infant-industry protection strategies had failed to induce much effort.

To meet local content requirements, Suzuki had to invest significant resources and effort in upgrading tacit productive capabilities, not only in its own joint venture plant, but also along the entire Indian supply chain for automobile components. Suzuki's incentive was the significant rent it could achieve after meeting the local content target. But to get there, it had to invest in learning and in the transmission of organizational capabilities to a range of Indian component producers. The company therefore had no possibility of satisficing, because its ex-ante investments had to succeed if it was to collect the promised future rents. This created a financing instrument with both incentives and credible compulsions for high-effort development of organizational capabilities. Suzuki invested in and worked with its local suppliers to improve their quality-control procedures and internal organization of production to achieve the local content it had committed to. The results of its effort to transform the productive capabilities of India's tier-one and tier-two producers were spectacular. Maruti rapidly became the dominant model in the Indian market.

This financing arrangement was repeated in subsequent government-supported deals, allowing other major foreign automobile producers access to the rents in the Indian domestic market in exchange for further investments in the organizational capabilities of domestic component producers over the next decade. By the late 1990s Indian automobile component producers were competitively entering the export market in their own right, and winning international quality recognition, such as the Deming Prizes. The viability of a globally competitive but domestically owned automobile industry depends on the presence of domestically owned globally competitive tier-one and tier-two components producers who can produce the parts required for a domestically produced car. By the 2000s, the emergence of a broad range of globally competitive Indian components producers allowed Indian auto companies such as Tata and Mahindra to launch Indian branded cars.

Other examples of successful learning from Bangladesh, India and Thailand show that organizational capability development can be successfully financed in contexts very different from that of the Republic of Korea provided appropriate

financing instruments are used. These successful strategies were based on combinations of public and private financing instruments that were appropriate for the context and created incentives and compulsions for high effort in developing productive capabilities that were credible given the enforcement capacities of the state.

It is important to distinguish between the problem of financing learning and the first-mover problem because the types of financing and the conditions required for success are very different. If the development of organizational capabilities is important, then support should not be limited to “new” sectors. Many sectors that lack competitiveness, like India’s automobile sector in the 1980s, can be supported with appropriately designed financing to help them achieve competitiveness. Equally, time-bound support for new sectors may not lead to discovery unless there are actually hidden areas of comparative advantage that only need to be discovered. It is unlikely that countries have hidden comparative advantages that experiments will “reveal”. Repeated experiments in different sectors are only likely to reveal that the country is not competitive in anything because it lacks organizational capabilities in every sector.

The emergence of new sectors, even those using very simple technologies such as the Bangladesh’s garments industry, are usually not discoveries of innate capabilities, but rather the results of successful organizational development. The upgrading of sectors, like the development of the competitive automobile sector in India in the 1980s, is also clearly not the result of a discovery of hidden comparative advantage, but rather the result of finally acquiring the necessary tacit productive capabilities. The challenge is to design incentives for partnerships between technology providers and domestic firms to transfer competitive production capabilities to domestic firms. But the structure of the financing is critical and has to ensure that all parties put in high effort in raising competitiveness while they are enjoying the additional financing. The design of the financing instrument is therefore essential for industrial policy success.

5.10 Conclusions

While countries define their own industrial policy objectives, in general it will be desirable for developing countries to (i) become competitive in a variety of products at the highest feasible levels of quality, (ii) ensure these capabilities can rapidly spread to create clusters of firms creating new jobs, and (iii) move up the quality ladder across product categories to achieve wage and productivity growth. These goals require solutions to a number of potential contracting failures, but the most essential one to address is the low levels of organizational capabilities in firms in developing countries. In financing this process, it is safer to be conservative at the early stages of industrial policy by choosing somewhat simpler technologies and qualities to support, for two reasons.

First, simpler technologies and qualities in which the learning periods are shorter require simpler monitoring and enforcement conditions to be successful. Where the gap in competitiveness is small, the results of successful learning are more rapidly observed and instruments that are not effective can be abandoned before the social loss of failed financing becomes too great. And second, if the organizational capabilities in a

society are generally low, clustering through imitation is more likely if the technological and organizational capabilities required to imitate the successful first movers are closer to the average capabilities of firms in that society. In general, these spread effects are very important and there is little point in creating one or two high-quality firms that produce high-quality products that other firms in that country are too far behind to feasibly imitate.

The important point that theory and evidence suggest is that forms of financing that worked in some political and institutional conditions will not necessarily work in others. The critical requirement for success is that the conditions of getting support should also create credible compulsion for high effort in raising competitiveness. The historical experience from a number of developing countries suggests there are examples of successful capability development even in countries that have political settlements that appear to be adverse for industrial policy as traditionally understood. This suggests that closer attention to the design of financing instruments for supporting learning, such that they create credible compulsion for high effort given the political settlement of the host country, can help develop policies that can accelerate the development of new sectors and upgrade existing ones.

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