

CHAPTER 2

Can Industrial Policy Be Good Policy?

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Abstract

Can industrial policy be good policy? Can it be market-conforming (not producing market distortions via misallocation of resources) and market-ensuring (e.g. via antitrust or enforcement of property rights)? Can it create a smaller market distortion to prevent a larger one that might result from political ferment? This chapter explores issues of the definition of industrial policy, discusses market failure vs. government failure in specific industries, contrasts the options for industrial policy in regulatory states with those available in developmental states, and provides examples to illustrate these issues based on the author's empirical research on biotechnology, high definition and digital television, flat panel displays, semiconductors, software, and cellular telephones.

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2.1. Introduction

Can industrial policy be good policy? Must it be market-distorting or can it be market-conforming (not producing market distortions via misallocation of resources) and market-ensuring (e.g. via antitrust or enforcement of property rights)? Can it create a smaller market distortion in order to prevent a larger one that might result from political ferment? The argument that will be pursued here is that industrial policy can be market-conforming and market-ensuring and that the best kind of industrial policy helps markets to work better. Markets fail occasionally for the usual reasons

(the presence of externalities and collective goods, information asymmetries, imperfect competition, etc.) and governments do not always fail when trying to compensate for market failures.

This chapter explores issues of the definition of industrial policy, contrasts the options for industrial policy in regulatory states with those available in developmental states, and provides examples to illustrate the argument that industrial policy works best when aimed at correcting market failures based on the author's empirical research on biotechnology, high definition (HDTV) and digital television (DTV), flat panel displays, semiconductors, software, and cellular telephones.

2.2. Definition of industrial policy

Industrial policy is any policy that affects a subset of industries differentially from the remaining group of industries. An industry is a set of firms competing in a specific and identifiable market. A specific and identifiable market is characterized by the types of goods and services that are offered for sale by the firms in that industry. Firms may participate in more than one market and thus may be in more than one industry.

Given this definition of industrial policy, then any tax, subsidy, trade measure, antitrust enforcement measure, standard-setting policy, etc. that affects industries differently can be considered an industrial policy. Industrial policy, to the extent that it involves the application of governmental resources, reallocates those resources across the universe of industries. Here is a list of examples focusing on a single industry (automobiles):

- a tariff on automobiles that is higher than tariffs on other goods or services;
- a government subsidy to the automobile industry for research and development that is not matched by subsidies to other industries;
- a preference given to the automobile industry for low-interest loans from government-controlled banks (a form of government subsidy);
- a change in the rules governing depreciation for tax purposes that affects only the automobile industry and not others;
- an imposition of an import quota to protect the automobile industry from import competition;
- the forced breakup of a large, monopolistic automobile firm in compliance with a ruling of an antitrust tribunal;
- an announcement of a new set of automobile safety standards that emphasize results rather than technologies used to obtain those results;

- the establishment of an R&D consortium jointly funded by government and private business to advance the state of the art in automobile technology.

Industrial policy is controversial because it may be market-distorting, producing allocatively inefficient results. You can see from the list above that some of the policies are clearly market-distorting, while others are not even though they apply only to a single industry. Some industrial policies are protectionist, others are not. Some policies, notably antitrust policies, may affect a single industry with the intention of correcting the bad consequences of imperfect competition or other kinds of market failure. The intentions of such policies are to make markets work better. Similarly, a change in depreciation rules that reflects actual practices in investments in a particular area more realistically can be more market-conforming than a previous set of depreciation rules that is based on unrealistic assumptions about investment practices. Consider a change from rapid depreciation to slower depreciation rules for investments in long-term fixed assets like buildings.

While some industrial policies are market-distorting, others may be market-conforming or market-ensuring. An example of a *market-conforming* industrial policy would be the expenditure of government funds to provide accurate market information to firms in a new industry that does not yet have access to market research done by a private firm or its own industry association. An example of a *market-ensuring* industrial policy would be the expenditure of government funds to assure the competitiveness of a given market through the enforcement of antitrust and competition laws. I turn next to differentiating regulatory and developmental states because there is a difference in the abilities of these two types of states to implement certain types of industrial policies.

2.3. Distinguishing between regulatory and developmental states

One important dimension of variation across countries is the role of the state in the economy. A number of social scientists have distinguished, in particular, between *regulatory* and *developmental* states. One of the most influential scholars to do this was Chalmers Johnson in his *MITI and the Japanese Miracle*:

In states that were late to industrialize, the state itself led the industrialization drive, that is, it took on developmental functions. These two differing orientations toward private economic activities, the regulatory orientation and the developmental orientation, produced two different kinds of business–government relationships. The United States is a good example of a state in which the regulatory orientation

predominates, whereas Japan is a good example of a state in which the developmental orientation predominates (Johnson, 1982, p. 19).

The literature on the developmental state owes much to the earlier work of the economic historian Alexander Gerschenkron on industrialization in the 19th century Europe. According to Gerschenkron, some European economies were able to compensate for their 'economic backwardness' by centralizing control over the financial sector:

[T]he more backward the country, the more likely its industrialization was to proceed under some organized direction; depending on the degree of backwardness, the seat of such direction could be found in investment banks, in investment banks acting under the aegis of the state, or in bureaucratic controls (Gerschenkron, 1962, p. 44).

Note that Gerschenkron does not require that the state be the agent of centralization, but rather only in the absence of a centralized banking system.

In the 19th century, the global leader of industrialization was Britain, a regulatory state. Two industrial followers, Germany and Russia, chose different paths to centralizing financial power: Germany relied on the already centralized private banking system, while Russia relied on the state bureaucracy. In Germany, "the paternalistic relationship between German banks and industry, engendered during the mid-century catch-up period began to erode..." (Fong, 1998, p. 342). In Russia after 1907,

Railroad construction by the government continued but on a much smaller scale both absolutely and even more so relatively to that increased industrial output... The conclusion is inescapable that, in the last period of industrialization under a pre-revolutionary government, the significance of the state was very greatly reduced ... Russian industry had reached a stage where it could throw away the crutches of government support and begin to walk independently (Gerschenkron, 1962, p. 22).

A *regulatory state* governs the economy mainly through regulatory agencies that are empowered to enforce a variety of standards of behavior to protect the public against market failures of various sorts, including monopolistic pricing, predation, and other abuses of market power, and by providing collective goods (such as national defense or public education) that otherwise would be undersupplied by the market.

In contrast, a *developmental state* intervenes more directly in the economy to promote the growth of new industries and to reduce the dislocations caused by shifts in investment and profits from old to new industries. In other words, developmental states can pursue market-distorting industrial policies, while regulatory states generally cannot.

Those who believe in the superiority of the regulatory approach argue that the developmental state wastes taxpayer funds in the vain hope of

advancing the prospects of one industry over another without the benefit of any real knowledge of underlying market dynamics. In picking 'winners and losers', the developmental state is bound to make mistakes that distort the market in unpredictable and undesirable ways. An example would be the failure of the Japanese government to jumpstart its domestic pharmaceutical industry or help consumer electronics companies by promoting global standards for HDTV. For every success, such as that of the Japanese consumer electronics and semiconductor industries, there are scores of less publicized failures that make the overall effort dubious at best (Schultze, 1983; Tresize, 1983; Noland and Pack, 2003).

Those who believe in the superiority of the developmental state approach argue that in the absence of state intervention, economically backward countries are doomed to fall farther and farther behind in the race for international competitiveness given the advantages of more advanced economies. The state intervenes to encourage private investors who would otherwise avoid putting their money into technologically risky ventures. The state absorbs some of the risk that would otherwise be shouldered entirely by private actors.

Advocates of the developmental state point to the crucial role of the state in countries with regulatory states in high-technology industries: e.g. the role of the US postal service in subsidizing the rise of the US aircraft industry, the subsidies provided to Airbus by the European Union that permitted the consortium to enter a market dominated by US airline manufacturers, and the enormous success of government efforts to promote the growth of the Japanese semiconductor industry (Tyson, 1992; Neven and Seabright, 1995; de Melo, 2000).

Theories of strategic trade have been used to justify a wide variety of industrial policies. Brander and Spencer (1981) suggested that in industries with imperfect competition and super-normal profits, subsidies can shift global profits to domestic firms such that the increase in their profits exceeds the subsidies. Developed further by Krugman (1986) and others, strategic trade theory briefly provided a new rationale for the use of market-distorting industrial policies. This use of strategic trade theory can be criticized, however, for neglecting the potential for international retaliation, special pleading by affected interest groups, and government failure (Hart and Prakash, 1997).

2.4. Differentiating regulatory and developmental states

The most important difference between regulatory and developmental states is the basic approach taken toward the proper role of the state in

the market. In the regulatory state, market interventions are limited to those necessary to preserve a minimal level of competition in markets and prevent the undersupply of collective goods and other potential market failures. In the developmental state, the state is permitted to intervene extensively in the economy in order to advance a variety of national purposes, but especially to catch up economically with other countries.

There are systematic and observable differences between the two types of states that spring from these underlying differences. For example, the regulatory state does not require the same kind of elite bureaucracy that is typical of the developmental state. It gives less discretionary power to bureaucrats, especially in the area of regulatory policies, and generally grants oversight power to both legislatures and courts. The regulatory state does not allocate credit or provide credit discounts to certain industries as the developmental state frequently does. Generally speaking, the regulatory state is more fragmented and less unified than the developmental state and is more easily manipulated by societal interests via the mechanism of 'forum shopping'. Finally, regulatory states provide greater access than developmental states to labor, environmental, and consumer groups (Woo-Cumings, 1999; Table 2.1).

The potential for bad outcomes in developmental states springs from a variety of possible failings. First and foremost is the potential for official corruption. Since bureaucrats in developmental states possess considerable discretion in deciding how much public money to provide via loans and subsidies to specific firms and industries, there may be incentives for firm managers to offer bribes so that their firm will be favored in such decisions. The close working relationship between public bureaucrats and private

Table 2.1. *Observable differences between regulatory and developmental states*

Characteristics	Regulatory	Developmental
Type of bureaucracy	Non-elitist	Elitist
Discretionary power of bureaucrats	Limited	Extensive
Oversight by legislatures	Yes	No
Oversight by courts	Yes	No
Allocation of credit	Arms length, no governmental interference	Preferential to industries favored by government
Privileged access for large firms?	No	Yes
Access for labor and consumer interests?	Yes	No

firms that is characteristic of developmental states may result in a confusion of public and private interests.

In addition, the informational demands on bureaucrats in developmental states are such that policy making is shaped by an asymmetry of information that favors industry over government. Managers of firms and heads of industry associations generally have better access to information about a given industry than the government officials who are responsible for policies affecting that industry. They also possess deeper knowledge about industry dynamics, and thus will be better able to interpret informational flows. Thus, government officials will be forced to either greatly increase their expenditure of time and money on industry analysis or purchase information about the industry from third parties in order to match or exceed the knowledge of industry participants. Since it will not always be possible to do this, representatives of industry may be able to shape governmental policies to their liking by selectively channeling or withholding crucial informational flows to the government.

A final argument is that the overall uncertainty associated with industrial outcomes militates against good public policy, even in the absence of informational asymmetries. Uncertainties can arise for a variety of reasons: e.g. (1) changing consumer tastes; (2) development and commercialization of new technologies; (3) shifts in the openness of domestic and international markets; and (4) the impact of macroeconomic variables on demand and supply. To make an intelligent industrial policy requires a degree of foresight and flexibility that is infrequently seen in government agencies.

2.5. The potential impact of globalization on industry policies

Defining globalization as the combination of increased flows of factors of production internationally with increased reliance on geographically dispersed supply chains, and identifying the last decade or so as a period of increased globalization of industry, one can argue that globalization is likely to have an impact on what sorts of industrial policies may or may not have desirable results. If supply chains are becoming more global, then efforts to promote industries by insisting that supply chains be national are unlikely to succeed. To the extent that the developmental state requires this, it might not be so successful in a more highly globalized world economy.

Similarly, one might argue that one of the more successful competitive responses of regulatory states to the recent successes of developmental states has been to promote greater flows of productive factors and the establishment of global production networks. Thus, the change in

the global economy is more the result of conscious governmental policies than of, say, changing technology or reduced barriers to trade, investment, and movements of people.

Since there is likely to be some variation across industries in the extent to which they are subject to globalizing forces (whatever their roots), one can use this variation to test propositions about the impact of the degree of industry globalization on the success of various industrial policies. One proposition that I will be examining below is that increased globalization is likely to mean that government policies are generally less important than firm strategies in influencing industrial outcomes. Another is that industrial policies that ignore globalization in highly globalized industries are very likely to fail.

2.5.1. The case of biotechnology

International competitiveness in the biotechnology industry relies strongly on the ability of small startup firms to find financing on venture capital markets and to convert research done in publicly funded universities and research laboratories into products and services while preserving the intellectual property rights of innovators. It should not be surprising, therefore, that US firms tend to dominate this industry. A potential problem for small firms in biotechnology is the prospect of being acquired by large pharmaceutical or chemical firms in a way that reduces their ability to innovate. Again, the United States seems to have dealt with this potential problem more successfully than other large industrial countries like Japan because it can credibly threaten enforcement of antitrust laws that prevent anticompetitive behavior.

For this reason, it can be argued that the capability of engaging in the types of industrial policies characteristic of developmental states does not provide the same sort of competitive advantage that it does in other industries. There is an advantage for regulatory states in this type of industry springing from the more decentralized industrial structure of the industry and the commitment of most regulatory states to fund basic research, protect intellectual property, and enforce antitrust and competition laws.

2.5.2. The case of HDTV and digital television

HDTV and DTV have been the focus of much speculation about the efficacy of industrial policies. Standard-setting is one subcategory of industrial policy that is generally thought to be important because of the large coordination problem connected with getting manufacturers, broadcasters, and program producers to agree on next-generation TV

technology standards. What we have here is a market with many informational asymmetries and a lot of collective action problems, combined with a large and complex infrastructure of signal delivery. Large market failures can occur in such an environment.

Attempts by the Japanese public broadcaster NHK and the European Commission to solve the collective action problems by top-down imposition of standards failed dramatically in the late 1980s and early 1990s. An attempt by some political forces in the United States to set up a large subsidy program for HDTV as a response to the perceived threat of increased competition from Japan was defeated in the late 1980s (Hart, 2004).

In the 1990s it was fashionable for a while to say that the regulatory approach of the United States, focused on the Federal Communications Commission (FCC) as the locus for setting national standards, produced the best policy. The record of the last 10 years, however, suggests otherwise. The FCC decided not to decide on the video formats that broadcasters and manufacturers would have to support in the transition to DTV. The resulting confusion among both producers and consumers has greatly slowed the transition. The FCC and the US made things worse by loaning the broadcasters an extra channel during an interim period of transition from NTSC to DTV standards, but created perverse incentives by allowing broadcasters to keep the extra channel until over 90% of the public could receive DTV signals. In my view, this was not a good industrial policy.

In contrast, in Western Europe, the European Union took a much stronger stand on DTV standards but made sure that the standards adopted made it possible for consumers to have a choice between a variety of DTV providers and for the signals to be distributed via terrestrial antennas, satellite broadcasting, telephone networks, and cable networks. It paid careful attention to potential restraints on competition that might occur by the dominance of certain firms over electronic program guides (EPGs) or proprietary encryption for pay TV. Finally, the EU was smarter than the US government on the question of whether to require broadcasters to move quickly to sharper signals or to let the market decide how much consumers valued higher picture quality. As a result, the new technology is being deployed more rapidly in Europe than in either the US or Japan.

2.5.3. The case of flat panel displays

Stefanie Lenway, Thomas Murtha, and I spent the last 5 years or so trying to understand firm strategies and industrial policies in the global flat panel display industry. The research we undertook started from

the premise that the US flat panel display industry was much weaker than it needed to be if the US computer industry was to maintain its competitiveness in light of the growing competitiveness of firms based in Japan, Korea, and Taiwan. We decided to examine the relative importance of firm strategies and industrial policies in the four countries (the United States, Japan, Korea, and Taiwan) to see if – first of all – industrial policies made any difference and, if so, could the United States benefit from judicious copying of the industrial policies of East Asian countries.

What we found was that, as one would expect in a globalizing industry, firm strategies were more important than government industrial policies in determining which firms did well in this market. However, firms that were successful were able to leverage certain advantages that existed in a given national economy because of certain types of government policies.

Japan was the location of the first round of large investments in high-volume flat panel manufacturing. The three main investors in this early period were Sharp, Toshiba, and IBM Japan. Subsequent investments were undertaken by other Japanese electronics firms, including Matsushita, Mitsubishi, NEC, and Hitachi. One small firm, Hosiden, invested with guaranteed purchases from Apple Computer. Our research showed that government policies had very little to do with any of these investments beyond the usual favoring of high-technology investments via accelerated depreciation and other tax breaks. The amount of direct subsidization of research or manufacturing by the Japanese government was relatively small.

One of the key reasons for locating initial investments in Japan was the ability of Japanese firms to move from small televisions to camcorders to laptop and notebook computers as the size of the displays that could be manufactured reliably increased. The pre-existing strength of Japanese firms in these consumer electronics markets was an important factor in the early advantage of Japan as a location for the first round of major investments. It is not surprising then that the technology and manufacturing activity would spread from Japan to its two main rivals in consumer electronics in East Asia: Korea and Taiwan.

One worrisome aspect of Japanese policies in this regard was the restrictions that continued to exist on inward foreign investment into Japan. If it had been easier for foreign firms to invest in Japan, it is possible that there would have been more competition in the industry. One of the results of restrictions on inward investment might have been the more rapid diffusion of flat panel display technology to other countries (because the lower level of competition within Japan made it more attractive for non-Japanese firms to enter the market).

In Korea, the practice of encouraging government-owned or -controlled banks to provide low-interest loans to high-technology investments of the *chaebol* (large Korean conglomerates) and of not enforcing antitrust laws created a favorable environment for the *chaebol* to make the large and risky investments connected with setting up large-scale manufacturing plants for TFT liquid crystal displays (LCDs). The down side for *chaebol* was that after 1997, the general weakness of the financial sector of the Korean economy that was due to the absence of adequate regulation of banks and other financial institutions in the wake of the opening of the Korean economy to international financial flows became a drag on the ability of firms to make further investments in the industry. In other words, what was a competitive advantage due to government policy prior to 1997 became a disadvantage after 1997.

In Taiwan, the government policy of favoring smaller firms over larger firms in order to reduce the influence of native Taiwanese in the political system initially made it difficult for the smaller Taiwanese firms to enter the flat panel display market simply because they could not match the ability of either Japanese or Korean firms to throw money and engineers at the problem of developing high-volume manufacturing plants for TFT LCDs. After 1997, however, the generally sound management of the Taiwanese financial system insulated Taiwan from the problems that faced Japan and Korea and permitted the larger Taiwanese firms to enter the market despite the large and risky investments required. It helped a lot that the Taiwanese government wanted to reduce the dependence of Taiwanese laptop computer manufacturers on imports of displays from Japan and Korea and thus was willing to provide some subsidies to the new industry.

In the United States, specific government policies were adopted by the Clinton administration to encourage the growth of the domestic flat panel display industry. The funds allocated were relatively small, given the size of investments that had already occurred in East Asia, however, and were divided among many small firms located in diverse regions. A number of US firms were already active in the industry: Corning Glass produced much of the specialty glass for flat panel manufacturing in Asia, AKT (a joint venture between Advanced Materials in the US and Komatsu in Japan) produced the chemical vapor deposition equipment for many Asian manufacturers, and IBM was a joint venture partner with Toshiba in the second largest producer of flat panels in Japan, Display Technology, Inc. (DTI). In short, US industrial policies were both too small and focused too much on the wrong goals to have had an impact on the competitiveness of US-located firms. One can argue that the predominant business environment in the United States, involving a general bias against industry subsidization and toward strict enforcement

of antitrust together with a robust and well-regulated financial system, produced correct decisions by US firms with regard to entering this highly risky industry, especially given the locational advantages possessed by East Asian producers.

One way to draw a conclusion from this case is to say that industrial policies of the ‘pick winners and losers’ variety either did not work (in the US case) or were not attempted (in Japan or South Korea). But a more convincing case can be made for the argument that industrial policies that were consistent with a country’s overall economic system became part of the environment for business decision-making and that those businesses that correctly matched their business strategies to their local business–government environment were the ones most likely to succeed in the flat panel display industry. Thus IBM, an American firm, could succeed in Japan by leveraging the advantages of its Japanese location. Similarly for AKT and Corning, the key was locating those activities that were necessary for adequately servicing their Asian customers in Asia. The small display firms based in the United States did not have this option and some US government policies actually restricted rather than widened their range of options (Murtha *et al.*, 2002).

2.5.4. The case of semiconductors

The semiconductor industry case is often cited in defense of the industrial policies pursued by developmental states. First in Japan, and later in Korea and Taiwan, firms established international competitiveness with substantial help from government-funded programs, and especially research and development consortia that were jointly funded by government and industry. The Asian firms were generally larger and more vertically integrated than the US firms. As the semiconductor industry matured, the focus shifted from innovation in small startup firms to high-volume production and the processing of larger and larger silicon wafers. Asian firms were better able to make this transition, generally, than US firms. This suggests that the developmental states of East Asia had an advantage in capturing market share in the maturation phase of this industry.

In addition, the firms that survived this transition in the United States were either design-intensive microprocessor firms like Intel and AMD or smaller ‘fab-less’ firms like Cypress Semiconductor, Transmeta Corporation, and Xilinx. Producers of standardized products like DRAMs had to diversify or close their doors. An interesting division of labor between the US and Asian firms began with the creation of ‘silicon foundries’ first in Taiwan and later in other Asian countries. The foundry firms offered

high-volume production facilities for the designs owned by US firms. In other words, the creation of foundries made it possible for fab-less firms to succeed without developing their own high-volume production facilities.

2.5.5. The case of software

The case of computer software starts from the observed fact that firms based in the United States led the world in the development and sales of advanced packaged software. The rapid increase in the market for personal computer software meant that there were major advantages for firms that were close to the PC industry. The most successful firm in this regard was Microsoft, but the PC platform was designed to encourage the growth of many independent software developers and give users a wide range of choice in suppliers of applications. One could argue that a whole new type of competition arose with the growth of the PC industry, an architectural competition in which firms competed for defining the rules for the next wave of innovation (Hart and Kim, 2002).

European and Asian firms did not do well overall in markets for packaged software from the early 1980s. There were a few exceptions: e.g. SAP in Germany, Softbank in Japan. But the basic problem in both regions was that it was difficult to establish startup firms and so large integrated computer firms dominated the regional software markets. In Japan, e.g. NEC was the main provider of PC operating systems until it was finally defeated by Microsoft after IBM developed a solution to the display of Japanese characters on PC screens in a Windows environment. In addition, and especially in Japan, a lack of strong intellectual property protection for software programs was a disincentive for investments in software creation (Kim, 2000).

This case illustrates the advantages of the relatively decentralized regulatory state approach over the developmental state. The Japanese government tried to promote the software industry thereby setting up a program for 'software factories' using as a model its support of the semiconductor industry. The problem was that software made in factories was not competitive with the operating system software made in huge firms like Microsoft or the applications software created in smaller and more nimble firms like Electronic Arts that were highly responsive to market demand.

The Europeans again were more successful than the Japanese eventually by reforming their financial systems to make a larger space for the venture capitalists who could fund startup firms. Doing this in Japan was difficult because of the overwhelming dependence on banks.

2.5.6. The case of cellular phones

The case of cellular phones is similar to that of HDTV and DTV in that the cellular phone business depends on the building of network infrastructure and the establishment of standards to reduce producer and consumer confusion about questions of connectivity and interoperability.

We are currently in the third generation of cellular phone technology. The winner of the first round of competition was the United States. The deregulation of the telephone industry created a space for the establishment of analog cellular phone networks that were partially in competition with the local land-line carriers. The public ownership of telecommunications service providers tended to slow the development of the cellular phone industry in both Europe and Japan.

In the second generation, Europe made a special effort to concert forces to develop a uniform standard for the entire region called GSM. In the United States, in contrast, no agreement could be obtained on second-generation standards. In addition, the European cell phone companies found a variety of pricing schemes that were much more attractive than those available in either the United States or Japan. Thus, deployment of second-generation phones was most rapid in Europe.

In the third generation, the Japanese had a major success with a product from NTT DoCoMo which allowed Japanese consumers to download information from the Internet via their cell phones at a reasonable price. In the United States, a complex agreement divided the third-generation market into national and regional segments with different standards in different regions and nationally, and pricing schemes that were better than earlier generations but still relatively costly in comparison with those in Europe and Asia.

Some experts argue that the Europeans and the Japanese were trying to compensate for their slowness in competing with the US in Internet services via PCs by using mobile phones as the main platform for accessing those services. But it is fairly safe to say that the top-down styles of regulation in both regions made it easier for them to impose uniform standards on the region than it was for the United States. In this case, the ability to impose standards reduced key uncertainties that would have otherwise slowed deployment of the technology (Lembke, 2002).

2.6. Conclusions

It is difficult to draw any definitive conclusions from this particular set of
1. There are some common themes that I would like to call to your

governance more generally seems to depend on the type of industry. Some industries are by their nature highly decentralized and require a regulatory governance style with highly entrepreneurial managers and flexible financial systems to prosper (e.g. biotechnology and PC software). Other industries lend themselves more to top-down decision-making both by firm managers and by governmental industrial policy makers (e.g. semiconductors, HDTV, flat panel displays, and cellular telephones). The developmental states do well in the latter; the regulatory in the former.

Second, firms learn to cope with the advantages and disadvantages of the prevailing form of industrial policies in different national environments. Globalization means that firms operating in more than one nation can leverage the advantages or compensate for the disadvantages of placing activities in a given national location. In this globalizing environment, industrial policy shifts from attempting to compete head to head in all industries to making sure that the current environment permits a range of industrial activities that allows the country to continue to prosper and that preserves access to technologies from other countries and regions that are needed for maintaining or enhancing existing strengths. Therefore, industrial policies that ignore the growing importance of multinational enterprises and the emerging international specialization that is a natural consequence of more open trade and investment flows are doomed to fail. This still leaves room for many types of industrial policy – particularly antitrust policies, intellectual property protection, and the encouragement of startups – that are either market-ensuring or market-conforming.

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