# Learning and the Dynamics of International Competitive Advantage

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## Enterprises, Nations, and Learning

How does learning occur in a modern society, and what are the economics of the learning process? Why are some societies better at learning than others, and how does superior learning contribute to superior economic performance? In this essay, I elaborate a theory of competitive advantage of enterprises and nations as a historically relevant framework for analyzing the economics of the learning process.

Learning is an economic problem because learning is rarely, if ever, costless. This proposition has been recognized by human capital theory, put forth originally to provide an explanation for how qualitative changes in human resources contribute to economic growth (Schultz 1968). But besides the insight that people make costly investments in human resources on the expectation of returns, human capital theory lacks a relevant framework for analyzing the development and utilization of human resources and the generation of returns (Lazonick 1991a, ch.5).

Not all mainstream economists view learning as an economic problem. Using the concept of "disembodied technical change," some neoclassical growth theorists have depicted learning as costless and its impact on productivity as automatic (Solow 1962). Producers, they say, simply acquire productivity-enhancing knowledge as by-products of productive activities. Such learning is costless in the sense that it would have been economically rational to undertake these productive activities even if learning were not to occur (Arrow 1962).

This conception of learning implicitly assumes that the producer already knows how to perform the relevant productive activity and that productivity-enhancing improvement occurs through the repeated application of this knowledge. Yet, even unskilled tasks require some instruction in "best practice" techniques, if only to ensure that workers do not acquire "bad habits"—

to ensure that they do not learn to do tasks in ways that impede, rather than enhance, productivity (Lazonick and Brush 1985). The inexperience of the untutored worker can result not only in low levels of labor productivity, but also in costly damage to materials and machinery, as well as disruptions to the flow of work (Lazonick 1990a). To attain the requisite learning, the enterprise may invest in the training of workers, if only by employing experienced workers to show the new recruits how to do their jobs.

Even for basic types of work, therefore, learning is the result of the investment strategy of the enterprise. For more sophisticated types of work that require intricate knowledge of the company's products and processes, the enterprise may have to make substantial investments in human resources to ensure that key employees learn the requisite skills. Investments in human resources, moreover, are integrally related to investments in physical resources. An understanding of how an enterprise generates learning must begin, therefore, with an understanding of its investment strategy.

But the analysis of investment strategy is not sufficient to comprehend the ability of the enterprise to generate learning. The extent to which an investment strategy generates learning depends on the organizational structure of the enterprise that makes the investments in human resources. Within an enterprise, learning is a collective process of cognitive development, in which the skills of the individuals who participate in the specialized division of labor must be combined to achieve desired results. An investment strategy allocates resources to the development of the skills of participants in the specialized division of labor. The organizational structure of the enterprise plans and coordinates the actual development of these skills so that the combined capabilities of the individual participants in the specialized division of labor result in a collective learning process. The greater the technological complexity inherent in an investment strategy, the more the skill acquisition process must be planned and coordinated, and hence, the more important the organizational structure is, in technological advancement (Lazonick 1991a, chs.2 and 3).

The need for organizational coordination renders collective cognitive development a social, as well as a technical, problem. In making investment decisions, strategic decision-makers may decide not to invest in the skills of certain types of workers if they think that skills acquired through learning will be used to subvert, rather than promote, the goals of the enterprise. Historically, American corporate employers have been unwilling to invest in the skills of shop-floor workers because of the fear that the possession of skills would enable these employees to obstruct the quest for high-throughput production and low unit costs. Instead, these employers developed the skills of their managerial personnel, who, in turn, used their knowledge to search for machine technologies that would dispense with the need for shop-floor skills (Lazonick 1990a, chs.7 and 8).

In other capitalist nations, such as Britain and Japan, employers generally adopted different strategies concerning investments in human resources. During most of the twentieth century, British employers continued to rely on shop-floor workers to train other workers, as had been the custom in the nineteenth century. For the British, leaving skills on the shop floor was an alternative to the American strategy that focused on investments in managerial skills and the search for new machine technologies that could take skills off the shop floor. In contrast, Japanese employers neither left the acquisition of skills to shop-floor workers nor sought to take skills off the shop floor. Rather, Japanese enterprises pursued a strategy of developing skills on the shop floor as complements to investments in human resource development within the managerial structure (Lazonick 1990a; Gospel 1991).

But why speak of "British," "American," and "Japanese" employers, workers, and enterprises? To assume that the learning process is a national phenomenon is to accept that cognitive development has a social dimension that is distinctive to the particular nation in which learning occurs. The learning process differs significantly even across those advanced capitalist nations that have high standards of living, relative to the less developed nations of the world. The strategies and structures of the business enterprises that have grown to maturation within these capitalist societies reflect this cross-national differentiation. Because capitalist societies leave so much investment decision making in the hands of the business sector, an essential foundation for comprehending the competitive advantage of capitalist nations is a relevant theory of the competitive advantage of capitalist enterprises (Lazonick 1993a).

## The Competitive Advantage of Enterprise

### Learning and Internal Economies

An enterprise invests in the development of human resources because the market cannot supply the quality and quantity of resources required by the organization's product and process strategies. By making investments that develop human resources, the business enterprise gains access to knowledge, and hence, learning, that would not otherwise be available to it. Some of this knowledge becomes embodied in specialized equipment and materials, while some remains in the possession of individuals or groups of individuals.

This privileged access to knowledge in turn provides a *potential* foundation, on which the enterprise can build competitive advantage. The knowledge base is only a potential foundation for competitive advantage because the enterprise must still effectively utilize the resources, both human and physical, that it has developed. But investments in productive resources burden the enterprise with fixed costs. The critical issue for competitive advantage is

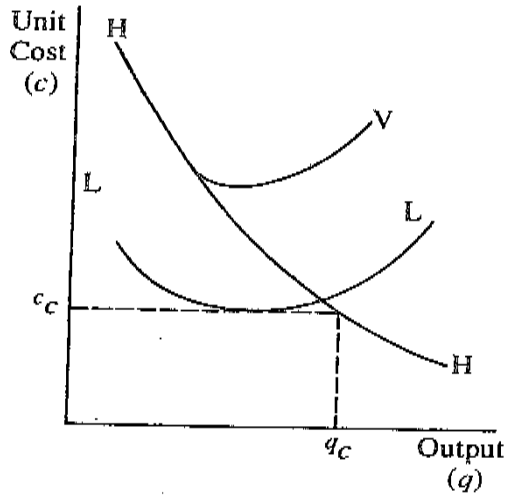


**Fig. 1. Fixed cost strategies and competitive advantage**

whether the enterprise has the organizational capability to transform these high fixed costs into the high-quality products at low unit costs that enable it to capture market share.

Assume that to compete in a particular product market, an investment strategy that aims to develop human resources entails fixed costs that are higher than an investment strategy that simply makes use of "ready-made" human resources that can be purchased on the market. In figure 1, HH depicts the cost structure that can *potentially* be generated by the high fixed cost (HFC) strategy if the human resources in which the enterprise has invested are, indeed, effectively developed and utilized. In contrast, LL depicts the cost structure of an enterprise that is competing on the basis of a low fixed cost (LFC) strategy—one that requires little or no new investments in human resources by the enterprise.

If both LL and HH in figure 1 were known cost structures, it would be rational to choose the HFC strategy that generates HH, as long as the enterprise could supply a market demand at least as great as $q_c$—a quantity that I shall call *competitive output*. Except when industry demand is simply not large enough to enable an HFC enterprise to supply output at least equal to $q_c$, HH will displace LL as the best-practice cost structure.

At the outset, however, at the time when the investments that entail fixed costs are made, assume that only LL is a *known* cost structure. To say that LL is known is to say that the productive capabilities of the inputs that enter into LL have already been developed and that the prices of these inputs to the enterprise have been established. Perhaps LL is the result of what was, at some previous time, an HFC strategy that rendered obsolete a cost structure

based on even lower fixed costs than those depicted by LL. But what is important to the analysis is that, at the time when the high fixed-cost investments required to generate the as-yet unknown cost structure HH are being made, LL is already an established cost structure.

In contrast to LL, at the point in time when the fixed costs inherent in what, ex post, becomes HH are being committed, HH is unknown because the *productive capabilities* that can ultimately yield higher quality products at lower unit costs do not yet exist—these resources have to be *developed* and, once developed, *utilized*. The rationale for the HFC investment strategy is the possibility that, through the development and utilization of productive resources, HH will come into existence. The enterprises that make the HFC investments and bring HH into existence will gain competitive advantage over enterprises that continue to use traditional productive capabilities that generate LL.

The cost structure HH, depicted in figure 1, is, therefore, the outcome of an evolutionary process. Although the cost structures depicted in each of the figures in this essay are short-run curves that exist at points in time, they have long-run histories. Indeed, in discussing the transition from one figure to the next, I shall be outlining *potential* paths of this historical evolution. As for the cost structure HH in figure 1, not only at the outset, when the investments that entail fixed costs are made, but also during the evolutionary process in which HH is being generated, the productive potential of the HFC strategy remains an uncertain possibility, while the productive potential of the LFC strategy is a certainty. Hence, during this evolutionary process, the HFC strategy may put the HFC enterprise at a competitive disadvantage if it does not develop and utilize its productive resources sufficiently to lower unit costs below $c_c$ in figure 1.

By definition, the process of bringing HH into existence involves *innovation*—however major or minor—because it generates quality/cost outcomes that did not previously exist. I shall, therefore, call the business organization that makes these developmental investments the *innovative* enterprise. In contrast, I shall call the business organization that eschews developmental investments the *adaptive* enterprise.

If, relative to known cost structures, an innovative investment strategy that required the development of resources, human or physical, were to be a low fixed-cost strategy, fixed costs would not pose a problem for the innovative enterprise. Even at low levels of output, the innovative enterprise would have a competitive advantage. But, given factor prices and work norms (and, hence, a given social setting), innovation invariably involves an HFC strategy precisely because to gain competitive advantage, the innovative enterprise must *develop* the productive resources that can generate higher quality products and cost-reducing processes.

Innovation generally entails higher fixed costs than existing methods of production, because of not only the *size* but also the *duration* of the developmental investments that the innovative strategy requires. The size of the developmental investment entails fixed costs that are larger than is the case with LL, because the innovative enterprise must plan and coordinate the development of a more complex specialized division of labor—involving interrelated activities not only in R&D, but also in marketing and vertically related production processes. The duration of the developmental investment entails fixed costs that are larger than with LL, because it takes time for the innovative enterprise to transform its investments into products and processes that can yield low costs per unit of output. The innovative enterprise must develop its productive resources before they can be utilized, whereas the adaptive enterprise makes use of productive resources that have already been developed, either internally or externally to the business organization itself.

For an investment of any given size, the longer the duration between the commitment of resources and the achievement of low unit costs (and the consequent generation of returns), the higher the fixed costs that must ultimately be recouped. In terms of figure 1, a shortening of the time from the commitment of resources to the generation of returns reduces fixed costs and, all other things equal, thereby pushes the point of competitive output ($q_c$) to the left, thus making competitive advantage attainable with a smaller market share.

Central to reducing the duration component of fixed costs is the rapidity of the learning process that transforms productive resources into their developed states. Hence, rapid learning enhances the ability of the innovative enterprise to transform the competitive disadvantage inherent in its HFC strategy into the competitive advantage that comes from generating higher quality products at lower unit costs.

What determines the rate of learning within an enterprise? The "learning curve" concept posits that the rate of learning is a function of output; the more rapidly the enterprise achieves a large volume of output, the more rapid the rate of learning (for a survey of the learning curve literature, see Dutton, Thomas, and Butler 1984). Some economists have posited the existence of a learning curve, and have then analyzed the implications of pricing strategies that sell products below current costs for the sake of gains in market share that will move the enterprise down the learning curve more rapidly than if current prices had reflected current unit costs (see Spence 1981). Although such strategies may have the posited impact on productivity and unit costs, it is not clear why, subject to the limitations imposed by elasticity of demand for the industry's output, all enterprises in an industry would not, then, choose a below–current-cost pricing strategy. If they did all choose such a strategy, the productivity of all the enterprises in the industry would grow more rapidly

than if the constituent enterprises had priced at or above current costs. But no individual enterprise would gain competitive advantage.

Investment strategy is a much more potent determinant of the competitive advantage of enterprises than pricing strategy. Given an investment strategy, the key determinant of the rate of learning is the organizational structure of the enterprise. Even within a given national industry, the organizational structures of business enterprises differ, in terms of both the productive capabilities that have been put in place and the extent to which its personnel are committed to the goals of the enterprise. These differences can have significant enterprise-specific impacts on the rate and direction of the learning process required to generate higher quality products at lower unit costs. It is those enterprises that possess superior learning capabilities—what I have elsewhere subsumed under the heading "organizational capabilities" (Lazonick 1990b)—that can transform HFC investment strategies from a temporary competitive disadvantage into a sustained competitive advantage.

How does organizational structure affect the rate of learning? One function of an organizational structure is to put in place an incentive system that influences the amount of effort supplied by participants in the specialized division of labor (for an elaboration, see Lazonick 1990a). A greater supply of effort per unit of time in doing known tasks results in more rapid learning in how best to perform those tasks. In time, a producer's application of concentrated and continuous effort in the performance of particular tasks results in an internalization of the knowledge required to perform these tasks, so that they become what Richard Nelson and Sidney Winter have called "routines" (Nelson and Winter 1982, chs. 4 and 5). In addition, and of more importance to the innovation process, a producer's application of concentrated and continuous effort may be essential to the acquisition of new knowledge that cumulates on the basis of previously acquired knowledge. Indeed, concentrated and continuous effort may be essential for achieving breakthroughs in the understanding of a problem—breakthroughs that would not have occurred had the supply of effort been less concentrated and continuous.

Therefore, the quantity and quality of effort that individual producers supply to the enterprise, and, hence, the rate and direction of learning that the enterprise acquires, depend critically on the organizational structure of the enterprise. But the impact of organizational structure on learning goes beyond the responses of individual producers to the incentives that the enterprise holds out. Besides requiring effort that is concentrated and continuous, and, hence, cumulative, learning in a modern business organization is typically collective. Learning derives not only from the efforts of individuals, but also, and more potently, from the ways in which the individual efforts of the participants in the specialized division of labor are combined. It is the organizational structure of the enterprise that determines how, and to what

extent, the efforts of individuals coalesce to constitute a collective productive force.

Organizational capabilities enable the enterprise to affect not only the rate but also the direction of learning. Unlike the image of the trajectory of cost reductions conveyed by the learning curve literature, the learning process does not necessarily result in a continuous decline in unit costs. Indeed, it may only be with the onset of increasing costs that the enterprise becomes aware of what productivity problems must be solved and what it is that must be learned. As illustrated by the cost curve HV in figure 1, an HFC strategy may be unsuccessful if internal diseconomies of scale set in before unit costs have been driven down to a level that the LFC enterprise cannot achieve (as would have been the case had HH, rather than HV, evolved from the HFC strategy). At any level of output, the LFC enterprise has competitive advantage in this situation. An adaptive investment strategy would appear to have won out over an innovative investment strategy.

The cost curve HV, however, need not necessarily represent the final outcome of the HFC enterprise's investment strategy. The very experience of increasing costs may focus the attention of the managers of the HFC enterprise on problems in implementing the innovative strategy that (precisely because innovation is involved) could not have been foreseen at the outset. To eliminate the source of increasing costs, the HFC enterprise must now make even more—and different—investments in productive resources, and incur even more fixed costs, as depicted in figure 2.

In figure 2, the HFC enterprise that has experienced the cost curve HV makes additional investments that are meant to complement its original investment strategy (that is, the strategy that generated HV in figure 1). The purpose of these additional investments is to "unbend" the U-shaped cost curve, thus transforming internal diseconomies of scale into internal economies of scale. If the HFC enterprise is successful in this strategy, the result is $H_1H_1$; if not, the result is $H_1V_1$. Because we are dealing in evolutionary processes, however, even $H_1V_1$ might be the prelude to even more developmental expenditures that further increase fixed costs but that put in place the potential for transforming high fixed costs into high quality products at low unit costs. Innovation is an ongoing evolutionary process, in which the enterprise broadens the range of activities in which it has invested, and, hence, both augments and alters the learning processes that are essential to its eventual competitive success.

## External Economies and Learning

As it attempts to achieve a larger extent of the market, the enterprise may experience external, as well as internal, diseconomies of scale (the distinction

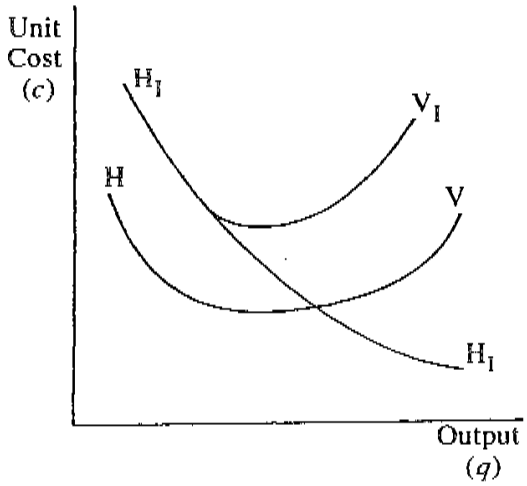


**Fig. 2. Transforming internal diseconomies into internal economies**

is, of course, due to Alfred Marshall; see Marshall 1961, Book IV, ch. 9; see also Lazonick 1991a, ch. 5). Internal economies and diseconomies of scale reflect changes in *factor productivity* (physical output per unit of input) as the volume of output changes, and are determined by the organizational capability of the enterprise in producing for varying extents of its product market. In contrast, external economies and diseconomies of scale reflect changes in *factor prices*, and are determined by changes in the relation between the growth of the demand for inputs on factor markets relative to the growth of supply. Whereas internal economies and diseconomies influence the *shape* of the cost curve, external economies and diseconomies alter the *position* of the cost curve. Whereas internal diseconomies of scale arise because of a decline in the average quality of inputs into the enterprise's productive activities, external diseconomies of scale arise because of an increase in the market prices of inputs of a given quality. When an enterprise experiences external diseconomies, its cost curve shifts up, as depicted by $H_EV_E$ in figure 3.

As illustrated by $H_IH_I$ in figure 3, in response to the appearance of external diseconomies, the enterprise might make investments that integrate into its internal organization the provision of the input that has become more expensive. For the enterprise, the goal of this investment strategy is to develop its productive resources so that it can supply itself with the input at a lower unit cost than that inherent in $H_EV_E$. Alternatively, the appearance of external economies might induce the firm to invest in new technologies that reduce its reliance on the input that has become more expensive. In such cases, the enterprise, in effect, tries to use its internal organization to overcome the constraints that market forces impose on enterprises in general. In

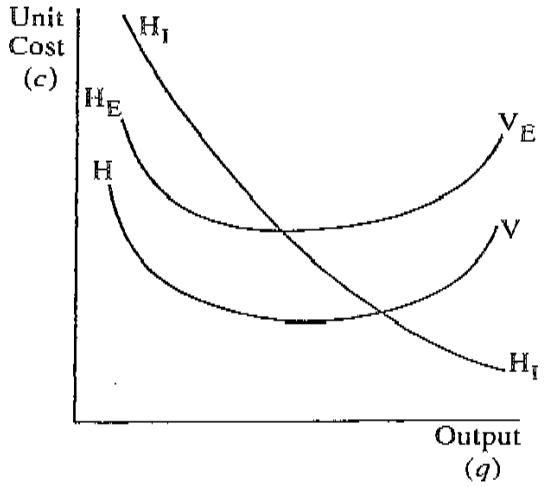


**Fig. 3. Transforming external diseconomies into internal economies**

the process, the enterprise alters the direction of learning that is critical to its success.

## The Competitive Advantage of Nations

### The Sources of U.S. Competitive Advantage

During the first decades of the twentieth century, international industrial leadership shifted away from Britain and toward other advanced capitalist nations, particularly the United States, Germany, and Japan (Lazonick 1991a, ch.1; Elbaum and Lazonick 1986). Accompanying the change in industrial leadership was a dramatic transformation in the institutional structure of the leading capitalist economies. Central to this transformation was the rise of managerial structures that, through the planned coordination of specialized divisions of labor, could generate economies internal to the enterprise. Along with the development of managerial structures came the separation of ownership from control, as the knowledge critical to running the enterprise increasingly came to reside in the heads of professional managers, rather than shareholders.

The industrial corporations that generated internal economies and gained distinct and sustained competitive advantages did so by making substantial investments to develop the capabilities of their managerial personnel. Management development took three forms. First, in the early stages of a manager's career, the employee gained expertise in a technical specialty relevant to the corporation's investment strategy and organizational structure. Second, through rotation across functional departments, those technical specialists

who displayed the most skill and applied the most effort to the performance of their functions were given the opportunity to learn about other technical and organizational aspects of the operations of the enterprise, thus providing these specialists with a more general comprehension of the organization's capabilities. Third, those managerial personnel who could effectively transcend their specialist backgrounds climbed up the hierarchical ladder of the corporation to positions that required more authority and responsibility in coordinating, and ultimately planning, the activities of the enterprise. In making the investments and providing the opportunities to transform the manager from a specialist into a generalist, the corporation offered the manager a "lifetime" career path within the enterprise (Lazonick 1986).

The industrial corporations that were best able to offer such internal careers were those that, through attaining competitive advantage, experienced rapid and sustained growth. The ability of the dominant enterprise to utilize the scarce managerial resources that it had, itself, developed contributed, in turn, to its sustained success. The availability of knowledgeable and committed managerial personnel made it possible for the enterprise to gain the benefits of the development and utilization of productive resources through vertical integration (see the discussion of figure 2, above). The availability of these managerial resources also permitted the enterprise to expand its operations into new geographic areas, both nationally and internationally, as its evolving investment strategy warranted.

The industrial progress of the United States depended on profound institutional transformations external to corporate enterprises that complemented the building of organizational structures within the enterprises to plan and coordinate innovative investment strategies. Most prominent among the institutional changes in the national environment that supported the investment strategies of its managerial enterprises were (1) the transformation of capital markets, (2) the transformation of the educational system, and (3) the transformation of worker organizations. By briefly outlining how these institutional transformations affected the learning process in the United States, I shall indicate why the rise of U.S. managerial capitalism to international industrial leadership during the first half of this century can be conceived of as a national phenomenon.

The critical transformation in U.S. capital markets that supported the learning process in American industry was the rise of a market in industrial securities, from the 1890s (Navin and Sears 1955). Owner-entrepreneurs who had transformed their firms from new ventures into major going concerns during the last decades of the nineteenth century could now monetize their accumulation of real assets through a transfer of ownership. The old owners thereby exited from their enterprises. In doing so, they left control over strategic decision making in the hands of career managers who had earlier

been recruited by the original owner-entrepreneurs as part of their (as it turned out) successful strategies to build organizational structures that would allow their enterprises to gain sustained competitive advantage (Lazonick 1992). The new owners were not these managers, but portfolio investors, who lacked any detailed knowledge of the organization and technology of the enterprise. In addition, with shareholding widely distributed among many owners, these portfolio investors lacked the power to influence the investment strategy of the enterprise.

When the original owner-entrepreneur exited from his enterprise, the only productive resource that he took with him was his "old" learning. At the same time, his departure made it possible for those career managers most capable of providing leadership in charting innovative investment strategies to rise to positions of strategic decision making. Thus, the separation of ownership from control provided career managers with greater incentives to commit themselves to the goals of the enterprise. Moreover, the new possibilities for top management succession now made it possible to replace "old" learning with "new" learning, in the strategic decision-making process.

The new learning that was relevant for industrial innovation was increasingly science-based. In the most dynamic industries, in-house development of the capabilities of scientists and engineers became central to the success of enterprises (Mowery and Rosenberg 1990; Chandler 1990, ch. 5). In making these investments in highly trained human resources, the corporations required recruits who entered their organizations with a conceptual comprehension of science and technology on which internal development programs and on-the-job experience could build. From the late nineteenth century, the American system of higher education acquired a science-based orientation that could provide the industrial scientists and engineers with the conceptual knowledge that employment in a science-based enterprise required. Through personal connections (often between university professors and their former students working in industry), moreover, there was an ongoing exchange of information that kept the basic research in university laboratories in touch with the developmental research in corporate laboratories (see Noble 1977; Reich 1985; Hounshell and Smith 1988).

The impact of the U.S. system of higher education, however, went far beyond its contribution to the science-based industries. Under the direction of the United States Department of Agriculture, from the late 1880s, the federal government funded the development of technology within the USDA and in State Agricultural Experiment Stations, generally attached to land-grant colleges. Agricultural Extension Services run by the USDA through the Experiment Stations and the colleges helped to ensure that farmers would become aware of the existence of successful new technologies and be instructed in the use of them (Ferleger and Lazonick 1993). In addition, in utilizing the new

technologies, farmers would provide the Experiment Stations with feedback that could be used for the further development of the technologies.

Beyond developing technologies or technologists, after the turn of the century, the system of higher education was increasingly called on to provide the general cognitive and behavioral formation that those destined for line, as well as staff, positions would require to function within a bureaucratic organization. By the 1920s, the American system of higher education had taken its present form. It provided the preemployment foundation for managerial development within the enterprise. Educated recruits could be expected to have the cognitive capabilities necessary for acquiring industry-specific technical knowledge, as well as the behavioral characteristics required to interact with others within the organizational context and respond positively to organizational incentives (Lazonick 1986).

Not all corporate employees had the benefits of higher education and in-house training. In the late nineteenth century, the managerial quest to use mass production technologies to achieve high levels of throughput and low unit costs confronted the attempts by workers to exercise craft control in the manufacturing process. The result was a growing confrontation between management and labor. As the corporations became more concentrated and more anti-union around the turn of the century, workers built their craft unions. At the same time, the American Federation of Labor, founded in 1886, experienced its greatest growth in membership as craft workers looked, largely without success, to a national organization to support their basic objective of inducing employers to engage in collective bargaining. But if there was one common objective of American industrial corporations during the first three decades of this century, it was to keep their enterprises union-free. So successful were the major corporations in achieving this objective, that the period from the late 1890s to the early 1930s has become known as "the nonunion era" in American labor history (see Brody 1980, ch. 1).

How did the American corporations contain the organized labor movement in the early twentieth century, and what are the implications of this victory of corporate management for the competitive advantage of the American enterprise? An adaptive corporate response was to transform key craft workers, generally paid by the piece, into salaried members of the managerial structure, thus securing their commitment to the goals of the enterprise (Montgomery 1987). A more innovative response was to do away with the need for craft labor by adopting skill-displacing technologies (Lazonick 1989).

The adoption of skill-displacing technologies freed management from reliance on an expensive and unreliable "variable" factor of production. In the United States, skilled labor was highly mobile between enterprises and industries. Highly mobile skilled labor can command high wages and cannot be compelled to deliver high levels of effort. By investing in machines and

managers, employers replaced skilled shop-floor labor with fixed factors that were easier to control.

How did American managers exercise this control? How did they transform the high fixed costs of the new technologies into low unit costs? To tend the new technologies, corporate managers substituted unskilled operatives (mainly immigrants from southern and eastern Europe) for the skilled craft workers (mostly of British and German origins). They then increased the complements of shop-floor supervisory labor, to monitor the effort of these workers. But, especially in periods of boom, when labor markets were tight and when employers most wanted to achieve high levels of throughput, overbearing supervisors could be counterproductive. Knowing that their labor was in short supply, alienated workers might engage in slowdowns, or even in the sabotage of expensive machinery and materials, rather than feel compelled to supply more effort (Lazonick 1990a, ch. 7).

Ultimately, it was not simply close supervision that transformed high fixed costs into low unit costs. Rather, it was the offer of "good jobs" to shop-floor workers—employment opportunities that could not easily be found elsewhere in the economy (Jacoby 1985). The enterprises that were best able to make these superior employment offers were those that, through innovative investment strategies and appropriate organizational structures, had already gained dominant positions in their industries. By the 1920s, those American enterprises that, through the superior development and utilization of their productive resources, had gained distinct competitive advantages, were able to cumulate those advantages by inducing their blue-collar workers to supply high levels of effort in exchange for the promise of relatively high pay and employment security. These high levels of effort were critical for achieving high levels of throughput on mass production machine technologies, and thus helped to transform the high fixed costs of the investments in these technologies into low unit costs.

Yet, in recent decades, the very strategy of investing in technologies and organizations that permit the utilization of deskilled shop-floor labor has proven to be the Achilles heel of American industry in international competition. The Japanese, in particular, have been able to gain competitive advantage by developing the skills not only of white-collar employees within the managerial structure, but also of blue-collar employees on the shop floor.

The strength of American industry in the post–World War II decades lay in the development of skills among those salaried personnel who were deemed to be part of management—an investment strategy that, as we have seen, dated back to the nineteenth century. It was through the collective learning of these personnel that American enterprises retained unmatched organizational capability for product and process innovation.

The advent of mass-production unionism from the late 1930s gave rise to

seniority provisions that compelled the major American industrial corporations to grant blue-collar workers long-term employment security. But these workers were still deemed to be "hourly employees." As such, corporate employers fought hard and successfully to ensure that these blue-collar workers had no formal control over work organization on the shop floor, and no formal right to influence, or even question, management's investment strategy. In particular, the coming of mass-production unionism did not result in investment strategies to upgrade the skills of blue-collar workers. On the contrary, as workers gained more collective power, American managers became all the more determined to take, and keep, skills off the shop floor.

## Sources of Japanese Competitive Advantage

A prime source of Japanese competitive advantage derives from the strategy of investing in the skills of shop-floor employees. The Japanese strategy contrasts with that of enterprises in the United States, where corporate employers have historically replaced craft control with managerial control and then have become obsessed with keeping skills off the shop floor. American corporations have, instead, focused on developing skills within their managerial structures. The unwillingness of U.S. industrial corporations to invest in skills on the shop floor has ensured a clear-cut organizational segmentation between management and labor within American enterprises—a segmentation that can pose a formidable barrier to effective planned coordination of the activities of the enterprise (Lazonick 1990a; see also Florida and Kenney 1990).

In recent years, the Japanese strategy has provided blue-collar workers with skills that are relevant to the successful operation of just-in-time inventory systems, statistical quality control, and flexible manufacturing technologies. By combining the skills of shop-floor workers with mass production methods, Japanese enterprises have been able to achieve high levels of throughput while attaining high standards of product quality and reducing the fixed costs of inventories to a minimum. More than that, the combination of shop-floor skills and machines have given them the ability to engage in "flexible mass production": the use of the same plant and equipment to produce a variety of differentiated products without having to resort to low-throughput, batch-production methods (Lazonick 1990a, ch. 9). What some observers have called "lean production" (Womack, Roos, and Jones 1991) depends critically on developing the skills of shop-floor workers. What accounts for the willingness of Japanese enterprises to make investments in shop-floor workers that U.S. enterprises have generally been unwilling to make? Historically, the distinguishing feature of the history of Japanese labor-management relations was the absence in Japan of a significant supply of craft workers

during the period in which industrial capitalism emerged as a viable economic system (Lazonick 1990a, ch. 9; see also Gordon 1985). When Japan began its rapid industrial development in the last decades of the nineteenth century, enterprises could not draw on an already-developed supply of industrial skills, as was the case in the nineteenth century in both Britain and the United States. Japanese employers, therefore, did not have to confront the problem of introducing high-throughput technologies in opposition to groups of craft workers intent on maintaining their traditional craft prerogatives. Instead, the shop-floor problem for Japanese enterprises was one of developing industrial skills, and then maintaining access to them.

Long before the advent of "permanent employment" in the post–World War II decades, Japanese enterprises had sought to overcome the scarcity of industrial skills by investing in the capabilities of their shop-floor workers, and particularly male workers, who could be expected to spend their working lives with the company. Having made these investments, these enterprises then structured internal employment incentives to ensure that they maintained access to these human resources over the long term.

The Japanese strategy for developing and utilizing the skills of shop-floor workers has been possible only because Japanese enterprises made the complementary investments in managerial organizations that could plan and coordinate specialized divisions of labor. Early in the twentieth century, Japanese enterprises were already engaged in the widespread recruitment of college graduates (many of whom had to be lured away from prestigious government posts) to serve as line and staff personnel (Yonekawa 1984; Daito 1986; Morikawa 1989; Uchida 1991). As a result of this organization building, the Japanese have been better able than the Americans to ensure that the activities of shop-floor workers are integral to the overall strategies and structures of their enterprises.

Supporting these investments in managers and workers has been a national environment in which government policy has played a major role (see Johnson 1982; McCraw 1985; Freeman 1987; Best 1990, ch. 6). As was historically the case in the United States, the Japanese state has protected the home market in order to permit business organizations to develop and utilize their productive resources to the point where they can attain competitive advantage in open international competition. The Japanese state has also maintained a stable macroeconomic environment, characterized by high levels of employment and a relatively equal distribution of income across sectors, thus enlarging the extent of the Japanese market for manufactured goods. It has increased incentives for consumers and businesses to purchase goods (for example, computers and televisions) that embody state-of-the-art technologies. It has limited the number of firms competing in major manufacturing industries, thus creating incentives for these firms to incur the high

fixed costs necessary to attain competitive advantage. It has promoted cooperative research and development among major Japanese competitors, while ensuring the access of manufacturing corporations to long-term finance at low rates of interest. And the Japanese state has provided industry with a highly educated labor force to fill blue-collar, white-collar, and management positions.

But, however important the role of the Japanese state in shaping an environment conducive to economic development, the formulation of investment strategies and the building of organizational structures to carry them out has been entrusted to private-sector enterprises (for industry studies on business-government relations, see Anchordoguy 1989; Fransman 1990; Collis 1988). Until the 1980s, it was tempting for foreign competitors to assume that the main source of competitive advantage of these Japanese enterprises was not their ability to develop and utilize productive resources, but instead, their ability to pay their workers low wages and work them long hours. These sources of competitive advantage have played a role in Japan. But, as foreign visitors to Japan learned when they visited cotton mills in the late 1920s and early 1930s (see the references in Mass and Lazonick 1990) and automobile plants in the late 1970s and early 1980s (see, for example, Abernathy, Clark, and Kantrow 1983), the belief that Japan's competitive advantage lay simply in an exploited labor force missed the importance of continuous, cumulative, and collective learning in generating economic development that was both substantial and sustained.

## Learning, Institutions, and "Convergence"

The organizational foundations of Japan's rise to international industrial leadership in the twentieth century do not constitute a wholly new model of advanced capitalist development, but a more thoroughgoing elaboration of the managerial institutions for planning and coordinating specialized divisions of labor that carried American managerial capitalism to its preeminent position in the first half of this century (Lazonick 1991a, ch.1). The history of the change in industrial leadership from the United States to Japan over the past few decades does demonstrate, however, that the social structure of economic institutions exerts an influence—and, I would argue, a preponderant influence —on the rate and direction of learning.

The learning that lays the foundation for industrial leadership is increasingly continuous, cumulative, and collective. For such learning to occur requires that the institutions that develop and utilize productive resources, and hence generate economic development, plan and coordinate specialized divisions of labor that are increasingly complex and costly. Through managerial coordination, these institutions must ensure not only the appropriate collective

cognitive development of human resources, but also the appropriate behavioral responses on the parts of the participants in the specialized division of labor in whom investments have been made. For it is only through the appropriate behavioral responses that the investments in cognitive development are utilized sufficiently to transform the high fixed costs of investments in innovative learning into low unit costs.

In capitalist economies, the central institutions for developing and utilizing productive resources are business enterprises—enterprises that must capture sufficient market shares to lower unit costs and generate the revenues to justify their continued existence. Yet, the strategies and structures of these business enterprises are influenced by the social environments in which they acquire productive resources and in which they seek to generate revenues. Among other things, this social environment—which I have identified as the national environment—affects the quality of human resources that business enterprises find available, as well as the financial terms on which the business enterprises can make investments in productive resources, including, first and foremost, human resources.

The relation between business enterprises and their national environment can, however, be reciprocal. By the very development and utilization of productive resources, the strategies and structures of business enterprises can also shape elements of the national environment—such as educational systems, financial systems, and class structure (Lazonick 1986; Lazonick 1990c; Lazonick 1992). Indeed, it is when business enterprises are most successful in developing and utilizing productive resources that the strategies and structures internal to these enterprises have the greatest influence on the transformation of the social system, as a whole.

The perspective that I have outlined has important implications for understanding why changes in international industrial leadership occur, and the difficulties that former leaders have in responding to new competitive challenges. Recently, economists have raised these issues in exploring the validity of the convergence hypothesis (Baumol, Blackman, and Wolff 1989; Abramovitz 1989, chs. 1 and 7). The convergence hypothesis argues that those nations that have made fundamental public investments in the education of their people—nations that belong to what Baumol, Blackman, and Wolff (1989, ch. 9) call the *convergence club*—have the capability of borrowing new technology from technological leaders, which, in turn, permits them to increase their rates of productivity growth so that their levels of productivity converge on that of the leaders.

The convergence hypothesis has the virtue of focusing attention on education and technological change as critical determinants of long-run industrial competitiveness. But the institutional perspective on learning and competitive

advantage that I have offered here suggests a number of weaknesses in the convergence hypothesis (see Lazonick 1993b).

First, it is argued that a sound educational system provides the foundation for followers to adopt foreign technology, thus permitting their rates of productivity to converge on that of the leader. In long-run historical perspective, however, it must be recognized that the relation between public investments in education and industrial leadership is a twentieth-century phenomenon. In the nineteenth century, Britain developed into the workshop of the world with little investment in or assistance from a system of public education. In contrast, in the twentieth century, the development of a system of public education has become critical for successful economic performance. Yet, particularly in the United States, the form and content of the system of public education responded to the changing labor force requirements of business enterprises—requirements that were determined by the strategies and structures of these enterprises (Bowles and Gintis 1976; Noble 1977; Lazonick 1986). In all the advanced capitalist economies of this century, the willingness of the state to invest in an educational system has been of vital importance to the growth of productivity. But the rate and direction of such public investments have been profoundly shaped by the rate and direction of business investments. Part of Britain's economic problem in the twentieth century has been the failure of business enterprises to make widespread and effective investments in organizational and technological innovation that could have, in turn, placed enough pressure on, and provided enough resources to, the educational system to transform it to serve the human-resource needs of business (Lazonick 1986).

Second, the convergence hypothesis overestimates the degree to which technology can be adapted from one national environment to another. Insofar as the utilization of technology requires complementary human inputs with specific cognitive capabilities and behavioral responses, the transferred technology will have to be developed in the new national environment before it can be utilized there (see Mass and Lazonick 1990). As a result, when transferred technology is ultimately developed so that it can be productively utilized in a new national environment, it is, in effect, a new technology. Indeed, in terms of its impact on productivity, it may be a superior technology. Historians of technology now recognize the importance of the social determinants of technological change within particular national environments (see MacKenzie and Wajcman 1985; Bijker et al. 1987). The analysis of the social determinants of technological change must also be put in comparative, cross-national perspective.

Third, because social organization is so important to the development and utilization of productive resources, former technological leaders may

have problems responding to competitive challenges from national industries that, through the dynamic interaction of organizational structure and technological change, have generated rapid rates of productivity growth. With institutions in place that were appropriate for the development and utilization of what have, by now, become traditional technologies, the former technological leaders may be incapable of increasing their rates of productivity growth by simply "borrowing back" technology from the rising competitors. They may also lack the organizational capabilities to develop and utilize superior technologies. Instead, they may pursue the alternative strategy of adapting on the basis of their traditional organizations and technologies (Lazonick 1991a, ch. 1). By avoiding high fixed-cost investments in organizations and technologies that will generate returns only in the future, this adaptive strategy may augment rates of productivity growth in the short run, while making it impossible to sustain these rates of growth in the long run.

It is important, as the proponents of the convergence hypothesis argue, to focus the analysis of economic performance on the long run. But future research must also recognize that it is the dynamic interaction between organization and technology that determines whether the long run results in competitive success or relative decline.

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