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## Worker Problem-Solving and the Nature of the Firm: New Theory, New Evidence

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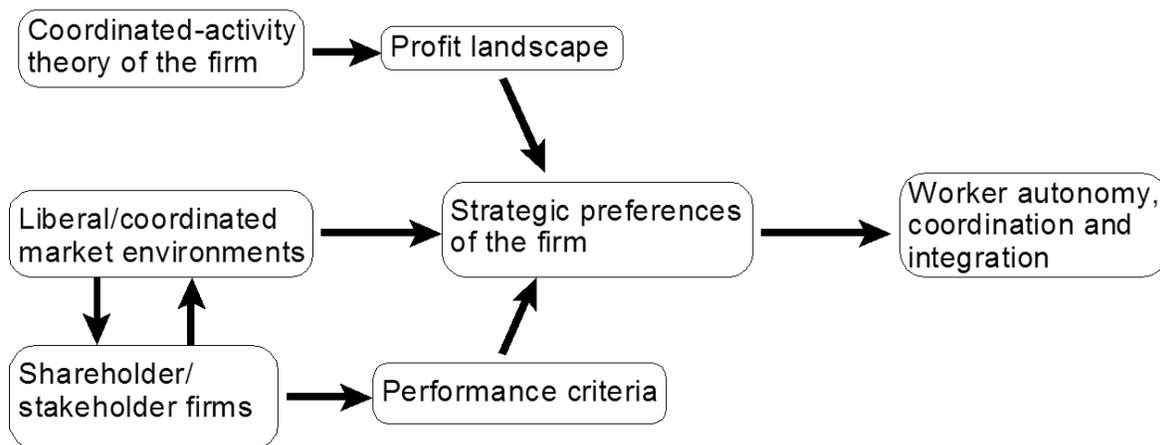
*ABSTRACT:* This paper proposes a different theory of the firm and demonstrates how it can be employed to yield hypotheses about differences in innovation and human resource strategy according to the shareholder/stakeholder and liberal/coordinated market dichotomies. The theory assumes that feasible production and demand sets are nonconvex due to interaction among activities; thus firms exist to permit the identification and exploitation of profit opportunities through coordinated action. This implies that firms face a nonconvex profit landscape comparable to the fitness landscapes invoked in evolutionary biology. Given the complexity of these landscapes and the uncertainty of the location of profit hills, there is a tradeoff between exploiting existing or adjacent hills and prospecting for more distant ones: the first minimizes risk, the second maximizes potential profit. A further assumption is then introduced, that shareholder firms seek to maximize the present value of expected future profit streams, while stakeholder firms maximize the likelihood of achieving profitability over a given time horizon. Combining these theoretical priors, we characterize the likely innovation, organizational and human resource characteristics of the two types of firms and the effects exerted by their external environment, as described in the Varieties of Capitalism literature. These theoretical predictions are confirmed in a set of case studies of a stakeholder firm in liberal and coordinated environments and a shareholder firm in a coordinated environment. This is seen through differences in the role of worker problem-solving, which brings together innovation and learning, organizational structure and human resource strategy.

The authors would like to thank Richard Weiss for generating the profit landscape graphic used in the text.

This paper is an attempt to bridge two worlds, economics and management, using a theoretical framework in which managerial issues of strategy and organization can be linked to economic modeling of profit opportunities. The key element, which will be developed further on, is the concept of a profit landscape, which relates performance outcomes to configurations of activities in a manner that respects the complexity and uncertainty in which firms normally operate. Aside from demonstrating this theoretical apparatus, our goal is to shed light on the way “varieties of capitalism” factors—whether the firm is responsive primarily to shareholders or to a broader array of stakeholders and whether its systemic environment is primarily “liberal” or “coordinated”—are reflected in organizational, production, and human resources choices that alter the position of workers within the enterprise. Our path to profit landscape analysis will take us first through a coordinated-action (CA) theory of the firm, which is predicated on the assumption that the feasible production and revenue sets available to the firm are typically nonconvex, and complexly so. From the analysis of alternative firm types we suggest different performance criteria, profit maximization for shareholder firms and profitability likelihood maximization for stakeholder firms. Combining this difference in performance goals with profit landscape analysis, and taking into account the opportunities and constraints of liberal versus coordinated market environments, yields predictions for the strategic preferences of the different kinds of firms in the realm of skill development, organizational learning and innovation pathways, and these in turn point to consequences for the balance between autonomy, coordination and integration in the position of workers.

The argument is summarized in Figure 1:

**Figure 1: The Argument of the Paper**



The plan of the paper is as follows: In Section I we will briefly discuss the context within which our discussion takes place. There are several recent and ongoing literatures in economics and management that consider the interrelationship between the governance of the enterprise, its external context and its internal organization. While our questions are somewhat different, we take notice of these parallel research streams. Section II describes the CA theory of the firm, leading to the formulation of the profit landscape model which will be our workhorse in the rest of the paper. In Section III we summarize the literature on liberal versus coordinated market economies and sketch the relevance of the shareholder/stakeholder distinction for the firm’s performance goals, showing how this leads to different strategies for navigating the profit

landscape. Section IV applies these theoretical tools to our main question, how firm governance and the firm's environment are related to the role of worker autonomy and skill in enterprise strategy. In Section V we present case study evidence that illustrates how these factors have played out in actual firms. We conclude with Section VI, where we identify important questions raised by our approach that future research can address.

## I. The Context of the Argument

Several parallel research trajectories have addressed the question of how the external organization of the economy affects the internal organization of the firm and, to a lesser extent, vice-versa. Our purpose here is to simply reference them. As will be seen, we ask somewhat different questions, and our analytical approach does not correspond to theirs.

A. Internal versus external labor flexibility. In response to the evident transformation of labor relations in the United States and several other countries (e.g. Kochan et al., 1986), students of employment relations and strategic human resource management became interested in the potential downside of increasing labor market flexibilization. It was noted that flexibility means one thing in the context of labor allocation within an enterprise and another across enterprises. In the first case, it refers to the ability to redeploy labor readily and without loss of productivity across tasks and units in response to changing production and demand conditions. In the second it is about the ease with which workers can be recruited and separated, so that labor flows across employers and economic sectors are not encumbered. This latter form of flexibility, which had become more prominent across much of the industrialized world by this point, is what is commonly referred to as labor market "reform", for instance in the discourse surrounding credit conditionality in Europe and elsewhere. Interestingly, an analysis of over 50 of the most-used business administration textbooks at German universities showed that flexibility has a positive connotation in the fields of logistics and production, finance, marketing, accounting and controlling, planning, organizational design and process management. Only in the field of human resource management is it presented as being negative as well as positive, and HR managers are advised that individual solutions are required to balance divergent interests regarding workforce flexibility. (Nolte, 2007)

A popular hypothesis is that there is a tradeoff between internal and external flexibility of the workforce at several scales. (Atkinson, 1984) First, at an economy-wide level, more liberal labor market institutions are sometimes held to undermine the committed labor relations on which production flexibility depends. (Appelbaum et al. 2000; Michie and Sheehan, 2005) As a general proposition, this has been disputed; perhaps it is possible for both forms of flexibility to coexist at this scale. (Osterman, 2000; Kalleberg, 2001) Second, firms are sometimes portrayed as choosing to pursue one or the other form of flexibility as a matter of strategic human resource management. (Youndt, 1996; Lepak et al., 2003) Third, firms are observed to separate their workforce into "core" and "periphery" components, with the first contributing internal flexibility and the second external. (Cappelli and Neumark, 2004)

Our concern in this paper is not with the allocation of labor per se. It is possible for workers to be either more general or more task-specific resources within the firm without necessary consequences for their autonomy. Of course, to the extent the investments in training, which depend on greater long-term commitment, support both allocative flexibility and autonomy, they will be correlated. Nevertheless, the issues this paper is concerned with, while they parallel those in the internal/external flexibility literature, are sufficiently separate that we do not have to take a position on the flexibility debates.

B. The topic of worker autonomy in production systems has been broached indirectly in the context of organizational learning and team organization. To the extent that workers are perceived as exercising autonomy, this is thought to happen via teams that are purposefully organized by management. There is, of course, an immense literature on such teams—their productivity, the extent to which they are able to act autonomously, and their strategic interrelationship with other managerial choices and contextual factors.

There is general agreement on the set of practices that are consistent with team organization. Roberts (2007), for instance, characterizes the elements of “modern manufacturing” as summarized in Table 1:

**Table 1: “Characteristic Features of Modern Manufacturing”**

|  |
|--|
| Flexible machines, low set-up costs                    |
| Short production runs                                  |
| Frequent product improvements                          |
| Broad product lines                                    |
| Targeted markets                                       |
| Highly skilled, cross-trained workers                  |
| Worker initiative                                      |
| Local information and self-regulation                  |
| Horizontal communication                               |
| Cross-functional development teams                     |
| Continuous improvement                                 |
| Accent on cost and quality                             |
| Low inventories  |
| Demand management                                      |
| Make to order, extensive communications with customers |
| Long-term, trust-based relationships                   |
| Reliance on outside suppliers                          |

Source: Roberts (2007)

Worker initiative is one component of this package, as is self-regulation and committed, trust-based relationships. Thus worker autonomy is considered in a general way to be systemically related to other high-performance practices, but it is not addressed as a distinct topic. Similar lists, incidentally, can be found in Paaue (1994) and Baron and Kreps (1999).

C. The problem of firm- versus economy-level determinants of production systems has come to the fore due to the challenge of transnational production systems. If these systems can be fully compartmentalized through outsourcing, of course, there is no problem of accommodating multiple national contexts to be solved, but assuming this compartmentalization begs the question. For a variety of reasons, it is often the case that firms engaged in production across national boundaries are unable to seal off these activities from one another. First, firms wish to diffuse their best practices, which are costly to identify and implement, throughout the enterprise. Second, learning and innovation are of greater value to the enterprise if they can be derived from and applied to the widest possible scope of operations. Third, firm-level governance structures, as well as the cultural investments we will describe later, are vulnerable or less effective if they are subject to geographical limitations.

For all these reasons, a literature has emerged within international management on how to respond to differences in the legal, cultural and political environments within which business must operate. This isn't the place for an examination of this literature, but we hope that our approach to organizational issues will contribute to it.

To sum up, our question about differences in the role of workers across different types of firms and economic systems is parallel in some respects to other currents in economic and management research, but it is different in the specific aspect of firm organization it addresses, and unlike them it is based on a theoretical approach that permits organizational and strategic questions to be investigated more comprehensively.

## II. A Coordinated Activity Theory of the Firm

In this section we present an approach to the analysis of firms whose key feature is the concept of a profit landscape. Such a landscape presupposes the nonconvexity of profit functions, and it poses questions regarding uncertainty, flexibility and learning (identifying the landscape and its changes through time) and the scope of the firm (its ability to navigate through the landscape via strategic plans).

The dominant approaches to the economic theory of the firm currently center on contracting and its pitfalls. The Coase view is that the make-or-buy decision would always be settled in favor of "buy" were it not for the frictions that accompany the searching and contracting aspects of reliance on the market. Williamson takes this further by emphasizing the trust aspect of contracting: a firm substitutes institutional hierarchy—a command relationship—for markets in intermediate goods and services when hierarchy sufficiently economizes on trust. Similarly, viewing the firm as a nexus of contracts calls attention to the mechanism design problem associated with the multiple contracting function of a single economic agent. We do not wish to criticize these theories, since they capture aspects of real decision-making, but we regard them as not particularly useful for the purposes of this paper. The principal-agent problem, which is a point of departure for standard theories, will appear for us to be a consequence rather than a prior cause of organizational form and strategy.

Instead, we will develop a theory of the firm centered on the value to an entity of coordinating a set of decisions that would otherwise be made independently by separate entities. It is a distant relation of two pre-existing theories, Schumpeter's entrepreneurial view and Chandler's assertion of economies of administration, but as we will see, it is based on a different foundation. We will proceed in two steps. First we will present the general, highly abstract argument for gains to coordination in environments characterized by interactive nonconvexity, and then we will apply this logic specifically to the theory of the firm, summarized in a profit

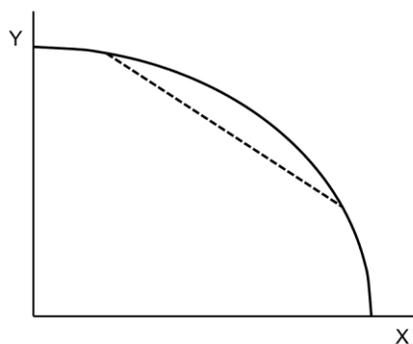
landscape. Readers who want a refresher in the elementary analytics of the convexity properties of functions and their associated sets, distinguishing between increasing returns and interaction effects, can find this in the appendix.

A. The convexity assumption in economics and its relationship to the case for the superiority of market organization.

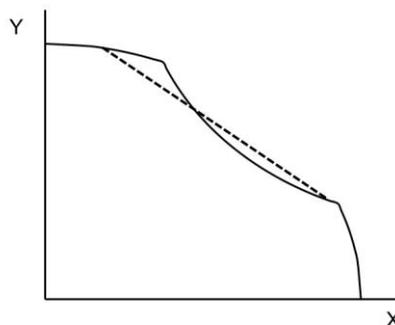
A set is convex if every point on a straight line drawn between two points in the set is also in the set. A well-known example is the production possibility set found in most introductory economics textbooks, as depicted in Figure 2a: it shows the set of an economy's feasible outputs of goods X and Y given available resources and production technologies. Any combination of X and Y on the thick curved line or between that line and the origin is feasible. A dashed straight line has been arbitrarily drawn between two feasible points, and it can be seen that the entire line falls within the feasible set. A set is nonconvex, however, if it is possible to draw a straight line between two points in the set which contains points *not* in the set. This is depicted in Figure 2b, another production possibility set, but containing a "depression", such that the condition for convexity is not met. Here a straight line drawn between two feasible points lies partly within the feasible set but partly outside it. Such production possibility sets are seldom found either in introductory texts or even advanced research, a matter of considerable interest, as we will see.

Inspection of Figure 2 yields two important insights. First, there is a determinate relationship between the price system and the selection of points on the boundary of the feasible production set if that set is convex. A price in the context of Figure 2 means a negative slope indicating how much of good Y trades for a corresponding quantity of good X. Every point on the thick curved line in Figure 2a is associated with a particular price, the slope of a line exactly tangent to it. Similarly, any price intermediate between the slopes at the X and Y intercepts is associated with exactly one point on the boundary of the feasible set. Thus, given the assumption of efficiency—that only boundary points matter—the price system "controls" the physical allocation of X and Y, and the allocation of X and Y determines the corresponding price. This is the underlying property of the conventional positive analysis of markets, the use of microeconomic theory to describe, explain or predict market outcomes.

**Figure 2: Two Production Possibility Sets**



2a: convex



2b: nonconvex

The second insight is that, if a given price—a tradeoff between X and Y—reflects the relevant preferences of decision-makers, given the assumption of efficiency, a sufficient rule for maximizing the joint value of X and Y is to make any small adjustment (movement along the curve a bit to the NW or SE) that is value-increasing. The decision-maker in this context could either be a group of consumers enjoying the benefits of consuming X and Y or producers enjoying the profits of selling X and Y to consumers. This normative property is extremely important at each scale of the economy. At the economy-wide level it argues for the decentralized procedures of a market, since each transaction can be regarded as a small step in the direction of a more desired allocation (otherwise it would not be voluntarily undertaken). At the level of an enterprise it indicates that “buy” should normally be preferred to “make”, since each such “buy” decision, if rational, moves the enterprise closer to its optimum, whereas “make” is less determinate with respect to incremental improvement—there isn’t voluntary choice on both sides, the producer and the user, to ensure that improvement has actually occurred, particularly with respect to all the other options that exist beyond the boundaries of the firm.

The convexity assumption is essential to the case for incremental, decentralized, myopic decision-making. This becomes clear when we examine Figure 2b. Here neither the positive nor normative property holds. There are multiple points on the production possibility boundary that correspond to the same price, so the price system no longer fully controls the allocative system. Normatively, the traverse along the boundary to arrive at a preferred production of X and Y may require going “down” as well as “up”: decisions need to be far-sighted rather than myopic and, if different small movements along the curve represent decisions by different agents (as in the case of a set of transactions in a price system), coordinated rather than piecemeal and independent.

The abstractions of the geometry translate into social theory in a straightforward manner. There are two potential sources of nonconvexity, increasing returns and interaction effects. Increasing returns refers to the notion that increases in some good, either as an input or output, yield ever-increasing increments to whatever outcome is being generated. Increasing returns to a factor of production mean that with the addition of each additional unit of that factor, output is rising at an increasing rate. Increasing returns on the preference side mean that each unit consumed confers an ever-larger increase in the consumer’s well-being (and demand). Increasing returns violate the usual “laws” of textbook economics by requiring initial allocations when returns are low in order to take advantage of the higher returns later on, such as when a firm must operate at a loss for a period of time in order to grow larger, so it can become profitable. Increasing returns are common in modern production systems, and economic models that incorporate them often yield a role for interferences in the market, such as trade protection to nurture growing industries. Nevertheless, economists normally assume the opposite: diminishing marginal returns to each factor of production and diminishing marginal utility of each good consumed.

When economists hear the word “nonconvexity”, they reflexively think of the problem of increasing returns, but the theory of the firm discussed in this paper is based on a second source of this property, nonmarket interaction. When economic actors interact through the marketplace, if all relevant production and demand sets are convex, and all the other necessary conditions (not discussed in this paper) are met, the market will incrementally bring them to an optimal state of affairs, and the price system will be sufficient to uniquely determine each person’s outcome. Nonmarket interactions, however, potentially violate the convexity property and yield results like the one depicted in Figure 2b. Quite simply, if what I want to do depends on what you do in a way that is not the result of market operations, in order to arrive at a

preferred state of affairs you and I may need to coordinate our actions in some fashion. (Technically, increasing returns violate convexity assumptions along the principle diagonal of the matrix of second derivatives of the function in question; interaction effects are represented by nonzero values in the off-diagonal elements. Complexity arises from the potential for these values to take the form of higher-order functions of the dimensional arguments: the strength of the interaction effect changes as arguments change.)

Many such interactions are constituted by what we call “culture”. These include:

- shared affective responses (how your well-being affects mine)
- sociality (changes in well-being due to personal interaction with others)
- social norms (how a group’s behavior can generate a norm, which influences each individual)
- social discourse (how the stories we tell about our actions alter how others perceive their actions)
- reference group effects (how what I have affects how you value what you have)
- organization (how my actions within an organization affect others within the same organization)

Other interactions are physical:

- proximity effects
- environmental effects
- public health effects

Later in this section we will consider technical interactions that arise within production.

A view of human beings acting within shared physical and cultural space would presume widespread interaction, with resulting nonconvexities in any economic set (feasible production, consumer preference, equilibrium portfolios, etc.) impacted by them. Economists, however, have routinely assumed the opposite, that all relevant relationships in the economy generate convex sets, which is why their benchmark utopia is a world of infinitely many, infinitely small actors. Explicit coordination need play no role at all. Thus the paradise of the self-regulating market is also the pre-social world of the free-floating, unaffiliated individual. Our purpose, however, is not to decry this situation but to see what can be learned from theories premised on interaction and nonconvexity.

Fortunately, research streams have recently emerged in economics which incorporate interaction effects in modeling exercises. General treatments of such modeling forms include Glaeser and Scheinkman (2000), Brock and Durlauf (2001), Papandreou (2003) and Horst and Scheinkman (2006). An example of the application of interactive nonconvexity to financial markets is Basu (2009); an application to labor markets is van den Berg (2003). This paper applies a similar modeling orientation to the theory of the firm.

B. The CA theory of the firm under conditions of nonconvexity.

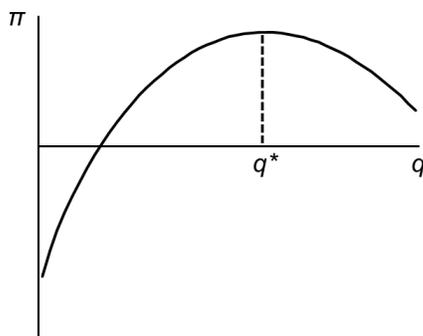
Firms exist, above all, because there are opportunities to profit from production possibilities and consumer demand that would not be met by the independent, uncoordinated exchange of goods by separate, unrelated actors. A new market, for instance, may require coordination of production and marketing activities which independently would not be worthwhile: a producer would not voluntarily undertake the production without the activities of the marketer, and the marketer would not voluntarily undertake her activities without a coincident choice by the producer. That describes a situation in which there are nonmarket interactions between the two

actors which permit their collective choice to be superior to the sum of their individual choices. Of course, the various component entities of the firm are unlikely to come together out of a spontaneous, mutual realization of their joint benefit. It is typically an active agent (the entrepreneur) who initiates the venture and elicits participation by agreeing to accept the largest share of financial risk associated with it.

A useful way to think about entrepreneurship is as the formulation and implementation of a plan. An entrepreneur may have an idea for a venture which differs in some way from what is currently being done. Perhaps this venture has not yet been undertaken because its particular configuration of activities has not been envisioned by anyone else. The implementation of this plan requires assembling sufficient resources—equipment, materials, know-how, workers—to carry it out. The make or buy decision is largely dictated by whether there are nonconvexities in a particular set of activities such that outcomes can be improved by direct coordination rather than decentralized processes brought together through purchase. Thus, it is possible that many critical components will be unavailable on the market, or unavailable with the specific qualities or according to the specific schedule required by the entrepreneur, because there was no pre-existing benefit for any such external supplier apart from the linked activities that constitute the entrepreneur's business plan. Imagine, for instance, Henry Ford attempting to purchase the various tools and dies that he needed for his first automobile assembly line from existing independent suppliers: these intermediate goods would not exist apart from his development of the entire productive system. (Firms specializing in them would come into existence later, and this would change the make-or-buy calculus—as it did.) In short, the slogan associated with the CA theory of the firm is that the firm exists to internalize nonconvexities.

In order to put this theory to work, however, we will need a more developed conception of how firms confront and cope with nonconvexities in their ordinary, ongoing operations. As a temporary convenience, we will assume that the purpose of the firm is to maximize profits. (This assumption will be modified in the next section.) The conventional economic depiction of profit maximization is predicated on perfectly convex production and demand sets, and can be seen in Figure 3, derived from the usual assumptions on total revenue and total cost as functions of output  $q$ .

**Figure 3: Profit Maximization under Conditions of Convexity**

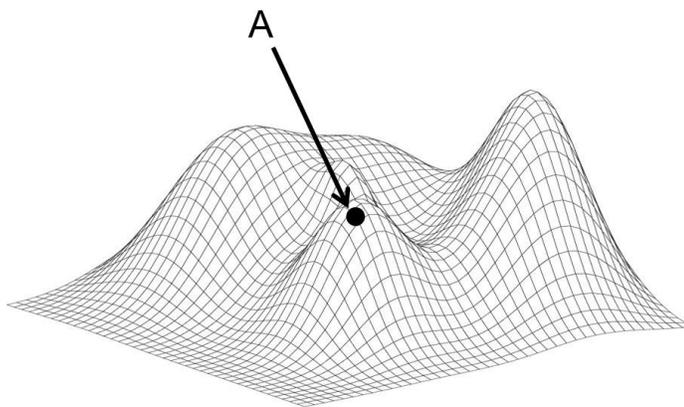


Profit as a function of output is monotonically increasing to the left of the unique profit-maximizing output level  $q^*$  and monotonically decreasing thereafter. Note that  $q$  does not have

to be a physically distinct product. It could be a quality of a product, such as a feature, a location or a delivery time. If there were two such qualities,  $q_1$  and  $q_2$ , the profit function would appear as a cone in three-dimensional space. For  $n$  qualities the profit function would be a smooth  $(n+1)$  dimensional conical surface. The profit maximizing rule is myopic and simple: consider producing just a bit more or less of any  $q$  and see what effect this would have on profits. Always proceed with an incremental change that is profit-increasing. When no such change is available, profits are at their maximum.

While nonconvex profit functions are rare in economics, nonconvex “rewards” are well-known in evolutionary biology. The relevant concept is known as a fitness landscape, and Figure 4 provides a conventional representation.

**Figure 4: A Fitness Landscape**



In this figure the horizontal axes could be two traits (phenotypes) of an organism, with the organism’s evolutionary fitness measured along the vertical axis. As can be seen, there is assumed to be nonconvexity of the fitness sets over both phenotypes. This is because reproduction is the result of a complex interplay of organismic characteristics: more of one trait may be either better or worse for fitness, depending on the extent of the other, and vice versa. Such a figure is for illustrative purposes only, since real-world organisms have vast numbers of potential characteristics, achievable by mutation, whose reproductive effects are interactive. Nevertheless, it is clear that myopic adaptation—which is how evolution operates, since it is nonpurposive—is not sufficient to assure an organism of optimal fitness under the given set of environmental conditions. Moreover, the fitness landscape moves as environmental conditions change, so even if optimal fitness were to arise in one context, it might prove to be a poor basis for adaptation to a new one.

Now let us suppose that Figure 4 represents a firm’s profit landscape, where the horizontal axes represent two of its activities. The vertical dimension represents the combined effect of production costs and sales revenues resulting from them, and it is assumed that, just as an organism’s traits interact to affect fitness, these activities interact to generate nonconvex profitability outcomes. This interpretation, incidentally, parallels work stemming from operations research, such as Kane (1996) and Robertson (2004).

At this point it may be useful to pause and consider what might be meant by “activities” in this context. An activity is anything a firm might undertake which could influence, directly or indirectly, its profitability—an immense list, although some will obviously be more consequential

than others. Examples include offering particular products, the qualities of these products, their delivery to particular places and times, the methods and resources employed to produce them, and activities undertaken to market them. In other words, anything firms do to produce and market goods and services could serve as a dimension in its profit landscape, which acquires its complexity both from the range of activities that jointly determine profit outcomes and the number of inflection points on its surface, which reflects the extent of interactivity between them. As an example, a firm might offer accounting services to business clients. Its activities include the professional and nonprofessional employees it recruits (and their particular qualifications), the specialties it offers in its services, the location it serves, the relationships it establishes with particular clients, the way it advertises its offerings, etc. A firm exists because there are combinations of these choices which, if undertaken in a coordinated manner, will be more profitable than outsourcing them to separate producers and purchasing their services as intermediate products on a market. This is the advantage of coordinated activity, and the relationship between these advantages and the many possible configurations of activity are summarized in a profit landscape.

The analytical usefulness of the profit landscape appears when we consider what the firm is likely to know about it. In very general terms, there are three dimensions that affect this knowledge, the complexity of the landscape, its perceptibility and the rate at which it changes.

Let's describe the landscape in terms of its hills—configurations of operational choices that are locally optimal. A simple landscape has few hills; in fact, the assumption common in most economic literature is that there is only one, so that myopic improvement is always optimizing. Clearly, in a world of convexity the information burden of the firm would be small: it is necessary only to be able to compare small adjustments in output, product design, market strategy, employment policy, etc. When nonconvexity is permitted, the firm needs to have some knowledge pertaining to relatively "distant" (non-incremental) reconfigurations in order to know whether it is operating on the right hill. The more such hills there are, and the more multidimensional their inflection points (so that reconfiguration encompasses more aspects of the firm's operations), the greater the information burden.

The second consideration is what might be called the visibility of the landscape. Since the information gathered from individual, incremental adjustments may not be sufficient to determine whether coordinated adjustments would be profit-increasing, the firm will want to know about the topography of the landscape at points some remove from its current operating position. An arbitrary starting point is pictured in Figure 4, A. A firm at A could benefit from knowing about other regions more profitable than this one. A reasonable hypothesis is that, the more closely drawn a region is around the current position of the firm, the more it can utilize its existing operations to acquire information about it. Points close to A might be disclosed by an observant, experimental (reflective) mode of work performance; those further from A, like the depicted local and global peaks, would tend to be perceptible, if at all, through more specialized learning activities, like R&D, less tied to current practices. Moreover, it can be assumed that the more distant a region on the profit landscape is from A, the less the firm will know about it given a fixed learning effort. Of course, the entire discussion of learning and purposive movement through a landscape has no counterpart in biological evolution.

The third consideration is the rate at which the profit landscape is changing. In evolutionary theory it is the change in fitness landscapes that drives genetic change. The rate at which natural selection operates depends on the reproductive cycle of the species of interest, as well as the degree and range of genetic mutation affecting the traits determining fitness. Thus, the more rapidly the fitness landscape is altered, the more endangered a genetic branch becomes.

Human institutions are purposive and can adapt to rapid changes in their environment if they have sufficient information, but learning also takes time. In fact, it is often the case that a firm needs to *unlearn* what it has previously discovered about profitability in order to respond effectively to a change in its environment. Both learning and unlearning take place over time, which means that firms in an unsettled environmental struggle with both a lack of knowledge and the problem of false knowledge.

Incidentally, just as organisms can alter their fitness landscapes via their own activity, so can firms influence their profit landscapes. We will abstract from such feedback effects in this paper, but it is an important topic for investigation.

Table 2 translates the first and third of these abstract considerations into characteristics familiar to economic analysis.

**Table 2: Complexity and Rates of Change as Determinants of the Firm’s Knowledge Burden**

|                                    |         | Rate of Change of the Profit Landscape                 |   |
|------------------------------------|---------|--|---|
|                                    |         | Slow   | Fast  |
| Complexity of the Profit Landscape | Simple  | Standardized production, stable technology and markets | Standardized production, unsettled technology and markets |
|                                    | Complex | Customized production, stable technology and markets   | Customized production, unsettled technology and markets   |

The information burden is least in the upper-left cell and greatest in the lower-right. The qualitative nature of this burden depends on the second of our considerations, the extent to which new knowledge acquisition is tied to the performance of existing operations.

Given that learning is costly and time-consuming, the ability to react quickly to unforeseen movements in the profit landscape is significant. All else equal, a firm is better off if it is able to respond quickly and flexibly to events that make current operations less profitable than “nearby” reconfigurations. For instance, the structure of market demand may change unexpectedly, and a firm that can readily alter its output composition benefits relative to one that can’t. Flexibility in this model has several dimensions. (1) It encompasses learning about the immediate vicinity of one’s profit landscape in order to identify and exploit changes in it. (2) It incorporates operating flexibility—human and physical resources that can be repurposed in response to new conditions—that would be represented as ease of movement through a profit landscape. (3) It may entail selection of a local optimum whose surrounding region has fewer “troughs” (profit-diminishing zones) that could impinge on the firm as a result of the general movement of the landscape. To the extent that flexibility is costly, this view restates the familiar tradeoff between efficiency in exploiting a given opportunity and the less risky strategy of profiting over the current opportunity and a wider range of potential future ones. This tradeoff, well-known in biology in its distinction between specialists and generalists, can also apply to firms.

This analysis takes us some distance toward our larger point that firms have alternative ways to respond to their environment, but we need more theoretical elaboration to represent the

stakeholder/shareholder (firms) and coordinated/liberal (systems) dichotomies within the profit landscape framework, and then to link organizational form—in particular the role of workers—to them.

### III. Varieties of Capitalism, the Stakeholder/Shareholder Distinction and Implications for Profit and Performance

Two distinctions are important for our purposes, the difference between stakeholder and shareholder firms and between liberal and coordinated economies. These are related but not the same; it is possible to have one without the other.

#### A. The stakeholder/shareholder distinction

There are actually two dimensions to this distinction, governance and performance criteria. With respect to governance, the question is whether control is vested predominantly in equity owners, or whether it is distributed more widely across other constituencies, including the workforce, representatives of the communities in which the firm operates, institutional creditors (such as investment banks), and representatives of relational counterparties, both suppliers and customers. This is a matter of degree, and many configurations of stakeholder governance are possible.

On the performance side, the question is, what objectives does the firm pursue? A shareholder firm seeks to maximize the value of its outstanding shares, which, if equity markets are efficient and responsive only to fundamentals, means maximizing the present value of future profit streams. A stakeholder firm has to balance the interests of its shareholders against other interests—the quality and quantity of employment, contributions to local, regional or national economic growth and development, and service to other contracting parties. There isn't an accepted theory of how these interests are reconciled—particularly with respect to profitability—but we will return to that issue momentarily.

#### B. The liberal/coordinated market distinction

After 1989 the contrasts within the capitalist world became more apparent and attracted greater research interest. The thesis that emerges from the essays collected in Hall and Soskice (2001) is that there are two such general models in the modern world, the liberal and coordinated market economies. The liberal version, represented by the US, relies to a greater extent on markets as decision-making mechanisms, as reflected in corporate ownership and governance, the role of financial markets, and labor market institutions that leave most matters to individual initiative and competitive outcomes. Coordinated capitalism can be exemplified by Germany and places greater emphasis on firm-level, industry and societal collective goods and their institutionalized acquisition and management. Coordinated economies tend to shelter corporate governance from financial markets and employed workers from competition with either the unemployed or those with lesser qualifications. They include institutions for promoting greater investments in human capital and to promote collaboration between firms and between firms and other entities. A further claim made by proponents of the varieties of capitalism perspective is that these characteristics logically cluster: there are synergies between them, such that countries that adhere to the liberal model in some respects are likely to adhere in others, and similarly with the coordinated model. This receives empirical support from Hall and Gingerich (2009), drawing national-level cross-country data.

The varieties of capitalism approach has been challenged from several vantage points. One initial criticism is that the dichotomy between the two models is overdrawn. For instance, King and Rueda (2008) point out that there is substantial institutional variation *within* national economies, and in particular that systems viewed as coordinated typically contain liberal sectors. Others question whether a two-way differentiation is sufficient (e.g. Freeman, 2000), and whether the scope and time frame capture the broader historical forces at work (Boyer, 2007). It has also been argued that differentiation within capitalism may be diminishing due to global competitive forces. (Baccaro and Howell, 2012; O'Sullivan, 2003; Yamamura and Streeck, 2003; Katz and Darbishire, 2000) A particular convergence mechanism of interest is that the liberal sector within coordinated economies may be expanding. (Raess, 2014; Palier and Thelen, 2012; Silvia and Schroeder, 2007) This latest wave of skepticism has not yet absorbed developments subsequent to 2008, however.

As Boyer (2007) points out, from a methodological standpoint it is interesting that the varieties of capitalism literature tends to center on the agency of the firm. To put it somewhat differently, it is often assumed that the predominance of stakeholder firms is the basis for a coordinated economy, while the economy-wide institutions of the coordinated economy support the functioning of stakeholder firms. We recognize these linkages, but we think it is important to keep these two levels analytically separate: shareholder firms *do* operate in coordinated economies, and stakeholder firms often find themselves operating in liberal economies. Consider the rather standard list of features presented in Table 3:

**Table 3: Main Elements in the Varieties of Capitalism**

|                       | Liberal market economies   | Coordinated market economies  |
|-----------------------|--|---|
| Ownership of firms    | Dispersed shareholders trading in asset markets; more recently private equity funds  | Stable cross-ownership of shares, bank equity positions in conjunction with credit, public ownership stakes |
| Governance of firms   | Shareholder model; workforce is external to the firm   | Stakeholder model; workforce is internal to the firm  |
| Worker representation | Decentralized collective bargaining only   | Centralized collective bargain, co-determination, works councils  |
| Worker motivation     | Monetary incentives and disincentives; minimal commitment by either workers or employers; reliance on external labor markets | Substantial intrinsic motivation; high mutual commitment; substantial reliance on internal labor markets    |
| Skill formation       | Skill formation external to the firm (e.g. school system)  | Skill formation internal to the firm (OJT, apprenticeship)  |
| Innovation            | Embodied particularly in new enterprises; low entry barriers   | Embodied particularly in practices within existing enterprises; high entry barriers                         |

|                         |  |  |
|-------------------------|--|--|
| Time horizon            | Short payback periods; limited investment in human capital                   | Long payback periods; high investment in human capital   |
| Product market emphasis | Low unit cost of standardized products; rapid exploitation of product cycles | High flexibility and customization of products; continuous quality improvements to extend product cycles |

Some of the rows describe features with an important systemic component, such as skill formation and the legal framework for worker representation, while others describe firm-level factors, such as product-market orientation and styles of worker motivation. Most have a foot in both levels, in the sense that they differ across firms but are responsive to economy-wide support and incentives, indicating that analysis has to encompass both levels. A significant area of interest for us is the problem of the multinational firm organized along stakeholder lines which must operate in both coordinated and liberal environments.

### C. A theory of performance criteria in shareholder and stakeholder firms

We previously introduced the notion of a profit landscape, but no distinction was made between different types of firms and their possibly differing performance objectives. To adapt the landscape model to a world in which both shareholder and stakeholder firms exist, we need a theory that translates the distinction in Table 3 into the formal language of profit functions.

The shareholder firm is unproblematic in this respect: its assumed goal is to maximize the discounted present value of its expected future profit stream. This is what is meant by “profit maximization”.

What about the stakeholder firm? This firm is interested in profit for two reasons: shareholders constitute one portion of its stakeholders, and being profitable is a precondition for any other objective it may hope to realize. As a simplifying device, let us assume that only the second reason applies—in practice, continued profitability may also be sufficient to satisfy the shareholders. This suggests an alternative maximand: *the goal of the stakeholder firm is to maximize the likelihood of being profitable over a given time horizon.*

The relevant time horizon matters, but we will abstract from this consideration here. What is essential is the difference between maximizing the expected value of profits versus the likelihood of being profitable. We will interpret this in terms of the properties of profit landscapes discussed above.

Without going into the analytics, we can directly see that the key difference is risk aversion:

1. A stakeholder firm is less likely to undertake high risk–high potential return investments. To the extent that more distant points on the landscape are more uncertain in their profitability outcomes, stakeholder firms will be drawn to innovative strategies centered more on those closer to its current position. This also reinforces the strategy of pursuing innovations that exploit the unique characteristics of its physical, human and knowledge resources. (Penrose, 1959) A shareholder firm, by contrast, is more likely to engage in “prospecting” for distant, less certain but potentially more lucrative opportunities. Such a strategy is especially favored if the

firm's resources are nonspecialized, or if there is little cost to shedding old resources and acquiring new ones.

2. A stakeholder firm places relatively less value on the prospect of a profit outlier. The main benefit it acquires from a profit windfall is greater ability to engage in profit-smoothing over time; hence it experiences diminishing returns to such outliers, compared to a shareholder firm for which each increment of profit is of equal value.

3. A stakeholder firm places more value on flexibility. It is relatively less interested in extracting the maximum profit from a given opportunity than in retaining flexibility to perform profitably as conditions change. It is also willing to invest more in relationships with external parties (partners) that can influence changes in the profit landscape; this is in effect a form of flexibility.

4. A stakeholder firm has less interest in strategies that transfer incomes from other stakeholders to owners of equity under conditions of solvency, but a greater interest under conditions in which institutional survival is at risk. We won't pursue this aspect further in the current paper.

Thus we propose that, for a stakeholder firm, the conventional profit motive should be replaced with a performance motive whose measurement, at a first approximation, is the likelihood of sustainable profitability as a function of its configuration of operations. In practice, this metric may be adjusted by other outcomes, such as favorable employment relations, political acceptance or influence, perceptions of social responsibility, etc. For our purposes, what matters is the retention of the landscape metaphor, plus the risk-aversion and flexibility-seeking motives described above. These play the main role in explaining the difference in characteristic resource acquisition, learning and innovation strategies we ascribed to the two kinds of firms. The effects of these strategies on organizational structure and culture are traced through the theory developed in the following section.

#### IV. The Core Argument: Varieties of Firms, Varieties of Capitalism, and Implications for the Position of Workers

At this point, we would like to restate the question underlying this paper: what do the different types of firms and of market environments portend for the role of workers within the firm? In the discussion that follows we will make use of three terms that identify aspects of work performance and decision-making in organizational contexts, autonomy, coordination and integration. Autonomy refers to the ability to determine and undertake actions without being constrained from doing so. Coordination is the process by which entities within the organization, normally at a higher hierarchical level, constrain the actions of individuals and groups below them in order to ensure that they adhere to a common plan. Integration achieves this alignment through joint decision-making and action, such that the participating units (people or groups) can influence the constraints under which they operate. It should be obvious that all three processes will be found in every organization; in a practical sense, each presupposes the others. Nevertheless the balance and the specific ways they are articulated can vary widely, and these variations are the subject of our paper. In particular, we are interested in the amount and type of autonomy exercised by workers and by the extent to which the organizational constraints on their work are arrived at through their integration into the larger decision-making structure versus being imposed hierarchically through processes over which they have little influence.

Although four combinations of firms and market types are possible, here we will discuss only the two polar cases, the shareholder firm in a liberal environment and the stakeholder firm in a coordinated environment.

#### A. The shareholder firm in a liberal environment

As described above, this firm is assumed to pursue profit maximization. Due to the relative freedom of exit and entry and the lesser attachment of shareholders to the specific assets embodied in the firm, there is greater willingness to bear higher risk in return for greater profit opportunities. This implies less interest in investing in marginal improvements to extend the (less profitable) stages of its product cycles, and more willingness to acquire new assets or otherwise transfer investment to production at earlier stages of their respective product cycles. In terms of the profit landscape described above, this takes the form of rapid exploitation of existing profit hills, but little incentive to remain in the neighborhood of this local optimum once returns begin to diminish (as the landscape shifts). Speculation on dramatic profit opportunities across the entire landscape, even in the absence of sufficient information to moderate risk, is relatively more attractive. This in turn diminishes the incentive to invest in exploration into more modest, but more contiguous, opportunities that would build on existing knowledge and practices. Dramatic entry into new markets is more readily achieved through startups, spinoffs and acquisitions than internal, incremental innovation.

Such a profit orientation has implications for worker skill and autonomy. Knowledge as a joint product of productive activity is relatively less valued, and there is reduced incentive to invest in worker skills that might be repaid through enhanced knowledge acquisition. At the same time, insofar as a liberal environment fosters less skill formation, the firm would find it more costly to acquire the requisite human capital for a learning-centered operation. A second effect of such an environment is to emphasize exit over voice in human resources, for several reasons: (1) the culture of liberal market economies predisposes parties to such a relationship, (2) there are fewer institutional vehicles, such as works councils or co-management, for worker voice, and (3) the bias in investment toward early-cycle, high-risk but high-profit potential opportunities accentuates the numerical flexibility of employment. The upshot is a lower commitment, lower-trust system of employment relations.

The combination of these influences should be reflected in the internal structure of the firm. Worker autonomy in job performance will be regarded as primarily a risk to be avoided rather than a learning and performance opportunity. Hierarchy, with its coordination of relatively less autonomous but also less integrated workers, will tend to play a larger role. Horizontal communication and collaboration between workers may be employed if teams can be regulated to serve the objectives of hierarchical control, essentially as conduits for instructions, but if they empower the base they will be viewed as threatening to the primary basis for coordination. Forward planning in such a firm is concerned to a much greater extent with shedding and acquiring productive units in order to sample various, mostly noncontiguous, areas of the profit landscape. This reinforces the tendency in these firms for personnel practices to favor contingency over commitment and continuity. Finally, the culture and operating rules of the firm will reflect shareholder incentives. This increasingly entails practices which convert reported profits into financial incentives for the workforce—incentives which tend to be strongest for employees closest to the firm's investment/disinvestment decision-making.

This stylized model should be qualified, however, to take account of the market environment faced by the firm. All of the above tendencies will be intensified where firms concentrate on the early stage development of standardized products. If product cycles are slow and markets are

stable, even a shareholder firm in a liberal environment may find that stable employment patterns permit longer term relations in which commitment is beneficial, although in this case investments in human capital and decentralized knowledge acquisition are still unlikely. If the firm finds itself in a market that takes the form of customized production in which the fixed costs of managerial overhead are distributed across fewer units, it may also rely on greater worker autonomy and invest more intensively in skills. Thus, the structure of incentives may yield shareholder firms in a liberal context that resemble the firms we will sketch in the following section. Nevertheless, the impediments to widespread skill formation in such an economy, as well as the institutions supportive of worker voice, combined with the greater willingness to employ exit and entry in order to pursue new profit opportunities less related to current operations, should result in an approach less conducive to worker autonomy and integration than one would find among stakeholder firms facing similar market pressures in a coordinated environment.

#### B. The stakeholder firm in a coordinated environment.

This firm values its longevity and therefore pursues relatively lower-risk opportunities to remain profitable. As its performance (likelihood of profitability) landscape changes, then, it will actively seek to enhance its knowledge regarding contiguous production and market options. A contiguous opportunity is one which, despite its alterations to existing operations, remains close enough such that information about it can be gleaned from reflection and experimentation on current work and its outcomes. To put it differently, innovation is incremental where firms pursue primarily contiguous profitability hills, and information is acquired as a joint product where workers are free and have the competence to engage in this experimentation. Reflective and experimental work in this context can take the form of problem-solving, tinkering, or using productive activities as a means of investigation (such as discussions with customers). Similarly, increased flexibility typically requires a more broadly-skilled workforce, the provision of opportunities for the acquisition of new skills, and greater roles for learning and autonomous action to cope with the complexity burden of more flexible systems and methods.

Thus we expect such firms to invest in skills as well as the conditions for longer term, committed employment relations. This is relatively less costly in a coordinated market environment, since general skill formation and institutional vehicles for voice are provided externally, and the predominance of stakeholder firms cultivates widespread expectations of commitment and trust. One drawback of this orientation, however, is that exit costs are raised, reducing the mobility of capital and labor across enterprises, sectors, and products. A healthy coordinated stakeholder economy thus requires a vibrant entrepreneurial sector to redress this imbalance. However, the practices conducive to incremental innovation (contiguous regions on the profitability landscape) also cultivate the skills and entrepreneurial inclinations, a capacity to learn in complex environments and a willingness to assume responsibility, that might be employed in this sector if given the institutional support.

The firm we are describing, in order to maximize its gains from learning as a joint product, will assign more importance to worker autonomy, horizontal communication and collaboration, and capacity-building. Workers will have more individual leeway to experiment with ways of doing their work, and they will be allowed more opportunities to share their knowledge and search for improvements on a group basis. The firm may even devote costly resources to training workers in broader skills or making more of its knowledge base available to them in order to gain greater benefit from this learning-by-doing (and by reflecting). Hierarchical coordination will be deemphasized accordingly. Forward planning, to the extent that it is oriented toward incremental improvements rather than discontinuous changes in the firm's asset portfolio, will be linked more

closely with individual and especially collective worker input (integration). The firm, given its stakeholder governance and its stake in worker autonomy, will promulgate a culture that emphasizes normative integration rather than incentive-driven coordination.

As with the shareholder firm in a liberal environment, the stakeholder firm in a coordinated environment is also influenced by its market context. It will show greater resemblance to its shareholder counterpart to the extent that it produces standardized products whose horizon of profitability is limited. This can take the form of reduced stakeholder orientation in small firms confined to such a market or a dualist structure in multi-unit firms spread across different markets, some of which have these characteristics. This may arise, for example, in traditional, relatively stable manufacturing sectors whose locus of production is steadily shifting to lower-wage producers abroad.

This stylized account is intended to provide an explanation for what we already know, that workers tend to occupy different roles in the organization of work and detailed operations across the shareholder/stakeholder and liberal/coordinated market economy divides.

## V. Case Study Evidence: Variation in Worker Autonomy, Coordination and Integration in Stakeholder and Shareholder Firms and Coordinated and Liberal Environments

### A. Scope and methodology

Our research compares firms in the same industries in the US, as an example of a shareholder economy, and Germany, a stakeholder economy. The research units are production sites. While the research is ongoing, Table 4 summarizes the three case studies on which this paper is based.

**Table 4: Case Study Data**

|               | Auto production              | Beverage processing/packaging |
|---------------|------------------------------|-------------------------------|
| United States | plant of German conglomerate | —                             |
| Germany       | plant of German conglomerate | plant of German conglomerate  |

As our specific object of investigation, we focused on problem solving by workers, since it lies at the intersection of worker autonomy, organizational learning and human resource strategy. We conducted telephone interviews with the plant in the US in late November/early December 2014. On-site interviews were conducted with the tea packaging establishment in November 2014 and the German auto plant in Fall 2011. In the US auto plant and the German tea packaging plant interviews were conducted with the appropriate managers; in the German auto plant they were conducted with a sample of workers across four assembly lines. In this last case an attempt was made to reconcile the differences between worker and managerial perceptions.

The three factories under study differ in industry, age and size. The two auto factories belong to the same conglomerate, which is over 70 years old. It opened its US subsidiary less than 10 years ago on a greenfield site in a rural area. The German factory has about 50,000 workers, its US counterpart only about 3000. The tea packaging factory has occupied the same site for more than 100 years and averages somewhat over 100 workers, fluctuating with seasonal demand. Its parent conglomerate employs about 1600 workers in Europe.

## B. Findings

1. Firm strategy. Both enterprises, the auto producer and the tea packager, have profit strategies that adhere to the theoretical prediction. The auto producer's main goal is to be able to provide a wider variety of options (models and features) to consumers at no extra cost, and to reduce the cost of achieving flexibility in the face of fluctuating demand for different types of cars. Both depend on developing multi-purpose assembly operations, such that a variety of cars can be produced on the same lines. This entails a shift to general-purpose machinery (programmable on the fly) and broadly-skilled workers. Workers contribute to learning by increasing the firm's capacity to troubleshoot a complex, flexible production system and by introducing incremental innovations that reduce the cost and difficulty of supplying product variety. In this way, the firm takes maximum advantage of the capacities of its workforce while enhancing flexibility and adaptation in the local region of its profitability landscape. Relative to some of its competitors, especially those with shareholder governance in liberal economies, it is more reluctant to accept the risks of trying to capture the early phases of the product cycle with radically different offerings, such as electric vehicles.

The tea packager is concerned primarily with progressively reducing the cost and increasing the delivery time reliability of manufacturing and filling its teabags. This motive applies to both standardized teabags and the niche bags that compete in specialized markets. It doesn't maintain a separate engineering or R&D department, but relies on worker experimentation and learning to continuously improve its current operations. Development of new types of teabags and tea products occurs externally.

2. The general place of worker problem-solving in the firm's culture.

According to official documents, as well as the interviews we conducted with the heads of the plants (US, German tea) and assembly workers (German autos), it was made clear that all three producers prioritize quality, and that problem-solving by workers is viewed by all of them as a core means for achieving it. This was based on the widespread assumption that workers had the capacity to make improvements in their work on their own initiative, encompassing the flow of work (autos) and the equipment employed in production (tea). Workers in the German auto plant were also expected to take initiative on the managerial level. A strong normative impetus, however, was apparent only in the tea factory, and, as we learned, it applied only to the relatively small core workforce and not to the larger contingent force employed as a buffer.

3. Worker autonomy and capacity for problem-solving

But an active role for workers in problem-solving and organizational learning depends not only on higher-level culture and the intentions of the top management, but also workers' actual ability to exercise these functions in their day-to-day work. We identified two dimensions that underlay this activity, workers' autonomy and capacity. By autonomy we mean, as before, the freedom of workers to take initiative over a range of interventions, and by capacity the possession of the relevant skills and knowledge to perform these interventions. Autonomy is a function of organizational form; capacity depends on the personnel strategy of the firm (recruitment and skill development), as well as investments in systems that make the necessary information and intervention opportunities accessible to the workforce.

Here differences abound. Workers in both auto plants have substantial leeway to take initiative, but the scope is not the same. In the US workers can identify problems, but there are

differences among the managers as to whether workers should be permitted to directly solve them. Instead, supervisors frequently play the role of fixing problems pointed out by workers. To some extent this may reflect the lower capacity for such initiative exhibited by the US auto workers. In the German plant workers are clearly able to take initiative on their own, and they have the ability to pool their expertise to accomplish tasks beyond the means of single individuals. Meanwhile, the tea factory tells a more differentiated story: there is a stark division between the autonomy accorded to qualified (core) and non-qualified workers. Moreover, the capacity to perform interventions is greater in the complex, craft-oriented production processes for high-end teabags but lower for the more automated process of producing conventional teabags.

#### 4. Methods and systems for problem-solving.

Despite different organizational preconditions, the practical autonomy of workers also depends on the extent of standardization embodied in the productive technology: the freedom of workers to intervene is constrained by the rules and pacing built into the technology itself. (Edwards, 1979) This constraint is particularly evident in the two auto plants, where highly standardized systems and tools limit autonomy beyond the extent determined by formal procedures. That said, teams, which are potentially less constrained by technology than individuals, have more freedom to take initiative in the German plant than the US one, while supervisors (compared to German Meisters) play a larger role in the US. At the tea packaging plant the technology is far less standardized, and workers can tinker with the systems as they operate them—although freedom of initiative is granted and taken in large part on the basis of the social standing of the individual worker concerned.

The economic motivation for exercising autonomy also differs across these three establishments. There is little reward for innovation or problem-solving in either the US auto plant or the tea packaging plant and moderate rewards in the German auto plant. To some extent, the two operations in Germany depend on intrinsic rewards and normative motivation to pursue the aspects of their strategy that depend on worker autonomy.

#### 5. Communication and learning.

Communication can occur prior to the exercise of worker initiative, which enhances worker capacity, and also subsequent to it, which enhances and diffuses learning; here we will discuss it as a single topic. Communication is highly restricted in the US auto plant: supervisors control who can communicate with whom, and workers do not have access to electronic devices for peer connection and access to data. In the German plant, by contrast, workers can communicate across the plant via their respective teams and are outfitted with mobile devices and computers that permit a much higher degree of information-sharing. At the tea packaging plant, consistent, with its smaller size, communication is dense and informal.

With respect to communication, it is interesting to see that it is very high in the two factories located in a stakeholder environment. The communication in the car factory in the stakeholder environment is more standardized than in the smaller tea packaging firm. The subsidiary of the car manufacturer in the shareholder environment is highly standardized, and workers are much less integrated in it than in the two firms in the stakeholder environment.

But learning can also be analyzed in terms of the nature of the learning process. Here we distinguish between three levels: (a) Single-loop learning seeks improved ways to meet predefined objectives. (b) Double-loop learning seeks improved means but also investigates

and potentially alters the objectives. (c) Deutero-learning is learning how to learn—meta-learning. From an empowerment perspective, which encompasses both autonomy and capacity for self-development, they constitute a progression from lower to higher.

We found that the US auto plant engaged its workforce primarily in single-loop learning, whereas double- and to a lesser extent deutero-learning were common in both German production locations, apparently reflecting differences in normative integration at the firm level and the expectations generated by predominately shareholder (liberal) and stakeholder (coordinated) external environments. We suspect that higher-order learning is likely to be more productive in meeting the strategic goals of the firm; if so, even a formally shareholder enterprise in a coordinated environment (the tea packaging plant) holds an advantage relative to the formally stakeholder enterprise in a liberal environment (the US auto plant). One caveat, however, is that the learning we describe in the tea establishment applies only to its core workforce. A second is that the age of the establishments may play a role: the US operation is by far the youngest, and it takes time before the social and cultural prerequisites of greater trust, communication density, and order of learning can be established.

## 6. Implications

The profit landscape is a metaphor that helps organize one's thinking about the relationship between the main drivers of profitability, the role of flexibility and innovation, and the strategic orientation of the firm. It does not lend itself to explicit calibration. In that, it resembles the evolutionary biologist's fitness landscape, which is also not observable or measurable. At most one can take transects of a multidimensional landscape to assess the effect of changes in a few activities or traits holding constant the rest.

That said, the general narrative of Section IV is supported by these case studies. The firms had adopted strategies that reflected a preference toward enhanced internal flexibility, incremental innovation and risk avoidance associated with stakeholder governance. This even applied to the tea packaging operation, which, while formally governed by shareholders (family held), operates in the context of a coordinated economy in which stakeholder influence is felt systemically and not only at the enterprise level. Taking into account the entire workforce and not only the core workers, there was a clear hierarchy of worker autonomy and capacity for initiative, with the German auto plant at the top and the other two "hybrids" beneath. That is, a stakeholder enterprise in a coordinated environment relies to a greater extent on worker autonomy and integration to achieve its desired outcomes than either a stakeholder enterprise in a liberal environment or a shareholder firm in a coordinated environment. The specific factors that produced this result are consistent with the causal mechanisms identified by our theoretical narrative.

## Section VI. Conclusion

This paper is intended to serve several purposes: to introduce a novel theory of the firm and its key concept, the profit landscape; to demonstrate the application of this theory to the particular question of the role of workers in profit-seeking enterprises; to translate the shareholder/stakeholder and liberal/coordinated economy literatures into terms that can be interpreted by the profit landscape metaphor; and to achieve more broadly an integration of economic and managerial perspectives through a theoretical framework consistent with both. We have produced a theoretical narrative that contributes to explaining the large differences one sees in the role of workers in different types of firms and economic environments, and we have offered some case study evidence to indicate that, at least for the three establishments for

which we collected data, the theory is supported.

Nevertheless, it should be clear that this paper is just a beginning. Doing so many things, it does none of them comprehensively. The profit landscape model, and particularly the predictions about the proclivities of different types of firms for different optimization strategies, could be subjected to a more analytically precise examination. The stakeholder/shareholder and coordinated/liberal dichotomies were sketched at a very general level, and there is much greater specificity and nuance in these respective literatures. We did not offer an explicit theory of the ways in which autonomy, coordination and integration interact to provide structure and coherence to firms and similar organizations. (Such models exist, particularly in cybernetic approaches.) Our empirical work considers only three establishments, and even so there is much more detail in our findings than we have space to present and examine here.

To conclude, we would like to suggest several promising areas for further research using the tools outlined in this paper:

1. Skill formation and development. We have not delved deeply into the differences between the role of general skills cultivated externally to the firm, firm-specific skills cultivated internally, and semi-general skills formed through interactions between the firm and external institutions.

2. The problem of dualization. Although the distinction between core and peripheral or buffer employees plays a crucial role at our tea packaging plant, it appears to some extent throughout all sectors of the modern economy. We need better theoretical understanding of this duality, particularly if we wish to formulate policies that, via the landscape metaphor, encourage firms to invest in the capacity of a greater share of their workforce in autonomous activity and systematic learning.

3. The problem of multinational production systems. The challenges faced by the German auto producer in the US are emblematic of a range of conundrums facing stakeholder firms in liberal or otherwise less familiar environments. Of course, there is a large literature already that examines such situations, but we believe the theoretical apparatus developed in this paper has something extra to contribute.

4. Labor market institutions, competitive strategy, and trade imbalances. In practice, national currencies do not fluctuate so as to make trade balances a random outcome; most countries are persistently in deficit or surplus. Moreover, in much of Europe a system of fixed exchange rates (the eurozone) prevails, and trade imbalances are central to concerns over systemic viability. In this context, calls for adjustment often include labor market reforms, which are predominantly directed toward liberalization. But to what extent does the analysis of this paper suggest a countervailing argument? It could be that excessive liberalization may undermine the cultural, organizational and learning-oriented factors that enhance competitive advantage at the firm level and trade outcomes at the national level. (Storm and Naastepad, 2015)

5. Worker autonomy, coordination and integration in emerging economies. The literatures on stakeholder/shareholder firms and coordinated/liberal economies are based on studies in the developed countries. Nevertheless, the future to a large extent belongs to the rapidly expanding economies of Asia, Africa and Latin America in which new production models, drawing on developed country experience but integrating features appropriate to new locations, will take form. There is a need for more observation of production systems in the emerging economies, which, combined with profit landscape analysis, can suggest the strategic orientations like to predominate.

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