

ON THE DYNAMIC ORIGINS OF ECONOMIC RENTS¹

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This paper presents a classification of the dynamic origins of economic rents. Control theory is used to model the dynamic interaction of firms and customers as a mutual attempt at control. Rents originate from asymmetries in information, knowledge and power. This approach classifies the potential origins of monopoly, Ricardian, Schumpeterian and Penrose rents. It also identifies potential rents from sales and marketing. The control theoretical model suggests that the objective of strategy should be to maximize the return on a portfolio of investments in information, knowledge and power. The model identifies potential origins of economic rents and links firm characteristics to market outcomes. Consequently, the control theoretical model may be a useful step towards a truly dynamic theory of strategy.

Key words: control theory, economic rents, dynamic theory of strategy

INTRODUCTION

Many strategists use a classification of rents based on competitive equilibrium theory (Marshall, 1920). However, competitive equilibrium theory assumes away the very factors that are of primary interest to strategy theorists – the causes of market imperfections. In addition, the assumptions underlying competitive equilibrium theory have been fundamentally challenged by developments in microeconomics. Akerlof (1970) shows that information asymmetries can result in market failure. Kahneman and Tversky (1979) identify consumer behaviors that differ in important ways from those of *homo oeconomicus*.

Competitive equilibrium theory may be an uncertain foundation for a theory of strategy. If customers face information problems and behave “irrationally”, what are the implications for strategy? Equilibrium theory can identify the conditions under which equilibrium rents may exist (Porter, 1980), but it cannot answer the key question asked by managers: what is the origin of competitive advantage? Identifying, deepening and defending extant sources of advantage is difficult without an understanding of the origins of economic rents.

Economists and strategy theorists have turned to theories of the firm in an attempt to identify the origins of rents. The resource-based view of the firm suggests that rents originate from competitively valuable resources (Grant, 1991). Penrose (1959) suggests that rents originate from the combination of human and physical resources. Nelson and Winter (1982) and Winter (1987) suggest that firms’ dynamic response to the environment is the source of rents. Teece et al (1997) suggest that “dynamic capabilities” are the source of rents. This paper follows Nelson and Winter (1982) and Winter (1987) in applying control theory to business strategy. However, the approach differs in two ways: it analyzes the interaction of firms and consumers, and it applies control theory more formally.

This paper argues that the origins of economic rents can only be understood by analyzing the dynamic *interaction* of firms and consumers. While the behavior of firms is clearly vitally important, a focus on the firm alone neglects important issues with the functioning of markets, underemphasizes the role of the consumer, and loses the link of firm behavior to rent-generating outcomes.

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I use control theory to develop a model of the dynamic interaction of firms and consumers. Firms and consumers are modeled as control systems. The firm-consumer interaction is modeled as a mutual and simultaneous attempt at control. The model assumes that information is unevenly distributed and costly to acquire, that firms (and consumers) may respond differently to the same information, and that learning takes place. The model provides a classification of the sources of monopoly, Penrose, Ricardian and Schumpeterian rents. It also identifies potential rents from sales and marketing.

In the control theoretical model, strategy consists of managing a portfolio of investments in information, knowledge and power. Managers decide in which information, knowledge and power to invest and how to combine them to maximize the return on investment. Investments in information may include investments in customers' information – that is, investments in sales and marketing. Investments in power may include strategic factor market purchases.

The control theory formulation facilitates strategy implementation. Organizational structure and business processes determine how information, knowledge and power are combined to create value. Managers gather information, apply knowledge and exercise power every day. By identifying potentially valuable information, knowledge and power, the control theoretical model guides managers' investment of their own time.

The control theoretical model identifies the potential origins of economic rents and links firm characteristics to market outcomes. Consequently, the control theoretical model may be a useful step towards a truly dynamic theory of strategy.

THE CONTROL THEORETICAL MODEL OF FIRM-CONSUMER INTERACTION

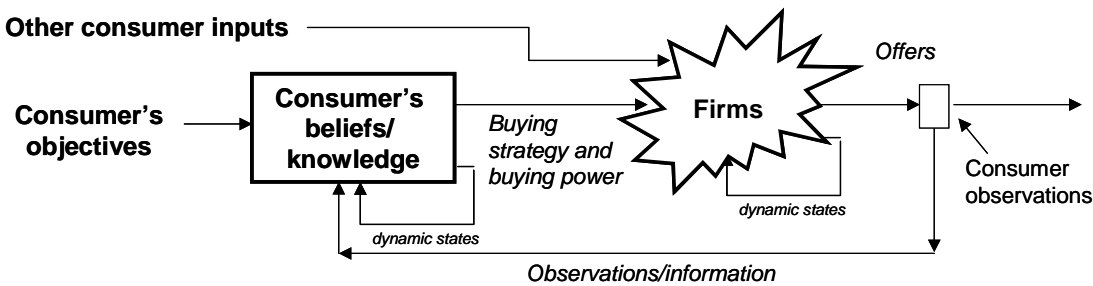


Figure 1a. Model of the Consumer as a Control System.

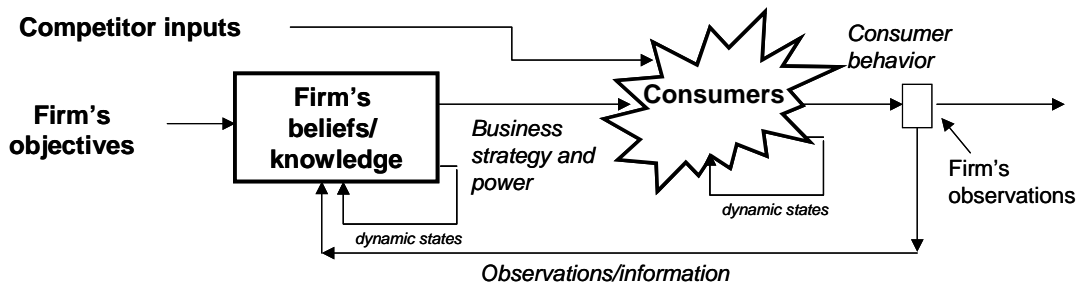


Figure 1b. Model of the Firm as a Control System.

Firms and Consumers as Control Systems

Control systems seek to achieve a desired change of state in a dynamic system. The current state of a dynamic system is represented by its current state vector. Control systems have three components: control input, control logic and control power (Stengel, 1994). In Figure 1a the consumer's observations are the input. The consumer's beliefs constitute the control logic. The consumer's power is the sum of spending power and the energy that can be invested in achieving a desired outcome – that is, the affordable transaction cost.

I model firm-consumer interaction as a mutual and simultaneous attempt at control (see Figures 1a and 1b). The consumer attempts to achieve some desired change in state by “controlling” the market. For example, a consumer may desire a change in state from “house unpainted” to “house painted”. The firm attempts to achieve some desired change in state by “controlling” the consumer. For example, a firm may desire a change in state from “profit X” to “profit X+ Δx ”. In this context, to “control” means to attempt to elicit a desired change of state. In general, firms cannot completely control consumers because of the existence of competitors and consumers cannot completely control firms because of the existence of other consumers.

The model presented in this paper represents a shift from a “consumer choice” paradigm to a “control” paradigm. In the theory of markets, consumers make rational choices to maximize their expected utility in an environment of perfect information and perfect knowledge. The control theoretical approach models consumers as investors in information, knowledge and power in an attempt to achieve a desired change of state. Consumer inputs are imperfect observations, not “perfect information”. Consumer behavior depends on beliefs and power.

In this paper, I will use the terms information, knowledge and power for control inputs, control logic and control power respectively. Information consists of observations over time. Observations may be predictive (speculative). Information is costly to acquire and may be incomplete or inaccurate. It is an investment with uncertain payoff. Firms and consumers may not invest optimally in information.

Knowledge determines the *response* to information. That is, knowledge determines behavior. Knowledge may be innovative or experimental. It may be wrong – that is, based on erroneous beliefs. Consumers with different knowledge respond differently to the same information. Knowledge is costly to apply. This definition of knowledge is consistent with the idea of organizational routines (Nelson and Winter (1982) and Winter (1987)), but conflicts with other definitions in the resource-based literature. For example, Liebeskind's (1996) definition of knowledge as “information whose validity has been established through tests of proof” conflicts with my definition in two ways. First, it confuses *stimulus* (information) with *response* (knowledge). Second, it views knowledge as a resource instead of as the determinant of behavior. I believe that the behavioral definition is more useful in analyzing the dynamic interaction of customers and firms.

Power determines the *amplitude* and *speed* of the response to information. Power is the amount of work that can be applied per unit of time. The control power needed to achieve a desired change of state depends on position. By definition, the firm positioned closest to a consumer for a transaction is the firm that requires the least power to accomplish the consumer's desired change of state.

From a firm's perspective, competitors represent uncontrollable inputs to a consumer's control system. From a consumer's perspective, other consumers represent uncontrollable inputs to a firm's control system

Properties of the Control Theoretical Model

Firms and consumers create value by the *combination* of information, knowledge and power. No one factor is valuable in itself. Different combinations of information, knowledge and power can achieve the same ends. That is, there are multiple solutions to the problem of achieving a desired change in state.

In the control theoretical model, learning is important. I define learning as investing in information or knowledge. If information and knowledge are not efficiently priced, a small investment in information or knowledge may have a large impact on the power needed to achieve the desired change in state. For example, a relatively small investment in improved demand forecasting may have a large impact on the cost of inventory.

Sales and marketing are important in the control theoretical model because information and knowledge are not perfect. Consumer behavior depends on costly investments in information and knowledge. Consumers may not invest optimally. Investment in consumers' information and knowledge is one element of sales and marketing. Firms can influence consumer behavior by reducing the cost of consumer information and knowledge favorable to the firm.

THE CONTROL THEORETICAL MODEL AND ECONOMIC RENTS

Classification of the Potential Sources of Rents

Rent is the payment for the use of factors of production that are fixed in supply (Samuelson and Nordhaus, 2001). In the control theoretical model, both the firm and the consumer produce the change in state. The subject of the analysis is one transaction. The factors of production are information, knowledge and power. Potential sources of dynamic rents can be classified as asymmetries in information, knowledge and power. These asymmetries may exist in different firms' abilities to control a consumer and in a consumer's ability to control different firms.

A firm-competitor information asymmetry exists when a firm makes observations of the consumer that a competitor does not. A firm-competitor knowledge asymmetry exists when a firm and competitor respond differently to the same observations of the consumer. A firm-competitor power asymmetry exists when a firm requires less power than a competitor to effect the consumer's change of state, given the same information and knowledge. By definition, power asymmetries depend on position.

A consumer information asymmetry exists when a consumer makes different observations of a firm and a competitor. A consumer knowledge asymmetry exists when a consumer observes a firm and competitors, but the response to the firm differs from the response to competitors. A consumer power asymmetry exists when a consumer observes and responds in the same way to a firm and a competitor, but requires a different amount of power to achieve the desired change in state.

Power, Position and Monopoly Rents

By definition, the firm positioned closest to a particular consumer requires the least power to effect that consumer's desired change of state *assuming perfect information and knowledge*. A firm can earn monopoly rents from a unique position. If information and knowledge asymmetries exist, firms with less favorable positions can compete successfully. For example, expensive branded pharmaceuticals may compete successfully with equivalent generics because of asymmetric customer information or customer beliefs. A firm that owns a low-cost source of minerals may fail to compete successfully with a firm that has superior technology. In the control theoretical model, information, knowledge and power asymmetries are all potential sources of monopoly rents.

The control theoretical model distinguishes between rents originating from the firm's position and from the customer's position. Switching costs and increasing returns move the consumer closer to the firm. Economies of scale and favorable locations move the firm closer to the consumer.

Information Asymmetries, Filtering and Rents from Sales and Marketing

The control theoretical model implies that rents from information asymmetries may be more persistent than is assumed by the neoclassical theory of markets. To earn a rent, a firm must *combine* information, knowledge and power. If information, knowledge application and power are costly, competitors may fail to earn the rent in three ways: they may fail to observe the information, observe it but fail to respond to it, or lack power to respond to it. That is, control systems filter information (Stengel, 1994, Chapter 4).

Similarly, rents from sales and marketing may persist because consumers filter information in different ways. Marketing executives understand that information transmitted is not necessarily received, and that information received elicits varying responses. Rents from sales and marketing may be particularly important when quality is difficult to determine – for example, in services businesses with customized products. Filtering helps to explain why the Internet did not lead to perfect information. The Internet eliminated the filtering effect of costly information transmission. The result was an explosion in volume, and a transfer of the cost of filtering to the consumer.

Resources, Ricardian Rents and Penrose Rents

The control theoretical model classifies the potential sources of rents from resources and relates resource ownership to market outcomes. The literature of the resource-based view of the firm defines resources rather broadly. For example, Grant (1991) classifies process technology, brands, distribution capabilities and access to low-cost inputs as resources. Using the control theoretical classification, “resources” and “assets” are comprised of knowledge, power or both. Unique low-cost inputs represent a firm-competitor power asymmetry. Capital equipment may represent both an embedded knowledge asymmetry and asymmetric power from economies of scale. Many of the traditional elements of resource-based strategy analysis - competencies, capabilities, activities, resources, processes and assets – represent some combination of firm-competitor knowledge and power asymmetries.

Some resources represent consumer asymmetries. Brands represent asymmetric consumer beliefs or knowledge. Switching costs represent asymmetric consumer power. The distinction between resources representing firm-competitor asymmetries and those representing consumer asymmetries has practical implications. For example, investment in process technology knowledge is not susceptible to competitor interference, while investment in brands must consider competitors.

The resource-based view of the firm has been criticized for a lack of connection with market outcomes. As Porter (1991) observes, “simply having pools of skills, knowledge or other resources is not in and of itself a guarantee of success”. In the control theoretical model, the value of resources depends on the combination of information with the knowledge and power represented by the resource and other knowledge and power applied in the production process.

The control theoretical model encompasses the observation by Penrose (1959) that a “resource...can be viewed as a bundle of possible services”. Because value is a function of the *combination* of information, knowledge and power, new investments in information and knowledge can render a scarce resource more “valuable”. This feature of the control theoretical model also helps to resolve the “strategic factor market” problem (Barney, 1986). A firm can acquire a “resource” for less than the present value of its associated rent stream because the value of the resource depends on its firm-specific application. That is, the firm can earn a consumer surplus.

Dynamic Capabilities and Schumpeterian Rents

The dynamic capabilities framework developed by Teece et al (1997) has some of the features of the control theoretical model of the firm described in this paper. For example, Teece et al argue that “the competitive advantage of firms lies with its managerial and organizational processes”, and that these “organizational processes have three roles: coordination/integration...learning...and reconfiguration”. In the control theoretical model managers have two roles: to direct investment in information, knowledge and power, and to combine information, knowledge and power to maximize the return on investment. Schumpeterian rents may originate from new observations, new responses or new combinations.

However, the dynamic capabilities approach focuses on the firm, while the control theoretical model focuses on the firm-consumer interaction. The most significant difference is the treatment of customers. Teece et al incorporate reputational assets into their definition of a firm’s specific asset position, but otherwise focus exclusively on the firm. In the control theoretical model, both firms and consumers may be the source of rents. The two approaches also define assets, resources and position differently.

BUSINESS STRATEGY AND THE THEORY OF THE FIRM

In the control theoretical model, the firm is a control system. The business strategy is the design of the control system. The strategy must specify the information, knowledge and power in which the firm will invest, and how to combine them to maximize the return on investment. Put another way, strategy consists of managing a portfolio of investments in information, knowledge and power. Managers seek rents by investing in information, knowledge and power asymmetries and by trying new combinations. Investments can be made in consumers, the firm or the factor market (suppliers and partners).

A firm’s strategy may consist of creating and exploiting a single asymmetry. For example, a realtor may seek asymmetric information about forthcoming listings. Strategies that exploit multiple asymmetries are more common. For example, an investment bank may exploit asymmetric information from close customer relationships, create customer power asymmetries from switching costs and develop customer knowledge asymmetries through branding.

The cost and value of investments in information, knowledge and power depend on the current state vectors of the firm and the consumer. The current state includes the current knowledge/beliefs and current power (physical position). State is a function of time. Because new investments may change the current state, the firm’s state vector follows a path or trajectory. History matters. For example, learning may be cumulative.

Factor markets can be modeled in the same way as the product market.

ORGANIZATIONAL STRUCTURE AND BUSINESS PROCESSES

A firm’s organizational structure and business processes determine how information, knowledge and power are combined to create value. Strategy suggests structure. For example, a firm seeking information rents may design processes for fast response.

Managers face difficult trade-offs in organizational design. For example, consistent exploitation of costly knowledge may suggest centralization, but a desire to combine knowledge with short-lived information asymmetries may suggest decentralization. Managers must also address the principal-agent problem. Employees may seek to appropriate rents from information, knowledge and power asymmetries within the firm.

The control theory formulation facilitates strategy implementation. Managers gather information, apply knowledge and exercise power every day. By identifying strategically valuable information, knowledge and power, the control theoretical formulation guides managers’ investment of their own time.

TOWARDS A DYNAMIC THEORY OF STRATEGY

The control theoretical model may provide a useful step towards a truly dynamic theory of strategy. Porter (1991) identifies two requirements for a dynamic theory: it must represent “a body of theory which links firm characteristics to market outcomes” and it should resolve the question of “the origins of the origins”.

The “market outcome” requirement leads Porter (1991, p.99) to assert that “the basic unit of analysis ...must ultimately be a strategically distinct business or industry”. In the control theoretical model, the unit of analysis is the transaction. The control theoretical model may help to resolve the problem of defining industry boundaries.

Porter argues that “the basic unit of competitive advantage...is the discrete activity”, and that activities are logically prior to resources. In the control theoretical model, an activity requires a combination of information, knowledge and power. The influence of the local environment (Porter, 1991, p.111) may be due to the existence of rents from asymmetric information and asymmetric power - derived from position.

When a firm is formed, its potential to generate rents depends on its initial state (knowledge and power), the state of its prospective customers and suppliers, and management decisions on how to invest in information, knowledge and power and how to combine them. The firm, consumers, suppliers and competitors follow trajectories over time. The information, knowledge and power investments of each affect the others. The firm’s success depends on creating, exploiting and protecting valuable asymmetries in information, knowledge and power. More research is needed before we can specify which information, knowledge and power asymmetries are the most valuable.

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