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A resource-based view of Schumpeterian economic dynamics

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A resource-based view of Schumpeterian economic dynamics

Abstract

The past decade has seen substantial progress achieved in developing a "competence-based" or "resource-based" view of the firm. According to this perspective, the observed variations in firms' strategies and profitabilities, results not from the different industrial settings in which essentially uniform firms compete (the conventional assumption) but from the heterogeneity of the firms themselves, based on the distinctiveness of their "resource endowments" or capabilities. Attractive as this framework may appear to be, in accounting for firms' abilities to diversify and to sustain the sources of their competitive advantage, nevertheless there is mounting frustration at the "internalist" perspective where the focus is almost exclusively on resources found within firms. This contrasts with the situation observed in reality, that firms frequently share resources, as in clusters and industrial districts, or in deliberately created alliances and joint ventures. Indeed it is clearly the case, as first expounded forcefully by Richardson, that firms are bound to each other through multiple connections, and that these all constitute potential, or actual, pathways for resource exchange between firms.

This paper takes as its starting point a somewhat radical proposal for dealing with the tensions created by this continued "internalist" perspective in the resource-based view of the firm. The paper asks: what if we start with a conception of an economy where the fundamental units of value generation are not firms themselves but rather the resources from which firms are constituted. Let us call this an extended "resource-based view" of the economy. Resources from this perspective may be seen as the fundamental economic categories; they are the sources of value generation. Resources are utilized by firms to transform inputs into outputs, but they are not consumed in the production process. In an industrial economy, a great variety of resources may be encountered, distributed through firms in complementary arrangements by entrepreneurial action..

As recognized by Wernerfelt, resources in this sense are the dual of the products and services discussed in mainstream economics. They encapsulate the "factors" that economics has traditionally separated as capital, labor and land (and more recently, adding technology and knowledge to the list). These categories may all be rolled into a notion of productive resource, where it is the variety and specialization of resources that is the point of interest, and their distribution through firms, rather than their "aggregate" characteristics. The "resource economy" is then the dual of the "goods and services" economy discussed in the production functions, utility functions and market-clearing prices of mainstream analysis. In the resource economy the interest focuses on the production and exchange of resources between firms -- as elaborated every day in the business pages of the newspaper, where firms' acquisitions and divestments are described in great detail.

This perspective has immediate application in the analysis of competitive dynamics and evolutionary dynamics of real economies. Competitive dynamics of a Marshallian kind are dealt with through firms' heterogeneity in terms of the resources they embody, while their strategies may be encompassed in their strivings to acquire new resources, giving them new capabilities, needed to enter new kinds of markets. Competitive dynamics of a Schumpeterian kind can be dealt with through processes of resource imitation, resource substitution and resource transfer between firms (as in licensing of technologies). Evolutionary dynamics can be construed in terms of

resource variation and resource selection (encompassing notions of search and adaptive learning); the unit of variation is in this case the fundamental resources themselves, rather than Nelson and Winter's organizational "routines." Technological innovation and entrepreneurship are captured in terms of resource propagation and replication and resource recombination, with the standardization of technologies being seen as a critical process in the creation of genuinely new resources which can then rapidly diffuse through an economy. In the discussion of competitive advantage, the internalist perspective gives way to a broader perspective encompassing firms' access to new resources in order to build new competitive positions, as challengers to incumbents. These all constitute the dynamics of production and exchange of resources in the resource economy.

The approach explored provides a way of dealing with the fundamental links between economic performance and industrial organization. Resources may be clustered locally, as in industrial districts, or distributed vertically, as in subcontracting pyramids, or distributed through various kinds of competitive-cum-collaborative consortia and networks. Resources can be linked in value-adding chains that criss-cross the real industrial economy. All these represent resource configurations with quite different potential for enhancing (or degrading) economic performance. Regions such as Silicon Valley can be characterized in terms of their resource concentration and specialization, rather than in terms of capital and labor inputs. Developmental experiences like the "East Asian Miracle" can be analyzed in terms of the resources assembled by firms and public institutes in the countries concerned, through technological leverage from advanced firms, rather than seeking explanations in terms of capital and labor deficits (total factor productivity). In the spirit of Adam Smith, with his observations on division of labor and its being limited by the extent of the market, the extended resource-based view of the economy is thus concerned as much with the organizational configuration of resources as with their specialization. Economic prosperity depends on both. Thus the "organization of industry" is brought by the resource-based view to its rightful place at the centre of economic analysis.

These considerations lead to the proposition that it might be worthwhile to further explore the "resource economy" as the dual of the conventional "goods and services" economy of mainstream economic analysis. The analytical goals of the two approaches are quite different. The goal of the resource-based approach is not to account for any given static distribution of goods and services and set of prices which clear all markets, as in conventional analysis. Instead its analytical goal is to historically account for a given configuration and specialization of resources, both within and between firms, through evolutionary trajectories and path dependencies and adaptive learning by firms. The resource-based approach to the economy promises to broaden the approach to resources of the prevailing "internalist" resource view of the firm, and to provide a secure bridge to evolutionary thinking through a common concern with the generation and exchange of resources within and between firms. At the same time it can promote a link to questions of economic organization and economic performance. It may indeed be quite promising to explore the ramifications of this heterodox notion of a "resource economy" as foundation for a more realistic account of a modern industrial economy.

1. Introduction

For as long as one can remember, the edifice of the neoclassical economic synthesis has been under attack. Critiques have focused on the extreme unreality of the assumptions that underpin the Arrow-Debreu theorems of welfare economics. They have queried the excessive formalism of the edifice, and the lack of practical significance of many of the results. They have castigated the neoclassical synthesis for its internal incoherence (lacking an independent theory of capital, for example, one of the favorite topics of the Cambridge school), its lack of a dynamic element, its non-evolutionary character, its lack of any conception of "market process" -- and so the list could be continued.¹ Through all this, the neoclassical synthesis remains as strong as ever, impervious it seems to these or any other attacks -- as a glance at the latest issues of *The Economic Journal*, or *Economica*, or *The American Economic Review* will confirm.

In this paper a different tack is taken. The neoclassical edifice is left alone, standing as a representation of what goes on *in a certain kind of economy* -- namely the economy where goods and services are produced and exchanged. This is the economy where the familiar apparatus of costs, prices, production functions, economies of scale and scope all exert their effects. The paper then introduces another kind of economy, namely an economy of productive entities -- called "resources" -- which are needed to produce the economy of goods and services. Resources are used by firms to transform inputs into outputs, but the resources themselves are not consumed. In their totality they can be said to constitute the "resource economy." This economy is equally concerned with production and exchange, but in this case it is the production and exchange of resources, within and between firms, that is the object of interest. Now it turns out that the rules of production and exchange of resources are rather different from the rules governing the goods and services economy. It turns out that the resource economy is best approached from a dynamic and evolutionary perspective, where path dependence and trajectories are paramount. It also turns out that such a concept seems to make sense of economic phenomena that are for all intents and purposes ignored by the neoclassical synthesis -- such as the trading that

¹ See Blaug (1997) for a devastating critique of mainstream economic analysis.

goes on between firms as they acquire new productive resources or dispose of resources no longer fitting with their current strategies. These activities, which reflect the thinking of the boardroom rather than the factory, have received scant attention in the neoclassical synthesis, other than being rolled into an aggregate notion of "capital" or examined in a sub-discipline termed "finance economics" which bears little relation to the overall neoclassical synthesis.

The idea of "resources" of course comes from the "resource-based view" (RBV) of the firm, which is a school of thought that has risen to prominence in the strategic management literature. It is otherwise known as the "capabilities view" in which guise it has been taken up and discussed by numerous economists.² Calls have been made to develop a synthesis of the RBV of the firm with evolutionary economics.³ Yet the two disciplines remain stubbornly apart. Why might this be the case?

One approach to an answer is linked to the fact that the two schools have held back from developing a common language and set of concepts. The RBV of the firm, while making some welcome progress in accounting for the heterogeneity of firms (in terms of the distinctiveness of their resources and associated capabilities), has nevertheless stopped short of taking its insights into the wider economy. The RBV remains a theoretical perspective on the growth and competitive dynamics of firms, not of whole economies. Moreover the conventional RBV appears to be wedded to an incumbent's perspective on competitive dynamics, ignoring the challenger's perspective and the distinctive strategies that challengers use to acquire or leverage resources externally; it therefore shies away from an evolutionary perspective that necessarily encompasses both challengers and incumbents. The RBV has also made few attempts to engage with resource valuation, and has thus made little contact with the literature on the market for corporate control. A focus on resources themselves, as fundamental entities, and their production and exchange, is needed to clear away these conceptual obstacles. The evolutionary view, for its part, discusses the evolution of firms, technologies, markets, or organizational "routines" – but rarely discusses the evolution or co-evolution of "resources" in general. A RBV of the economy invites

² See Teece, Pisano and Shuen (1997) for the definitive exposition of the dynamic capabilities view, and the collections edited by Foss and Knudsen (1996) and Foss and Loasby (1998) for representative discussions. References to the RBV of the firm are given below.

³ See Langlois (1995) or Levinthal (1995) and other essays in Montgomery (1995) as representative.

such an approach. Likewise the literature on the economics of industrial organization, with important exceptions, has remained detached from the RBV of the firm, whereas resource configuration arguably provides a matrix within which different kinds of economic organization might fruitfully be discussed.⁴

Thus an examination of a putative “resource economy” where firms trade productive resources with each other in order to enhance their competitive prospects, and these resources follow cumulative pathways exhibiting evolutionary and co-evolutionary dynamics, offers some hope of bringing these various fields together, enriching each of them. More to the point, it offers some hope of developing a foundation for economic analysis that is a clear departure from the neoclassical synthesis.

The focus on resources in an economic context, is the prime contribution of this paper. I elaborate this framework as a “resource-based view” of the economy, in conscious extension of the resource-based view (RBV) of the firm. This framework, to be credible, would need to be able to generate an account of firms that is consistent with the RBV; firms would be seen as encapsulated bundles of resources, thus reproducing the strategic insights of the conventional resource-based view of the firm, namely that firms base their success in their distinctive competences which are grounded in their resources and routines. But the extended framework does so without remaining trapped in an “internalist” perspective, which has to date been a serious limitation on the wider application of the RBV.⁵ On the contrary, an extended resource-based perspective sees firms as being able to draw on a wide array of external resources, through both market-mediated transactions and through various kinds of resource exchange and resource leverage relations that link firms in value-chains that criss-cross the economy.

2. Motivation for a concept of the "resource economy"

The past decade and a half has seen substantial progress achieved in developing a "competence-based" or "resource-based" view of the firm. According to

⁴ Richardson (1972) remains the outstanding exception. Subsequent contributions utilizing a RBV, such as Foss and Eriksen (1995) and Foss (1996; 1999) on the resource sharing characteristic of firm clusters, are very much Richardsonian in inspiration, as is the present paper.

⁵ I owe this insight to the pathbreaking paper by Coombs and Metcalfe (1999) where they introduce the notion of "distributed capabilities."

this perspective, the observed variations in firms' strategies and profitabilities, result not from the different industrial settings in which essentially uniform firms compete (the conventional industrial economics assumption) but instead they derive from the heterogeneity of the firms themselves, based on the distinctiveness of their "resource endowments" or capabilities. Attractive as this framework may appear to be, in accounting for firms' abilities to diversify and to sustain the sources of their competitive advantage, nevertheless there is mounting frustration at the "internalist" perspective where the focus is almost exclusively on resources found within firms. This contrasts with the situation observed in reality, that firms frequently share resources, as in clusters and industrial districts, or in deliberately created alliances and joint ventures, or through drawing on resources found in public institutions such as R&D institutes. Indeed it is clearly the case, as first expounded forcefully by Richardson, that firms are bound to each other through multiple connections, and that these all constitute potential, or actual, pathways for various kinds of resource exchange between firms.

This paper takes as its starting point a somewhat radical proposal for dealing with the tensions created by this continued "internalist" perspective in the resource-based view of the firm. The paper asks: what if we start with a conception of an economy where the fundamental units of value generation are not firms themselves but rather the resources from which firms are constituted. It is suggested that this be called an extended "resource-based view" of the economy.⁶ Resources from this perspective may be seen as the fundamental economic categories; they are the sources of value generation. Resources are utilized by firms to transform inputs into outputs, but they are not consumed in the production process. In an industrial economy, a great variety of resources may be encountered, distributed through firms in complementary arrangements by entrepreneurial action. The totality of resources may be called the "resource economy" to be distinguished at all times from the "goods and services economy" which is the subject of mainstream economic analysis.

There is an immediate and important interpretation of the "resource economy." Business restructuring is reported in great detail every day in the business pages of the newspaper. Firms buy and sell new divisions, make corporate acquisitions, enter new alliances and exit old ones, contract with each other for goods and services involving

the transfer of knowledge and capabilities. Oddly enough, little of this fundamental activity is captured, either in mainstream economic analysis, which is focused on the production and exchange of goods and services (rather than on the productive resources which generate them), or in the capabilities view of the firm, which has dominated strategic management literature in the 1990s. For mainstream analysis, the market for corporate control is subsumed in an aggregate notion of "capital" while for the capabilities view, its emphasis has been very much on firms' internally generated capabilities, rather than on resources external to the firm. But as the business pages make clear, resources are in fact widely available, and firms do in practice acquire resources for purposes of new strategic shifts, and divest resources which are no longer central to current strategies.

The resource perspective promises to connect with the reality of corporate acquisitions and divestments, which has unaccountably been ignored, more or less, by mainstream economic analysis (and by the RBV of the firm). But it also has immediate application in the analysis of competitive dynamics and evolutionary dynamics of real economies. Competitive dynamics of a Marshallian kind are dealt with through firms' heterogeneity in terms of the resources they embody, while their strategies may be encompassed in their strivings to acquire new resources, giving them new capabilities, needed to enter new kinds of markets. Competitive dynamics of a Schumpeterian kind can be dealt with through processes of resource imitation, resource substitution and resource transfer between firms (as in licensing of technologies). Evolutionary dynamics can be construed in terms of resource variation, resource selection and resource retention (encompassing notions of search and adaptive learning); the unit of variation is in this case the fundamental resources themselves, in addition to Nelson and Winter's organizational "routines." Technological innovation and entrepreneurship are captured in terms of resource propagation and replication and resource recombination, with the standardization of technologies being seen as a critical process in the creation of genuinely new resources which can then rapidly diffuse through an economy. In the discussion of competitive advantage, the internalist perspective gives way then to a broader perspective encompassing firms' access to new resources and new resource combinations in order to build new competitive positions, as challengers to

⁶ The allusion is to Wernerfelt (1984) who introduced a "resource-based view" of the firm to

incumbents. These all constitute the dynamics of production and exchange of resources in the resource economy.

The approach explored provides a way of dealing with the fundamental links between economic performance and industrial organization. Resources may be clustered locally, as in industrial districts, or distributed vertically, as in subcontracting pyramids, or distributed through various kinds of competitive-cum-collaborative consortia and networks. Resources can be linked in value-adding chains that criss-cross the real industrial economy -- or concentrated in vertically-integrated firms. All these represent resource configurations with quite different potential for enhancing (or degrading) economic performance. Regions such as Silicon Valley can be characterized in terms of their resource concentration and specialization, and their industrial adaptation can be captured in a notion of resource-based economic learning.⁷ Developmental experiences like the "East Asian Miracle" can be analyzed in terms of the resources assembled by firms and public institutes in the countries concerned, and their rapid diffusion, through technological leverage from advanced firms.⁸

In the spirit of Adam Smith, with his observations on division of labor and its being limited by the extent of the market, the resource-based view of the economy is thus concerned as much with the organizational configuration of resources as with their specialization. Economic prosperity depends on both. Thus the "organization of industry" is brought by the resource-based view to its rightful place at the centre of economic analysis. The approach that I take in this paper is to demonstrate the plausibility of adopting a comprehensive or extended resource-based view with regard to the competitive and evolutionary dynamics of the economy. No claims of originality are made in any of the topics covered. The originality, such as it is, lies in making the links between these fields, utilizing the elemental category of resources. The originality lies in the resulting synthesis, which actually supplies a coherent perspective on the dynamic operations of the economy over time. The approach taken has the merits that, firstly, it provides a unifying thread linking various disparate areas of economic investigation; second that it offers a coherent interpretation of the totality

strategic management, based on the work of Penrose (1959).

⁷ See Saxenian (1994/1996) for a study of Silicon Valley which is consistent with this approach.

⁸ Such an approach is consistent with the treatment of the East Asian phenomenon by scholars who focus on the acquisition of technological competences, such as Lall (1996), or Stiglitz (1987) or Dahlman and Westphal (1983).

of resources as the "resource economy"; third that it links with the processes of corporate acquisition and divestment that are described every day in the business pages of the newspaper; fourth that it provides fresh empirical challenges for economics; and fifth that it opens up new and challenging fields such as explaining the continuing relevance of clusters (like Silicon Valley) and even the very latest Internet phenomena. There is therefore suggestive evidence that it may be worthwhile to pursue the notion of the "resource economy" as a unifying and empirically rewarding field of inquiry that builds on established knowledge in evolutionary economics and the dynamic capabilities view of the firm.

3. The resource economy

Consider then, as an exercise in imagination, an entity to be called the "resource economy." By this is meant the totality of productive entities that make the production of goods and services possible. Resources may be thought of as encapsulated assets and competences; they are "smart assets."⁹ Resources are taken to be the fundamental units of value generation. They do not exist independently, but are contained within firms. Resources can be specialized and bundled together in highly distinctive configurations, to lend firms special competitive advantages. Resources can be built by firms internally, and they can be traded -- as described every day in the business pages of the newspaper. The production and exchange of resources is what we shall describe as the "resource economy."

Resources are the basic constitutive elements out of which firms transform inputs into outputs, or generate services. To provide an airline service, for example, a firm needs to acquire and consolidate resources such as aircraft with crews to fly them; landing slots at airports and the administrative capacities to operate them; passenger booking systems and the skills to operate them; aircraft maintenance facilities and skills, and so on. Building a distinctive "competence" out of these consolidated resources, the firm will enter into the passenger transport industry, and equipped with a certain strategy (eg targeting the business traveller) it will either

⁹ Many authors in the RBV literature make a distinction between resources and competences, or between assets and capabilities (eg Amit and Schoemaker 1993). We shall maintain this distinction at the level of the firm (speaking of organizational capabilities) and of the economy (economic capabilities) – as discussed below. But at the level of productive resource itself, it makes sense to combine the notions of assets and capabilities in a single category of "resource."

succeed or not. Its strategic capabilities and the competitive advantages generated over rival firms, rest on the distinctiveness of the resources at its command. These will not necessarily have to be owned; indeed the firm may lease its aircraft, subcontract its maintenance operations, and even its ground operations, reserving only the core functions of actually booking passengers and flying them as its distinctive competencies. An airline building a national air service can build its routes one at a time, or it can accelerate the process by acquiring routes from one or more regional operators (or acquiring the regional airlines themselves). Thus resources can be assembled by firms to reflect their current strategic imperatives.

The first point to make is that resources can be considered as encapsulated "factors of production." From a resource perspective, the categorization of factors into capital, labor, land et al is superfluous; consider instead all such factors as being rolled into a single entity, called a productive resource. The point of making such a departure is that resources will not be treated in aggregate (as in "aggregate production functions"), but in terms of their distinctiveness, and of the uses to which they are put, in combination with each other. It is the specialization of resources, and their heterogeneous distribution through firms, resulting in competitive dynamics between these firms, that will then come into focus.

Moreover let us insist on the distinction between the services provided by resources, and the stock of resources themselves -- a distinction that was important in the early years of political economy, but which has been obscured by the practice of combining "output" and "factors" in the same production function. Thus resources themselves are not used up in the production process. Their services facilitate the transformation of inputs into outputs, through the *activities* of firms.¹⁰ Using an analogy from the chemical sciences, we may view resources as the catalysts which drive production processes organized within firms. They are the source of value, without being consumed themselves.

I wish to suggest that the resource economy as defined may be characterized as the dual of the mainstream, neoclassical "goods and services economy." As pointed out by Wernerfelt (1984) products and resources are two sides of the same coin.¹¹ By

¹⁰ These notions were developed by Penrose (1959) and by Richardson (1972), thus launching the modern "resource-based view" of the firm. Wernerfelt (1984) is generally taken to be the starting point for the new trend in strategic management.

¹¹ As Wernerfelt (1984: 171) put it:

this is meant that they describe different facets of the same reality, namely a production process. In the economy as a whole, there are on the one hand the activities conducted by firms, which transform inputs into outputs; the terms used to describe these processes are the familiar ones of factors of production, outputs, costs and prices. The object of analysis is to determine for any given set of inputs and outputs a set of prices which will clear all markets, i.e. produce an equilibrium balance between supply and demand.

In the resource economy, on the other hand, the object of interest is the configuration of resources, i.e. their distribution in heterogeneous and distinctive bundles, within and between firms. What is of interest is the adaptive capacity of such an economy, in terms of its abilities to generate new resource configurations, and the evolutionary and co-evolutionary pathways along which such resource configurations develop. These resources, in totality, account for the goods and services that are described in mainstream economics. It is the same economy we are dealing with, but we are viewing it from a fresh perspective.

Valuation of resources: The size of the "resource economy"

Resources are very real and very expensive. They are bid for, won and lost every day, as reported in the business page of the newspaper. The price that productive resources fetch (e.g. a division of a company, a cellular telephone license, a group of media titles and their editorial staffs) is usually much greater than their asset "book value" and is determined by corporate valuations, such as stock market valuations if the company is listed.¹² The economic literature generally sees a firm's q ratio as being affected by its firm-specific resources or attributes, and by industry structure variables. Some analyses go further and seek links between the firm's q

"Most products require the services of several resources and most resources can be used in several products. By specifying the size of the firm's activity in different product markets, it is possible to infer the minimum necessary resource commitments. Conversely, by specifying a resource profile for a firm, it is possible to find the optimal product-market activities."

¹² An accurate sense of the worth of a resource, to the firm which utilizes it as well as potentially to other firms, is provided by the ratio of market capitalization to replacement book value of the asset. This is known as *Tobin's q*, after Tobin (1969; 1978). It was actually introduced by the Cambridge economist Robin Marris (1964) when it was known as the *valuation ratio*, and utilized subsequently in important empirical work on corporate acquisitions and their effect on firm value (Singh 1971; Singh and Whittington 1968). Tobin's q has been used widely in economic analysis, particularly in terms of long-term trends, such as by Cartwright and Kamerschen (1989). It is discussed in the context of the RBV of the firm by Montgomery and Wernerfelt (1988). For the use of Tobin's q in analyses of corporate takeovers, see Bartley and Boardman (1986) for a representative discussion.

ratio and specific features such as its IT capabilities, its brand equity, or its technological capabilities generally.¹³ So in one sense the answer to the question: what is the total worth of a nation's "resource economy" is provided by the total stock market valuation of the economy's firms.¹⁴

Resource valuation is important not only for the firms involved in resource exchange (and for their merchant bank advisers) but for economic analysis of the creation and destruction of value through resource activity, and for the valuation of firms with differing resource configurations. This empirical work would mesh with existing work that investigates the dynamics of the market for corporate control, corporate takeovers and the value implications of these activities for firms.

Resource dynamics

We now turn to an examination of the dynamics of the resource economy. The resources in a real economy are in a constant state of flux, accounting for observed phenomena of competitive and evolutionary dynamics. Resources are being developed by firms and being exchanged between firms, through open-market deals (e.g. as in the sale of a division of one firm to another) or more commonly through various kinds of contractual arrangements (e.g. technology transfer agreements, subcontracting/OEM agreements, licensing arrangements) or through resource transfers effected as a result of mergers or acquisitions. Economists have been slow to recognize the reality and significance of the multiple contacts between firms in an industrial economy, as contractors, collaborators, suppliers and customers as well as competitors.¹⁵ It is through these contacts that *resources are exchanged and shared* between firms, either voluntarily or involuntarily. Let us trace the processes involved, calling them cases of resource propagation, resource replication, resource exchange,

¹³ On the relation between IT capabilities and a firm's q ratio, see for example Bharadwaj, Bharadwaj and Konsynski (1999).

¹⁴ Resource valuation is a topic rarely tackled in the conventional RBV of the firm, which is perhaps one of the reasons it has not become a mainstream economic discipline. Valuation involves processes such as discounted cash flow and, where available, the valuation provided by stock markets. Insofar as resources are exchanged commercially between firms, the resource economy may be identified with the market for corporate control. However many more such processes of resource movement are encompassed in the concept of the resource economy.

¹⁵ One of the first to do so was Richardson (1972), in his pathbreaking work on the "organization of industry." He has since elaborated on his views, in Richardson (1998a). Mention should also be made of the pioneering Swedish studies of inter-firm networks in industrial markets, where the focus is on the relations between firms rather than treating them as atomistic entities; see Hakansson (1982) for an early analysis, and Mattsson (1998) for a representative discussion of the current approach.

resource redeployment, resource sharing and resource leverage. All are involved in the dynamics of the resource economy.

Resource propagation: Firms that develop valuable resources, such as a proprietary technology standard, can exploit the profitable opportunities involved in disseminating this standard as widely as possible, either under their own control (technology transfer) or to third parties (licensing). This is aptly described as "resource propagation." Licensing arrangements, where one firm licenses its proprietary technology to another firm in order to expand the user base, is a case in point. The competitive dynamics of the software industry are actually driven by such considerations, where price and production costs (the ingredients of the "goods and services economy") play a minor role.¹⁶ The management issues involved in resource propagation are focused on securing successful transmission of the tacit as well as explicit knowledge content of the resource -- a very demanding challenge.¹⁷ The speed and intensity of resource propagation is clearly an important consideration in the wealth generating capacity of an economy. A region such as Silicon Valley has created a formidable wealth generating process through rapid resource propagation by firms whose main business is the production of new knowledge-intensive resources (standards and systems).

Resource replication: Firms may also wish to profit from their valuable resources by replicating them. Franchising arrangements, which have exploded in popularity in the past half-century, are cases of what we shall call resource replication. Franchising enables the owner of a resource, such as a branded fast food model, to offer the resource, on strict lines of replication, to other businesses, thereby profiting from the resource itself, rather than from the production of goods (e.g. fast food) utilizing the resource. But franchising is not the only form of resource replication. Firms may wish to replicate their own resources, under their own control - as when a multinational wishes to expand its R&D operations from one country to another. This involves replicating the resources involved in R&D -- the skilled staff, the equipment, the "atmosphere" of the lab. Resource replication is actually a

¹⁶ Richardson (1997) analyzes the software industry from this perspective, without using the resource terminology adopted here.

demanding opportunity that few firms can manage well. It calls for higher order capabilities than "merely" managing the "activities" of a business.¹⁸

Resource sharing: Firms are involved in a variety of contacts with each other, as customers, suppliers, collaborators as well as direct competitors. Firms find it expedient to enter into various kinds of collaborative arrangements, such as alliances and joint ventures, even with their competitors. The trick is to "manage" the spheres of collaboration and competition so that they do not interfere with each other. From the resource perspective these are cases of resource sharing.¹⁹ Firms do not have to "own" or even have exclusive access to all the resources they need to produce their current range of goods and services. They can share resources for purposes of product development, such as in production of a general prototype which they can all shape to their own strategic ends. They can share resources for purposes of opening up new markets, as when small and medium-sized exporters mount a common booth at a new international trade fair. Firms which complement each other in a local cluster, or industrial district, share a common resource which can be described as a high degree of specialized know-how; it is what Marshall called the knowledge that is "in the air" in such a district. Shared resources can be a powerful source of competitive advantage for the firms which have access to them.

Resource redeployment: Firms can redeploy resources, effecting an exchange from one to another, as can occur in mergers and acquisitions. Here the acquiring firm can transfer tangible as well as intangible assets from the firm acquired; they might be broadcasting licenses, or airline routes, or process technologies. In each case the issue is: to what can extent can capabilities be transferred along with the assets that make up the resources?²⁰

¹⁷ On these issues, see the influential treatment by Nonaka and Takeuchi (1995), which discusses the management of modes of conversion between tacit and explicit knowledge.

¹⁸ Winter and Szulanski (1999) discuss replication as a viable firm strategy. Their focus is on the process through which a replicating firm reproduces its "routines." The focus in this paper is on the replication of resources -- a related but not identical concern.

¹⁹ See Combs and Ketchen (1999) for a discussion in the context of firm strategies.

²⁰ These issues are discussed in Capron and Mitchell (1998) and in Capron, Dussauge and Mitchell (1998) where the term used is resource redeployment; such resource redeployment is a frequent object of the merger, rather than financial or competitive considerations.

Resource leverage: Firms can also obtain resources from other firms through active strategies of resource acquisition and absorption. Prahalad and Hamel (1990) called this "resource leverage" in the context of their treatment of the "core competence of the corporation." (1990). The gist is that firms with an active conception of strategy, as "stretching" the corporation to expand its resource base with a view to entering new markets or new businesses, seek out the resources required and take the steps needed to incorporate them. Thus latecomer firms from East Asia, for example, entered into Original Equipment Manufacturing (OEM) contracting arrangements with advanced firms in the USA and Europe, partly for the cash flow generated by producing goods for other firms to brand, but even more importantly for the flow of knowledge resources such contracts entailed. Japanese firms likewise excelled at choosing strategic alliances with rival firms in order to absorb as much know-how as possible.²¹ These firms were all acting on the assumption that resources were *available* and *accessible* -- provided suitable strategies were employed for securing access to them.

Resource exchange: Our final case concerns explicit resource exchange between firms -- as in open market transactions where one firm sells a resource to another (e.g. a wireless communications license, or a set of regional air routes, or a set of magazine titles together with their editorial staffs and advertising clients). These are the transactions that dominate the business pages of the newspaper every day. They are brokered by specialist firms, such as merchant banks and securities houses. The process of bargaining is captured by the phrase "the market for corporate control" -- although this does not capture the key resource exchange feature, nor the fact that there is no organized "market" for these activities other than through the brokerage efforts of the firms involved.²²

The markets for resources

It bears repeating that the restlessness of the resource economy is quite distinct from the activities of the firms embodying these resources -- their production activities. Of course there could be a great deal of production and other economic

²¹ These strategies are described in the resource-based handbook on strategy produced by Itami (1987) which anticipated most of the points made by Prahalad and Hamel (1990).

activity without much resource exchange -- and vice versa, there could be a great deal of "resource churning" (e.g. huge numbers of mergers and acquisitions) without much effect on the level of productive activity. But in general, one would expect to find in a productive economy a reasonable degree of resource exchange activity. The extent of this depends on the development of specialized markets for resources.

Resource exchange takes place largely through bilateral contractual arrangements, without the mediation of a "market" at all. But some firms show exceptional enterprise and actually create "markets" for resources through their brokerage activities. Merchant banks in particular take the lead role in this.²³ Firms like Enron have also become extraordinarily successful in creating specialized markets for resources, such as in energy supplies and in "bandwidth" for communications purposes. It is certainly an indicator of a very sophisticated economy when organized markets for resources start to appear.²⁴

We now turn to the first of the substantial issues to be addressed by the extended RBV of the economy, namely whether it can reproduce the main elements of the conventional RBV of the firm, and do so by adding some "value" of its own.

4. Firms and resource heterogeneity

To be plausible, the extended RBV of the economy must translate into an account of firms and their capabilities, based on the way that resources may be encapsulated within firms, and on how firms may derive profitable opportunities from this bundling.²⁵ This leads to questions such as what determines the rate of growth of

²² See Moran and Ghoshal (1999) for an extended discussion of resource exchange in the context of the management literature.

²³ Merchant banks frequently recombine resources and launch them as new companies. For example Deutsche Bank in 1999 was assembling wireless communications licenses covering different parts of Europe in order to bundle them into a new corporate venture.

²⁴ Geroski (1998) refers to these as "strategic markets."

²⁵ It was Edith Penrose in *The Theory of the Growth of the Firm* (1959) who developed the first clear expression of a "resource-based view" of the firm. She considered firms to be "bundles of resources" and saw the specialization of these resources as fundamentally accounting for the variations between firms.

As Penrose put it (1959/1995: 24):

"... a firm is more than an administrative unit; it is also a collection of productive resources the disposal of which between different uses and over time is determined by administrative [management] decision." Or elsewhere (1959/1995: 31):

"The business firm ... is both an administrative organization and a collection of productive resources; its general purpose is to organize the use of its 'own' resources together with other resources acquired

firms as resource bundles, the limits to this growth, the circumstances under which firms divest resources, and how these matters are translated into entrepreneurial and management practice.²⁶

The disposition of resources within firms is the outcome of entrepreneurial action, or it is bequeathed from earlier situations. It is the task of management to utilize such a resource stock and extract the most productive services from it in transforming inputs into outputs. The range of goods and services to be produced with the services provided by such a resource stock cannot be known in advance; it is a matter of discovery, a process of learning, where the outcome depends on the management's knowledge, experience and capacity for imaginative experiment. Management seeks to capture synergies between resources (utilizing a resource bundle for more than one kind of activity, or to produce goods for more than one kind of market). The capture of such synergies is the resource-economy equivalent of co-specialization of assets and the capture of cost-based economies of scope in the goods and services economy.²⁷

What accounts for the growth of firms is their propensity to develop management or organizational "routines" which then liberate management attention to investigate and discover further development and diversification opportunities. Penrose (1959) puts this in terms of management capturing the services of an "excess" of resources that call for diversification into production of new products or entry into new markets. What then limits the size of firms, or their rate of growth, is the managerial burdens of keeping track of these diversifications. In the end, the firm can "pay attention" only to so many different kinds of activities. In the end, it can forge an effective union out of only so many resources; beyond that limit, at any time, the firm functions as no more than a conglomerate, where its resources have no synergistic interaction (and the whole is therefore no more than the sum of the parts). Such a disaggregated firm is a prime candidate for a hostile takeover.²⁸

from outside the firm for the production and sale of goods and services at a profit" For a recent discussion of Penrose's contribution, see Pitelis and Wahl (1998).

²⁶ These are all well-known issues treated by authors such as Coase (1937); Penrose (1959) and others. The point here is to translate the terms used into those of the resource economy.

²⁷ Teece (1980; 1986; 1992) has developed an account of the dynamics of firm diversification in terms of the co-specialization of the assets involved and the capacity of managements to appropriate the services of these assets.

²⁸ A parallel argument was developed in the literature on the "managerial" theory of the firm (Marris 1964) or the growth maximization hypothesis for firms (Mueller 1969); this line of work

This then is a behavioral account of the process through which managements are led to seek diversification and new market entry, based on an existing stock of resources, and why they are led to seek to combine those resources with others (e.g. through mergers and acquisitions) to further enlarge their “strategic options.”²⁹ It works on the basis of a notion of “disequilibrium” within the firm, where the potential services rendered by a stock of resources is out of balance with the actual services being secured through the firm’s existing organizational routines.³⁰ The same reasoning put into reverse can also account for the case where a firm divests resources, or spins them off into a new corporate venture (“spinoff”) in order to gain extra focus on the new venture’s line of business.³¹ We shall discuss below the analogue to this intra-firm resource disequilibrium in the form of an economy-wide resource disequilibrium, which generates the motive for entrepreneurship.

Firms: activities and capabilities

Firms are instruments of action; they engage in activities, converting inputs into outputs. To do so, they develop capabilities – both functional capabilities (manufacturing management, product development, market opening) and deeper “core capabilities” or core competences which underpin their competitive success over many years.³² In the framework developed here, we reserve capabilities as firm-specific categories; capabilities inhere in the organization as a whole.³³ They need to

anticipated many of the issues currently addressed by the RBV of the firm. See Marris (1998) for a fascinating reprise, and Mueller (1986) for a collection of his papers on this theme.

²⁹ The Japanese management scholar, Hiroyuki Itami, has developed a view of corporate strategy that reflects the firm's resource position, both in terms of matching current strategy to the firm's current resource position, but also in dynamically predicting the resource acquisition requirements of a potential change in strategy. See Itami (1987).

³⁰ Loasby (1991), building on the work of Hahn, has developed a formulation of this process in terms of attaining an "equilibrium" within the firm between the services provided by the current resource base and the services required by the current range of goods and services produced. This is a striking way of expressing the core of Penrose's argument. But of course it is a completely different use of the term 'equilibrium' from its use in neoclassical economics, and it goes against the grain of the 'disequilibrium' tone of reasoning adopted in this paper -- and therefore it is not pursued here.

³¹ The literature on corporate spinoffs, as the complement to mergers and acquisitions, is growing rapidly. Most studies are concerned with the issue of corporate returns, and whether they are enhanced by spinoffs; see for example Johnson, Brown and Johnson (1994).

³² Teece, Pisano and Shuen 1997 Prahalad and Hamel 1990

³³ As Winter (1991: 185) puts it:

“... it is undeniable that large corporations are as organizations among society’s most significant repositories of the productive knowledge that they exercise and not merely an economic contrivance of the individuals currently associated with them ... it is firms, not the people that work for firms, that know how to make gasoline, automobiles and computers.”

be built through conscious management activity. They need to be sustained and enhanced. As they accumulate, the organization can be said to be engaged in organizational learning – which captures the sense that it is able to adapt purposefully to new circumstances by drawing on experience to frame appropriate courses of action.

Capabilities may be seen as resting on three levels of firm attributes. The most basic, and simplest, are resources – the “smart assets” that firms assemble in order to go into business. Resources can be built internally, through hiring people and exposing them to market intelligence, or they can be transferred inwards, from outside the firm, or across from other units of the firm. The next level are the processes, or “routines” that managements build to put resources to use, and to accomplish the firm’s activities. Firms act through routines. They purchase materials through the routines of raising purchasing orders, taking deliveries and stock accounting, and creating accounts payable entries in the ledger; they sell goods through the routines of issuing invoices and creating accounts receivable entries in the ledger; they acquire new competences through the acquisition of companies or company divisions. The third level is that of corporate values, or what Drucker (1994) calls the “theory of the business.” This constitutes the set of criteria which enable the firm to distinguish between courses of action, at any level – from the level of a salesperson deciding to serve one customer rather than another, or a production division accepting one order and rejecting another, to that of the senior management group, deciding to invest in one business rather than another.³⁴

Successful firms differentiate themselves from mere conglomerates in terms of the resources they employ and the synergies generated.³⁵ Co-specialization of assets

³⁴ See Christensen and Overdorf (2000) for an exposition of these three corporate attributes and how they underpin the firm’s capabilities. Drucker (1994) discusses the “theory of the business” as a testable series of propositions regarding the nature of the business and what distinguishes it from others. Garvan (1998) sets the building of organizational processes or “routines” at the center of his analysis of management functions, in a way which is reminiscent of the formulation provided by Nelson and Winter (1982). Loasby (1994) provides an essential link between organizational capabilities and wider economic relations between firms.

³⁵ Itami discusses how the firm has to manage its “resource fit” and its “resource accumulation” processes. He recognizes how firms acquire distinctiveness based on their set of resources; this is the aspect of Japanese management practice that was picked up so clearly by Prahalad and Hamel and popularized so effectively in their 1990 *HBR* article on the “core competences of the corporation.” But Itami pays equal attention to the processes through which a firm may *expand* its resource base, to support diversification strategies. He makes the point that resources “must be accumulated at low cost, quickly, and in a timely manner” (1987: 116). The most successful approaches are those where a firm can exploit resources developed for one kind of strategic initiative in a different but related strategic initiative. (This is what Prahalad and Hamel (1990) called “resource leverage.”)

has frequently been referred to as a source of innovative advantage for firms.³⁶

Translating to a resource perspective, we may postulate that firms are able to enhance their distinctiveness through the capacity to develop co-specialized resources in synergistic combinations, and that this in turn is the engine of successful diversification and enhanced firm performance.

In passing, it is worth noting that this provides a plausible foundation for a theory of management. Given a stock of resources within a firm (assembled through entrepreneurial action or bequeathed) it is management's task to develop the "organizational routines" needed to capture as many of the services from these resources as possible. Management has the task of rationalizing the resource base, in order to capture synergies. Yardsticks to measure management performance are then its effectiveness and efficiency in developing, and adapting, the routines needed to put in motion the firm's resource stock. This is a theory of management which is concerned with maximizing the creation of value through discovering new activities, rather than appropriating as much value as possible (through cost cutting) from a given set of activities – in keeping with the best of current treatments of the management function.³⁷

To summarize the discussion so far, what we have is a picture of the economy where firms are built from encapsulated resources, and operated [managed] with a view to building and capturing resource synergies. Firms are involved in actively accumulating resources to enhance their dynamic distinctiveness.³⁸ As firms translate their newly discovered activities into "routines" so management attention is liberated for further discovery, and they are led to grow and diversify, building on their "excess" resource base, i.e. on a disequilibrium in their resources. Successful diversification is based on co-specialization of resources which act synergistically with each other.³⁹ Firms seek complementary resources from other firms with which

³⁶ Teece (1980; 1986; 1992) has developed an account of the dynamics of firm diversification in terms of the co-specialization of the assets involved and the capacity of managements to appropriate the services of these assets.

³⁷ Ghoshal, Bartlett and Moran (1999) adopt this perspective in their "new manifesto for management."

³⁸ This is what Teece, Pisano and Shuen (1997) call the "dynamic capabilities view." It is applied to the case of latecomer catchup firms in Mathews and Cho (1999; 2000).

³⁹ Substantive predictions follow from this account, such as that the "value" of firms will reflect the degree to which managements have succeeded in capturing resource synergies. Empirical work designed to test such predictions would have to utilize a value parameter such as *Tobin's q*, and proxies

they have direct dealings, through the dynamics of resource propagation, replication, leverage and transfer.⁴⁰

So far, then, we have been able to demonstrate the consistency of the extended RBV of the economy with the conventional RBV of the firm, through consideration of the *exchange dynamics* of the resource economy, driven by disequilibrium considerations (rather than the equilibrium considerations which govern neoclassical analysis of the goods and services economy). What drives firms in these patterns of behavior is the competitive dynamics of an industry -- the role played by rival firms, as well as by potential partners and other kinds of organizations. So we turn next to the analysis of competitive dynamics from the resource perspective, to see what added insights may be gleaned from this approach.

5. Competitive dynamics: incumbents and challengers

Firms are in constant competition with each other, in terms of their products and services. Price competition is the primary vehicle through which these dynamics are expressed, as well as qualitative attributes like time to market, product quality, customer responsiveness and innovation -- as described in the analysis of the goods and services economy. In the 1980s a vision of firms locked in competitive struggle within an "industry forces" framework was developed.⁴¹ The basic assumption, in keeping with the neoclassical synthesis, was that firms are more or less uniform; what distinguishes their performance (and their potential sustainable competitive advantage) is the industrial setting in which they find themselves. Industrial pressures are transmitted through processes such as barriers to mobility which keep firms locked in (and out of) industries.

This "industry forces" view of competitive processes, based on a view of firms as homogeneous, has given way in the 1990s to an approach that sees firms as heterogeneous, and looks inside firms, to their resources, for an account of competitive performance. The essential insight of the RBV of the firm as developed in

for the firm's resources – as is done in studies which seek to capture the effects on firm value of diversification. For a recent review of the issues involved, see Steiner (1996).

⁴⁰ In the same spirit, Granstrand (1998) discusses by which firms acquire resources as encompassing "generation, combination, transformation, regeneration and recombination of resources" (1998: 477).

⁴¹ Porter (1980; 1985) synthesized many strands of thinking in competitive dynamics regarding the "industry forces" framework within which a firm could fashion its strategic options.

strategic management has been that underpinning these competitive struggles in product markets lie the attempts by firms to secure sustainable competitive advantages through the distinctiveness of their resource base.⁴² Thus there are multiple levels to competitive dynamics. The most obvious and superficial level is that of product competition. Beneath that there is competition over product ranges and families, e.g. brand loyalties from one product to another, and product architectures (e.g. the Intel Pentium series of microprocessors). And beneath this level is the most fundamental of all, namely the underlying resources (assets and capabilities) that enable firms to consistently bring out new competitive products and thereby circumvent their rivals.

This is the insight that has generated a new perspective on the competitive dynamics of the resource economy. Firms are competing with each other, at the most basic level, through emulation, variation and substitution of each other's resources. It is the competitive struggle over resources which may be viewed as the fundamental driving force of the capitalist economy.

There is a Marshallian and a Schumpeterian dimension to these resource-based competitive dynamics. Marshall's conception of competitive dynamics involved firms with varying strategies and programs each implementing their different approaches; the market then "selected" the most appropriate strategic arrangement in line with current demand and industrial preferences. The Marshallian processes of competitive dynamics are observed every day as firms compete not just in terms of prices but in terms of their complementary offerings, involving technologies, or products connected together in value-chains. In industrial districts, the Marshallian forces may be seen in terms of the sharp competition between suppliers of similar goods or services, and the collaboration between complementary suppliers linked in a value chain. These are the origins of increasing returns in a manufacturing district -- as discussed below.⁴³

⁴² Contributors to the RBV of the firm include Wernerfelt (1984), Lippman and Rumelt (1982), Rumelt (1984), Barney (1986), Itami (1987), Dierickx and Cool (1989) and then a host of contributors and commentators in the 1990s such as Conner (1991), Collis and Montgomery (1995), Peteraf (1993), Amit and Shoemaker (1993) and economic commentators such as Foss (1993; 1996), Knudsen (1996) and Loasby (1998). Hunt and Morgan (1995; 1997) and Hunt (1997) have merged the heterogeneity of resources within firms (the RBV of the firm) with heterogeneity of consumer demand to develop a marketing oriented "resource-advantage theory" of competitive dynamics.

⁴³ Allyn Young (1928) provided a perfectly clear account of this process, in a way which anticipated most of the more recent discussion of increasing returns.

Marshall captured an essential feature of these processes in the distinction between the economies which a firm could introduce for itself (internal economies) and those introduced by other firms but which are of benefit to the focal firm (external economies). In doing so, Marshall was able to reconcile the phenomena of increasing returns and inter-firm competition: the firm's activities are subject to diminishing returns, but the benefits it derives from other firms (externalities) enable increasing returns to be secured.⁴⁴ Translating across to the terms of the resource economy, it may be observed that firms derive advantages not just from the resources they embody themselves, but also from resources *external to the firm* to which the firm can secure access. Following Richardson (1972) we may call these complementary resources.⁴⁵ The complementary resources which are available to the firm, either through open-market transactions or other forms of transfer or leverage, whether they be found in other firms or in public institutions, are now seen to be fundamental to the analysis of competitive dynamics.⁴⁶

Schumpeterian competitive dynamics

The more fundamental and sweeping kind of competition that drives capitalist dynamics is captured by Schumpeter's conception of the "creative gales of destruction" that regularly sweep through the capitalist system, initiated by entrepreneurs who break with existing arrangements in order to try out new combinations. From a resource perspective, such entrepreneurs are accomplishing *resource recombination* -- one of the most powerful factors driving competitive dynamics.

Of course Schumpeter did not use the language of resources, which has only come into vogue in the 1980s and 1990s -- but it is easy to translate Schumpeter's

⁴⁴ Prendergast (1992: 460) puts the matter in these terms:

"By the time he published the first edition of his *Principles*, Marshall had formulated an ingenious theoretical solution to the problem of reconciling increasing returns and competition within the framework devised by Cournot. The solution involved the introduction of the concept of external economies which were viewed as the sole cause of increasing returns within a regime of competition. Interpreted as a perturbation of a firm's unit-homogeneous production function caused by changes in the output of the industry as a whole, external economies are a device of considerable power and elegance ..."

⁴⁵ Richardson (1972) referred to firms' activities and capabilities; he used capabilities very nearly in the sense referred to here by resources. Complementary activities are those which bind firms together in contractual arrangements, thus forming larger aggregates which constitute the "organization of industry." These issues are taken up in Section 7 below.

⁴⁶ As developed for example in Coombs and Metcalfe (1999) where the term used is "distributed capabilities."

insights into the language of competitive resource imitation and substitution.⁴⁷ From the resource perspective, the Schumpeterian dynamics may be captured in terms of *resource imitation*, *resource transfer* and *resource substitution*. (These are the terms used in the RBV of the firm.) It bears repeating that we are talking here of processes at the resource level, not at the level of the goods and services produced from the resources.

Resource imitation: This is the form of resource-based competition where the underlying resource that generates a set of products or services for one firm (the incumbent) is replicated in some way by another firm (the challenger) to produce similar goods or services. It is summarized by the less precise term *imitation* (where we are focusing on imitation of the underlying resource, rather than of the products or services generated from it). *Resources are fundamentally imitable*. This is the consideration that drives one aspect of Schumpeterian competition in the economy (and which distinguishes the perspective developed here from the conventional RBV of the firm, where the emphasis is on the *non-imitability* of resources).⁴⁸

Resource transfer: An alternative to imitation for a prospective new entrant is direct acquisition of needed resources from a third party. If a firm finds it too difficult to imitate another firm's basic resource underlying a product or service, then it can seek to "transfer" the resource through some form of purchase, rental, licensing or consultancy arrangement. Thus it appropriates the same resource (or something similar) in a legal and commercially well defined form, in a way that serves the interest of both firms party to the transaction. Resource transfer can be accomplished without ever approaching the originating firm. It might be accomplished by hiring a

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As Schumpeter himself put it (1942/1975: 84):

".. in capitalist reality as distinguished from its textbook picture, it is not (price-guided) competition which counts but the competition from the new commodity, the new technology, the new source of supply, the new type of organization (the largest-scale unit of control for instance) -- competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the outputs of the existing firms but at their foundations and their very lives. This kind of competition is as much more effective than the other as a bombardment is in comparison with forcing a door ..."

⁴⁸

See Barney (1991; 1996) for a representative sample of repeated assertions that firms sustain their advantages by focusing on resources that are non-imitable, non-transferable and non-substitutable. Even if one allows a little license, and interprets this to mean "relatively" non-imitable, etc, it is still a strange emphasis and one which is entirely foreign to a wider concern with a healthy degree of competition in an economy favouring challengers more than incumbents.

consulting firm which has made the resource one of its key attributes. For the originating firm, transferring a resource, e.g. through licensing, is usually a means to secure a stream of revenue, as well as a strategic move to broaden the use of a technology, say, or software system, and thus broaden the market for other products which extend it or adapt it in some way.⁴⁹

Resource substitution: If efforts by a challenger to replicate a resource or transfer the resource meet with little success, there is always the alternative of finding an alternative resource that will do the trick just as well. This is “resource substitution.” It is the fundamental driver of Schumpeterian technological competition, where a given resource is outflanked and substituted by an alternative. Resource substitution does not necessarily call on innovation by the challenger – it is sufficient to recognize that a product or service produced in one way could equally be substituted by an alternative. Resource recombination is what drives the "creative gales" of substitution through technical change.

Sustainability of competitive advantage?

The RBV of the firm emphasizes the sustainability of competitive advantages due to resource endowments. To do so, it is focused almost exclusively on the extent to which firms can capture resources which are difficult to imitate and not easily transferred or substituted. This has always struck me as extremely odd. It takes an incumbent's perspective -- whereas economics should, and normally would, be more concerned with promoting competition, and would therefore take a challenger's perspective. In the competitive dynamics as developed in this article, we are concerned with neither incumbent nor challenger advantage, but with how both incumbents and challengers drive each other to higher and higher levels of economic performance.

The incumbent's perspective: Uncertain imitability of resources

It is through uncertain imitability of resources that incumbents are able to establish sustainable competitive advantages. The more that incumbents are able to create (resource-based) isolating mechanisms, the more sustainable their advantages.

⁴⁹ See for example the study of the dynamics of the PC industry by Ferguson and Morris (1984).

Lippman and Rumelt (1982) and Rumelt (1984) introduced these ideas in the explicit context of a resource-based view of strategic competitive dynamics. They demonstrated how an analysis at the level of resources would shed light on the sources of sustainability, i.e. through uncertain imitability.⁵⁰

For our purposes, where we are concerned as much with a challenger perspective as with incumbents, the Lippman and Rumelt theorem, and its elaboration through such notions as time compression diseconomies, tells only half the story. The complementary proposition concerns how challengers successfully confront incumbents, even when they have built a resource base on causal ambiguity and strewn the competitive landscape with as many "isolating mechanisms" as they can devise.⁵¹

The challenger's perspective: Reliable imitability

It is through the fundamental imitability and transferability of resources that challengers are able to invade industry segments occupied by incumbents. Challengers acquire the requisite resources through internal development and through external leverage, where they are guided in their choice of which industry segment to attack by the availability of resources which are most easily imitated and transferred. We may coin the expression "reliable imitability" for such an approach, to bring out the complementarity with the uncertain imitability of Lippman and Rumelt.

Now the imitability of non-tradeable resources by competitor firms is held to be linked to five features of the resource accumulation process. These are: time compression diseconomies; asset mass efficiencies; interconnectedness of asset stocks; asset erosion and causal ambiguity.⁵² The extended RBV of the economy offers a wider perspective on these issues. Reliable imitability can be linked to attributes of the resource accumulation process, as seen from the perspective of the challenger. For example, *time compression diseconomies* in certain resources can be countered by time-related advantages of others – as in the case when a new technological trajectory is being launched, and incumbents have no advantages over challengers (indeed may have disadvantages, when the new trajectory entails new

⁵⁰ Rumelt introduced the idea of an "isolating mechanism" as the (resource-based) firm-level analogue of mobility barriers (Caves and Porter 1977) at the industry level.

⁵¹ Lieberman and Montgomery (1998) raise many of these issues from the perspective of first mover (dis)advantages, and make an explicit link with the RBV.

⁵² For discussion of these attributes, see Dierickx and Cool (1989; 1994).

resource architecture). *Asset mass efficiencies* can be countered by resource free riding on the part of the challenger – as when a challenger is able to take advantage of market infrastructure created by early movers. *Asset stock interconnectedness* refers to the fact that an incumbent’s position can be strengthened by the way that one set of strategic assets (resources) can work synergistically with another. A potential challenger may be able to replicate one of these sets, but lack the other.⁵³ By the same reasoning, a challenger may succeed if resources being targeted for acquisition or leverage are complemented by resources already in the challenger’s possession. Thus a challenger can build an effective resource base, where each addition complements the others.⁵⁴ *Causal ambiguity* may work to the advantage of the incumbent – but as knowledge becomes explicit, it can work to the advantage of a challenger. Thus challengers can target their attacks on sectors where knowledge of product or process becomes more explicit, through licensing, or third party vendors of equipment, or consultants. All these patterns where challengers are able to take advantage of the attributes of the resource accumulation process, are evident in the way that latecomer firms from East Asia fashioned an entry into the world semiconductor industry.⁵⁵

Reliable imitability depends for its plausibility on such features of the resource economy as path dependence. Technologies, for example, are known to evolve along “trajectories” that reflect the path dependence of cumulative design and utilization decisions.⁵⁶ In resource terms, this may be described as a case of predictable resource evolution (as discussed below). Now a challenger can “read” a technological or resource trajectory as well as an incumbent – in fact, it can probably read the trajectory better, because it is unencumbered with the prior commitments that create

⁵³ An example might be the case where a challenger successfully replicates an incumbent’s product but fails commercially because it lacks the complementary customer service network required to make the product attractive.

⁵⁴ An example might be a contract manufacturing firm moving through a succession of contracts with a multinational, starting with simple Original Equipment Manufacturing (OEM) then moving through Own Design and Manufacture (ODM) to Global Logistics Contracting (GLC), where each step complements and builds on the preceding. The contracting firm emerges at the end as a formidable challenger – as has been the case in Singapore, for example.

⁵⁵ These points are made for what appears to be the first time, in Mathews (1997b; 1998). The semiconductor experience is related in detail in Mathews and Cho (2000) and in the country-specific papers, Mathews (1997; 1999) and Mathews and Cho (1999).

⁵⁶ See for example Dosi (1997) and Dosi, Malerba and Orsenigo (1994) and the contributions to Dosi et al (1988). Freeman (1994) provides an overview of the economics of technological change, while Freeman (1987) introduced the important links between technological dynamics, technology policy and economic performance.

inertia for firms, and make it so difficult for them to swing into new technological trajectories.⁵⁷

If resources were non-transferable and non-imitable, then incumbents' competitive advantages would be sustainable forever. But firms are able to diversify and challenge incumbents' positions. They are able to do so because they adjust their resources to their strategic needs. A goal of entering a new market needs to be thought through, from the resources perspective, with an analysis of the resources required to support such a shift. This is what Itami (1987) calls "dynamic resource fit" and he gives numerous Japanese examples of firms building their resource base, or acquiring new resources, in order to support their new strategic thrust. Firms are able to draw on multiple connections, from industrial networks or supplier networks, in effecting these resource transfers.⁵⁸ East Asian firms in Korea and Taiwan and Singapore have all learned much from these Japanese examples, and have applied the lessons in their own attempts to "leverage" resources from advanced firms in advanced countries. The case of the creation of a semiconductor industry in East Asia, entirely through strategies of resource leverage (knowledge, technology, market access) is one of the best examples of this process at work. The strategies pursued by the firms involved sought to make up their initial disadvantages in terms of their "latecomer" advantages -- such as being able to read technological trajectories, and take advantage of the availability of process technology equipment from third party vendors. These are ways in which the imitation of a given resource base may be made more "reliable."⁵⁹

Competitive dynamics shape the rise and fall of firms within an industry setting at any moment in time. Incumbents seek to defend their position, through the

⁵⁷ Henderson and Clark (1990) and Henderson (1993) give the graphic example of semiconductor equipment supply firms, where in each successive generation of the technology, the previous leading firm was unable to make the transition; this is plausibly interpreted by Henderson and Clark as a case of organizational failure to accommodate new technological architectures. Likewise, Christensen (1997) and Christensen, Suarez and Utterback (1998) discuss the industrial dynamics of the disk drive industry, with a focus on the processes that enable late entrants to capture market share from incumbents, who remain wedded to earlier architectural forms. In the same spirit, Tripsas (1997) discusses the industrial dynamics (processes of creative destruction) in the typesetter industry. There is thus accumulating substantial empirical evidence of the kinds of organizational issues involved in industrial dynamics, and the specialization of firm resources. The argument clearly carries over to the resource economy, where firms committed to a particular resource trajectory will find it difficult to accommodate new resource variations. This is the challenger's advantage, and the source of "reliable imitability."

⁵⁸ See Imai (1989) for a definitive treatment; von Hippel (1989) treats the general case of supplier networks and know-how trading between rivals.

⁵⁹ See Mathews and Cho (2000) for a detailed exposition of this process. See Mathews (1997; 1998) and Mathews and Cho (1999) for a discussion of the "latecomer firm" strategy that underpinned these East Asian successes.

uncertain imitability of their distinctive resource base. Challengers are constantly seeking ways to evade this resource base, or to appropriate it, through imitation, transfer and substitution of resources. Their success can be grounded in the sources of reliable imitability, such as the tendency of resources to evolve along certain well-defined trajectories. So we turn next to consider the evolutionary dynamics of the resource economy.

6. Evolutionary resource dynamics

The ingredients of an evolutionary approach in economics are now reasonably well-defined.⁶⁰ It is clear that a consistent and coherent account must identify some category or categories as unit of variation and something else (or the same) as unit of selection, together with an account of the actual processes involved in generating variations and selecting entities according to some designated "fitness" criterion. Furthermore there has to be some kind of "inheritance" function, or entity which accounts for retention. The point of course is that such a theoretical structure has nothing in common with the comparative statics of the neoclassical synthesis; it represents a completely different way of visualizing the workings of the economic system.

It was Nelson and Winter who first formulated a clear evolutionary account, as an alternative to the static, optimizing account of mainstream neoclassical economics.⁶¹ They did so in terms of firms (as "phenotype") and their organizational "routines" as "genes" (or genotype) seeing these as lending continuity to economic life, as opposed to the random fluctuations and optimizing responses to prices envisaged by the neoclassical view. The resource-based view as extended in this paper can take over this description provided by Nelson and Winter, and subsequently elaborated, with the proviso that it is not just "routines" but resources which are acting as the units of variation, selection and retention. The resource based view of the

⁶⁰ For excellent introductions, see Dosi and Nelson (1994) or Metcalfe (1998a; 1998b); Langlois and Everett (1994) provide an illuminating discussion informed by a reading of the current evolutionary debates in the biological sciences. Andersen (1994), Hodgson (1993) or Witt (1992) provide expositions of the evolutionary approach to economics from different perspectives, while Vromen (1995) provides an extended comparison of evolutionary schools of thought. The modern field was essentially started by Nelson and Winter (1982).

⁶¹ See discussions by Nelson and Winter (1974; 1982) and the individual contributions of each author, such as Winter (1964) and Nelson (1994).

economy thereby provides a unifying account of the processes of economic evolution, via the dynamics of resource variation, selection and retention.

Resource variation: Underpinning the appearance of new products, technologies or organizational routines, one can look for the fundamental variation that occurs at the level of resources. Resource variation can at one extreme mean the creation of an entirely new resource -- a new technique, or a new technological standard -- as discussed below. Normally it would entail some new combination of resources (i.e. resource recombination). This might be accomplished within the firm, as a result of its active search for such new combinations, e.g. through its R&D expenditures, enhancing its "absorptive capacities."⁶² It might be accomplished outside the firm, by entrepreneurs or other promoters creating new resource combinations. Resources can be exchanged between firms to create new combinations -- by exact analogy with the processes of genetic exchange between microorganisms that account for their extraordinary abilities to accelerate their evolutionary adaptation.

Resource selection: Not all variations in resources result in competitive advantages being secured by the firm introducing the variation. Indeed many prove to be of passing relevance; they and the firms adopting them pass quickly into obscurity. But some resource variations turn out to be exactly the resource combination needed to develop the products and services called for by, say, a new phase in the development of the economy, or a new market development opportunity. Capitalism seems to be particularly effective in promoting technology selection mechanisms.⁶³ To take a recent example from the Internet economy, firms with resource variations combining wireless two-way communications technologies with domestic connections together with broadcasting licenses, have been able to seize the advantage in offering broadband Internet connections to households, bypassing both traditional coaxial telephone and cable TV operators. While the companies which developed such a resource variation may have done so fortuitously, they quickly recognized the source of their advantage and built on it, enhancing their competitive advantages. This

⁶² On "absorptive capacity" as a novel perspective on the resource-enhancing effect of R&D expenditure, see Cohen and Levinthal (1990).

⁶³ Nelson (1989) provides a particularly clear account.

can plausibly be described in terms of resource selection, where the vehicle for the "successful" resources are the firms embodying them, and the "fitness criterion" is the profitability and growth of these firms (as measured, for example, by an improvement in their Tobin's q ratio).

Resource retention: The key factor in evolutionary processes is the mechanism through which successful variations are maintained, or inherited. In the biological world, this is through inheritance of genetic characteristics (e.g. through transmission of mutations) via reproduction. In the artificial world of technologies and organizations -- of resources more generally -- it is through inheritance of acquired characteristics and the capacity to maintain "resource integrity" through a variety of environmental changes. Successful resources are "inherited" through the growth and diversification of firms carrying the successful resources.⁶⁴

The distinction between variation and selection of "resources" as opposed to that of "routines" (Nelson and Winter) is subtle but important. Nelson and Winter argue that organizational routines are "sticky" in the sense that they vary slowly, and are "inherited" by successful firms as they grow and develop. Exactly the same arguments carry over to resources, but with even greater force. Resources as defined here are clearly good candidates as vehicles of variation and selection, in that they are explicitly exchanged between firms, as part of a process of adaptive learning; no such consideration applies to "routines."⁶⁵

However the extended RBV does not need to argue that variation and selection operates through one and not through the other. Clearly evolutionary pressures can be experienced through both resources and routines and, for that matter, through firms' capabilities more generally, as well as through the variation and selection of specific technologies. It was argued above that routines are the behavioral expression of the resources encapsulated in a firm. Managements utilize the firm's distinctive resources by creating routines; this is the origin of the firm's propensity to grow and expand, as managers look to extract enhanced services from "routinized" resources. Now the argument is transposed to an evolutionary context. If it is the underlying resources

⁶⁴ This is a process explicated by Nelson and Winter (1982) and more recently by Metcalfe (1998a; 1998b).

⁶⁵ On this point see Hutter (1994) for further discussion.

which are varying, they create selection pressures which are experienced in terms of successful routines of successful firms.

Co-evolutionary resource dynamics

In biological evolution, the phenomenon of species co-adapting to changes in their environment is frequently observed, so that they become co-specialized with respect to each other. This is termed co-evolution. Numerous examples include the microorganisms that evolve in the guts of certain mammalian species, or the ants that co-evolve with certain kinds of acacia to provide mutual advantages. Now it is coming to be observed that business works also according to co-evolutionary principles. Firms for example encourage business units to evolve in different but complementary directions, allowing them to seize opportunities for collaboration where they present themselves – rather than imposing predetermined patterns of divisionalized operation on them.⁶⁶ From a resource perspective, the notion of co-specialization of resources both within and between firms can be interpreted as the expression of co-evolutionary dynamics.

If resources can be described in terms of their evolutionary and co-evolutionary dynamics, what then is the significance of this perspective for economic performance? Variety is the driver of evolutionary dynamics, whether we are talking about technologies, firms or resources. This is the core of the Fisher principle, the "fundamental theorem" of systems in evolutionary motion. It states, when applied to competitive economic systems, in the words used by Metcalfe (1994: 328) that "the rate of change of average behavior within a population of competing firms is governed by the degree of variety in behavior within that population."⁶⁷ The key issue then is how resource creation can exceed resource destruction to enhance the resource variety and diversity that drives economic learning and adaptation, i.e. evolutionary success.

Resource variety is generated by new combinations and, sometimes, by genuinely new resources, as in the case of a new technological standard emerging and

⁶⁶ See Eisenhardt and Galunic (2000) for a recent exposition of this perspective.

⁶⁷ Metcalfe (1994: 328-9) notes that: "Implicit in this view are the four central themes of the evolutionary perspective: that it is differences in behaviour between firms which drive the evolutionary process; that these differences are evaluated economically within a population of competing behaviours; that this evaluation generates selective pressure to change the relative performance of each distinct form of behaviour in the population; and, that these behaviours are subject to inertia, changing slowly relative to the changes imposed by selection."

driving the spawning of a new industry. This brings us to the consideration of entrepreneurship, innovation and technological dynamics, involving issues such as path dependencies, lock-in, adaptive learning and technological trajectories.

7. Innovation and entrepreneurship: resource cycles

From the resource perspective, novelty in the economy is generated principally through resource recombination, and the principal agents who accomplish these recombinations are entrepreneurs.⁶⁸ Schumpeter had the clearest possible conception that it is entrepreneurship which creates new lines of development within an economy, in ways that cannot be anticipated through analysis of the "circular flow" economy. Entrepreneurial initiative creates new activities, whose profitability then attracts imitators, and so the new activities become incorporated in a new version of the "circular flow" where the resource distribution in the economy as a whole is shifted. Following Schumpeter, we keep a firm dividing line between "entrepreneurship" and "innovation." Sometimes the two coincide, as when a technologist develops a completely new product or process concept and starts a new company to exploit it. But usually the two are best treated separately.

Entrepreneurship

Schumpeter's account of entrepreneurship, as elaborated in TED, is concerned with the process through which new economic combinations are created. The language itself seems designed to be adapted to the resource perspective: we can interpret Schumpeter to mean "new resource combinations." Entrepreneurs do not create anything new, insisted Schumpeter; they perceive opportunities not currently being accounted for, and assemble the resources needed to meet the business opportunity generated. Nor should they be seen as bearing the risks of new enterprise formation; these risks are properly borne by the suppliers of capital (and, one might add, by employees and suppliers of goods and services to the fledgling firm). Thus the profits from the enterprise must be allocated as interest to the capital advanced, with

⁶⁸ Schumpeter developed such a theory of entrepreneurship, in the sense of initiating new lines of economic development, in his *Theory of Economic Development*. This classic was first published in German in 1911, in a second German edition in 1924, and in an English translation of this second edition in 1934. The Transaction Publishers edition was published in 1996; hence the bibliographic

the residual being seen as entrepreneurial profit, which lasts for as long as the opportunity is not imitated away.

Moreover Schumpeter insists that the creation of new enterprises takes place in a disruptive fashion, outside the normal economic course of events, or what he calls the "circular flow" of economic events wherein demand induces supply which meets demand, and so on. The "circular flow" can be equated with the static conception of the mainstream "goods and services" economy, where the emphasis is on the equilibrating process through which supply matches demand. The circular flow cannot generate variety; it cannot adapt to new situations. But equipped with a new element called the "entrepreneurial function" -- in all its messiness and disruptiveness -- the circular flow can be transformed into a dynamically adjusting economy. I wish to take over these terms to the case of the "resource economy" where it is the dynamics of the production and exchange of the resources needed for production of goods and services that is the object of entrepreneurial interest.

From the extended resource perspective developed here, there is virtually nothing to be changed in Schumpeter's account. The resource economy is where resource recombination occurs. (Schumpeter: new enterprise formation occurs outside the "circular flow" of normal economic events.) New enterprises are created through new combinations of existing resources, adapted to new perceived needs or opportunities. (Schumpeter: new enterprises are created through recombination.) The new combinations are assembled not by managers but by entrepreneurs or other corporate promoters (e.g. a merchant bank); it is the entrepreneur/promoter who establishes the firm's initial business strategy on the basis of the particular combination of resources assembled. (Schumpeter: It is the entrepreneur who initiates a new sequence of economic operations -- as the "new employment of existing production goods" (1934/1996: 136)).⁶⁹

Day (1986) has provided an intriguing reinterpretation of Schumpeter's entrepreneurial function in terms of disequilibrium dynamics of the goods and services economy. He takes the position that in any real setting the "circular flow"

reference to TED as Schumpeter (1911/1934/1996). For a useful introduction to the text, in the context of Schumpeter's early career, see Swedberg (1991).

⁶⁹ It is interesting to compare this perspective with that developed by Marris (1964) in his development of a "managerial" theory of the firm. Marris viewed entrepreneurship in its classical guise as just about dead, having given way to administrative and bureaucratic managerial processes. The history of subsequent technological upheavals unleashed by entrepreneurial action would seem to have been kinder to Schumpeter than to Marris.

would rapidly swing wildly into disequilibrium, with one cycle of price formation and production decisions feeding off another to produce unstable swings – exactly as are observed in reality. He maintains that entrepreneurs actually bring stability to this unstable system, by identifying the sources of disequilibrium and initiating new actions that are then embodied in corrective fashion in a new round of the “circular flow.”⁷⁰ From our perspective, it is disequilibria in the goods and services economy which provide the stimulus for entrepreneurial action, combining and recombining resources in order to produce a new set of goods or services. Entrepreneurs have the capacity to translate the disequilibria into resource terms, and to visualize how a new resource combination can be effected to “correct” the disequilibrium identified. This is a nice way of illustrating the duality of the goods and services economy and the resource economy: entrepreneurs are guided by signals from the goods and services economy but their actions are conducted in the resource economy, which in turn change the dynamics of the goods and services economy.

Innovation

There is hardly a term in economics that has attracted as much confusion as “innovation.”⁷¹ Is it the appearance of totally new forms, or their uptake in the economy? The term is frequently taken to imply much more than technological novelty; it can span the appearance of new marketing forms, or new organizational arrangements, or any other economic activity that shows signs of novelty. From the resource perspective, these ambiguities may be dispelled: innovation may be identified *tout court* with the creation of *new resources* – resources that have not existed before, rather than resource combinations achieved through entrepreneurial action.

An example of a completely new resource is a *technological standard*. Suppose that we regard a technological standard as a “resource” -- since it becomes widely available as such, to a variety of firms, and not just to the originator. Resource

⁷⁰ As Day (1986: 67) puts it:

“Schumpeter taught us much of what we need to know about the nature of entrepreneurs but did not explain why they intruded themselves on the circular flow. One possible explanation is now clear. They don’t intrude on the circular flow; they emerge in a disequilibrium, globally unstable economy with the fundamental function of creating the mechanisms that allow an economy to work when its agents are boundedly rational, its transactions imperfectly coordinated, and its long-run behavior intrinsically and globally unstable.”

⁷¹ For a comprehensive overview of the issues involved in technological innovation, see Freeman (1994); for an exploration of empirical experience, see Malerba and Orsenigo (1995).

creation in this sense is needed to drive the formation of new industries and their diffusion. This is generally beneficial in its effects. But standardization can also lead to perverse outcomes, as for example where one resource is *created* and then *propagated* on such a scale that it precludes the creation of another, perhaps superior resource. This is a case of “lock-in” where the success of the inferior resource is generated through increasing returns.⁷²

While interesting, lock-in effects are simply an extreme form of the more general phenomenon which may be described as *resource trajectories*, or path dependence.⁷³ It is another way of saying that “history matters.” From a resource perspective, resource accumulation, within firms and in the wider economy, can clearly be expected to follow certain trajectories, or pathways, given that firms tend to develop their resource stock based on what they already have. There is nothing counter-intuitive in resource accumulation following a trajectory. Moreover, whole systems of firms may generate resource configurations which become “locked-in” in inferior economic performance – to be discussed below in the context of industrial districts. Resource pathways in this manner become of fundamental significance for economic performance.

Reproducibility of the resource economy: innovation and technological evolution

One of the over-arching concerns of the resource perspective on the economy is that of reproducibility of the entire system. How are new resources created, and how are “old” or discarded resources destroyed? What are the grand cycles through which resources pass, and what can one say in general about the balance between resource creation and destruction in any real economy? It hardly bears mention that these are questions that are seldom asked in mainstream economic analysis of the traditional “goods and services” economy.

⁷² Such lock-in effects are discussed by Arthur (1989), where the wide adoption of the perhaps inferior technology in itself generates “network externalities” that preclude the other, perhaps superior, technology from being started. The case of the QWERTY typewriter keyboard is the most famous such case (David 1985).

⁷³ See Antonelli (1997) for a comprehensive treatment of the economics of path dependence. Again, the point is to translate the terms of this treatment to the resource economy.

Creation of new resources: New resources are created as firms discover new ways of accomplishing activities, and others learn of their improvements. As discussed, one of the critical pathways of new resource creation is through the development of new technologies and their standardization. Mainstream economic analysis has no place for the process of standardization, which is generally discussed only in non-mainstream literatures of technological dynamics.⁷⁴ But in the resource economy, standardization is a central and critical process -- it is the process through which *a new resource, available to all*, is created.

Resource destruction: The counterpart to resource creation is resource destruction. Resources do not decay, like obsolescent goods. They do not vanish, like obsolescent services. Resources that are no longer needed have to be *transferred* or *liquidated*. Transfer of resources, such as by a multinational corporation from an advanced part of the world to a less-developed part with lower costs, is a way of ensuring that resources circulate through the wider economy. It is a case of *resource diffusion*. Outright liquidation is the ultimate alternative. This needs to be accomplished through the use of specialist agencies, such as bankruptcy firms and liquidators. Resources embody value-generating potential, and it is this potential that changes as the economy as a whole evolves.⁷⁵

Resource cycles, resource balance and resource diversity

The resource view ultimately demands a perspective be taken on the overall resource cycles of the economy -- by analogy with the water cycle or carbon cycle in the biological world. We are not talking here of resource cycles in a physical sense (i.e. in terms of their material constituents) but in terms of the creation, circulation and destruction of value-generating entities. A healthy and productive economy clearly is able to command a wide variety or diversity of resources, which in turn call for healthy processes of resource creation as well as satisfactory disposal of resources

⁷⁴ Standards can be interpreted as equilibria where users are agents with multiple technical choices (Cowan and Miller 1998). But such game-theoretic formulations, while illuminating, miss the essential dynamic features of standardization. Often it is not foresight and calculation on the part of agents which leads to the emergence of a standard, but the outcome of unforeseen technological dynamics.

⁷⁵ Note the link here to the notion that poor management of firms can destroy "shareholder value" (even while making a profit in terms of conventional accounting).

no longer required. This creates what may be termed a dynamic “resource equilibrium” – in the sense in which the term is used in analysis of ecological cycles in biological studies. The resource cycle is just as important for a healthy economy, generating the resource diversity which drives adaptation and learning.

8. Industrial organization, economic performance and economic learning

The resource economy perspective is concerned not primarily with individual firm development, but above all with the interactions between firms -- or with the "organization of industry" itself. The fundamental feature of an economy is the patterns through which the actions of economic agents are coordinated with a view to enhancing overall economic performance. I shall refer to *economic performance* as opposed to the performance of individual firms which populate the economy. I wish to demonstrate that this is critically linked to the way that resources are distributed within the economy, both within and between firms -- in other words, that economic performance is limited by the organizational configuration of resources within the economy.⁷⁶

Organizational configuration of resources and economic performance

Enhanced performance at the economic level, as at the organizational level, can be captured through specialization and the emergence of intermediate input suppliers, which in turn is associated with decomposing a process into a finer division of labor. Consider the case of a group of firms, each specializing in a particular range of products and overlapping with each other in terms of their resource. As the market expands, some firms can specialize in intermediate subassemblies, to create more complex value-adding pathways within the industry. Standardization of subassembly modules enables potential economies of scale to be captured, and an organizational

⁷⁶ It was Richardson (1972) who first drew attention to these issues, by introducing a range of firm interactions laid out across a spectrum whose endpoints were the integrated firm at one end and the open, anonymous market at the other. Utilizing a classification of activities as "similar" and "complementary" he argued that similar activities would be carried out within a single firm (under unified management) while dissimilar activities would be coordinated through the market. Complementary (but dissimilar) activities would be coordinated by direct negotiation between firms (as in various kinds of contractual arrangement). Without damage to Richardson's argument we may translate the terms across to resources. It is thus complementarity of activities which induces firms to act together, in order to pool resources, or to find ways to service the activities from a common resource.

reconfiguration of resources to be effected. It is the possibility of intermediate specialist activities emerging, as the scale of the market expands, that drives specialization of resources.⁷⁷ If these activities are conducted by new, specialist firms, it is a case of horizontal division of labor (Langlois 1989). If the activities are conducted within the same firm, it is a case of vertical division of labor (Stiglitz 1951). We thus have a resource interpretation of the process first alluded to by Adam Smith, in his theorem proposing that the division of labor and its beneficial effects is limited by the extent of the market.

Sometimes the required further specialization is not achieved, and the economic performance of a group of firms is thereby degraded. This has occurred over and over again as industrial districts wax and wane. The district of Okayama, in western Japan, for example, became a flourishing center of production of varied kinds of farm engines in the 1950s and 1960s, as Japan's farmers moved en masse to mechanize their operations. They needed one engine only per farm, to drive pumps, tractors, or threshing machines. Over 30 manufacturing firms arose in the Okayama district to service this need, producing small, light engines of variable but low horsepower to a variety of end-specifications, for distribution by specialized distributors throughout Japan. But nothing remains of this district today. It was wiped out by the rise of mass producing firms in Tokyo and other metropolitan centers, who were much more vertically integrated and connected to lengthy subcontracting chains than were the small Okayama producers who encapsulated all the technical capabilities needed to produce an engine in one small firm. As new kinds of engines appeared, such as faster and lighter machines, the small self-contained producers of Okayama found themselves unable to switch from being self-sufficient producers to specialized parts of a longer production chain. The longer metropolitan production chains, which encouraged specialized mass producers, therefore wiped them out.⁷⁸

From the resource perspective, these Okayama producers were not able to make the breakthrough from self-sufficiency in resources to a new configuration where some resources are shared between firms. There was apparently no mechanism

⁷⁷ As expressed by Richardson (1996/1998: 168): "where the scale of an economic activity increases, it will be practicable for component processes within it to be separated out. In general, the cost savings made available by an increase in the scale of a particular economic activity [lead] ... to a change in industrial structure, those stages exhibiting the greatest scale economies becoming the business of specialist suppliers." Further comment is provided, in the context of Adam Smith's arguments, in Richardson (1975).

⁷⁸ See Tokumaru (1998) for a description and analysis of this episode.

in this case to shift the cluster of firms to a new configuration. Successful clusters of firms, such as in a Silicon Valley, are able to make these configuration shifts; others stay “locked in” to a particular configuration and decline. The issue is how such shifts are accomplished, and whether they call for specific institutional interventions, or are accomplished by the actors themselves.

One obvious way to impose an organizational configuration on economic activities, beyond encapsulating them within individual firms, is to cluster them, in local communities of firms specializing in closely complementary activities. These entities all entail an organizational structure between firms as opposed to one that holds within firms. Clusters of this form are well recognized and indeed are becoming the object of increasing attention -- due to the outstanding success of such high tech clusters as Silicon Valley in the USA, and other science-driven clusters like Research Triangle Park in North Carolina, or the Hsinchu district in Taiwan where all the country's major IT and semiconductor activities are co-located.⁷⁹ It is widely recognized that the success of a Silicon Valley owes much to highly specialized complementarities that are closely co-located -- something that cannot be accounted for in simple capital and labor terms in a production function.

Now from a resource perspective there is a clear interpretation to be offered for the phenomenon of clustering, which is that clusters constitute a form of economic organization where resources are shared between firms locally. The two operative words are *shared*, and *local*. Resources can be utilized by more than one firm -- this is the very point of adopting a resource perspective on the economy (as opposed to the usual perspective which treats the firm on its own). Resources such as specialized manufacturing knowledge and technical capabilities can be shared in the form of a common "culture" of excellence and leading edge technical intelligence -- where the latest developments are exchanged in cafes and meeting points, in workshops and seminars, and through rapid job-hopping, as in Silicon Valley. These are all ways in which one might describe resources as being "in the air" to adapt Marshall's telling phrase. But they are also local. Other forms of shared resource do not have to be local -- as in worldwide R&D collaborative structures for example. But the point of the

⁷⁹ See Porter (1998) for a recent discussion, and Martin (1999) for a review of the field of geographical economic studies. On clustering in Silicon Valley, see Kenney and von Burg (1999) for one view, and Saxenian (1994/1996; 1999) for a contrasting view. On clustering as a source of success in Taiwan and Singapore, see Mathews (1997a; 1999) and Mathews and Cho (2000).

cluster is that it draws benefits from resources shared between firms which are closely co-located.⁸⁰

So local sharing of resources in clusters can be expected to improve economic performance, as numerous historical and contemporary examples attest. But again organizational configuration of resources holds the key. Not all locally clustered firms thrive economically. There are many examples of industrial districts, for example, which have declined, not because of poor management or technical capabilities, but because of their inability to adjust to changing external economic circumstances.⁸¹ They were "locked in" to one particular kind of organizational configuration (of resources). And when economic circumstances changed, and this proved to be a sub-optimal configuration, they were unable to pull themselves spontaneously into a new configuration. This has happened on countless occasions as industrial districts have flourished for a time but have eventually declined as external economic circumstances changed – as in the Japanese case of Okayama.

Non-local forms of organization, where again resources are shared, tend to be more successful in adapting to new circumstances and changing their form -- or rather, they organize for shorter periods, and break up and re-organize as circumstances and opportunities change. Consider the case of R&D consortia, fashioned through private initiative or through public policy. Again from a resource perspective, the rationale and source of success is clear: it is through managed sharing of resources. Firms participate in such consortia in order to acquire access to knowledge and techniques which would be too difficult or expensive for each to acquire individually. But the consortium can allow Smith's division of labor to operate. Each firm or group of firms can specialize in certain aspects of a problem, while the consortium as a whole pools the results for the benefit of all.

It is important to stress that these resource configurations usually span firms – in “development blocks” or “technological systems” or "systems of tight linkages" or "national systems of innovation" - and call for supra-firm modes of organization that

⁸⁰ See Foss and Eriksen (1995) and Foss (1996; 1999) for a discussion of this phenomenon in an explicitly resource-based context, and Lawson (1999) for a similar argument extending the "competence perspective" from the individual firm to the region. Schmitz (1999) adds the point that firms in industrial districts develop collective action through conscious intervention, as in the formation of consortia.

⁸¹ See for example the study of the Italian footwear industrial districts of Fusignano and San Mauro Pascoli by Nuti and Cainelli (1996).

facilitate the sharing of resources.⁸² There is a recursive feature to this process of resource encapsulation – from small groups of resources encapsulated within a small firm to capture synergies, to larger encapsulations within larger or divisionalized firms, or encapsulations in clusters, networks, alliances, or national systems. In each case the driving factor is encapsulation into a resource agglomeration that has an “identity” and a capacity for self-action, or adaptation.⁸³ They can be agglomerated through the expression of “market forces” or through deliberate, policy-guided action, as in the formation of numerous consortia and alliances. It is the heterogeneity of such resource aggregations that lies at the heart of national competitive systems, just as it is the heterogeneity of resource clusters within firms which accounts for their firm-level competitive advantage. And it is the capacity of an economy to form such resource configurations, and to adapt them as circumstances change, that constitutes what might be called “economic learning” -- a notion that makes no sense in mainstream equilibrium analysis.

Economic learning

The concept of “economic learning” refers to a process through which an economy adapts to new circumstances using measures that go beyond random, price-guided reactions.⁸⁴ Learning involves adapting intelligently to new circumstances by developing a repertoire of routines that are stored in memory and which can be drawn on as circumstances change.⁸⁵ I propose that the notion of the “resource economy”

⁸² On development blocks, see Dahmen (1989); on technological systems, see Carlsson and Stankiewicz (1991), Carlsson and Jacobsson (1991) and the contributions to Carlsson (1997); on “systems of tight linkages” see Cohen and Zysman (1987). Foss (1996) refers to all these forms of industrial organization as operating at the meso level -- between the firm and the national industry. On national systems of innovation, see Lundvall (1988; 1992); this concept spans firms as well as supporting institutions such as public R&D laboratories. From the resource perspective, these concepts all embody the notion of resources held in common and shared within a specified group of firms and institutions.

⁸³ A useful analogy is an Object-Oriented software system, where the software “objects” are the elemental units, and larger programs are built through encapsulated systems of interacting objects. Such analogies are discussed in Mathews (1996a; b).

⁸⁴ See Lundvall (1998) and Lundvall and Johnson (1994) for a discussion of the concept of the learning economy; Mathews (1996a; 2000) gives an account of the organizational underpinnings of economic learning. Accounts of technological capability enhancement, which paved the way to more broadly conceived notions of economic learning, are provided by Stiglitz (1987) and by Dahlman and Westphal (1983).

⁸⁵ Lundvall (1998) makes a distinction between the “knowledge economy” where production of goods and services depend to an increasing degree on flows of knowledge, and the “learning economy” where new knowledge is being created. As he puts it:

with its emphasis on the mobility of resources, provides a fitting framework within which a notion of economic learning becomes plausible.

The analogy with organizational learning is strong and immediate. Organizational learning refers to an adaptive response on the part of an organization to changing circumstances which calls on something more than random exploration of new technological or market spaces. Organizational learning implies the existence and acquisition of “organizational competences” as the outcome of learning. The “learning organization” is one that can translate the learning of individual members or individual business units into something that belongs to an organization as a whole – into its organizational capabilities. It refers to the creation of competences/capabilities that transcend those held by individuals. Quick and nimble organizations are those that can call on such capabilities. Learning in this context implies the existence of an organizational memory in the form of behavioural routines such as standard operating procedures and the ability to learn from mistakes.

Likewise at the economic level, the notion of “economic learning” refers to the capacity of an economy to react intelligently to changing circumstances – by forms of economic adjustment that follow certain “learned” routines and which demonstrate a capacity to improve over time. Examples of such economic learning routines would include firms learning to work collaboratively in R&D consortia to accelerate the process of new product development, or firms cooperating in export consortia, or public sector research institutes taking a lead in a new technology and diffusing the fruits of its development efforts across to constituent firms. In addition to the learning that goes on within such arrangements, there is also a longer-term institutional learning concerning the optimal institutional arrangements for such experiences – long-term vs. short term consortia, private financing vs. public financial support, prototype development vs. component standardization, and other such choices.⁸⁶

By analogy with the case of organizational learning, the outcome of economic learning will be a set of competences or capabilities that we might call “economic” –

“... learning gives rise to know-how, skills and competencies which are often tacit rather than explicit and which cannot easily be transmitted through telecommunication networks.” (1998: 34)

⁸⁶ See Mathews and Cho (2000): 325. The discussion of organizational capabilities as likewise resting on three attributes, namely resources, routines and “values” is discussed above; see Christensen and Overdorf (2000).

namely capabilities to do with economic or industrial adjustment; the spawning and upgrading of industries; the phasing out of old industries; the formation of new firms and the absorption of old firms. Such capabilities rest on the same kinds of three economic attributes listed above for firms, namely resources, routines and values (or national goals). Resources are common to the two levels of analysis, providing the link between them. Routines refer to economic routines, such as routines for the formation of product development consortia, or for the creation and protection of intellectual property rights. Values or national goals refer to the criteria used in making judgments as to what kinds of industries should be phased in and what kinds phased out, what kinds of technologies should be supported and what kinds not. The distinguishing values of many of the successful late developing nations in East Asia were a strong desire to “catch-up” with more advanced countries, and to employ institutional forms designed to achieve this national goal.

Thus cases of what we are terming economic learning can be found in Japan, Korea and Taiwan, to do with technological upgrading in an industry such as semiconductors. In Japan, the FONTAC program was an initial economic learning experiment, in which the new institutional form of the Engineering Research Association (ERA) – a formal consortium -- was tested, and which proved to have some survival value for the firms which became participants. So it was varied and refined over time, to become an “economic routine” (by analogy with organizational routines) which Japan was able to invoke each time there was a step change in technological competence to be accomplished by Japanese firms, culminating in the famous VLSI program of 1976-1979.⁸⁷ Likewise in Korea the early attempts to promote major changes in technological capabilities on the part of the *chaebol* by simple imitation of Japanese organizational forms -- as in the 1988-89 ULSI program -- were not very successful; but later programs launched by the industry association, have embodied the “learning” from these earlier experiences and have demonstrably been more effective. In Taiwan the number of cases of economic learning are numerous, an excellent case being the changes in organizational form of the R&D alliances, which became more effective in diffusing technological capabilities to participant firms as experience in their operation was accumulated. It is clear that in

⁸⁷ Sakakibara (1997) provides an analysis of later Japanese cooperative R&D programs, demonstrating the institutional learning involved.

the sense we are using the term, some countries “learn” economically better than others.⁸⁸

The key organizational insight is that economic performance is not optimized by simply looking to optimize the performance of each productive resource, on its own.⁸⁹ The organizational dimension is essential in order to deal with the issue of coordination. The organizational dimension operates at several different levels -- bundling resources in firms to capture synergies, and then connecting firms with each other to capture further synergies, and groups of firms with other groups of firms to capture further synergies again. These are what may be called the "organizational" sources of performance enhancement in the resource economy.

9. Concluding remarks

The claim to novelty in the preceding exposition lies not so much in the parts (where existing ideas are taken over and transmuted into resource equivalents) as in the whole. It represents a synthesis of concerns that are ignored in the neoclassical analysis, ranging from resource-based firm growth through competitive and evolutionary dynamics to the organization of industry, where the connecting thread is provided by the elemental category of "resource." But this synthesis itself is of more than passing interest -- for at least five reasons. These are, firstly, that resources provide a common thread that links the existing theory of the firm with theories of competitive dynamics, evolutionary dynamics, entrepreneurship, innovation, organization of industry and economic performance. Utilizing a common category of "resource" with a consistent definition can be of benefit in facilitating synergistic interactions between these fields of inquiry. Second, the approach provides coherence in the notion of the totality of resources; this is a meaningful economic category, with a more realistic interpretation than, say, the notion of "aggregate capital." Third, the category of resource has a straightforward real-world interpretation or identification, in the form of the corporate acquisitions and divestments that are reported every day in the business pages of the newspaper. The value of resources may be captured in

⁸⁸ See the discussion in Mathews and Cho (2000) and in Mathews (1996a).

⁸⁹ Likewise it is a commonplace in cybernetics and systems theory that optimization of system performance cannot be guaranteed by partwise optimization of the system elements independently – except in the extreme case of completely decomposable systems. In most cases, it is inter-element dynamics that must be taken into account in achieving overall system optimization.

their stock market valuation (if they are embodied in a listed firm), or in the replacement book value of the resource. Resources have an intuitively satisfying indexical measurement, in the form of *Tobin's q*, which captures both: it is a measure of the (stock) market valuation of an asset compared with its replacement book value. Fourth, the approach promises to take economic analysis away from its debilitating fascination with pure formalism, and its discouragement of empirical inquiry, towards active historical and empirical analysis and description of resource trajectories in real economies over real time -- again providing a unifying thread in such studies between corporate histories, technological histories and accounts of economic development. Finally, and perhaps unexpectedly, the claim is made that the resources approach actually offers a plausible way of analyzing recent phenomena that are difficult to explain utilizing traditional economic tools, such as the rise of high technology clusters like Silicon Valley, or the rise of Internet companies. Such firms, which have minimal overheads, minimal revenues, zero profits and zero prices (i.e. giving their product away) represent something of a challenge for mainstream economic analysis. But from the resource perspective such firms can be seen as consisting of concentrated knowledge resources, whose value is reflected in stock price quotation rather than in terms of conventional revenues, and whose strategy needs to be understood in terms of enhancing these knowledge resources, through company acquisitions and various kinds of alliances, in order to drive the stock price and maintain the market valuation of the firm.

Three further methodological points can be made in defense of the approach proposed, that relate not so much to what it contains as to what it does *not* contain. Firstly, it is worth noting that the resource economy is a self-contained category that makes no call on the familiar features of the mainstream economic analysis, viz goods, services, output, prices, profits and other micro or macro categories. These all continue their existence undisturbed by the introduction of the resource economy, which aims to capture an aspect of economic reality which slips through the "conceptual net" of the mainstream approach. Thus the resource-based approach does not have to seek to destroy an intellectual enemy in order to assert its own right to existence.

Secondly, it is worth noting that the resource-based approach makes no assumptions regarding bounded rationality, interest-seeking behavior with guile, shirking, cheating nor any other of the individualistic assumptions made familiar by

the "economics of organization." They too are simply irrelevant to the consideration of the encapsulation of resources in firms and industrial organization.⁹⁰ It is worth adding that costs are not absent from the above discussion. There is the behavioral assumption that resources are "economized" -- that entrepreneurs will build firms from resources with an eye to minimizing their costs, reducing prices of the products produced, and maximizing performance.

Third it is worth noting that knowledge is contained in the notion of resource, but on the other hand, resources cannot be equated with knowledge. One can know a great deal about raising pigs, for example, but actually setting in motion the resources needed to open and operate a pig farm, and do so profitably, is a different story altogether. Thus it seems to me that many authors in the past decade have become over-enamored of the notion of knowledge as the critical organizational and competitive variable. What they say can be captured by the resource approach (e.g. regarding the significance of tacit and explicit knowledge, and the management of knowledge dynamics) but in a context where resources are the fundamental category, not the knowledge itself.

These considerations lead to the proposition that it might be worthwhile to further explore the "resource economy" as the dual of the conventional "goods and services" economy of mainstream economic analysis. The analytical goals of the two approaches are quite different. The goal of the resource-based approach is not to account for any given static distribution of goods and services and set of prices which clear all markets, as in conventional analysis. Instead its analytical goal is to historically account for a given configuration and specialization of resources, both within and between firms, through evolutionary trajectories and path dependencies and adaptive learning by firms. The resource-based approach to the economy promises to broaden the approach to resources of the prevailing "internalist" resource view of the firm, and to provide a secure bridge to evolutionary thinking through a common concern with the generation and exchange of resources within and between firms. At the same time it can promote a link to questions of economic organization and economic performance.

⁹⁰ This is consistent with some of the more innovative contributions to the RBV literature. Conner and Prahalad (1996) build a resource-based theory of the firm that excludes such opportunistic assumptions, as do Kogut and Zander (1992).

What is novel in this treatment is the category of the "resource economy" itself, as something distinct from the mainstream goods and services economy and labor economy of neoclassical analysis. Everything covered in the mainstream analysis of the goods and services economy continues as before; it is undisturbed by the present analysis. But it is complemented by the analysis of the extended RBV, which is concerned with the issues of resource dynamics that have slipped through the conceptual cracks in the mainstream neoclassical analysis. The approach of the extended RBV is quite distinctive in that it is dynamic and evolutionary; it is descriptive rather than analytical, and concerned with accounting for outcomes in terms of processes that have a history and a pathway that "makes a difference." It is concerned with differences, and with how these drive evolutionary dynamics and overall economic performance. It is the private opinion of this author that in time these approaches will come to dominate the analysis of the "goods and services" economy as well, by which time the obsession with formalistic static equilibrium analysis will just be a bad memory. But for the moment all we need claim is that these evolutionary-oriented approaches are "tailor-made" for the resource economy.

As outlined in the Introduction, the resource-based view has already proven its worth in the strategic management field, where it has helped to rejuvenate the theory and practice of developing and understanding coherent corporate strategies. Many scholars are of the view that the resource perspective has wider application, precisely because it gets at the fundamentals of firm heterogeneity and firm "fitness" -- two of the principal issues in an evolutionary approach.⁹¹ But a persistent problem in expanding the scope of the resource-based view from its home in the management sciences has been the very manner of its use in that discipline. The leading RBV scholars in strategy see resources as underpinning what they insist on calling "sustainable competitive advantage" and they insist on discussing resources in a context of *non-imitability*, *non-transferability* and *non-substitutability* -- which not only flies in the face of all experience to the contrary, but also makes it difficult to establish connections with the evolutionary approach where the emphasis is on, precisely, *imitation*, *transfer* and *substitution*. So the starting point for this exercise has been to find a way to break out of this intellectual straitjacket of "sustainable"

⁹¹ See Nelson (1994) for such an approach, where it is argued that the resource-based view needs to be combined with the evolutionary economics approach. This is also argued in texts such as Montgomery (1995).

competitive advantage. In my own case, this was done through consideration of the experiences of "latecomer firms" from East Asia which broke their way into advanced high technology industries, in spite of all the so-called "sustainable" competitive advantages of the incumbents. On investigation, it turned out that they owed their success not to any simplistic capital or labor considerations, but to determined efforts to "leverage" resources from advanced firms, utilizing both open-market transactions as well as various forms of inter-firm alliances and contractual relations, such as OEM arrangements. It was the *transmissibility* and *availability* of resources in the wider economy that had to be seen as the necessary condition governing the success of East Asian latecomer strategies discussed above.

From this it is but a short step to formulate a view of the economy in terms of the effects of these available and transmissible resources. But it turns out to be a big step for economics to do so. It means placing the emphasis not on the paraphernalia of the "goods and services" economy -- products, prices, output vectors, production functions etc -- but on the quite different dynamics of the "resource economy."

The synthesis, which I have dubbed an "extended" resource-based view of economic dynamics, is fundamentally Schumpeterian, Penrosian and Richardsonian in inspiration. It is *Schumpeterian* in its emphasis on the restless dynamics of resources. It is *Penrosian* in its view of firms' capabilities being built from a resource base, and put to use in generating value through organizational routines. It is *Richardsonian* in its view that economic performance ultimately depends on the dynamic configuration of resources in the economy, both within and between firms.

This paper seeks only to sketch what an analysis of the "resource economy" might look like, and how it might complement the kinds of analysis subsumed under the rubric of the neoclassical synthesis. The case is made that the project is at least plausible and probably feasible. It has the merit that it is empirically oriented, and if taken up, will encourage empirical investigations of competitive resource dynamics, evolutionary resource dynamics, pathways and adaptations, and many other phenomena that the neoclassical synthesis ignores. This goes to the heart of the critique of the neoclassical synthesis, which is not so much that it is wrong, as that it discourages any kind of empirical inquiry -- given that all interesting questions are settled in advance. In the resource economy, everything has to be settled by testing claims against reality. This might be a good foundation for an economics suited to the 21st century.

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