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Competitive dynamics and economic learning:

An extended resource-based view

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Competitive dynamics and economic learning: An extended resource-based view

Abstract

In this paper a conceptual framework for the analysis of economic learning is developed. Economic learning, by analogy with organizational learning, results in the development of competences, or capabilities, which rest on a foundation of economic resources, from which value is generated, and economic routines, through which resources are utilized. It is the mobility of resources, and their exchange and production dynamics, along evolutionary pathways, which underpins the plausibility of a notion of economic learning. The paper elaborates this framework as a “resource-based view” of the economy, as an extension of the resource-based view (RBV) of the firm. This framework turns out to be surprisingly productive of insights. In the first place, it generates an account of firms as encapsulated bundles of resources, which reproduces 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 it does so without remaining trapped in an “internalist” perspective, which has to date been a serious limitation on the wider application of the RBV. 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. Unlike the conventional RBV, which remains tied to the analysis of the resource choices of incumbents, this extended view applies as much to challengers as to incumbents, generating an evolutionary perspective on the competitive dynamics through which industrial sectors rise and fall.

The framework developed generates an account of the resource dynamics that underpin production of goods and services – including resource propagation, diffusion and recombination. These processes encompass evolutionary pressures, experienced through resource variation, selection and retention. Entrepreneurial initiatives take the form of resource recombinations, while resource innovation captures the creation of new economic resources, such as technological standards. Such a perspective brings into focus the resource cycles that drive real economies, as well as the resource specialization and configuration, within firms and between firms, that translates into enhanced or diminished economic performance. Within such a framework, the capturing and accelerated diffusion of resources, and the development of economic routines for efficiently utilizing resources, turns out to have a convenient interpretation as “economic learning.”

The resulting synthesis, which is here characterized as 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 changing configuration of resources in the economy, both within and between firms. This extended resource-based view promises to take the analysis of competitive dynamics further along the new, empirically-based path that has already been blazed by evolutionary and dynamic capabilities approaches to economics.
1. Introduction

It is a striking feature of successful economic sectors and districts that they display adaptive responses to changing circumstances, bringing firms into alignments with each other, in ways that mimic a process of learning. The success of Japan as an industrial power, and of other East Asian countries like Taiwan, Korea and Singapore, clearly owes more to learned patterns of economic behavior, oriented towards national goals of industrial catchup, than to firms responding independently as programmed profit maximizers to random price signals. Similar patterns can be found in the advanced countries of the West. The success of firms in Silicon Valley is clearly grounded in a rich “industrial ecology” where firms and institutions such as venture capitalists co-evolve in learned patterns of adaptation to new technological opportunities. Clusters of complementary firms in industrial districts, once thought to be characteristic of the 19th century but marginalized by mass production developments in the 20th century, continue to flourish, through patterns of collective adaptation and coordinated response to external challenges. All these represent systemic patterns of behavior that I suggest is best captured as a notion of “economic learning.”

Economic learning, by analogy with organizational learning, results in the development of competences, or capabilities, which rest on a foundation of economic resources, from which value is generated, and economic routines, through which resources are utilized. Economic learning, then, seems to be associated closely with the availability of resources, whose specialization and configuration both within and between firms can be seen to be critical to the outcome of economic adjustment. It is the mobility of resources, and their exchange and production dynamics, along evolutionary pathways, which underpins the plausibility of a notion of economic learning.

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.¹ 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. Unlike the conventional RBV, which remains tied to the analysis of the resource choices of incumbents, this extended view applies as much to challengers as to incumbents, generating an evolutionary perspective on the competitive dynamics through which industrial sectors rise and fall.

Over and above these matters, the extended RBV of the economy can be expected to generate further interesting insights based on the propagation, specialization and diffusion of resources within the economy and their evolutionary and co-evolutionary dynamics. 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.

¹ I owe this insight to the pathbreaking paper by Coombs and Metcalfe (1999) where they introduce the notion of "distributed capabilities."
Such a 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, and thus for the category of economic learning. Regions such as Silicon Valley can be characterized in terms of their resource concentration and specialization. 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. 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 concerned as much with the organizational configuration of resources as with their degree of
specialization. Economic prosperity depends on both. Thus the "organization of industry" is brought by the extended resource-based view to its rightful place at the centre of economic analysis, linked as it should be with a comprehensive notion of economic learning.

2. 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. Learning involves adapting intelligently to new circumstances by developing a repertoire of routines that are stored in an institutional memory and which can be drawn on as circumstances change. It implies a systemic level of inter-firm coordination that goes beyond the purely independent responses of independent firms to independently perceived external developments.

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. It results in the coherence of firms over extended periods of time, as they develop and accumulate their dynamic capabilities. 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

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2 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).

3 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: "... 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)

4 These are the terms pioneered by scholars such as Teece, Dosi, Rumelt and Winter (1994) and Teece, Pisano and Shuen (1997).
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 a given 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 the case where a national economy structures consortia within which firms learn to work collaboratively in R&D consortia in order to accelerate the process of new product development, or the case where a regional economy structures consortia within which firms cooperate to expand export sales, or the case where public sector research institutes take a lead in replicating 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.\(^5\)

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” – 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 three economic attributes which have their counterparts at the level of the firm, 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, or for the preparation of firms for Initial Public Offering (IPO) – one of the specialisms of the Silicon Valley learning economy. 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

\(^5\) See Mathews and Cho (2000): 325. For a description of the case of organizational learning in firms, as resting on the threefold typology of resources, routines and “values” see Christensen and Overdorf (2000).
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. The distinguishing values of the Silicon Valley learning economy, with their relentless bias towards innovation, generate the processes through which new firms and new technologies are spawned -- which is the overwhelming strength of the system.

Bringing the focus onto the resources themselves, as the fundamental units of value generation, helps to clarify what is going on in these cases of economic learning. I propose that 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 I am calling “economic learning” -- a notion that has no place in mainstream equilibrium analysis. In each case, it is mobility of resources – the capacity of firms to exchange resources between themselves, and develop new combinations of resources – that underpins this process. Let us then place these resource dynamics, the production and exchange of resources, at the center of analysis, to see what insights may be generated.

3. The resource economy

Consider cases of what we are terming economic learning that 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. 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, a 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 the sense we are using the term, some countries “learn” economically better than others. For further details, see the discussion in Mathews and Cho (2000) and in Mathews (1996a).

On Silicon Valley, see Saxenian 1994/1996 for an analysis that looks to the key success factors involved.

The management literature is now addressing such issues; see for example Moran and Ghoshal (1999).
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.” 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 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.

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

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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). 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.”
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.\textsuperscript{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.

In passing, we may note that the extended RBV approach provides a plausible account of the very latest features of the "new economy" with internet stocks and "dot.com" companies. Many of these firms have minimal overheads, minimal revenues, zero profits and zero prices (i.e. they give their product away); as such, they 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.\textsuperscript{11} The strategies of such firms need 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. This is a perfectly rational strategy from a resource perspective.

\textit{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 pages 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.\textsuperscript{12} The economic literature generally sees a firm’s

\textsuperscript{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.

\textsuperscript{11} This argument is quite independent of controversies surrounding possible over-valuation of "dot.com" companies' stocks, which is a separate issue.

\textsuperscript{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
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 ratio and specific features such as its IT capabilities, its brand equity, or its technological capabilities generally. 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.  

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.  

It is through these contacts that resources are exchanged and shared between firms, either voluntarily or involuntarily, through markets or through non-market transactions. These processes can be identified as cases of resource propagation, resource replication, resource exchange, resource redeployment, resource sharing and resource leverage. All are involved in the dynamics of the resource economy. We shall look first at competitive dynamics from a resource

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13 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.

14 One of the first to do 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.


16 On resource exchange, see Moran and Ghoshal (1999); on resource recombinations within the firm, see Galunic and Rodan (1998); on resource redeployment, as a result of horizontal mergers and
perspective at a point in time, and then at their evolutionary dynamics as the competitive landscape changes over time.

4. Competitive dynamics and resource heterogeneity

The starting point in applying the extended RBV is to consider how resources may be encapsulated within firms, and how firms may derive profitable opportunities from this bundling. This leads to questions such as what determines the rate of growth of 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.17

The extended resource based view of the economy yields as an immediate result the idea that firms may be considered as bundles of resources, whose distinctiveness underpins the competitive success of firms. 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.18 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.19 Firms seek complementary resources

acquisitions, see Capron and Mitchell (1998); on resource leverage, see Prahalad and Hamel (1990). On resource leverage as a resource-focused catchup strategy, see Mathews (1997a, b; 1998).

17 These are questions dealt with by the leading scholars such as Coase (1937), Penrose (1955; 1959) and Richardson (1972). The object here is to develop a rigorously resource-based account. 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. For a recent discussion of Penrose's contribution, see Pitelis and Wahl (1998).

18 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).

19 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 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).
from other firms with which they have direct dealings, through the dynamics of resource propagation, replication, leverage and transfer.\textsuperscript{20}

These constitute 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.

\textit{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.\textsuperscript{21} 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 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.\textsuperscript{22} Thus there are

\textsuperscript{20} In the same spirit, Granstrand (1998) discusses the means by which firms acquire resources as encompassing “generation, combination, transformation, regeneration and recombination of resources” (1998: 477).

\textsuperscript{21} 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.

\textsuperscript{22} 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
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, as captured by Schumpeter's conception of the "creative gales of destruction" that regularly sweep through the capitalist system. These are 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.

*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 paper, 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*

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. The knowledge aspects of resource dynamics are dealt with by scholars such as Marengo (1995) and Mowery, Oxley and Silverman (1997).
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. 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.23

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.24

**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.25 The extended RBV of the economy invites us to consider these issues in a wider perspective. Reliable imitability also 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

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23 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.

24 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.

25 For discussion of these attributes, see Dierickx and Cool (1989; 1994).
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 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.\(^{26}\) 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.\(^{27}\) *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.\(^ {28}\)

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.\(^ {29}\) In resource terms, this may be described as a case of predictable resource

\(^{26}\) 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.

\(^{27}\) 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.

\(^{28}\) These points are made 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). For alternative accounts of East Asian successes in semiconductors and electronics, with an emphasis on the limits of the resource leverage involved, see Ernst, Ganiotsos and Mytelka (1995). For a wider treatment of the industrial policy issues involved, see Lall (1996).

\(^{29}\) 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,
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 inertia for firms, and make it so difficult for them to swing into new technological trajectories.30

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.31 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."

30 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) discusses 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.”

31 See Imai (1989) for a definitive treatment; von Hippel (1989) treats the general case of supplier networks and know-how trading between rivals.
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 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, or pathways. This goes to the question of the time dimension, and the evolutionary dynamics of the resource economy.

5. Evolutionary resource dynamics

The extended resource based view generates important insights into the evolutionary and co-evolutionary dynamics of economies, based on the variation, selection and retention of resources within and between firms. The ingredients of an evolutionary approach in economics are now reasonably well-defined. It was Nelson and Winter who first formulated a clear evolutionary account, as an alternative to the static, optimizing account of mainstream neoclassical economics. 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 appropriate 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 economy thereby provides a unifying account of the processes of economic evolution, via the dynamics of resource variation, selection and retention.

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).

See discussions by Nelson and Winter (1974; 1982) and the individual contributions of each author, such as Winter (1964) and Nelson (1994).
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. Some 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.34 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? Resource variety provides the linking variable. 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."35 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 driving the spawning of a new industry. This brings consideration of entrepreneurship, innovation and technological dynamics, involving issues such as path dependencies, lock-in, adaptive learning and technological trajectories, into the

34 See Eisenhardt and Galunic (2000) for a recent exposition of this perspective.
35 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."
ambit of the resource economy. Let us examine these issues from the standpoint of innovation and entrepreneurship.

**Innovation and entrepreneurship: resource cycles**

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?36

From the resource perspective, novelty in the economy is generated principally through resource recombination, and the principal agents who accomplish these recombinations are entrepreneurs.37 Schumpeter had the clearest possible conception that it was entrepreneurship which created new lines of development within an economy, in ways that could not be anticipated through analysis of the "circular flow" economy. Entrepreneurial initiative created new activities, whose profitability then attracted imitators, and so the resource distribution in the economy as a whole is shifted. Like 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.

**Creation of new resources:** New resources are created as firms discover new ways of accomplishing activities, and others learn of their improvements.38 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.39 But in the resource

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36 It hardly bears mention that these are questions that are seldom asked in mainstream economic analysis of the traditional "goods and services" economy.

37 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 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).

38 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).

39 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
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 bringing about the circulation of resources through the wider international 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.40

**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 cycles of water or carbon 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 no longer required. This creates what may be termed a dynamic “resource equilibrium” – in the sense in which the term is used in ecological analysis. The resource cycle is equally essential for a healthy economy, generating the resource diversity which drives adaptation and learning.

6. **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. It was Richardson (1972) who first drew attention to 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.
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.

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 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.41 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.42

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 mass 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.

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40 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).
41 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."
42 For commentary on Smith's argument, in the context of increasing returns and economic performance, see the works by Richardson cited above, as well as Richardson (1975).
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.43

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 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.44 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.

43 See Tokumaru (1998) for a description and analysis of this episode.
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 cluster is that it draws benefits from resources shared between firms which are closely co-located.\(^45\)

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.\(^46\) 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. This can be counted as a case of failure to engage in economic learning.

\(^{45}\) 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.

\(^{46}\) See for example the study of the Italian footwear industrial districts of Fusignano and San Mauro Pascoli by Nuti and Cainelli (1996).
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 facilitate the sharing of resources. 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. 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. As noted above, 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.

47 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.

48 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 (1996c; b).
change, that constitutes what I am calling in this paper “economic learning” -- a notion that has no place in mainstream equilibrium analysis.

7. Concluding remarks

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. 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" 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.

49 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).

50 Mathews and Cho (2000) provide a detailed discussion of the process of creation of a semiconductor industry in East Asia through guided mechanisms of "resource leverage." This is to be
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 extended resource-
based view promises to take the analysis of competitive dynamics further along the
new, empirically-based path that has already been blazed by evolutionary and
dynamic capabilities approaches to economics.

This paper seeks only to sketch what an analysis of the "resource economy"
might look like, and how it might generate a plausible account of such phenomena as
economic learning. The framework 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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