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TOWARDS AN ECONOMIC THEORY OF THE MULTIPRODUCT FIRM*

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This paper outlines a theory of the multiproduct firm. Important building blocks include excess capacity and its creation, market imperfections, and the peculiarities of organizational knowledge, including its fungible and tacit character. A framework is adopted in which profit seeking firms are seen to diversify in order to avoid the high transactions costs associated with using various markets to trade the services of various specialized assets. Neoclassical explanations of the multiproduct firm are shown to be seriously deficient.

1. Introduction

'Of all outstanding characteristics of business firms perhaps the most inadequately treated in economic analysis is the diversification of their activities' [Penrose (1959, p. 104)]. Little progress has been made since Penrose registered her dismay. Accordingly, the theory of the firm has yet to accommodate one of the principal features of the modern business enterprise — its multiproduct character. The mission of this paper is to outline how this deficiency might be rectified. To accomplish this objective it turns out to be necessary to modify the neoclassical theory of the firm to emphasize the distinctive properties of organizational knowledge and the transactions cost properties of market exchange. It is also necessary to make an analytical separation between a theory of diversification and a theory of growth since growth and diversification are not inextricably linked. A central issue for a theory of multiproduct organization is to explain why firms diversify into related and unrelated product lines rather than reinvesting in traditional lines of business or transferring assets directly to stockholders.

An earlier paper [Teece (1980)] argued that the multiproduct firm could not be explained by reference to neoclassical cost functions. Panzar and Willig (1975, p. 3) have argued that economies of scope explain multiproduct organization.[1] While economies of scope explain joint production, they do

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[1]Economies of scope exist when for all outputs y_1 and y_2, the cost of joint production is less than the cost or producing each output separately [Panzar and Willig (1975)]. That is, it is the condition, for all y_1 and y_2: $C(y_1, y_2) < C(y_1, 0) + C(0, y_2)$.

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not explain why joint production must be organized within a single multiproduct enterprise. Joint production can proceed in the absence of multiproduct organization if contractural mechanisms can be devised to share the inputs which are yielding the scope economies. Whereas the earlier paper had the limited objective of exploring the relationship between economies of scope and the scope of the enterprise, the objective here is more ambitious — to outline a theory of multiproduct enterprise.

As mentioned earlier, the existing literature has failed to grapple successfully with the multiproduct firm. Some theories depict the multiproduct firm, particularly when created by mergers and acquisitions, as a manifestation of managerial discretion. Other explanations emphsize how taxes and regulations provide the driving force for diversification. Managers and business policy researchers often explain that value maximization through the capturing of 'synergies' lie at the heart of the incentive to diversify. (Rarely, however, are the nature of the efficiencies generating 'synergies' spelled out in a convincing fashion.) All of these factors undoubtedly help explain in part the ubiquity of multiproduct firms. The purpose here, however, is to focus on those incentives most likely to be operative in an economy which is dynamically competitive in the Schumpetarian sense, and which are consistent with profit seeking behavior by business firms. This focus is chosen partly because it traverses an essentially unexplored theoretical niche, but also because the perspective holds promise of explaining a good deal of observed behavior in modern industrial economies, a mission which orthodox theorizing has failed to accomplish.

2. Some traditional perspectives

2.1. The neoclassical firm and multiproduct organization

The neoclassical theory of the firm generally assumes profit maximizing entities operating in competitive product and capital markets exhibiting zero transactions costs and competitive equilibrium. Under these assumptions, it is virtually impossible to erect a theory of the multiproduct firm. For instance, consider a cost function displaying scope economies (operating 'synergies'). Irrespective of the source of these economies, there is no compelling reason for firms to adopt multiproduct structures since in a zero transactions cost world, scope economies can be captured using market contracts to share the services of the inputs providing the foundations for scope economies [Teece (1980)].

Nor are 'financial synergy' arguments compelling within the classical framework. Thus, define for a firm both a mean return μ, and a probability distribution of returns described entirely by the variance σ^2. Statistical theory

establishes that if the returns to independent firms are non-correlated, the creation of a single diversified firm leads to a reduction in the variance of total cash flow.[2] But within the context of the capital asset pricing model (CAPM), this need not reduce stockholder risk since all gains from this kind of amalgamation should have already been achieved by stockholders, all of whom are able to diversify away unsystematic risk. The argument clearly only has merit if the stock market is imperfect in some way, or if all stockholders are no following the precepts of the CAPM.

Nor does multiproduct organization increase the value of the firm by reducing default risks. While bondholders risk — and hence the costs of debt — can be reduced through diversification, Galai and Masulis (1976) point out that since the value of the firm is simply the sum of the constituent parts, the value of the equity of the merged firm will be less than the sum of the constituent equity values and the value of debt will be higher. Options pricing theory indicates that increased variability increases the value of options and conversely. Since equity is an option on the face value of debt outstanding, its value will fall with a decrease in volatility [Black and Scholes (1973)]. 'What is taking place... is that the bondholders receive more protection since the stockholders of each firm have to back the claims of bondholders of both companies. The stockholders are hurt since their limited liability is weakened' [Galai and Masulis (1976, p. 68)]. Hence a pure diversification rationale for the multiproduct firm is not valid within the context of orthodox theories of financial markets. Reducing the risk to bondholders represents a redistribution of value from shareholders, leaving the total value of the firm unchanged.

Thus multiproduct firms can emerge within an economy operating under neoclassical competitive assumptions, but they must do so only by accident. Whether firms are organized along specialized or multiproduct lines is economically irrelevant since market arrangements and internal organization are perfect substitutes. Thus divesting multiproduct firms or diversifying

[2]This can be most easily illustrated by considering the merger of two firms with identical pre-merger μ and σ^2. The expected return, μ_m, of the merged firm is, of course, 2μ. The variance of these returns is given by $\sigma_m^2=\sigma_i^2+\sigma_j^2+2r\sigma_i\sigma_j$, where i and j refer to the pre-merger firms and m to the merged firm. r is the coefficient of correlation between the two profit streams, and can take values between $+1$ and -1. If $r=1$ then a positive or negative deviation in firm i returns is paralleled by an identical variation in the profits of firm j. In this case $\sigma_m^2=4\sigma^2$. This means that the expected returns to the merged firm are exactly the sum of the expected returns of the constituent firms, and the spread of returns (measured by the standard deviation σ_m) has also doubled. There has been no reduction in the variability of the earnings stream expressed as a ratio of the average return. (This measure is the coefficient of variation, a normalized measure of variability.) However, for $r<1$ it is clear that $\sigma_m^2<4\sigma^2$. Specifically when $r=0$, i.e., the two profit streams are completely independent of each other, $\sigma_m^2=2\sigma^2$. So the return has doubled, but the standard deviation increases by only $\sqrt{2}$, so the coefficient of variation diminishes by a factor of $1/\sqrt{2}$. Finally if $r=-1$ the two streams move in precisely opposite directions: a positive deviation in firm i is exactly offset by a negative deviation in firm j. In this unlikely case, the variance of the returns falls to zero. Obviously in all cases where $r<1$, a merger reduces the variability of profits.

specialized ones is a transformation lacking economic significance in the context of a neoclassical economy.

2.2. *Managerial explanation*

Another class of theories used to explain diversification are based on managerialism. Marris (1966) and Mueller (1969) have made important contributions which are illustrative of this literature. In Marris's growth maximizing managerial enterprise, managers not only bring the existing supply of resources and the demands upon them into line, but also their future rates of growth. Thus the equating of the growth of supply of resources and growth of demand upon them is an equilibrium condition. In identifying the main determinants of the growth of demand, Marris recognizes that firms are usually multiproduct and that diversification into new products is the main engine of corporate growth. Thus in order to grow any faster than the rate of growth of the markets in which the firm establishes itself, it must carry out further successful diversification.[3] However, there are significant costs attached to successful diversification and these costs of diversification all reduce the firms' rate of return on capital. The growth of demand is thus an inverse function of the rate of return on capital because faster growth of demand via more rapid diversification either requires a lower profit margin, which lowers the return on capital, or leads to a higher capital–output ratio, which also lowers the return on capital, or both.

The core of Muellers (1969) theory is that managers are motivated to increase the size of their firms further. He assumes that the compensation to managers is a function of the size of the firm and he argues therefore that managers adopt a lower investment hurdle rate. The lower investment hurdle rate prompts the managers of older, larger, mature firms to invest more heavily than they would if they were confronted with a higher hurdle, and represents a basic motivation for diversification.[4] However, the basic premise of the theory — that compensation is a function of the size of the firm — is problematic. In a study critical of earlier evidence, Lewellen and Huntsman (1970) present findings that managers' compensation is significantly correlated with the firms profit rate, not its level of sales. Thus Muellers theory has to fall back on the non-pecuniary benefits — such as status and visibility in the business community — which managers may obtain from managing larger enterprises. Nor are the basic facts of diversification via

[3] Thus $g_D = f(\dot{d})$, where g_D is growth of demand and $\dot{d}$ is the rate of successful diversification.

[4] The Mueller theory must also confront efficient market theory. If managers are making investment decisions using a hurdle rate below the market equilibrium rate and therefore below the alternative returns available to stockholders, stockholders will shift their investment to firms offering higher rates of return. Capital market forces will not permit different firms to follow a 'two-tier' investment hurdle rate policy, at least not in the long run.

merger supportive of Mueller's theory. The larger acquirers during the 1954–1968 period were about 1/10 the average size of the larger, more mature non-acquirers [Bock (1970)]. Thus the initial size of the active conglomerate acquirers was small, not large as Mueller's theory suggests.

This is not to say that managerialist theories are entirely without merit. Managerial motives may well explain a portion of observed diversification activity. However, diversification can also be efficiency driven, as this paper will seek to demonstrate. The nature of possible efficiencies are delineated, thereby providing the foundations for an efficiency-based theory of the multiproduct firm. This theoretical exploration is of relevance to managers and policy analysts since a framework is developed within which it is possible to assess the likelihood that economies can be captured through corporate diversification strategies. Within this framework the firm is conceptualized as a structure designed to organize the employment of various assets which have greater value when employed under the internal control apparatus of a firm than under the external control appararatus of a market.

3. Nature of the firm

In microtheory textbooks, and in much contemporary research, it is accepted practice 'to represent the business enterprise abstractly by the productive transformations of which it is capable, and to characterize these productive transformations by a production function or production set regarded as a datum' [Winter (1982, p. 58)].[5] Furthermore, production functions and hence firms can be eliminated or replicated with amazing alacrity, as when prices a whisker above competitive levels attract new entrants. New entry in turn drives profits back down to equilibrium levels. Embedded in this conceptualization is the notion that a firms' knowhow is stored in symbolic form in a 'book of blueprints'. Implicit in this commonly used metaphor is the view that knowledge can be and is articulated. Following Winter (1982), and Nelson and Winter (1980, 1982), the appropriateness of this abstraction is examined below, and the implications for multiproduct organization explored.

3.1. Individual and organizational knowledge

Polanyi has stressed, in obvious contradiction to the book of blueprints

[5]In modern general equilibrium theory [Arrow (1951), Arrow and Debreu (1954), Debreu (1959)] 'commodity outputs in amounts represented by $q=(q_1,\ldots,q_m)$ may or may not be producible from input commodities in amounts represented by $X=(\chi_1,\ldots,\chi_n$. If q is producible from χ, then the input/output pair (χ, q) is "in the production set". Whatever is known or considered plausible as a property of the structure of technical knowledge is treated as a postulate about the properties of the production set' [Winter (1982, p. 63)].

metaphor, that individual knowledge has an important tacit dimension, in that very often knowhow and skills cannot be articulated. It is a 'well known fact that the aim of a skillful performance is achieved by the observance of a set of rules which are not known as such to the person following them'[6] [Polanyi (1958, p. 49)]. In the exercise of individual skill, many actions are taken that are not the result of considered choices but rather are automatic responses that constitute aspects of the skill.[7]

Similarly, in the routine operation of an organization such as a business firm, much that could in principle be deliberated is instead done automatically in response to signals arising from the organization or its environment. Articulation of the knowledge underlying organizational capabilities is limited in the same respects and for the same reasons as in the case of individual capabilities though for other reasons as well, and to a greater extent. This routinization of activity in an organization itself constitutes the most important form of storage of the organization's specific operational knowledge. In a sense, organizations 'remember by doing'. Routine operation is the organizational counterpart of the exercise of skills by an individual. [Nelson and Winter (1982, quoted in part from an earlier draft).]

Thus, routines function as the basis of organizational memory. To utilize organizational knowledge, it is necessary not only that all members know their routines, but also that all members know when it is appropriate to perform certain routines. This implies that the individual must have the ability to interpret a stream of incoming messages from other organizational members and from the environment. Once received and interpreted, the member utilizes the information contained in a message in the selection and performance of an appropriate routine from his own repertoire.[8] Thus to view organizational memory as reducible to individual member memories is to

[6]'The premises of a skill cannot be discovered focally prior to its performance, not even understood if explicitly stated by others, before we ourselves have experienced its performance, whether by watching it or engaging in it ourselves' [Polanyi (1958, p. 1962)].

[7]Polanyi illustrates this point by discussing how a bicyclist keeps his balance: 'I have come to the conclusion that the principle by which the cyclist keeps his balance is not generally known. The rule observed by the cyclist is this. When he starts falling to the right he turns the handlebars to the right, so that the course of the bicycle is deflected along a curve towards the right. This results in a centrifugal force pushing the cyclist to the left and offsets the gravitational force dragging him down to the right. This maneuver presently throws the cyclist out of balance to the left which he counteracts by turning the handlebars to the left; and so he continues to keep himself in balance by winding along a series of appropriate curvatures. A simple analysis shows that for a given angle of unbalance the curvature of each winding is inversely proportional to the square of the speed at which the cyclist is proceeding. But does this tell us exactly how to ride a bicycle? No. You obviously cannot adjust the curvature of your bicycle's path in proportion to the ratio of your unbalance over the square of your speed and if you could you would fall off the machine, for there are a number of other factors to be taken into account in practice which are left out in the formulation of this rule' [Polanyi (1958, pp. 49–50)].

[8]An organizational member's repetoire is the set of routines that could be performed in some appropriate environment [Nelson and Winter (1982)].

overlook, or undervalue, the linking of those individual memories by shared experiences in the past, experiences that have established the extremely detailed and specific communication system that underlies routine performance. [Nelson and Winter (1982, p. 105).]

While there is abundant reason to believe that remembering-by-doing may in a wide range of circumstances surpass symbolic storage in cost effectiveness, one circumstance where complications arise is where the knowledge is to enter market exchange for subsequent transfer to a different organizational context. The transfer of key individuals may suffice when the knowledge to be transferred relates to the particulars of a separable routine. The individual in such cases becomes a consultant or a teacher with respect to that routine. However, only a limited range of capabilities can be transferred if a transfer activity is focused in this fashion. More often than not, the transfer of productive expertise requires the transfer of organizational as well as individual knowledge.[9] In such cases, external transfer beyond an organization's boundary may be difficult if not impossible, since taken out of context, an individual's knowledge of a routine may be quite useless.

3.2. *Fungible knowledge*

Another characteristic of organizational knowledge is that it is often fungible to an important degree. That is, the human capital inputs employed by the firm are not always entirely specialized to the particular products and services which the enterprise is currently producing. This is particularly true of managerial talent, but it is also true for various items of physical equipment and for other kinds of human skills as well. Of course, various items of capital may have to be scrapped or converted if an organization's product mix is changed but these costs may in fact be quite low if the opportunity cost of withdrawing the equipment from its current use is minimal.

Accordingly, the final products produced by a firm at any given time merely represent one of several ways in which the organization could be using its internal resources. [Penrose (1959).] As wartime experience demonstrated, automobile manufacturers suddenly began making tanks, chemical companies began making explosives, and radio manufacturers began making radar. In short, a firm's capability lies upstream from the end product — it lies in a generalizable capability which might well find a variety of final product applications. Economies of specialization assume a different significance when viewed from this conceptual vantage point, as

[9] "Over the years an individual may learn a piece of the company puzzle exceptionally well and he may even understand how the piece fits into the entire puzzle. But he may not know enough about the other pieces to reproduce the entire puzzle" [Lieberstein (1979)].

specialization is referenced not to a single product but to a generalized capability. (It might be 'information processing' rather than computers, 'dairy products' rather than butter and cheese, 'farm machinery' rather than tractors and harvestors, and 'time measurement' rather than clocks and watches.) The firm can therefore be considered to have a variety of end products which it can produce with its organizational technology. Some of these possibilities may be known to it and some may not. What needs to be explained is the particular end product or configuration of end products which the firm chooses to produce.

This view of the nature of the firm turns the neoclassical conceptualization on its head. Whereas the neoclassical firm selects, according to factor prices, technologies off the shelf to manufacture a given end product, the organization theoretic firm depicted here selects an end product configuration, consistent with its organizational technology, which is defined yet fungible over certain arrays of final products. In short, the firm has end product as well as technological choices to confront.

4. Dynamic considerations

4.1. General

Whether the firms knowhow is embedded in a book of blueprints or in individual and organizational routines will not explain its multiproduct scope unless other dimensions of the neoclassical model of firms and markets are modified. Thus following Schumpeter (1950) and others, the competitive process is viewed as dynamic, involving uncertainty, struggle, and disequilibrium. In particular, two fundamental characteristics of a dynamic competitive system are recognized: (a) firms accummulate knowledge through R & D and learning, some of it incidental to the production process, (b) the market conditions facing the firm are constantly changing, creating profit opportunities in different markets at different times. Furthermore, the demand curve facing a specialized firm is rarely infinitely elastic, as is assumed in the perfectly competitive model.

4.2. Learning, teaching, and 'Penrose-effects'

Edith Penrose (1959) has described the growth processes of the firm in a way that is both unconventional and convincing. According to Penrose, at any time a firm has certain productive resources, the services of which are used to exploit the production opportunities facing the firm. Opportunities for growth exist because there are always unused productive services which can be placed into employment — presumably in new as well as existing lines of business. Unused resources exist not only because of indivisibilities, but also because of the learning which occurs in the normal process of

operating a business. Thus, even with a constant managerial workforce, managerial services are released for expansion without any reduction in the efficiency with which existing operations are run. Not only is there continuous learning, but also as each project becomes established so its running becomes more routine and less demanding on managerial resources. The managerial workforce can also be expanded, at least within limits. Existing managers can teach new managers. However, the increment to total managerial services provided by each additional manager is assumed to decrease the faster the rate at which they are reoriented. (The 'Penrose-effect'.)

A specialized firm's generation of excess resources, both managerial and technical, and their fungible character is critical to the theory of diversification advanced here. What has to be explained, however, is (1) why diversification is likely to lead to the productive utilization of 'excess' resources, and (2) the sequence in which this assignment is likely to occur.

4.3. Demand conditions

A specialized firm's excess resources can of course be reinvested in the firm's traditional business. Indeed, if the firm confronts a perfectly elastic demand curve, has a distinctive capability (lower costs) in its traditional business, and markets elsewhere are competitive, it has incentives to reinvest in its traditional line of business, both at home and abroad. Assume, however, that at some point competitive returns can no longer be obtained through reinvestment at home or abroad, either because of a secular decline of demand due to life cycle considerations [Grabowski and Mueller (1975), Mueller (1972)], or because the firm is facing a finite degree of elasticity to its demand curve, in which case reinvestment and expansion will serve to lower prices and profits. Confronted with this predicament, a profit seeking firm confronts three fundamental choices:

(1) It can seek to sell the services of its unused assets to other firms in other markets.
(2) It can diversify into other markets, either through acquisition or de novo entry.
(3) If the unused resource is cash, it can be returned to stockholders through higher dividends or stock repurchase.

A theory of diversification for a profit seeking enterprise emerges when conditions are established under which the second option appears the more profitable. The first option involves the use of markets for capturing the employment value of the unused assets. Multiproduct diversification (option 2) will be selected by profit seeking firms over the market alternative (option 1) when transactions cost problem are likely to confound efficient transfer.

Accordingly, an assessment of the efficiency properties of factor and financial markets is warranted.

4.4. Market failure considerations: Physical and human capital

If excess resources are possessed by a single product firm, there is the possibility of disposal in factor markets, i.e., sale and transfer to other specialized firms. This strategy permits standard specialization economies to be obtained, and if transaction costs are zero, ought to usurp incentives for diversification. Consider, therefore, whether efficient employment of these resources is likely to involve multiproduct organization. Assume, furthermore, that the excess resources are either individisible or fungible, so that scope economies exist.[10] Four classes of scope economies are identified and analyzed.

Class I. Indivisible but *non-specialized* physical capital as a common input into two or more products:

Scope economies may arise because some fixed item of capital equipment is indivisible. It may be a machine — such as heavy gauge sheet metal shears — which is needed occasionally in the production process for product A but is otherwise idle. Assume that the machine could be used to manufacture both products A and B. Even if this is the case it need not indicate that an efficient solution is for the manufacturer of A to diversify into the manufacture of B. There are at least two other options. The manufacturer of A could rent the services of another firm's machine, or it could acquire its own machine and lease access to it when it would otherwise remain idle.

To the extent that there is not a thin market for the services of the machinery in question — which will often be the case — there does not appear to be a compelling reason for diversification on account of the hazards of exposure to opportunism. [Williamson (1975), Klein, Crawford and Alchian (1978).] Market solutions would appear to be superior.[11]

[10]As a general matter, 'economies of scope arise from inputs that are shared, or utilized jointly without complete congestion. The shared factor may be imperfectly divisible, so that the manufacture of a subset of the goods leaves excess capability in some stage of production, or some human or physical capital may be a public input which, when purchased for use in one production process, is then freely available to another' [Willig (1979, p. 346)].

[11]A related example would be the provision of air services between points A and B. An airport will be needed at both A and B and in the absence of complete congestion, service can also be provided from both points to C (which has an airport) once airport terminals A and B are constructed. Hence $C(AB, BC, AC) < C(AB, 0, 0) + C(0, BC, 0) + C(0, 0, AC)$. While economies of scope exist it need not imply that one airline ought provide services AB, BC, and CA. Individual airlines could specialize on each route and access to terminals (the source of the assumed indivisibility) could be shared via contracts. Only in the extent to which transactional difficulties can be expected in writing, executing, and enforcing contracts will common ownership be necessary to capture the scope economies.

Class II. Indivisible *specialized* physical capital as a common input to two or more products:

Assume that the piece of equipment is specialized but not entirely so. Assume specifically that it can only be used for making products A and B, that there is some idle capacity if it is only used to manufacture A, and that the market for A and B will only support a small number of producers. In these circumstances there may be incentives for the manufacturer of A to also manufacture B because of the transactional difficulties which might otherwise be encountered in the small numbers markets assumed. Since the fixed asset is highly specialized, and the number of potential leasees is assumed to be quite small, markets for the services of the fixed assets will be thin. Bilateral monopoly situations can then arise in which leasees may attempt to extract the quasi-rents associated with the utilization of the leasor's fixed and specialized asset.[12] [Williamson (1975, 1979), Klein, Crawford and Alchian (1978). Monteverde and Teece (1982a, b).] In order to avoid these hazards, intrafirm trading — that is, multiproduct diversification — can be substituted for market exchange. Internal trading changes the incentives of the parties and enables the firm to bring managerial control devices to bear on the transaction, thereby attenuating costly haggling and other manifestations of non-cooperative behavior. Exchange can then proceed more efficiently because of lower transactions costs.

Class III. Human capital as a common input to two or more products:

To the extent that knowhow has fungible attributes, it can represent a common input into a variety of products. Knowhow may also display some of the characteristics of a public good in that it may be used in many different non-competing applications without its value in any one application being substantially impaired. Furthermore, the marginal cost of employing knowhow in a different endeavor is likely to be much less than the average cost of production and dissemination (transfer). Accordingly, the transfer and application of proprietary information to alternative production activities is likely to generate important economies.

However, internal organization (multiproduct enterprise) is generally needed for these economies to be realized. Markets do not work well as the institutional mode for trading knowhow. One reason is that an important component of organizational knowledge is tacit. As discussed above, the transfer of tacit knowledge from one enterprise to another is likely to be difficult and costly. A temporary if not permanent transfer of employees may be needed, especially if the technology involved is state of the art and has not as yet been stabilized and formalized. If this is the case, multiproduct

[12]The quasi-rents will be the difference between the asset value if the equipment is used to produce multiple products and its value when it is used to produce the single product.

organization is likely to have appeal because it provides a more efficient technology transfer mode.

Besides the logistical problems surrounding the transfer of tacit knowledge, technology transfer must confront an important class of transactions cost problems. These can be summarized in terms of (1) recognition, (2) disclosure, and (3) team organization [Teece (1980), Williamson and Teece (1982)]. Thus consider a firm which has accumulated knowhow which can potentially find application in the fields of industrial activity beyond its existing product line(s). If there are other firms in the economy which can apply this knowhow with profit, then according to received microtheory, trading will ensue until Pareto Optimality conditions are satisfied. Or, as Calabresi has put it, 'if one assumes rationality, no transactions costs, and no legal impediments to bargaining, all misallocations of resources would be fully cured in the market by bargains' [Calabresi (1968)]. However, one cannot in general expect this result in the market for proprietary knowhow. Not only are there high costs associated with obtaining the requisite information but there are also organizational and strategic impediments associated with using the market to effectuate transfer.

Consider, to begin with, the information requirements associated with using markets. In order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to the bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on [Coase (1960, p. 15)]. Furthermore, the opportunity for trading must be identified. As Kirzner (1973, pp. 215–216) has explained:

> '...for an exchange transaction to be completed it is not sufficient merely that the conditions for exchange which prospectively will be mutually beneficial be present; it is necessary also that each participant be aware of his opportunity to gain through exchange... It is usually assumed... that where scope for (mutually beneficial) exchange is present, exchange will in fact occur... In fact of course exchange may fail to occur because knowledge is imperfect, in spite of conditions for mutually profitable exchange.'

The transactional difficulties identified by Kirzner are especially compelling when the commodity in question is proprietary information, be it of a technological or managerial kind. This is because the protection of the ownership of technological knowhow often requires suppressing information on exchange possibilities. For instance, by its very nature industrial R&D requires disguising and concealing the activities and outcomes of R&D establishment. As Marquis and Allen (1966, p. 1055) point out, industrial laboratories, with their strong mission orientation, must

> '...cut themselves off from interaction beyond the organizational perimeter. This is to a large degree intentional. The competitive environment in which they operate necessitates control over the outflow of messages. The industrial technologist or scientist is thereby essentially cut off from free interaction with his colleagues outside of the organization.'

Except as production or marketing specialists within the firm perceive the transfer opportunity, transfer may fail by reason of non-recognition.

Even where the possessor of the technology recognizes the opportunity, market exchange may break down because of the problems of disclosing value to buyers in a way that is both convincing and does not destroy the basis for exchange. A very severe information impactedness problem exists, on which account the less informed party (in this instance the buyer) must be wary of opportunistic representations by the seller. If, moreover, there is insufficient disclosure, including veracity checks thereon, to assure the buyer that the information possesses great value, the 'fundamental paradox' of information arises: 'its value for the purchaser is not known until he has the information, but then he has in effect acquired it without cost' [Arrow (1971, p. 152)].

Suppose that recognition is no problem, that buyers concede value, and are prepared to pay for information in the seller's possession. Occasionally that may suffice. The formula for a chemical compound or the blueprints for a special device may be all that is needed to effect the transfer. However, more is frequently needed. As discussed above, knowhow has a strong tacit and learning-by-doing character, and it may be essential that human capital in an effective team configuration accompany the transfer. Sometimes this can be effected through a one-time contract (a knowhow agreement) to provide a 'consulting team' to assist start-up. Although such contracts will be highly incomplete, and the failure to reach a comprehensive agreement may give rise to dissatisfaction during execution, this may be an unavoidable, which is to say irremediable, result. Plainly, multiproduct organization is an extreme response to the needs of a one-time exchange. In the absence of a superior organizational alternative, reliance on market mechanisms is thus likely to prevail.

Where a succession of proprietary exchanges seems desirable, reliance on repeated contracting is less clearly warranted. Unfettered two-way communication is needed not only to promote the recognition and disclosure of opportunities for information transfer but also to facilitate the execution of the actual transfer itself. The parties in these circumstances are joined in a small numbers trading relation and as discussed by Williamson, such contracting may be shot through with hazards for both parties [Williamson (1975, 1979)]. The seller is exposed to hazards such as the possibility that the buyer will employ the knowhow in subtle ways not covered by the contract,

or the buyer might 'leap frog' the licensor's technology and become an unexpected competitive threat. The buyer is exposed to hazards such as the seller asserting that the technology has better performance or cost reducing characteristics than is actually the case, or the seller might render promised transfer assistance in a perfunctory fashion. While bonding or the execution of performance guarantees can minimize these hazards, they need not be eliminated since costly haggling might ensue when measurement of the performance characteristics of the technology is open to some ambiguity. Furthermore, when a lateral transfer is contemplated and the technology has not therefore been previously commercialized by either party in the new application, the execution of performance guarantees is likely to be especially hazardous to the seller because of the uncertainties involved [Teece (1977)]. In addition, if a new application of a generic technology is contemplated, recurrent exchange and continuous contact between buyer and seller will be needed. These requirements will be extremely difficult to specify ex ante. Hence, when the continuous exchange of proprietary knowhow between the transferor and transferee is needed, and where the end use application of the knowhow is idiosyncratic in the sense that it has not been accomplished previously by the transferor, it appears that something more than a classical market contracting structure is required. As Williamson notes 'The nonstandardized nature of (these) transactions makes primary reliance on market governance hazardous, while their recurrent nature permits the cost of the specialized governance structure to be recovered' [Williamson (1979, p. 250)]. What Williamson refers to as 'relational contracting' is the solution; this can take the form of bilateral governance, where the autonomy of the parties is maintained; or unified structures, where the transaction is removed from the market and organized within the firm subject to an authority relation [Williamson (1979, p. 250)]. Bilateral governance involves the use of 'obligational contracting' [Wachter and Williamson (1978), Williamson (1979)]. Exchange is conducted between independent firms under obligational arrangements, where both parties realize the paramount importance of maintaining an amicable relationship as overriding any possible short-run gains either might be able to achieve. But as transactions become progressively more idiosyncratic, obligational contracting may also fail, and internal organization (intrafirm transfer) is the more efficient organizational mode. The intrafirm transfer of knowhow avoids the need for repeated negotiations and ameliorates the hazards of opportunism. Better disclosure, easier agreement, better governance, and therefore more effective execution of knowhow transfer are likely to result. Here lies an incentive for multiproduct organization.

The above arguments are quite general and extend to the transfer of many different kinds of proprietary knowhow. Besides technological knowhow, the transfer of managerial (including organizational) knowhow, and goodwill

(including brand loyalty) represent types of assets for which market transfer mechanisms may falter, and for which the relative efficiency of intrafirm as against interfirm trading is indicated.

Class IV. External economies:

George Stigler has cast the Coase theorem [Coase (1960)] in the following form: 'Under perfect competition and any assignment of property rights, market transactions between a firm producing a nuisance and one consuming it will bring about the same composition of output as would have been determined by a single firm engaged in both activities. That is, market transactions will have the same consequences as internal management no matter what the property structure, *provided transactions costs are negligible.*' [Stigler (1966, p. 113, emphasis added).] The converse of this is that external economies — which can generate economies of scope — will dictate multiproduct organization when there are significant transaction costs.

External economies in the production of various goods are quite common. For instance, there are locational externalities if a new airport opens up a previously remote area and stimulates tourism.[13] There are also externalities if a cost saving innovation in one industry lowers costs in another. If these externalities can be captured at low cost by common ownership, then multiproduct organization is suggested.

Of course there are limits to the economies which can be captured through diversification. If diversification is based on scope economies, then there will eventually be a problem of congestion associated with accessing the common input. For instance, if the common input is knowhow, then while the value of the knowhow may not be impaired by repeated transfer, the costs of accessing it may increase if the simultaneous transfer of the information to a number of different applications is attempted. This is because knowhow is generally not embodied in blueprints alone; the human factor is critically important in technology transfer. Accordingly, as the demands for sharing knowhow increase, bottlenecks in the form of over-extended scientists, engineers, and managers can be anticipated.[14] Congestion associated with accessing common inputs will thus clearly limit the amount of diversification which can be profitably engaged. However, if the transfers are arranged so that they occur in a sequential fashion, then the limits imposed by congestion are relieved, at least in part [Teece (1977)].

Control loss considerations may also come into play. However, the

[13]Common ownership may also be needed if the external economies are in the form of skills. Suppose firm X_1 is a monopolist in industry A. A new industry Y emerges which requires labor skills developed in industry X. Because of the transactional difficulties which confront X_1 in appropriating the skills with which it has imbued its employees, X_1 may generate an externality in industry Y. Diversification of X_1 into Y enable the externality to be internalized.

[14]The 'Penrose-Effect' discussed earlier focuses on this problem with respect to managerial resources.

establishment of a decentralized divisionalized 'M-Form' [Williamson (1975)] structure is likely to minimize control loss problems. In fact Chandler argues that the M-Form innovation made diversification a viable strategy [Chandler (1969)]. It is also important to note that diversification need not represent abandonment of specialization. It is simply that a firm's particular advantage is defined not in terms of products but in terms of capabilities. The firm is seen as possessing a specialized knowhow or asset base from which it extends its operations in response to competitive conditions. This element of commonality simplifies the control problem, at least compared to other forms of diversification.

4.5. Market failure considerations and financial capital

Suppose that cash is the only excess capacity possessed by a specialized firm. Assuming, for the moment, that taxation of dividends and capital gains is unimportant, I wish to investigate whether allocative efficiency and/or a firm's market value can possibly be improved by diversification if financial markets are 'efficient'. Oliver Williamson, among others, has postulated that multidivisional firms can establish internal capital markets with resource allocation properties superior to those obtained by the (external) capital market. In particular, he postulates 'a tradeoff between breadth of information, in which respect the banking system may be presumed to have the advantage, and depth of information, which is the advantage of the specialized firm. [Williamson (1975, p. 162).] Inferior access to inside information and the weak control instruments exercised by financial intermediaries and the stock market provides the foundation for Williamson's assertion that the 'miniature capital market' within the firm has distinctive efficiency properties.

Financial theoreists, however, are often quick to reply that since the financial markets have been shown to be 'efficient', no improvement in allocative efficiency or market value can possibly derive from managers usurping the role of financial markets. Myers (1968), Schall (1972), and Mossin (1973) have all argued that value is conserved (value additivity obtains) under the addition of income streams, as would occur with diversification by merger. However, the notions of 'efficiency' as used by financial theorists is highly specialized and do not accord with the concept of allocative efficiency used in welfare economics. Nor does it deny that stockholder wealth can be improved through the operations of the firm's internal capital markets. These issues are critical to the analysis of follow and so are examined below.

In the finance literature, the term 'efficient markets' has taken on a specialized and misleading meaning. One widely employed definition refers to informational efficiency. For example, according to Fama (1970, p. 383) 'A

market in which prices fully reflect available information is called "efficient",[15] and according to Jensen (1978), 'A market is efficient with respect to information set Θ_t if it is impossible to make economic profits by trading on the basis of information set Θ_t'. The other widely employed definition is what can be called mean-variance efficiency. The market is mean-variance efficient if capital market prices correspond to an equilibrium in which all individuals evaluate portfolios in terms of their means and variances, about which they all have identical beliefs. Unfortunately, these concepts have nothing to do with allocative efficiency. As Stiglitz (1981) has shown, neither informational efficiency or mean variance efficiency are necessary or sufficient conditions for the Pareto optimality of the economy. In short, 'there is no theoretical presumption simply because the financial markets appear to be competitive, or "pass" the standard finance literature tests concerning efficiency, that they are efficient' [Stiglitz (1981, p. 237)].

One reason for this result is that it is costly to obtain and transmit information about investment opportunities. Since managers are obviously more informed about investment opportunities available to the firm, they must somehow convey this information to potential investors if efficient outcomes are to be obtained solely through utilization of the (external) capital market. However, capital markets in which it is costly to obtain and transmit information look substantially different from those in which information is assumed to be perfect, and they fail to possess the standard optimality properties' [Stiglitz (1981, p. 244)].

The capital market clearly does not fully reflect all information — which is what is necessary for Pareto optimality to obtain.[16] If markets were perfectly efficient in transmitting information from the informed to the uninformed, informed individuals wouldn't obtain a return on their investment in

[15]Fama (1970, 1976) actually defines three types of efficiency, each of which is based on a different notion of the type of information understood to be relevant in the phrase 'prices fully reflect available information'. Specifically, he recognizes:

(1) *Weak-form efficiency.* No investor can earn excess returns if he develops trading rules based on historical price or return information. In other words, the information in past prices or returns is not useful or relevant in achieving excess returns.
(2) *Semistrong-form efficiency.* No investor can earn excess returns from trading rules based on any publicly available information. Examples of publicly available information are: annual reports of companies, investment advisory data such as 'Heard on the Street' in *The Wall Street Journal*, or ticker tape information.
(3) *Strong-form efficiency.* No investor can earn excess returns using any information, whether publicly available or not.

Obviously, the last type of market efficiency is very strong indeed. If markets were efficient in their strong form, prices would fully reflect all information even though it might be held exclusively by a corporate insider. Suppose, for example, he knows that his company has just discovered how to control nuclear fusion. Even before he has a chance to trade based on the news, the strong form of market efficiency predicts that prices will have adjusted so that he cannot profit.

[16]Strong form efficiency, defined in the previous footnote, would be necessary for Pareto optimality to hold.

information; thus, the only information which can, in equilibrium, be efficiently transmitted is costless information. With costly information, markets cannot be fully arbitraged [Grossman and Stiglitz (1976, 1980)].

The above considerations indicate why a useful economic function can be performed by the internal allocation of capital within the firm. If managers have access to an information set which is different from investors, and if it is difficult and costly to transmit the content of this information set to investors, then managers may be able to increase stockholder wealth by making investment decisions on behalf of the stockholders. In the process, resource allocation is likely to be improved over a situation in which all earnings are returned to stockholders who then make all reinvestment decisions. The transactions cost properties of such an arrangement render it absurd in most circumstances. Accordingly, the existence of internal capital markets and the (partial) internalization of the capital allocation process within the firm appear to possess a compelling rationale — both in terms of stockholder wealth enhancement and allocative efficiency.

In this context it is possible to recognize that if a specialized firm possesses financial resources beyond reinvestment opportunities in its traditional business, there are circumstances under which both stockholder wealth and allocative efficiency can be served if managers allocate funds to new products. However, the domain within which an efficiency gain is likely swings on empirical factors, and is likely to be quite narrow, given the relative efficiencies within which managers and stockholders can scan investment opportunities. It is generally only with respect to related businesses — businesses related functionally, technologically and geographically — that a relative advantage seems likely. It is for those investment opportunities in which the firm has a decided information advantage that managers are likely to possess such an advantage. Broader investment opportunities are better assessed by mutual funds which specialize in that function and can make portfolio investments at low transactions costs.

Nevertheless, financial theory provides insights into other ways by which stockholder wealth might be changed through diversification. In particular, the Capital Asset Pricing Model (CAPM)[17] provides a framework for assessing the rate of return the capital market expects an individual asset to earn. According to the CAPM, this rate of return is a function of the asset's level of systematic risk, the on the market portfolio rate of return, and the risk-free rate of return. A security's systematic risk, measured in the marketplace, depends on the degree of correlation between its return and the market's return. Defined as cash income plus capital appreciation over one

[17]The CAPM was developed almost simultaneously by Sharpe (1963, 1964), and Treynor (1961), while Mossin (1966), Lintner (1965, 1969) and Black (1972) made important extensions.

time period, these 'returns' are equivalent to a security's cash flow over its lifetime. Focusing on cash flow allows systematic risk to be decomposed into the systematic risk of the current-period cash flow, and the systematic risk arising from future cash flows. Whereas current cash flow is fixed in timing and size, the future cash flow component of systematic risk if not fixed. It has a variable time horizon and the possibility of growth, and its estimated size is affected by changing investor expectations. The effect of varying the time horizon and growth of cash flow on present value is obvious; an increase in either results in more cash in absolute terms at some future date, and consequently a greater present value.

In the context of the CAPM, multiproduct organization can increase stockholder wealth by (1) increasing the income stream, (2) improving forecast reliability, or (3) decreasing the systematic risk by an amount greater than could be obtained by creating a portfolio investment in specialized firms. Economies of scope, where the economies would not be captured by a set of contracts amongst specialized firms, is a case in point. In addition, stockholder wealth could be increased if diversification assists the creation of free cash flows that have a negligible relationship to the level of activity of the economy, or improved investor confidence about future cash flows, since these developments would lead to reduced systematic risk. Outcomes of this kind seem possible, in that a distinctive attribute of internal organization is that it enables physical and human resources to be transferred, using powers of fiat, from one kind of business to the other, at low cost and with considerable speed. This flexibility, if exploited, might in fact provide the foundation for enhanced stockholder wealth. Businesses could be assembled in a fashion which enables the low cost and timely transfer of resources from one to another.

5. Related issues

5.1. Slack and managerial discretion

The concept of excess resources used here and in Penrose (1959) bears certain similarities with the concept of slack found in the organization theory literature, excellently summarized by Bougeois (1981). For instance, slack has been variously defined as: '(The) disparity between the resources available to the organization and the payments required to maintain the coalition' [Cyert and March (1963, p. 36)]; the 'supply of uncommitted resources' [Cyert and March (1963, p. 54)]; 'The margin or surplus (performance exceeding "satisficing" levels) which permits an organization's dominant coalition to adopt structural arrangements which accord with their own preferences' [Child (1972, p. 11)]; "The difference between existing resources and activated demand' [March and Olsen (1976, p. 87)]; '...since organizations do not

always optimize, they accumulate spare resources and unexploited opportunities which then become a buffer against bad times. Although the buffer is not necessarily intended, slack produces performance smoothing, reducing performance during good times and improving it during bad times [March (1979, p. 17)]; 'organizational slack is that cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy vis-à-vis the external environment' [Bourgeois (1981).] While definitions abound, the concept of slack has, unfortunately, never been successfully operationalized. Part of the problem is that it can perform many functions; it can be a technical buffer, an inducement mechanism to attract and sustain organizational numbers [Barnard (1938)], a resource for conflict resolution, or a facilitator of strategic behavior [Bourgeois (1981)].

As used here, the concept of excess resources refers to the services of factor inputs available once managerial goals and the requirements for the long-run profitable operation of a production process have been met. In short, it refers to excess factor services over and above what is needed to meet managers requirements for organizational slack. As such, the concept is consistent with both satisficing and maximizing theories of the firm, as excess resources, as defined, can emerge in business firms no matter the behavioral rules it is following. Thus, if the desired level of organizational slack is zero, all redundant factor services become excess resources.

5.2. *De novo entry vs. acquisition or merger*

The appropriate vehicle for diversification is an issue upon which the theory is not silent. If an enterprise has excess or slack internal resources, and market failure considerations dictate internal utilization, then the choice of de novo entry or acquisition will depend upon the amount of slack, the time period over which it is available, and the complementary resources which can be accessed through acquisition. Thus, if the slack appears gradually over a long period of time, de novo entry is likely to provide an effective entry vehicle. This is because de novo entry can be tailored as an incremental approach to diversification. If, on the other hand, slack resources are expected to emerge suddenly — due, for instance, to a sudden surge in technological innovation or due to an adverse change in demand which suddenly throws internal resources into unemployment — then merger or acquisition is likely to be the most favored route. Merger or acquisition will also be preferred if complementary resources can thereby be acquired.

Another consideration will be the relationship between the firm's internal valuation and the market value of the takeover candidate. Since the acquired firm possesses, by assumption, complementary resources which will work

with the acquiring firm's slack resources, then the lower the price of the acquired firm relative to the market price of the individual resources which it possesses, then the greater the attractiveness of the takeover alternative. Hence, a depression in the stock market coupled with buoyant factor markets may change the relationship between the market value of the complementary resources purchased as a 'team' and their value if purchased in factor markets. This differential — which reflects the difference between the value of a firm as a 'going concern' and the value of its underlying assets when disaggregated — will help determine whether acquisition or de novo entry is the preferred route. Thus, as firm specific or economy wide factors depress the market value of a firm, the firm will appear more attractive as a takeover target to other firms which wish to diversify into its product line(s). Furthermore, the faster internal resources are released, the more attractive does the acquisition strategy become.

A curious implication of this analysis is that viewed on this framework, an active takeover market not only provides discipline for the acquired firm, thereby serving to minimize managerial discretion [Williamson (1975, ch. 9)], but it may also function as a vehicle for channelling the internal resources of the acquiring firm into productive use. Hence, it appears that mergers and acquisitions may serve to minimize slack in both the acquiring and acquired firms, thereby generating a positive contribution to economic efficiency.

5.3 *Lateral vs. conglomerate diversification*

A robust theory of the multiproduct enterprise should ideally be able to explain the richness of diversified enterprises existing on the industrial landscape. At least two different types of diversification can be identified: lateral or 'related' diversification in which the different physical capital and technical skills of business or products bear an important element of commonality; and conglomerate diversification, where the physical capital and technical skills requirements are quite disparate.

The above analysis supports an efficiency rationale for the lateral integrated (diversified) enterprise. The efficiency rationale for the conglomerate is much more circumscribed. The only skill likely to be common to 'unrelated' businesses is management, but except in those circumstances where the market for managerial services is subject to high transacations costs, it is doubtful whether the scope economies arising from transferring managerial resources are large enough to provide compelling efficiencies.

A firmer foundation for conglomerates can be built by examining the operation of the internal capital market. Conglomerate firms may be able to develop distinctive capabilities in assessing investment opportunities in disparate businesses. As compared to banks, operating companies can often

bring industrial experience to the assessment of acquisition candidates. Furthermore, with the appropriate internal governance structure, disparate businesses can be managed efficiently. For these and other reasons, Williamson concludes 'a transactional interpretation of the conglomerate, in which the limitations of capital markets in corporate control respects are emphasized, reveals that conglomerate firms (of the appropriate kind) are not altogether lacking in social purpose' [Williamson (1975, p. 175)]. The Williamson conglomerate with its own internal capital market is superior to the unassisted capital market in its ability to identify and direct cash to high yield investment.

5.4. Some historical observations

The economic theory of the multiproduct firm outlined above has firms adopting multiproduct features due to the coupling of market failures and the emergence of excess capacity. Implicit in the analysis is a conviction that this model explains a substantial portion of the diversification activity which has occured in the American economy. To demonstrate this convincingly would involve a major empirical effort. I settle here for a more limited objective — to establish that the historical trends appear broadly consistent with the theory.

Diversification has unquestionably made for great changes in the profile of American industry during the last half century [Chandler (1969, p. 247)]. Furthermore, the Depression apparently triggered the trend towards diversification. Historians point out that the purpose of diversification was not to reduce portfolio risk or to pursue managerial motives, but rather to put slack resources to work. Furthermore, it was the technologically sophisticated firms which led the way. As Chandler (1969, p. 275) observed:

> 'Precisely because these firms had accumulated vast resources in skilled manpower, facilities, and equipment, their executives were under even greater pressure than those of smaller firms to find new markets as the old ones ceased to grow. In the 1920's, the chemical companies, each starting from a somewhat different technological base, began to widen their product lines into new industries. In the same decade, the great electrical manufactuers — General Electric and Westinghouse — which had concentrated primarily on the manufacture of light and power equipment, diversified into production of a wide variety of household appliances. They also entered electronics with radios and X-ray equipment. During the Depression General Motors (and to a lesser extent other firms in the auto industry) moved into diesels, appliances, tractors, and airplanes. Some makers of primary metals, particularly aluminum and copper, turned to consumer products like kitchenware

and household fittings, while rubber firms developed the possibilities of rubber chemistry to compensate for declining tire sales. In the same period food companies employed their existing distribution organizations to market an increasing variety of products.'

Whereas the Depression triggered diversification by generating excess capacity, the Second World War stimulated the demand for new products because the world market for many raw materials was severely disrupted while the war effort generated demand for a wide range of military products. The synthetic rubber program caused both rubber and petroleum firms to make far greater use of chemical technologies than they had even done before. Similarly, the demand for radar and other electronic equipment carried the electrical, radio, and machinery firms farther into this new field, and the production of tanks, high-speed aircraft, and new drugs all created skills and resources [Chandler (1969, p. 275)]. Once these capabilities were created, they were applied, where possible, in the production of civilian goods for the peace time economy. Thus, 'the modern diversified enterprise represents a calculated rational response of technically trained professional managers to the needs and opportunities of changing technologies and markets' [Chandler (1969, p. 279)].[18]

6. Implications and conclusions

Recent contributions to the transactions costs and market failures literature [Williamson (1975, 1979), Klein, Crawford and Alchian (1978), Teece (1980)], and to the literature on the nature of the firm [Nelson and Winter (1982)] have made it possible to outline a theory of the multiproduct firm. Important building blocks include excess capacity and its creation, market imperfections, and the peculiarities of organizational knowledge, particularly its fungibility and tacit character. Further research on each of these elements, and how they relate to incentives for diversification, is likely to assist in the construction of a robust theory of the multiproduct firm. The successful completion of this mission could provide the foundation for a discriminating approach towards mergers and acquisitions.

[18]While Chandler's original focus was on managerial and technological considerations, his more recent writings indicate that he has been able to identify additional sources of underutilized resources — such as marketing and purchasing know-how — which could also provide the foundation for an efficient diversification strategy. In the years after the first world war, 'many American companies... added lines that permitted them to make more effective use of their marketing and purchasing organizations and to exploit the by-products of their manufacturing and processing operations' [Chandler (1977, p. 473)].

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