



Toward a Praxeological Theory of the Firm*

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Recent decades have witnessed significant advances in the theory of the firm. Specifically, the capabilities theories of the firm, such as Nelson and Winter (1982), Teece (1982), Foss (1994, 1996, 1997), Witt (1997), Langlois (1986, 1998) and, Langlois and Robertson (1995), which base largely on the classic works of Penrose (1959, 1995) and Richardson (1972), have greatly improved our understanding of the nature of the firm. Some of these works come close to the Austrian theory of the firm. In particular, Foss (1994, 1996, 1997) develops a capabilities theory of the firm which draws on many of the Austrian's favourite insights.¹ Lewin (1998) also investigates the relationship between the capital and business organisation in the Austrian market process perspective.² Despite these brilliant studies, an Austrian theory of the firm is still missing.³ In this paper, I shall construct a praxeological theory of the firm which is more deeply rooted in the Austrian theories of human action, capital and entrepreneurship than is the capabilities view. As will be argued shortly, my theory which takes on a subjectivist approach can provide certain insights and advantages which are lacking in the capabilities view.

My Austrian theory of the firm is based upon three building blocks: (1) Weber-Mises' action theories and Schutz's phenomenology, (2) Lachmann's theory of capital structure, and (3) Kirzner's theory of entrepreneurial alertness and discovery. As will be argued, the firm emerges as an institution to solve coordination problems. The entrepreneurial discovery and innovation require the construction of a common interpretive environment with its own shared structure of typifications. Within this shared structure, there may be elements of conflicting ideas, rivalrous competition, diverse experiences and division of knowledge. However, the firm as a shared structure can reduce these variegated systems of motives to a set of common organisational goals initiated by the entrepreneur, thus

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¹Foss (1994, p. 55) argues that the Austrian theory of firm behaviour consists of (1) a grasp of the distinction between planned and spontaneous orders, (2) the market process as a process of entrepreneurial discovery, (3) property rights, (4) specificity and complementarity of assets, (5) the subjectivity of costs, (6) the private and tacit nature of knowledge and (7) transaction and information costs.

²Though Lewin's paper is entitled "Capital Structures and Organisational structure", unfortunately, he has not actually incorporated the Austrian (Lachmann's) theory of capital structure in his arguments. In my view, his paper looks more like a capabilities than an Austrian one.

³It is widely known that the theory of the firm is a neglect area in Austrian Economics (O'Driscoll and Rizzo, 1985, p. 123; Loasby, 1989, p. 157; Langlois, 1992, p. 166; Foss, 1994, p. 31). One reason, as suggested by Foss (1994) is that the Austrians are primarily interested in the entrepreneur because it allows them to construct a dynamic theory of the market process. As a result, there is no Austrian theory of the firm explaining its existence, boundaries or productive competence.

facilitating communications. In short, the firm is a social world constructed for the purpose of coordination (Section 1).

The firm in which production takes place has a capital structure, just as the whole economy does. The employment of capital resources is associated with the agent's production plans, knowledge and expectations. Given the heterogeneity and multiple specificity of capital goods, capital resources are combined in such a way as the entrepreneur perceives to be most profitable. A meaningful capital structure implies that these plans must be consistent with each other. Plans which are inconsistent with either the consumer or the producer plans will be revised. Changes in circumstance will cause the disintegration of the capital combinations which the owner of the firm previously considered optimal (Section 2).

The growth of the firm is critically dependent on entrepreneurial discovery. The firm expands as the entrepreneur explores or exploits profitable opportunities. As the firm grows, capital accumulation results in an increase in the number of production stages as capital combinations become more and more specialised. The increased number of stages is indicative of increased complexity, which, in turn, is indicative of an increase in the productivity of the firm. Increased complexity implies an ever more complex pattern of capital complementarity. Complexity of the firm's capital structure also increases vulnerability because production systems are exposed to individual whims. Thus, increases in the complexity of capital structure will increase the degree of vertical disintegration but will be limited by the costs of coordination (Section 3).

This paper concludes that the proposed Austrian model can offer insights which may be overlooked in the transaction costs or capabilities approach. More importantly, the use of Austrian capital theory creates a bridge between the theory of the firm and monetary theory (Section 4).

1. The firm as a coordinating institution

In many respects, the theory of the firm can be thought of as an extension of the Mengerian/Hayekian theory of social institutions (Langlois, 1992, p. 174). O'Driscoll and Rizzo (1985, pp. 123–124) argue that the subjectivist or Austrian approach is particularly appropriate for analysing firms as evolved social institutions. This approach is also consistent with Nelson and Winter's evolutionary perspective. The Austrians, in common with scholars in sociology and organisational studies in their Weberian tradition, ask, "how is the firm possible?" and what is the nature of the interplay of economising agents and firm? Specifically, Granovetter (1992, p. 6) asks, "how and why economic activities are carried out not by isolated individuals, but by groups that entrepreneurs get to cooperate in such larger entities as firms...". The answer in this perspective is that the firm is a social construction (Burrell and Morgan, 1979, p. 273; Granovetter, 1992, pp. 3–11), a product of the human activity of making meaning (Reus-Smit, 1974, p. 41).

1.1. Human action, coordination and institution

Human action is always oriented toward other individuals (Weber, 1964; Mises, 1949). Action is forward looking and extended into the future. Uncertainty arising from the actions

of others generates economic problems. Expressed differently, the success of the plan of the human agent depends on the extent to which that plan is adapted to the external world and more specifically, to the actions of other human agents (Langlois, 1986, p. 173). As Hayek (1945, p. 523) argues, all economic problems are knowledge problems, arising out of uncertainty. In addition, only coordinated human action, that is, the process of relating vast repositories of data and information into a coherent pattern to successfully achieve goals and purposes, qualifies as knowledge (Zeleny, 1996, p. 213). That is why, for the Austrians, the term “economising” means “coordinating”.⁴ In the action frame of reference, coordination implies subjective understanding, an interpretation of the meaning of the other actor. As Weigert (1981, p. 74) puts it, “interpretation is a process of perceiving the other and his or her interaction within symbolic frameworks so that we can make some sense out of what the other is doing ... if we cannot make any sense out of the other’s interaction, it may be that there is no sense in it, or worse, it may be that there is no sense in me”. Human agents in daily life find at any given point of time a stock of knowledge at hand that serves them as a scheme of interpretation of their past and present experiences, and also determines their anticipation of things to come. The stock of knowledge at hand is by no means homogeneous. Human agents, because of diverse experiences, will respond differently to the same objectively-defined stimulus⁵ (Silverman, 1970, p. 130; O’Driscoll and Rizzo, 1985, pp. 38–39; Yu and Robertson, 1997). In Lachmann’s words (1970, p. 36), “different men in identical situations may act differently because of their different expectations of the future.” In short, economic problems, the problems of coordination, are associated with an understanding of the other actors’ meanings in the market process.

The agents’ ability to coordinate their plans will deteriorate as the external environment becomes more volatile, with a resulting decrease in the division of labour (Langlois, 1986, p. 179). The human agent is always eager to reduce uneasiness arising from uncertainty (Mises, 1949). Such uncertainty can be attenuated by means of institutions in which actors share a similar stock of knowledge and attach the same meaning to their actions. As Lachmann (1970) argues, the firm as an institution provides a means of orientation to a large number of actors. It enables actors to coordinate their actions by means of an orientation towards a common goal. For every institution such as a post office, a school or a manufacturing firm, there exists an internal working-order (which is termed “routine” by Nelson and Winter, 1982). Members within the institution work according to a certain routine but the details of their operations are irrelevant to the general public. The firm, as a concrete institution, coordinates the actions of its team members at lower cost because

⁴The term ‘economising man’ is first used by Carl Menger in his *Principles of Economics* (1871). The mainstream Neoclassical School confines the term “economising” to the allocative effect in the Paretian paradigm. On the other hand, in interpreting Hayek’s contributions, O’Driscoll (1977) entitles his book, *Economics as a Coordination Problem*.

⁵Simmel (1918, 1980, pp. 57–92) identifies two modes of understanding, namely, historical and immanent. On the one hand, an interpretation may represent an answer to a question about the conditions for the production of the interpretandum. In that case, the question is historical and the interpretans produces a historical interpretation. On the other hand, the interpretation may represent an answer to a question about the intrinsic properties of the interpretation itself. A description of these properties is independent of any description of the genesis of the interpretandum. The question is then immanent. The argument that human agents will respond differently to the same objectively-defined stimulus belongs to the former, i.e., the historical question.

it reduces the volatility in the plans of others. As Lachmann (1970, pp. 49–50) puts it, an institution “enables ... coordinating the actions of millions whom they relieve of the need to acquire and digest detailed knowledge about others and form detailed expectations about their future action”. Similarly, Langlois and Foss (1997, p. 5) argue that “the fundamental role of institutions (including the firm) is to coordinate, in helping cooperating parties to align their knowledge and expectations”.

1.2. Hierarchy, plans and institution

Langlois (1986, 1992, 1995) argues that human actions are organised in a hierarchical manner. An actor’s plan at the highest level of the hierarchy is typical in the sense that it is oriented towards a typical situation and consists in a general pattern of response. More details are incorporated in the plan at lower levels of hierarchy. The plan becomes increasingly more concrete in its orientation and more distinctive in the response it embodies (Langlois, 1986, p. 185). As O’Driscoll and Rizzo (1985, p. 78) note, “we anticipate events as to their typical features but we cannot fill in details beforehand.”⁶ Similarly, institutions are hierarchical in their nature (Langlois, 1992, p. 167). They are systems of rules of conduct, operating at many different levels, each level affecting the operations of the rules at the level below. Highest-level institutions or external institutions such as legal orders, money and price systems coordinate the highest level of plans. Lower levels institutions, or internal institutions, coordinate more specific and concrete plans (Langlois, 1986, p. 185). In Lachmann’s (1970, p. 81) words,

It may be said that the undesigned institutions which evolve gradually as the unintended and unforeseen result of the pursuit of individual interests accumulate in the interstices of the institutional order. The interstices have been planned, though the sediments accumulating in them have not and could not have been. In a society of this type we might then distinguish between the external institutions which constitute, as it were, the outer framework of society, the legal order, and the internal institutions which gradually evolve as a result of market processes and other forms of spontaneous individual action.

Langlois (1986, 1992, 1995) further classifies two types of institutions, order and organisation, and argues that both can be pragmatic or organic.⁷ Pragmatic organisations comprise rules directed toward specific ends. Conscious intentions play important roles if the organisation is not very complex and is confined to a relatively short time perspective, so that the original intentions of the founder can influence the shape of the organisation. However, organisation can also be unintended consequence of human action. The rules of thumb

⁶All events have both foreseeable and unforeseeable aspects. In Schutz-Weber’s arguments, they are referred to as “typicality” and “uniqueness” (O’Driscoll and Rizzo, 1985). Typical features are the relatively stable elements of reality and are repeatable in principle while unique features are the idiosyncratic, nonrepeatable aspects of reality. The two aspects of events exist on different levels and the process of typification operates in a hierarchical manner.

⁷Menger (1883, 1985, p. 158) distinguished between two types of institutions, by their pragmatic or organic origin. The former arises because of a common will directed toward their creation. The latter is “the unintended result of innumerable efforts of economic subjects pursuing individual interests”.

operating inside the firm evolve over time into an institution which no one expects to emerge, although it is the result of the human economising effort.

Langlois and Robertson (1995) hail Silver's (1984) arguments on vertical integration in the light of entrepreneurial coordination. Suppose that the entrepreneur conceives a new way of doing things (Schumpeter, 1934). The success of an innovation requires the adaptation of complementary activities. The problem for the innovator is to call forth these complementary activities. In the economy, people are accustomed to traditional methods of doing things. Given the novel and idiosyncratic idea, it is very difficult for the innovator to inform and persuade the contracting parties to invest in specialised assets which involve irreversible investment. In many cases, suppliers may refuse to comply with the innovator's vision.⁸ Owing to this difficulty, it may be less costly for the innovator to integrate the co-specialised activities and to employ those parties with the relevant skills than to contract them out (Langlois and Robertson, 1995, p. 38). Within the firm, entrepreneurs can work out detailed plans at their own discretion. Successful plans will, by trial and error, gradually crystallise into the firm's routine (Lachmann, 1970, p. 68; O'Driscoll and Rizzo, 1985, p. 124).

1.3. The firm as a "communicative common environment"

Further insights into the nature of the firm from a coordination perspective can be gained by employing Weber's action theory and Schutz's phenomenology. As early as 1928, W.I. Thomas made a famous statement on human action: "If men define situations as real, they are real in their consequences" (cited in Schutz, 1964, p. 348; Jones, 1987, p. 24; Weick, 1969, p. 27; Silverman, 1970, p. 224). What Thomas really argues is the way in which what people 'know' and believe to be true or false is always related to their social situations. Knowledge has social effects which have nothing to do with whether that knowledge is 'true' or 'false' in any absolute sense. Knowing the world is just like 'knowing' yourself by your image in a mirror. Thus, "things are what the acting people think they are" (Kirzner, 1979, p. 137). As will be elucidated in Section 3, this subjectivist perspective of knowledge is the foundation of Kirzner's theory of entrepreneurial discovery. Moreover, unlike the environmental or behavioural school which emphasises the agents' adaptive response to external factors, scholars in the action frame of reference believe that human agents "enact" rather than "react" to their environment (Weick, 1969, p. 27; Jehenson, 1973, p. 235; Jones, 1987, p. 24). In this framework, human action is not seen as a given response to some external stimuli, but arises out of the meaning and significance people construct in events. Bringing to bear personal frameworks of beliefs and values, acting men have developed over their lives, persons subjectively and selectively define situations (Jones, 1987, p. 24). As Weick (1969, p. 27) argues, "instead of adapting to a ready-made environment... actors themselves create the environment to which they adapt". Shackle (1958, p. 21) takes a radical subjectivist view and argues that the entrepreneur can "create imagined results". By

⁸The role of persuasion in economic life has received attention in recent years. McCloskey (1994, pp. 76–79) shows that, in the United States, about a quarter of the labour force or national income in 1988 devoted to persuasion activities.

acting differently, he or she can make a difference (White, 1977, p. 67). In other words, human agents define their future and their reality (Berger and Luckmann, 1966). In terms of coordination, the paramount necessity is to fit together lines of action in order to achieve the concrete economic meaning and significance which human agents project as the realisation of their personal destiny (Weigert, 1981, p. 73). This fitting process involves interpretation and expectation. Normally, an individual is equipped with sufficient knowledge to interpret events in a typical situation. Interpretations provide the basis for expectations concerning the other's next move. Hence, expectations are more than prediction or anticipation; they are social realities.

In a stable environment, human behaviour displays little variation. Events are typical and so actions are anticipated. Agents can use their stocks of knowledge to interpret familiar events and therefore solve economic problems they encounter. However, if another person deliberately violates our expectation, such as in the case of Schumpeterian innovation, then a sense of reality at the centre of the human self is also violated (Weigert, 1981, p. 75). In other words, such a violation threatens people's sense of what is real. In Schutz's argument (1976), the stocks of knowledge of market participants are now unable to tackle new problems. Knowledge hitherto taken for granted now becomes problematic. Routine expectations are disrupted by radical technological breakthrough. Consequently, coordination fails and production becomes costly for the Schumpeterian entrepreneur.⁹

The basic solution to the coordination failure is to increase the understanding of another person's action and thus increase the chances of success in economic interactions. This can be done by setting up a formal organisation called the firm. The founder(s) of the firm provides a set of rules which generally lay down clear lines of authority and communication with the intention of ensuring that the entrepreneurial goal may be attained (Silverman, 1970, p. 14). The newly established firm is initially characterised by a pattern of relationships which is less taken-for-granted by the participants who seek to coordinate and to control. By asking the members to subordinate their in-order-to motives to the officially defined goals, the firm "attempts de facto to substitute an objective context of meaning for the subjective configuration in which the individual actor discovers the meaning of his (or her) action" (Jehenson, 1973, p. 227). The world taken for granted inside the firm is thus composed of actors following typical courses of action prompted by a set of invariant, typical motives. In other words, employees are given expectations about appropriate acts for themselves and others when in various status positions. As a result, they are then able to apprehend the meanings associated with the economic actions of other people and to form a view of self based on the responses of others. Members will meet the expectations of others because these expectations are part of the definitions of themselves (i.e., they have been internalised). Such a system would remain unhindered in its function if the members could retain their reciprocal anonymity and interact only at the level of 'they' relationship (Jehenson, 1973, p. 229). In

⁹Schumpeterian innovation, by nature, is 'creative destruction'. Unlike adaptive or incremental innovation which operates within the existing system, Schumpeterian innovation can practically never be understood ex ante; it cannot be predicted by applying the ordinary rules of inference from the pre-existing facts. It creates situations from which there is no bridge to those situations that might have emerged in its absence. Therefore, though some technological breakthroughs, such as communication technological breakthrough in recent decades, can facilitate coordination, they cause market disruptions at the initial stages of adoption.

essence, they conform to a set of shared values which is central to the existence of a firm (Silverman, 1970, p. 131).

In this way, the founder of the firm creates a “communicative common environment” (Schutz, 1976, p. 31, 165). It is a situational environment shared by a group of people who are able to communicate with one another. Treating the firm as an entity that supports shared mental constructs, Foss (1997) rightly remarks that “an important part of the rationale of firms is that it makes sense out of the world for a subset of the economy’s input-owners by cultivating a shared knowledge-base that promotes the coordination of the plans of these input-owner in the face of change”. By establishing a firm, the entrepreneur is in fact building a coherent world of knowledge¹⁰ and a cultural community (Schutz, 1976, p. 81).¹¹ Employing labour and other resources to work under one roof (common environment) by the entrepreneur, the firm facilitates mutual understanding and consent. Events are experienced simultaneously and in common.¹² In Schutz’s terms, the entrepreneurs expand the “I” in the firm they establish, so that the common environment becomes a “we” relationship (Schutz, 1976, p. 32). The members of the firm now work as if they were at “home”. In Schutz’s argument, the entrepreneur is creating an ingroup (firm) out of the outgroup (market).

1.4. Typification: from pragmatic to organic

Within the firm, the same production activities are repeated and become types. Accordingly, actors will react similarly under similar conditions. Weber referred to this routinised process as ‘Veralltaglichung’, meaning ‘rendering into everyday’ (Berger and Berger, 1976, p. 339; Weigert, 1981, p. 101).¹³ Through a process of typification, the future ‘becomes’ knowable and predictable (Weigert, 1981, p. 101). In other words, as production is routinised, the pragmatic features of the firm transforms into the organic features. Routines, the firm’s stock of knowledge, can help its members to coordinate each other expectation. Typification also takes place outside the firm. Entrepreneurial innovation creates confusion to other market participants. The knowledge they possess is no longer adequate to solve new problems. What is likely to happen is that the contracting parties will cope with their knowledge-deficiency by creating expectations to serve as knowledge-surrogates (White, 1977, p. 80). In other words, these actors will project and plan as if it were a completed act. Schutz (1976) refers to this as “projected act in the Future Perfect Tense” (see also Weick, 1969, pp. 64–66). At the same time, a process of typification will also operate. Again, as the market participants gain new experiences and hence ‘update’ their stocks of knowledge, those new ways of doing things will over time crystallise into institutions (organic order) in which specific meanings are derived from the economic interactions among the parties involved (Lachmann, 1970, p. 62; Rogers, 1983, p. 175).

¹⁰Schutz (1976, p. 80) argues that the world of knowledge is incoherent, only partially clear and not free from contradiction.

¹¹This is the concept of organisational culture in management literature.

¹²It follows that a family firm exhibits the most common environment because its members have been socialised together and shared the same culture (Yu and Robertson, 1998).

¹³Husserl referred to it as the idealisation of ‘I can do it again’ (Schutz, 1967, p. 15).

2. The internal structure of the firm

In analysing macroeconomic phenomena, such as unemployment and the business cycles, the Austrians (for example, Hayek, 1941; Lachmann, 1956) consistently emphasise the influence of uncertainty and ignorance on the capital structure of production. They offer a praxeological theory of capital in which the employment of capital resources is linked to the agent's production plans, knowledge and expectations. For Lachmann (1970, p. 30, 33), human action exists in the form of plans. It is impossible to account for human action without taking into account the state of knowledge of the individuals involved (Lachmann, 1970, p. 36). It follows that failure of a plan must be due to inadequate knowledge of the circumstances in which action has to be taken. Previously unsuccessful actions prompt the need for a revision of plans. For Lachmann, expectations always embody problematical experiences, that is, experiences which require interpretation. This subjective interpretation yields provisional judgements to be confirmed by later experience, imperfect knowledge capable of being perfected. The formation of expectations is nothing but a phase in the continuous process of exchange and transmission of knowledge which effectively integrates a market society. Each expectation does not stand by itself but is the cumulative result of a series of former expectations which have been revised in the light of later experiences, and these past revisions are the source of whatever present knowledge we have. On the other hand, our present expectations to be revised later as experience accrues is not only the basis of the action plan but also a source of improved future knowledge. The formation of expectations is thus a continuous process, an element of the larger process of the transmission of knowledge. This praxeological approach—the linkage of the agent's production plan with knowledge and expectations—has been applied by Lachmann (1956) in his theory of capital structure.

2.1. *The firm as a collection of capital resources*

If the Penrosian firm is a collection of resources (Penrose, 1959, 1995, p. 24), then the Austrian firm is a collection of capital resources (Lachmann, 1956).¹⁴ A major difference between the two concepts is that the latter has a time dimension which is the Austrian School's heritage. Penrose differentiates between resources and services in terms of multiplicity of usage. As she puts it, "Strictly speaking, it is never resources themselves that are the 'input' in the production process, but only the services that the resources can render. The services yielded by resources are a function of the way in which they are used—exactly the same resource when used for different purposes or in different ways and in combination with different types or amounts of total resources provides a different service or set of

¹⁴There are striking similarities in the arguments between Penrose (1959, 1995) and the Austrian works, particularly, Lachmann (1956). The similarities include the role of entrepreneurship in the growth of the firm (Penrose, 1959, Chap. 2 versus Kirzner, 1973), the role of uncertainty, knowledge and expectations (Penrose, 1959, pp. 56–64 versus Lachmann, 1956), the heterogeneity of resources and the specificity of use (Penrose, 1959 versus Lachmann, 1956, Chap. 4). Note that Penrose's work (1959) was published three years after Lachmann's (1956). Neither Lachmann's nor Austrian works were cited by Penrose, only those of Joseph Schumpeter and Fritz Machup. Both are not regarded as orthodox Austrians.

services. The important difference between resources and services is not their relative durability. Rather, it lies in the fact that resources consist of a bundle of potential services and can, for the most part, be defined independently of their use, while services cannot be so defined, the very word 'service' implying a function, an activity." (Penrose, 1959, 1995, p. 25). She is correct to point out the multiplicity of the use of resources but fails to acknowledge the importance of the durability of the resources, embedded in the meaning of capital structure. Nevertheless, Penrose (1959, 1995, p. 25) admits that the size of a firm should be measured with respect to the present value of the total of its resources used for its own productive purposes. This implicitly recognises the 'capital' nature of resources.¹⁵

2.2. *Heterogeneity, complementarity and capital combination*

According to Lachmann (1956), capital resources possess several distinct features. Firstly, to the director of the firm, capital resources are scarce materials with alternative uses. This is known as the heterogeneity of capital resources. Secondly, each capital good can only be used for a limited number of purposes, the multiple specificity of capital goods. Thirdly, each item of capital good, at any point in time, is devoted to what under the circumstances appears to the owner of the firm to be its most profitable use.¹⁶

Lachmann (1956, p. 90) also distinguishes between three types of operating assets that a firm may have: first-line assets, second-line assets and reserve assets. First-line assets refer to those capital goods such as machines whose services provide the input of the production plan from the outset. Second-line assets such as spare parts and labour, are employed to be put into operation at a definite point of time during the production plan. They will either be required physically or will later be replaced by real services of labour. Reserve assets are those stocks of which it is hoped, will not be needed if all goes well. These are kept as a protection against unforeseen contingencies. In production, the owner of the firm will combine these assets in various proportions into a structure.

What are the determinants of the firm's capital structure? In particular, the Austrians are concerned with the issue of why capital resources are used in the way they are; why in a given situation, some alternatives are rejected and others are selected, and with what governs the choice or rejection of alternative uses when unexpected change compels a revision of plans. In Lachmann's view (1956, p. 8), the answer hinges on two criteria. Firstly, capital goods must be used to produce what consumers are prepared to pay. After some trial and error, capital goods will be oriented towards this direction. Secondly, capital uses must fit into each other. Capital equipment may have to be discarded because no capital combination can be found into which it would fit. Each capital good has a function which forms part of a plan. Capital goods with no such function will be discarded. This implies that there is a tendency towards an integration of capital structure. Given the hierarchical nature of the owner's plans, a meaningful capital structure also implies that these plans must

¹⁵This leads Boudreaux and Holcombe (1989, p. 149) to argue that the Penrosian firm is composed of a certain stock of capital, including human capital, and that its current investments are, in large part, determined by the particular attributes of the firm's existing stock of capital.

¹⁶In the capabilities theory of the firm, Richardson (1972) discusses the coordination of complementary activities while Teece (1982, 1986) talks about complementary assets that might be co-specialised with one another.

be consistent with each other. Plans which are inconsistent with either the consumer or the producer plans will be revised. However, the scrapping of surplus capital may be delayed for a number of reasons. If the owners of the firm think that complementary factors will be available in the future, they may prefer to wait. Furthermore, it may be that the annual cost of maintenance of heavy durable equipment is relatively small, in which case even a small amount of profit may suffice to keep it in existence. Hence, the owners of a firm with certain surplus resources will then try to find complementary combinations. This means switching capital goods to their second-best use. Eventually, an acceptable network of plans will emerge with certain patterns of capital use.

Foss (1996, pp. 7–28) uses “complementarity interpretation” to explain the boundaries of the firm. For Lachmann (1956, p. 3), “complementarity is of the essence of a capital goods”. As mentioned, capital goods have to be used jointly and are not combined in an arbitrary manner. Instead, only certain modes of complementarity are technically possible, and more importantly, only a few of these are profitable. The entrepreneurs will choose the best combination of capital resources. Such an ‘optimum’ combination is not available to the entrepreneurs without costs. Instead, they have to devote time and energy, often in a painful way, to determine this optimum use of capital resources.

Given a firm’s capital structure, a change in circumstances will cause the disintegration of the capital combination which the owner of the firm previously considered optimum. In Lachmann’s view, decisions on capital combinations reflect the complex interaction of economic forces from which entrepreneurs take their orientation. Unexpected changes open up new possibilities of use and enable a switch from previous best use to second best use. For this reason, we often observe that inside the firm, durable goods are no longer used for their original purpose. The new uses of the capital goods, from the viewpoint of the owner of the firm, may be more or less profitable than the original one. In each case, the alteration of use indicates that the original plan has gone astray.

Firms thus emerge and dissolve. The life cycle of the firm represents a continuous readjustment against unexpected changes (Lachmann, 1956, p. 13). In the world of unexpected change, the capital combinations of the firm will be dissolved and reformed. In some occasions, the cost of reshuffling the existing capital structure of a firm is so large that the entrepreneur may be better off by simply closing down the firm and starting another one with a new combination of capital. Unemployment from this perspective means that the owner of the firm perceives difficulties in fitting labour into its existing capital combination to produce profitable returns. Therefore unemployment, the result of the failure of plan coordination, originates from the complementary nature of the capital structure. Whether the owner of the firm can successfully switch into another business depends on the entrepreneur’s capabilities and knowledge of the new business.

3. Entrepreneurial discovery, capital structure and the growth of the firm

3.1. The role of entrepreneurial discovery

Firms rise and fall partly in response to changing needs. To bring a new firm into existence requires not only the existence of certain needs but also the specific entrepreneurial skill

of the innovators, as well as that of his successful imitators. According to Penrose (1959, 1995, p. 31),

the productive activities of a firm are governed... by 'productive opportunity' which comprises all the productive possibilities that its 'entrepreneurs' see and can take advantage of. A theory of the growth of the firm is essentially an examination of the changing productive opportunity of firms... It is clear that this opportunity will be restricted to the extent to which a firm does not see opportunities for expansion, is unwilling to act upon them, or is unable to respond to them.

Furthermore, in Penrose's view, the decision on the part of a firm to investigate the prospective profitability of expansion is an enterprising decision, in the sense that "whenever expansion is neither pressing nor particularly obvious, a firm has the choice of continuing on its existing course or of expending effort and committing resources to the investigation of whether there are further opportunities of *which it is not yet aware*. This is a decision which depends on the 'enterprise' of the firm ... and it is here that the 'spirit of enterprise', or a general entrepreneurial bias in favour of 'growth' has perhaps its greatest significance." (Italics added)

The concept of entrepreneurial discovery, an important contribution of the Austrian School, is formally put forward by Kirzner (1973) who rejects informational economics or search theory in the orthodox neoclassical paradigm. In Kirzner's view (1979, pp. 137–153), a subjectivistic theory of knowledge argues that things simply do not exist if a person does not know about them. Given the presence of such ignorance, it is impossible for a person to search for something that he or she does not know about, let alone to estimate the costs and benefits associated with the search. Earlier, Penrose (1959, 1995, p. 34) put forth a similar view: "The assumption that firms are 'in search' of profits already implies some degree of enterprise, for it is only in the special case where the profitability of expansion in a given direction is obvious and the decision to expand almost automatic that no particular quality of enterprise is required". However, such conditions do not last indefinitely and the unenterprising firm ceases to expand as this type of opportunity declines. Therefore, we observe that a large enterprising firm often "commits part of its resources to the task of investigating the possible avenues for profitable expansion, acting on the general presumption, supported perhaps by past experience that there are always likely to be opportunities for profitable growth or that expansion is necessary in a competitive world" (Penrose, 1959, 1995, p. 34).

From the Austrian perspective, the growth of an economy depends critically on entrepreneurial discovery (Kirzner, 1985, p. 71). In explaining economic development, Kirzner makes an important distinction between growth in technical knowledge on the one hand and an increased awareness of the availability of resources on the other. For where development occurs as a result of increased awareness of the availability of resources, it occurs not because of the availability of new opportunities, but because of an expanded awareness of existing opportunities. Kirzner (1985, p. 75) concludes that at a given point in time, output may be less than is possible and desired, because of opportunities that have remained unnoticed. Entrepreneurial discovery of these opportunities makes possible a growth in output. As time goes by, expansion of physical resources increases the range of productive

possibilities. For this increased range to be translated into growth in output, however, it must be perceived. Hence entrepreneurial discovery is also an indispensable ingredient in economic development.

Kirzner's insight can also be applied to the growth of the firm. The growth of the firm consists of entrepreneurial exploration and exploitation of profitable opportunities.¹⁷ For instance, in non-entrepreneurial neoclassical economics, the firm responds only to demand. However, Yu and Robertson (1997) argue that while for established products, with known and stable characteristics, it is reasonable to suppose that consumers' tastes are formed by the range of commodities which are available to them or, at least, about which they know. But when there is innovation, the situation becomes more fluid: "The really enterprising entrepreneur has not often, so far as we can see, taken demand as 'given' but rather as something he ought to be able to do something about" Penrose (1959, 1995, p. 80). The neoclassical view holds that the firm supplies what consumers stand ready to buy or can be persuaded to buy.¹⁸ But, as Penrose (1959, 1995, p. 80) notes, in reality "when the selling expenses are incurred and when possible retaliatory action of rivals is considered, a firm recognises that the demand for its product can be affected by its own actions". Moreover, as Schumpeter (1928, p. 379) argues, "that new commodities or new qualities or new quantities of commodities are forced upon the public by initiative of entrepreneurs ... is a fact of common experience." Ventures into new products or into the development of new uses for old products are originated by entrepreneurs who believe that they can produce goods or services with uses of which consumers are as yet unaware, but which they will find useful and be willing to pay for. Firms may even go into production in the face of active consumer resistance. An anticipation of eventual consumer acceptance, however, is a necessary condition for entrepreneurial interest in any product (Penrose, 1959, 1995, pp. 84–85). Failure to grow is attributed to the *limited nature of entrepreneurial resources* rather than to demand conditions (Penrose, 1959, 1995, p. 37).

3.2. *Discovery, capital structure and the boundaries of the firm*

As entrepreneurs perceive the need to change and expand their productive activities, what will happen to the internal capital structure of the firm? The growth of the firm implies capital accumulation. As capital accumulates, specialisation of individual capital resources takes place. Such a division of capital enables production to resist the law of diminishing returns. In other words, as capital becomes more abundant, its accumulation does not take the form of multiplication of existing items, but that of a change in the composition of capital combination. The capital structure of the firm will move towards a higher degree of complexity in which more types of capital items are included in the combinations. The new items, which either did not exist or were not used before, will mostly be of an indivisible

¹⁷Using Dosi and Fagiolo's classification (1997, p. 11), Yu (1998) broadens Kirzner's theory entrepreneurial discovery into two types, namely extraordinary and ordinary discoveries. The former is Schumpeterian innovation while the latter is imitative or adaptive entrepreneurship. The two are respectively associated with what Dosi and Malerba (1996) called exploration and exploitation of profit opportunities.

¹⁸Such an informational economics perspective is best represented by Stigler (1961, p. 220), Arrow (1974), and Alchian and Allen (1983).

character. Complementarity plus indivisibility are the two crucial elements in determining the direction of change. The owners of the firm will find it economically feasible to introduce new indivisible resources only when the volume of complementary capital reaches a certain size. In other words, they will not install an indivisible capital resource unless there are enough complementary capital goods to justify it. The introduction of new indivisible resources will, as a result, entail a change in the composition of the complementary capital, resulting in the shifts of these capital goods to other uses. For those which cannot be shifted, may lose their capital character altogether (Lachmann, 1956, p. 80). In short, as the firm expands, capital accumulation results in an increase in the number of production stages as capital combinations become more and more specialised (Lewin, 1996, p. 149). The increased number of stages is indicative of increased complexity, which, in turn, is indicative of an increase in the productivity of the firm. Increased complexity implies an ever more complex pattern of capital complementarity. As Lachmann (1956, p. 85) puts it,

We conclude that the accumulation of capital renders possible a higher degree of the division of capital; that capital specialisation as a rule takes the form of an increasing number of processing stages and a change in the composition of the raw material flow as well as of the capital combinations at each stage; that the changing pattern of this composition permits the use of new indivisible resources; that these indivisibilities account for increasing returns to capital; and that these increasing returns to the use of capital are, in essence, the 'higher productivity of roundabout methods of production'.

Lachmann further contends that the increased complexity of the firm's capital structure implies an increased vulnerability. A firm with a large number of workers, each specialised in one job and who cannot be substituted for each other, "is more exposed to individual whims and vagaries of sickness" than one that depends on only a few 'more general workers' (Lachmann, 1956, p. 85).¹⁹ Thus an expanding firm "is likely to encounter problems of increasing complexity ... (among which are) disproportionalities and the resulting maladjustment of the capital structure that may give rise to serious problems in economic progress". Such a message can be interpreted in two dimensions. One is that, given asset specificity, the production system is jeopardized by opportunism and hold-up. This is Alchian/Demsetz/Williamson theory of the firm.²⁰ But if we interpret Lachmann's view in terms of the coordinating theory of the firm, this means that an actor's novel idea, such as the Schumpeterian innovation, will bring chaos to the production system because the fellow members of the firm will have difficulty in interpreting the new meaning attached to the innovation. Again this implies that, for an innovating plan to be successful, entrepreneurs,

¹⁹In Lachmann's words (1956, p. 85), "a household with six servants each of whom is a specialist and none of whom can be substituted for another, is more exposed to individual whims and the vagaries of sickness than one that depends on two or more 'general maids'."

²⁰Since Coase's (1937) paper, one direction of the development of transaction costs economics as applied to organisations, represented by Alchian and Demsetz (1972) and Williamson (1985), emphasises moral hazard and monitoring problems. However, Langlois and Robertson (1995, p. 36) argue that the problem of hold-up or opportunism is neither a sufficient nor a necessary condition for vertical integration (see also Conner and Prahalad, 1996). The other direction, represented by Cheung (1984) and Barzel (1982), emphasises measurement problems in coordination.

the originators of innovation, need to inform, explain and persuade other contracting parties about their novel ideas (Langlois and Robertson, 1995). Such activities can be quite costly. In summary, complexity involves an increase in the stages of production associated with any production process. Complexity implies a growing number of components (stages) as production activities become more and more specialised. It can be concluded that increases in the complexity of capital structure will increase the degree of vertical disintegration but will be limited by the costs of coordination.²¹

4. Concluding remarks: The Austrian paradigm versus the capabilities view

Langlois and Foss (1997) have correctly remarked that the literature after Coase's (1937) paper has a narrow explanation of the firm with the focus removed from the issue of coordination. In their view, the issues of coordination in production 'have been overshadowed by a dominant interest in issues of incentive compatibility'. In recent years, the capabilities theorists have attempted to refocus their interests on coordination problems. The Austrian economists have always regarded economic problems as coordination problems. This paper interprets the firm from the coordination perspective. Specifically, it constructs a praxeological theory of the firm with human agency as the centre of analysis. Despite a difference in emphasis, the Austrian and capabilities approach in many ways share similar outlooks in explaining economic organisation (Foss, 1994, p. 56). Hence, the model developed in this paper can be regarded as complementary to the capabilities view.

My proposed theory is deeply rooted in Schutz's notion of human agency rather than on the transaction costs. Unlike most scholars in New Institutional Economics which take either 'firm', 'transaction' or 'contract'²² as the unit of analysis, this study adopts methodological subjectivism and brings entrepreneurial agency more fundamentally into the centre of the analysis. While there may be some merits (say, for simplicity) to conceptualise the firm as a learning entity as suggested by Foss (1994), the capabilities approach, like the neoclassical paradigm, may overlook the issue of how dynamic interactions of constituent members within the firm influence economic change. Moreover, my Austrian theory starts with the human agency and examines the agent's economising efforts on the evolution of the firm, industry and whole economy. In this regard, the cause of a phenomena in the economy can

²¹Thus, the Austrian capital theory of the firm illuminates Young's (1928) famous arguments. Extending Adam Smith's thesis, Young assumed that firms in an industry are initially vertically integrated and that expanding output leads to differentiation as various stages of the production process are spun off into specialised establishments. Small firms in the industry might need to produce intermediate goods, since outside suppliers would not find it profitable to produce such a small scale. However, an expansion of the output of final goods could allow the industry to exploit advantage of economies of scale as new specialised firms emerged to take over the production of intermediate goods. This differentiation is important where there are different levels of economies of scale for the various stages of production (see Langlois and Robertson, 1995, p. 20). Young then concluded his thesis in three main points: (1) The progressive division and specialisation of industries is an essential part of the process by which increasing returns are realised. (2) The securing of increasing returns depends upon the progressive division of labour, and the principle economies of the division of labour are the economies associated with roundabout production methods. (3) The division of labour depends upon the extent of the market, but the extent of the market also depends upon the division of labour.

²²They are associated with Alfred Chandler, Oliver Williamson and Stevens Cheung respectively (see Langlois and Robertson, 1995, p. 8, 152).

be traced back to its component industries, firms and ultimately to human agents.²³ Thus my model has a micro-macro link. Specifically, some authors have already noted that such a theory can be extended to understand organisational crisis and other macro phenomena.

The capabilities school is said to take a real-time account of production costs in which knowledge has as important a role as technology (Langlois and Robertson, 1995, pp. 30–31). However, scholars of this school more often apply the concept of Newtonian time in their studies,²⁴ than really concerning the influences of actor's experiences (real time). As mentioned, the Austrians have always been keen in understanding human action through the passage of time. More than this, they emphasise the subjectivist time—the actor's experience. As we have already illustrated, experience, knowledge and, hence, expectation of the actor have been formally incorporated into our model. In this way, we are able to avoid using the terms 'organisational learning', 'firm strategy' or 'firm behaviour', in which firms can in fact never act.²⁵ More importantly, elements such as learning, expectation, plan, imagination and persuasion will emerge as dominant factors in explaining economic change.

According to Langlois and Foss (1997), the capabilities view focuses more on the production side than is the mainstream post-Coase literature. However, in explaining the production process, the capabilities theorists have not examined comprehensively the role of capital and its relationship with the firm, though they pay a lot of attention to the effects of limitations of knowledge and asset specificity on the boundaries of the firm.²⁶ More precisely, the capabilities theorists have not formulated a 'capitalistic' theory of the firm. As this essay argued, production, firm, capital and entrepreneurship are indeed closely related and cannot be separated in the analysis. Moreover, Lachmann has linked capital resources with agent's experience, plan and expectation, though he has not applied the concept to the theory of the firm. Nevertheless, my Austrian theory of the firm which fills such a gap allows us to shed further light on the issues such as entrepreneurial strategies, industry competition, the rise and the fall of enterprises, unemployment and business cycles.

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²³Mises (1949, p. 18) argues that human action "cannot be traced back to its causes. It must be considered as an ultimate given and must be studied as such."

²⁴That is, the Marshallian notion of long run and short run. For an account of differences between real (Bergsonian) time and Newtonian time, see O'Driscoll and Rizzo (1985, pp. 52–70).

²⁵For the Austrian scholars, the firm, though created by men, is never a human agent. To say that the "firm" acts, is merely a metaphor. It must not be taken to mean that the firm itself has a reality apart from the acts of various individuals (Rothbard, 1962, p. 2). Therefore the firm as an institution becomes meaningful only through influencing the actions of those individuals who are and those who are not considered as members.

²⁶Today, the theory of capital structure has virtually disappeared in the mainstream neoclassical production analysis. This paper rekindles the importance of the (Austrian) capital theory in production.

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