

Capital and Entrepreneurship

A Radical-Subjectivist Exposition of Roundaboutness and the Stages of Production

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DISCUSSION PAPER

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“It is probably no exaggeration to say that every important advance in economic theory during the last hundred years was a further step in the consistent application of subjectivism.”
Friedrich A. Hayek¹

ABSTRACT

Although capital and entrepreneurship play an essential – maybe *the* essential – part in the everyday workings of the modern economy, the role of capital and entrepreneurship are almost entirely absent in current economic theory. It is only in Austrian economics that capital and entrepreneurship play a prominent role. The capital structure in terms of the stages of production has provided the foundation for the formulation of the Austrian theory of the business cycle which continues to be a major topic in the Austrian research program. Yet there are also deficiencies in the Austrian concept of capital. The problematic status of the Austrian capital theory is partly the result of conceptual problems that have their origin in an objectivist view of capital and roundaboutness and because the stages of production are seen as a macroeconomic phenomenon.

It is the aim of this paper to show how a subjectivist re-interpretation of capital and a microeconomic view of the stages of production will help to shed new light on the role of profit and loss, investment, savings and the emergence of malinvestment.

Two Concepts of Capital

Despite the effort that Hayek (1941) put in his “Pure Theory of Capital”, a concise theory capital has not been achieved. Hayek made decisive steps forward to purify the concept

¹ F. A. Hayek, *Scientism and the Study of Society*, in: *The Counter-Revolution of Science* (Indianapolis: Liberty Press, 1979)

of capital from some of the objectivist attributes but failed to integrate entrepreneurship into his theory, probably because his main focus was oriented towards macroeconomics in order to obtain a foundation of his business cycle theory.

Since the publication of Hayek's treatise, neither the Austrian nor the neoclassical theory of capital has made much progress. On the one hand there is the neoclassical concept of capital as a homogenous entity devoid a structure and time, while in the Austrian view capital is heterogeneous and is intimately linked to time. From this major difference, all other differences between the two concepts of capital do follow. Keynesian economics has only expenditures in sight and abandoned capital theory; and in Monetarism the real economy and its capital structure has vanished completely. Almost any branch of economics outside of Austrian economics defines investment as simple addition to capital ($I = \Delta K$), while the macroeconomic production function is given as a mathematical formula to represent the relationship between the input factors (including "capital") and the final aggregate output.

In this theory, capital is stylized as a relatively permanent stock. Once when capital is defined as a stock, the replacement and maintenance of capital recedes as a permanent problem and investment tends to be seen as something that happens discontinuously or periodically. In this type of model, capital investment and depreciation are regarded as additions and subtraction from a given a-historical capital stock. Non-Austrian economics treats capital (if it is mentioned at all²) as something that can be increased by capital additions without changing the structure of the existing capital stock. From this it follows that there is no need for an entrepreneur. The decision to increase or not to increase the existing capital stock could be made by any authority including government or even an automaton. This conception eliminates the essential properties of capitalist production in favor of mathematical simplification. Driven by the needs of the chosen method, the structural aspect of capital and with it the specifying function of the entrepreneur remains in the dark. With the concept of capital as a measurable unit – supposedly representing the aggregate of capital goods -- the subsequent thesis emerges that the demand for capital and labor would be determined by aggregate expenditure.

It is different with the Austrian approach³. The Austrian position holds that non-permanence is the characteristic attribute of capital goods and thus the problem of continuous

² A recent textbook, for example, that carries the promising title "Recessions and Depressions. Understanding Business Cycles", there is no entry for "capital" in the index, and the few times "capital" is mentioned at all, it is in the meaning of "capital flows". See Knoop (2004)

³ Hayek denotes the opposing paradigm to his theory the "Anglo-American" concept of capital in contrast to the "Austrian" concept of capital. But the designation "Anglo-American" capital theory is rather ambiguous as

reproduction and re-structuring of capital receives attention. In Austrian economics it is “not the individual durability of a particular good but the time that will elapse before the final services to which it contributes will mature that is regarded as the decisive factor. That is, it is not the attributes of the individual good but its position in the whole time structure of production that is regarded as relevant” (Hayek, XXXX).

As to the choice of technology, neoclassical economics assumes that the choice about which of the many known technological methods will be employed depends on current supply and demand conditions, and the technique employed in production is supposed to be unalterably determined by the given state of technology. Likewise in this theory, it is supposed that capital is being increased in the sense of a lateral expansion of production, as a simple duplication of the kind of capital already in existence. The homogeneity assumption provides the undispendible foundation of this approach.

In sharp contrast to the homogeneity thesis, it is stressed in the Austrian capital theory that additional capital is used to make changes possible in the technique of production. In this Austrian view, additional capital leads to structural changes of capital, and as such investment is not a mere addition or subtraction in relation to an existing capital stock, but new investment will transform the original capital structure. In the Austrian view, it is relative changes in the demand for consumer and production and goods that determine the changes in the capital structure, and thus it is not aggregate demand as given by the total money expenditure that accounts for expansion. Therefore, it is not necessary for Austrian capital theory to assume that expansion of production requires the existence of unemployed resources. In Austrian economics the structural changes of capital allow for the assumption of full employment. As a major consequence of these different views emerges the distinction that in non-Austrian economics the demand for investment goods and consumer goods will move in the same direction on an aggregate basis, while in the Austrian perspective the demand for capital goods will occur in the opposite direction from the demand for consumer goods.

The central problem of the non-Austrian theory of capital is the assumption of a homogenous and quantifiable capital stock. Such a theory is “bound to ignore important features of reality” (Lachmann 1956:6) and in particular as it disregards the heterogeneity of capital, “the true function of the entrepreneur must also remain hidden” (ibid. p. 16). In such a

Hayek himself makes it clear when he states that the classical English economists were in many aspects much more “Austrian” than their followers. Yet it is easy to avoid this notion because almost any branch of economics other than the Austrian theory has adopted the neoclassical or “Anglo-American” variant of capital theory. Therefore it is legitimate to differentiate in the following between “Neoclassical” and the “Austrian” capital theory in an effort to highlight some of the major differences.

theory “investment becomes merely a question of changing the absolute quantity of this homogeneous capital stock. Its *composition* does not interest the economist whose theory of investment is bound to be somewhat fragmentary.” (ibid. p. 49)

The Subjectivist Nature of Capital

An objectivist theory of capital can do no other than regard capital as a homogenous and quantifiable capital stock. Such a theory ignores reality (Lachmann 1956:6) and in particular, by disregarding the heterogeneity of capital, in any objectivist capital theory “the true function of the entrepreneur must also remain hidden. In a homogeneous world there is no scope for the activity of specifying” (ibid. p. 16), and investment becomes merely a question of changing the absolute quantity of this homogeneous capital stock. The *composition* of capital gets ignored and thus this capital theory is fragmentary at best. (Lachmann 1956: 49). The objectivist view of capital requires the assumption of homogeneity and thereby eliminates uncertainty and the role of the entrepreneur. The result is a theory that is highly unrealistic.

Once it is recognized that capital is heterogeneous, a subjectivist approach to capital and roundaboutness is warranted as the unity of the existing capital structure is no longer objectively given but will only exist in the mind of the entrepreneur in the form of a plan. Such a perspective opens up the theory of capital to acknowledge uncertainty and “makes room for the creativity and autonomy of individual choice” (O’Driscoll and Rizzo 1985:1). The subjectivist perspective leads to a view of the economic process that is fundamentally different from the objectivist position. The objectivist definition of capital can do no other than postulate homogeneity and throw out uncertainty and entrepreneurship, while the subjectivist theory of capital leads to a view of capital where uncertainty, choice and entrepreneurial action not only receive due attention, but become constitutive elements of the theory of capital.

Capital in contrast to labor has no natural physical dimension. It is only by the entrepreneurial plan that the capital structure will gain its coherence (logic). Capital as a homogenous entity exists only as financial capital and thus, in its monetary representation, serves as an accounting tool (Mises 1998:231 et passim). It is only in its financial representation that capital can be thought of as being homogenous, and as something from which additions and subtraction could be made without affecting its structure. Yet in the process of production, capital exists

as heterogeneous capital goods, and in this form capital has no natural unit of measurement other than entrepreneurial valuation based on vision, expectation, and plan. “The idea of capital has no counterpart in the physical universe of tangible things. It is nowhere but in the minds of planning men.” (Mises 1998:511)

Different from the common use of the term, investment, too, lacks objective criteria as it refers to the specificity of which goods to apply. As such, investment is based on speculation in the form of entrepreneurial expectations that not only refers to the “quantity” of investment, but to which kind of goods to apply. Investment requires judgment that goes beyond addition, because investment will have an impact on the existing capital structure in comparison to the new structure that will be brought about as a result of the investment.. Entrepreneurship in this sense is not so much “alertness” (Kirzner 1973) – a concept, which would imply basically costless profits from discovery -- or mainly technical and administrative progress (Holcombe 2003), investment rather shows up as the pursuit of productivity gains, i.e. it appears as purposive action in the move towards economic progress.

The entrepreneur is the essential link between the market signals and the capital structure. The task of the entrepreneur in Austrian capital theory is quite different from that as it is modeled otherwise in economic theory where an “investment function” is said to describe the relation between the interest rate and the amount of investment flow that would happen accordingly. In the non-Austrian conception of capital theory, the entrepreneur is eliminated or reduced to either an automaton or to a wild animal that is ruled by fierce spirits. In such a world, no visionary roundabout production can happen.

Investment in new equipment requires time until the results will show up. It is in this sense that plans and purposeful action are required to bring it about. As such, investment cannot be modeled as simple additions to existing capital, but attention will be drawn to the fact that for some prolonged time the output that is expected from the investment in new equipment will be below the level of the standard production procedures currently in place. It is the inherent characteristic of roundabout production that the *expected* later result has to outpace standard production and that in this calculation the formation of expectations and the interest rate will play a decisive role. In terms of the *ex ante* expected result, as it is given by the entrepreneurial expectations, future *expected* results have to outpace conventional production methods by a considerable margin in order even of being considered. Expected results of roundabout production must be substantially higher than those that are given by the currently applied production methods, because roundabout production requires waiting time and involve a transformation of the existing capital structure.

The application of new forms of new capital will be accompanied by uncertainty about the outcome of the investment. These uncertainties extend beyond future demand and include changes of the overall business environment during the process of maturation until the higher productivity will show up in goods production and until the profits can be realized. In an unfavorable business climate productivity will stagnate because more roundabout production procedures will be avoided and standard production methods tend to be maintained. The entrepreneurial plan has no other basis than the *expected* profits seen from the *ex ante*-perspective.

Capital and Time

Böhm-Bawerk's major contributions consist in the causal explanation of the interest rate as the result of time preference and his explanation that the unique form of "capitalist production" exists in the use of roundaboutness. For Böhm-Bawerk, the specific "capitalist production" consists in roundabout production⁴, and has the advantage of greater technical productivity while its disadvantage consists in a "sacrifice of time".

Doing business consist in the transformation of entrepreneurial plans into a trial and error procedure under the guidance of the result as it indicated by the expectations of profit. Entrepreneurial action consists in coming up with plans and realizing these plans in a continuous process of adaptation of both plans and actions. Doing business consists in maintaining the stream of goods by incessant adaptation to local and temporary conditions and as such it includes the revision of plans and expectations in the face of the changing market condition. The appraisal of the changes of relative prices is the major guide of spatial allocation, while the availability of savings is the major signal to provide orientation as to the *intertemporal* allocation of available funds.

⁴Böhm-Bawerk provides this instructive example to explain the character of roundaboutness: "A peasant requires drinking water. The spring is some distance from his house. There are various ways in which he may supply his daily wants. First, he may go to the spring each time he is thirsty, and drink out of his hollowed hand. This is the most direct way; satisfaction follows immediately on exertion. But it is an inconvenient way, for our peasant has to take his way to the well as often as he is thirsty. And it is an insufficient way, for he can never collect and store any great quantity such as he requires for various other purposes. Second, he may take a log of wood, hollow it out into a kind of pail, and carry his day's supply from the spring to his cottage. The advantage is obvious, but it necessitates a roundabout way of considerable length. The man must spend, perhaps, a day in cutting out the pail; before doing so he must have felled a tree in the forest; to do this, again, he must have made an axe, and so on. But there is still a third way; instead of felling one tree he fells a number of trees, splits and hollows them, lays them end for end, and so constructs a runnel or rhone which brings a full head of water to his cottage. Here, obviously, between the expenditure of the labour and the obtaining of the water we have a very roundabout way, but, then, the result is ever so much greater. Our peasant needs no longer take his weary way from house to well with the heavy pail on his shoulder, and yet he has a constant and full supply of the freshest water at his very door. ("Böhm-Bawerk XXX)

The attention paid to capital in its relation to time and its characteristics as being the concomitant of roundaboutness lies at the heart of Austrian economics. The realistic recognition that capital is heterogeneous brings with it a fundamentally different perspective compared to the neoclassical unrealistic assumptions. Heterogeneity of capital implies that the capital structure is built up as combinations consisting of complementary elements that are arranged by entrepreneurial plans (Lachmann 1978:12). The unifying focal point of capital is the vision of the entrepreneur who arranges the capital goods in a way that he deems appropriate to meet future demands. With the concept of roundaboutness and the heterogeneity of capital it is brought to light that the outcome of investment requires time and waiting and as such investment is confronted not only with risk but with uncertainty in the sense of unknown distributions of the results. In this perspective, the role of the entrepreneur comes into play as to his specific function as the anticipator of unknown future demand and prices and therefore as the preeminent economic agent whose prime specialization lies in the ordering of the capital structure under the conditions of uncertainty. The realistic postulate of the heterogeneity of capital in terms of production goods draws attention to the stages of production and the complexity of capital structures.

Beginning with Carl Menger (1871) and followed-up by Böhm-Bawerk (1884), the heterogeneity of capital as an ordered production structure forms the starting point for the Austrian theory of capital:

“... capital is the sum of heterogeneous concrete capital goods. To aggregate them, one needs a common denominator. This common denominator cannot be found in the number of capital goods ... nor their length or width or volume, or weight or any other physical unit of measurement. ... The only measuring rod that does not lead to contradictions ... is the value [of these capital goods].”⁵

Lachmann (1978, p. XV) asks what it is that unites capital in its concrete representation such as it shows up as “(b)eer barrels and blast furnaces, harbor installations and hotel-room furniture” other than the entrepreneurial plan and the valuations that are derived from this

⁵ Translated quotation from Böhm-Bawerk’s “Capital and Interest” in Hennings (1997, p. 132). Interestingly enough, Piero Sraffa, one of the major intellectual forerunners of what is now called “post-Keynesian” economics, put the problem quite succinctly in a letter to Joan Robinson of October 1936, although even his belated recognition after what Böhm-Bawerk had already said almost 40 years earlier seems to have met deaf ears not only by Joan Robinson regarding Sraffa’s reminder that “(if) one measures labor and land by heads or acres the result has a definite meaning; subject to a margin of error On the other hand if you measure capital in tons the result is purely and simply nonsense ... If you are not convinced, try it on someone who has not been entirely debauched by economics. Tell your gardener that the farmer has 200 acres or employs 10 men - will he not have a pretty accurate idea of the quantities of land & labour? Now tell him that he employs 500 tons of capital & he will think you are dotty – (no more so, however, than Sidgwick or Marshall).” Quoted in King (2002: 80/1)

plan? The arrangements that take place are arrangements in terms of an order guided by a purpose. It is a process of valuation that extends from the expectations, the plan, and the vision of the future, to the present. The valuation of capital is not causal but teleological and volitional, and it is grounded in human action with its basic elements of time, stages, and purpose.

Capital as a tool of action is a means. The purpose of capital is in the mind of the entrepreneur who employs capital as a means to gain returns. In this sense capital is a “praxeological concept” (Mises 1989:512). The realization of this entrepreneurial plan takes time and thus all entrepreneurial action is speculative because the plan is directed towards remote results and its outcome uncertain. Capital has an inescapable time dimension. Even in a highly developed economy where new technologies and all kinds of goods are readily available, the individual project of production involves time and the postponement of immediate use of resources for consumption.

Human well-being requires a continuous stream of consumption goods, and thus time preference poses a limit to the potential degrees of roundaboutness. The problematic nature of roundabout production measures lies in the uncertainty about the determination of adequate degree of roundaboutness. On the one hand roundaboutness is the way to increase productivity; on the other hand this pursuit may become over-extended in face of the necessity of having sufficient savings available to realize the project. Without roundaboutness there is no economic progress; but if the degree of roundaboutness is too high, incompatibilities between the urgent needs for consumption goods and the capital structure to deliver this stream of consumption goods will occur (Strigl 2000:6-14).

At the micro level, the rejection of roundabout production involves the risk of losing out to the competitor and to disappear from the market, while the pursuit of higher degrees of roundaboutness is confronted with the risk of over-extension relative to savings. This decision about the adequate degrees of roundaboutness constitutes the essence of entrepreneurship.

Stages of Production

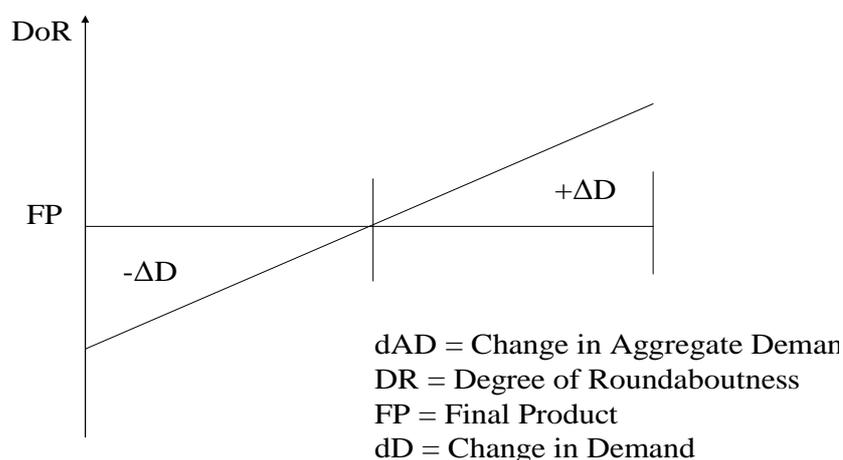
A specific production good does not have a value *per se*, but receives its valuation through entrepreneurial judgment as to the position which the specific production good is to have within the overall process of production. Production goods with the same physical properties can have different functions depending on their position in the production process.

The various distinct stages of production will have different durations measured by chronological time, as it happens, for example, with the time that it takes to grow a tree as opposed to felling it or transporting it to the factory where a stool is made and from where the piece goes to a store and is exposed in the showroom waiting for this product to be sold and at that very moment to turn into a consumption good.

The value of production goods that are physically similar or seemingly identical attain their specific value by their position within the chain of production which in turn is the result of the entrepreneurial plan guided by the relative prices and the expectation as to the future price of the resulting consumption good. For a specific good to go through the stages of production requires time, and these stages will have different chronological durations, but in the economic perspective each phase represents a different and distinct stage of production whose relevance comes from its position within the arrangement. The definite position that is assigned to a specific production good within the chain of the stages of production is the origin of the value of this specific production good and is derived by entrepreneurial judgment about future demand for the final product. Like in language, meaning is not derived from the individual letter but from its position within a word, and where likewise a word derives its meaning from the context in which it stands, with all of that linked to the purpose of communication.

The term “stages of production” has the basic praxeological meaning that production is a continuous process in time but that it consists in a series of distinct steps. The graph below (figure 2) represents the changes in the structure of production in a two-stage production model. The horizontal axis represents the two stages of production with the left side closer to the final product (FP) and the right part of the stages of production axis representing the more remote stages of production. The horizontal axis represents increasing degrees of roundaboutness. In this figure, more roundaboutness occurs in the more remote part of the production process with moving along the stages of production axis to the right signifying a higher degree of capital specialization as more stages of production are involved.

Figure 2
Roundaboutness and Stages of Production



In the graph above (figure 2) the negative change of demand ($-\Delta D$) represents a reduction in the rate of time preference which allows for more waiting time and a shift of resources to the more remote parts ($+\Delta D$) of the production process. This shift does not require a change in aggregate demand. The concept of the stages of production is represented in relation to the point where the production process results in the output of the final good (FG). In the representation of figure 2, a natural process of economic expansion occurs as it is given by the sequence of lower time preference first and consequently an increased readiness to sacrifice time. More waiting time allows a shift of resources to the more remote stages of production where roundaboutness is being applied. As its consequence, the production frontier will expand allowing for a higher output later on which in turn allows a higher level of consumption. In other words: roundaboutness of this kind means the recognition that before a good can be consumed, it has to be produced at first, and given that time preference has been decreased, higher degrees of roundaboutness can be applied to the earlier stages of production.

Capital expansion requires time. In this sense, roundaboutness entails waiting and the extent to which waiting is possible for the extended production process that is to deliver a higher output of consumption goods depends on savings. The demand for capital is not determined by the

absolute expenditure going into consumption goods, but is dependent upon the relative demand for consumption and production goods (Hayek 1931). Therefore, demand for capital does not vary directly with the demand for consumption goods, but in fact moves in opposition to it (Garrison (2001).

The concept of capital as roundaboutness based on entrepreneurial plans provides the starting point of the distinct Austrian theory of the business cycle as it emerged with the contributions of Ludwig von Mises and Friedrich von Hayek. The main contrast between the Austrian approach and other theories is that in the Austrian tradition, capital expansion and its contraction are seen as changes in its longitudinal structure, and expansions and contractions imply a restructuring of the *present* state of the capital structure. “Investment decisions determine not merely, as Keynes would have it, the ‘rate of investment’, but also determine the concrete character of each new capital good ... Each new capital good forms part of a whole and has to fit into a capital combination.” (Lachmann 1953: 117). Thus, in the perspective of Austrian economics, industrial fluctuations are not just the result of a maladjustment between planned savings and planned investment, “but also the result of structural maladjustment caused by the first type of maladjustment.” (Lachmann 1953: 114)

Sustainable and Unsustainable Production Structures

Sustainable production structures reflect the availability of authentic savings, which, in turn, are in tune with the prevailing time preference. Unsustainable production structures come about when monetary signals deceive entrepreneurs about the size of authentic savings. The entrepreneur when making a judgment about an investment project will only consider the monetary interest rate, i.e. the interest rate charged by his bank. This monetary interest rate is at one part determined by the central bank, by the other part it is determined by the financial markets.

Malinvestment and the Structure of Production

Given that all entrepreneurial activity is directed towards and unknown future, the occurrence of error is essential and cannot be eliminated how elaborate or sophisticate the tools of “prognosis” ever should become. This condition of inescapable speculation is the root of entrepreneurial profit and loss. Speculation implies the uncertainty of success or failure. Even more so, in economic speculation, the actors do not play against machines whose “class probability” (Mises XXXXX) can be mathematically established, but operate in the context of a social environment of unexpected change where not only the future is unknown but current price information is incomplete (Lachmann 1957: 22) and where estimates of probability are irrelevant not only because of the uniqueness of decisions (Shackle 1949) but also because of the heterogeneity of the situations (Lachmann 1957:26). The closed character of non-Austrian capital theory has not only expelled the role of the entrepreneur, but with this elimination this theory has also blocked its approach towards an adequate understanding of malinvestment and business failure.

It is appropriate to differentiate between management errors and entrepreneurial errors. Management errors are failures as the result of bad administration, while entrepreneurial errors have their origin in failed roundaboutness. Failures of miscalculation of roundaboutness can be both of a micro- and of a macroeconomic nature. On the individual business level, wrong investment decisions happen when the entrepreneur misreads the potential demand for his product. This kind of failed investment can be called “*microeconomic malinvestment*”. Competition serves to eliminate those businesses that will commit this kind of misjudgment. Competition serves as a process of selection whereby the successful entrepreneur earns a higher profit and can go on, while the unsuccessful entrepreneur, as determined by the market participants, with the consumer being the final arbiter, suffers losses and is forced to retrench or move out of the market. In this respect, market competition works as a selection mechanism that favors successful action and eliminates unsuccessful entrepreneurial action according to the final judgment by the consumers.

At the micro level these errors are inherent to the competitive process. A typical microeconomic failure of this kind occurs when the competitor comes out ahead with a superior product or beats the lagging company in having selected the better time frame for roundabout production. As can be shown with the help of the graph developed above (figure 1), the successful company beats its competitor by coming out ahead of the losing business by choosing the more effective way of roundabout production. For the losing business such a

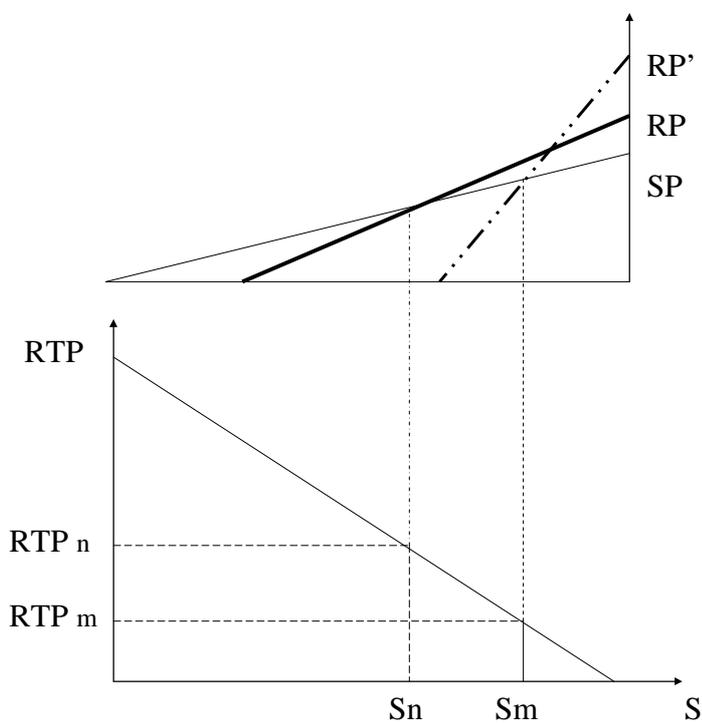
case would mean that the result may be worse than for the company that adhered to standard production because failed new roundaboutness involves higher costs than the company that operates with standard production has to bear. In the long run of economic development, the higher degrees of roundaboutness will bring about the productivity gains, but in the day to day operations, the continuation of standard production methods may be less costly and therefore superior to a roundabout production that fails to get out in time ahead of the competitors. If business decisions were simply of the kind to use ever more capital and to apply the latest technology, one could do away with entrepreneurial judgment. Yet it is exactly this specifying decision as to the kind and extension of roundaboutness where entrepreneurial appraisal comes in. This kind of error is central to the economic selection process and is actually beneficial in its consequences for the economy.

Malinvestment of the macroeconomic kind are the result of policy changes. These may affect only certain sectors of the economy or the economy as a whole. Errors that affect certain sectors of the economy involve all those policy changes that come with regulation, taxation and changes in government spending. These kinds of malinvestment will cause smaller or larger disruptions of the economy, and may only bring about periods of low economic growth. Macroeconomic errors proper, however, lie at the heart of an economic recession or depression, when it is not individual business errors that are the reason for losses, or when it is not only certain sectors of the economy are affected, but when the macroeconomic environment has misled entrepreneurial action. The resulting “*macroeconomic malinvestment*” has a different origin and a different phenomenology than *micro-malinvestment*. These macroeconomic malinvestments arise from a systematic falsification of the signals of time preference and of the availability of resources, when a monetary policy is being applied that translates into an interest rate that transmits erroneous information and produces misleading signals about the macroeconomic conditions, and particularly about the feasibility of the degrees of roundaboutness.

While micro-malinvestment business errors tend to cancel each other out and make for an improvement in efficiency, because the mechanism of selection is also a device of learning and as such serves as a promoter of economic progress, business decisions that are misled by erroneous *macro signals* will result in a collective entrepreneurial errors, and it is in this sense that “any business cycle theory is essentially a theory of error” (Hülsmann 1998:1). Here the miscalculation of time is the result of an interest policy that has deceived the entrepreneur across the board about the availability of savings. In so far as the interest rate affects any investment decision, the overall business community is enticed to embark upon

roundaboutness of a degree that will later on prove to have been too high. This is the case where there is first a massive boom that only will be followed by a massive bust and in its extreme form brings about economic recession and depression. In this regard the monetary interest rate plays a central role in the entrepreneurial decision if and to what extent roundabout production will be initiated and to what extent it will result in success or failure (see figure 3).

Figure 3
Unsustainable Roundaboutness



It is typical for the occurrence of macroeconomic malinvestment that a monetary interest rate is brought into existence that does not reflect the availability of savings but the supply and demand for credit. In the modern monetary system, such a divergence is more the rule than the exception because it is not only by monetary policy decisions that such a deviation will be brought about, but such a divergence between the monetary interest rate and the natural rate is also inherent to the workings of a fractional reserve banking system (de Soto XXXX). An interest rate that is set too low in relation to a rate which would equilibrate authentic saving and investment induces business to embark upon roundaboutness to a degree that is not sustainable given the availability of authentic savings, i.e. that amount of savings

that reflects the state of time preference (RTP_n in figure 3). The consequence of an additional money supply is equal to an apparent increase of savings ($S_m - S_n$, as shown in figure 3), an increase that is not based on the prevailing rate of time preference. In such a case, entrepreneurs are enticed to embark upon the pursuit of projects that cannot be finalized (project RP' in contrast to project RP) because consumers are unwilling to give up part of their demand for consumption goods (as given by S_n in figure 3). The result will be the emergence of unfinished projects when this policy has to be abandoned as the economy runs into bottlenecks or creditors begin to panic. In the bust phase "idle resources" will emerge, both in the form of unusable capital and unemployable labor. Yet it is not the existence "idle resources" per se which constitute the problem, but the underlying causes that point to projects of failed roundaboutness for which the idle resources stand as a symptom.

Relative prices of goods and services together with the price for labor and the interest rate as the price for waiting serves as the essential tool of information as to how the entrepreneurs should arrange the production structure, and it is these signals that also provide the incentives in the ongoing process of capital structuring and restructuring. As it is the case with other policy interventions, when the price system gets manipulated by policy or distorted institutions have emerged (as it is the case with fractional reserve banking in the context discussed here) interest rate tends to transmit false signals and provides false incentives. A deviation of the monetary interest from its natural level, as it would result from the unhampered interplay between foregone consumption and investment, produces errors that show up in the structure of production. The degree of the implementation of roundaboutness has to be in tune with time preference, the availability of resources in the form of authentic savings and the purchasing power and tastes of the consumers. This coordination gets disrupted when false signals are provided by the interest rate. Fractional reserve banking falsifies both to the upside in the boom and to the downside in the bust, the availability of authentic savings. While in the phase of the credit glut deceives the entrepreneurs with the illusion of an abundance of savings, the opposite happens in the phase of the credit crunch where savings in fact are available but the financial intermediaries hold back lending.

Conclusion

In contrast to labor and land, capital has no objectivist physical dimension. Capital exists in the form of heterogeneous capital goods whose unified representation exists in the mind of the entrepreneur. The creation of capital is the result of entrepreneurial plans and

comes into existence with the cost of bearing uncertainty and investing time. Even in a highly advanced economy where all kinds of tools are immediately available, including new technologies, production takes time and occurs in stages at the individual business level. Like all extended human action, entrepreneurial action requires imagination and the conscientious application of time. The fact that production costs time means that roundaboutness implies sacrifice in the sense that immediate satisfaction gets postponed in the pursuit of the exploitation of a trade-off to get more or better goods in the future. Capital appears empirically as heterogeneous production goods, but as such they do not represent capital. Capital emerges when the heterogeneous capital goods are combined as tools in the context of an entrepreneurial plan. The heterogeneity of capital goods becomes only capital proper when these production goods become tools, when they receive a specific position in a production process that is ordered for the purpose to achieve economic progress and as such capital exists as intention in the human mind of the entrepreneur.

Given the uncertainty that surrounds roundaboutness production as the quintessential form of capitalist production, economic growth and development is not brought about by mere capital accumulation, but requires changes in the capital structure. Any such change, as it comes with investment, implies that some parts of the capital structure will become obsolete, and additionally that the result of roundaboutness will only show up after some period of time. It is here that the role of the entrepreneur comes into play as the agent to specify the capital structure under the guidance of expected profit and losses.

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