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Rethinking Capital-Based Macroeconomics

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ABSTRACT: The objective of this article is to present an extension of Garrison's "capital-based macroeconomics" model. Garrison's objective was—starting from a full employment equilibrium situation—to build a model that provides insight into the causes of crisis and depression. We offer—starting from an unemployment situation—an explanation of why expansionary monetary policies fail in the longer term to solve the unemployment problems associated with recessions. This extension provides a fresh perspective on the debates between Hayek and Keynes in the 1930s and over "quantitative easing" today.

KEYWORDS: Austrian business cycle theory, monetary policy, capital structure

JEL CLASSIFICATION: B53, E32, E58

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RETHINKING CAPITAL-BASED MACROECONOMICS

Roger Garrison was the first Austrian economist to model the process of capital formation and the distortion of market processes by monetary policy, which he illustrated by means of a series of interrelated graphics in his *Austrian Macroeconomics: A Diagrammatical Exposition*, published in 1978. He used "Hayekian Triangles" representing the inter-temporal structure of production and Rothbard's "Aggregate Time Market" representing the relation between present and future goods to illustrate changes in aggregate time preference and interest rate determination. Even in this, his first attempt, Garrison demonstrated the model's potential as a means of evaluating alternative economic doctrines, using Austrian Economics and Keynesianism as an example.

Over the next twenty years Garrison wrote numerous articles on this theme, many of which were published in mainstream macroeconomic journals. In the process he developed his own version of the Austrian theory of capital and the business cycle to which Richard Cantillon, David Ricardo, Carl Menger, Eugen von Böhm Bawerk, Knut Wicksell, Ludwig von Mises, Friedrich A. von Hayek, Richard von Strigl, Murray Rothbard and Mark Skousen, amongst others, had contributed.

The results of this process were published as *Time and Money: The Macroeconomics of Capital Structure* (Garrison 2001).[1] The objectives of this book were (1) to express capital theory in such a way that its implications for market processes in both the short- and long-term are evident, and (2) to help reintegrate capital into macroeconomics, and macroeconomics into modern Austrian economics.

[1] We can see that these two dimensions (time and money) were in Garrison's mind almost twenty years before he published the book. In *Austrian Macroeconomics: A Diagrammatical Exposition* (Garrison 1978, p. 169) he wrote: "One of the most distinctive features of Austrian macroeconomic theory is the concept of the 'structure of production.' This concept was formulated to give explicit recognition to the notion that capital (and the capital structure) has two dimensions. It has both a value dimension which can be expressed in *monetary terms*, and a *time dimension* which is an expression of the time that elapses between the application of the 'original means of production' (labor and other resources) and the eventual emergence of the consumption goods associated with them." (Emphasis added.)

This work is both an important and controversial contribution to Austrian macroeconomics. This is to be expected, as one of his critics acknowledged that "Garrison's approach represents a rather radical rupture from traditional and established modes of thought within Austrian economics" (Ludwig van den Hauwe, 2001, p. 83). Yet Joseph Salerno (2001, pp. 44–45), who has been critical of Garrison's conception of "secular growth," acknowledged that he had made a significant contribution to Austrian macroeconomics:

> In *Time and Money*, Roger Garrison (2001) now provides a substantial restatement and diagrammatic elaboration of Austrian macroeconomic analysis that has been so sorely lacking these many years. Garrison accomplishes this by constructing an analytical apparatus that Austrians can bring to bear on the central issues and problems of interest, business cycle, and growth that are of concern to contemporary mainstream macroeconomics. *Clearly, future research in Austrian macroeconomics will rest on the analysis of Garrison's "capital-based macroeconomics."* (Emphasis added.)

These and more uniformly critical treatments, such as that of Jörg Guido Hülsmann (2001), are offset by more positive reviews in the work of Richard Ebeling (2001), William Butos (2001), John Cochran (2001), Randall Holcombe (2001) and Larry Sechrest (2001). Richard Ebeling (2001), for example, explains that

> [Garrison] is, in a sense, attempting to pick up where the Austrians left off in their contributions of the 1930s, and at the same time reinterpret what has happened in Macroeconomics since then. He does so by offering a "capital-based" theory of macroeconomic relationships that focuses on the patterns of demand and relative prices in the structure of production, and contrasting it with his view of standard macroeconomics as a "labor-based" theory of aggregate relationships.

Garrison's contribution was the application of capital theory to bridge a gap between mainstream and Austrian economics. The controversy Garrison aroused suggests an opportunity. Ten years after the first publication of *Time and Money*, the purpose of this note is not just to review the impact of Garrison´s contribution, but to build upon it.

In contrast to Garrison, who started from a full employment equilibrium situation in order to reveal the cause of crisis and

depression, we start from an unemployment situation to explain why expansionary monetary policies fail to resolve this condition in the longer run.

It should be acknowledged that this "big question" is not new in the Austrian literature. After his *Prices and Production* (1931) had been criticized for failing to address the unemployment of resources Hayek himself considered the question in *Profits, Interest and Investment* (1939, p. 5):

> We shall start here from an initial situation where considerable unemployment of material resources and labour exists, and we shall take account of the existing rigidity of money wages and of the limited mobility of labour. [...] The earlier presentation of essentially the same argument in *Prices and Production* has been frequently criticised for its failure to take account of the existence of unused resources. It still seems to me that to start first from a position of equilibrium was logically the right procedure, and that it is important to be able to show how from such an initial position cyclical fluctuations may be generated. But this ought to be supplemented by an account of how such cyclical fluctuations, once started, tend to become self-generating, so that the economic system may never reach a position which could be described as equilibrium. This I shall try to do here and I hope to show that to introduce these more realistic assumptions strengthens rather than weakens my argument.

Our objective is to use an extension of Garrison's framework to illustrate the validity of Hayek's argument. This issue is of particular interest in the context of recent recourse to "quantitative easing." We also advance the argument that by extending Garrison's work to include recent developments in capital-based macroeconomics our model sheds light on the debate between Hayek and Keynes that took place in the 1930s.

Our starting point is Salerno's (2001, p. 45) warning that

> It is crucial to get the analytics right from the very start. In particular, it is essential to carefully scrutinize Garrison´s analytical apparatus to ensure that it does not implicitly assume any causal relationship that contradicts the underlying verbal-logical theorems that it is built upon.

We adopt the unemployment case with this caution in mind. This extension is advantageous for two main reasons: 1) it facilitates a more direct contrast with the Keynesian approach, and 2) it both

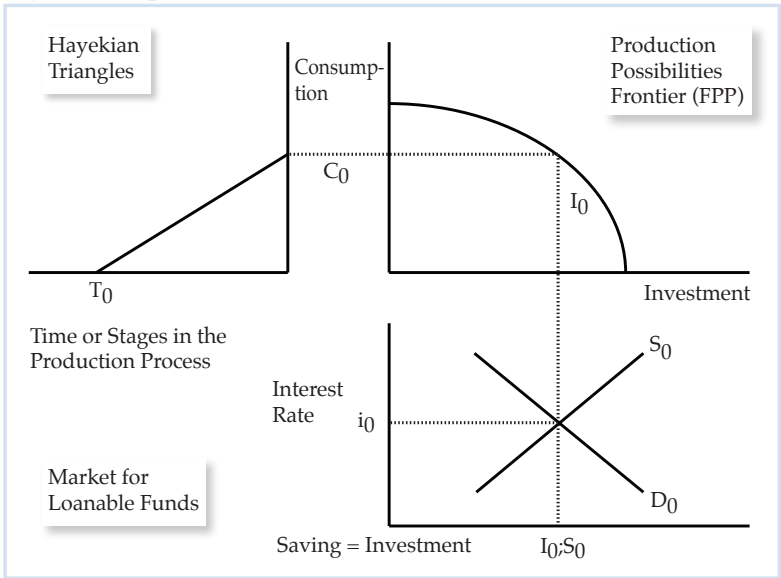
requires and permits explicit treatment of the non-neutrality effect, which we believe was not feasible in the original framework.

Part I outlines the original model as it was presented in *Time and Money* (2001). Part II proposes a modification of the model which allows us to answer a question Garrison's capital-based macroeconomics could not address. Part III presents the implications of this modification. Part IV concludes with a tabular summary comparing the original model with our modification.

PART I: THE ORIGINAL MODEL

"Understanding the market process that translates a change in intertemporal preferences into a reshaping of the economy´s intertemporal structure of production, is a prerequisite to understanding the business cycle, or more narrowly, boom and bust", is how Garrison (2001, p. 67) opens his section on economic cycles. However, here we ignore his contribution to capital formation in order to concentrate entirely on his explanation of unsustainable booms and its implications for Austrian business cycle theory (ABCT).

Figure 1. Capital-Based-Macroeconomics



Garrison's framework uses the three main tools illustrated in Figure 1. The first is a "Market for Loanable Funds,"[2] a mainstream tool which—in Figure 2—demonstrates the impact of the Central Bank's monetary policy when it lowers the market interest rate below its "natural" level (to borrow Wicksell´s terminology) and thereby causes savings and investments to diverge (Garrison, 2001, pp. 69–70).

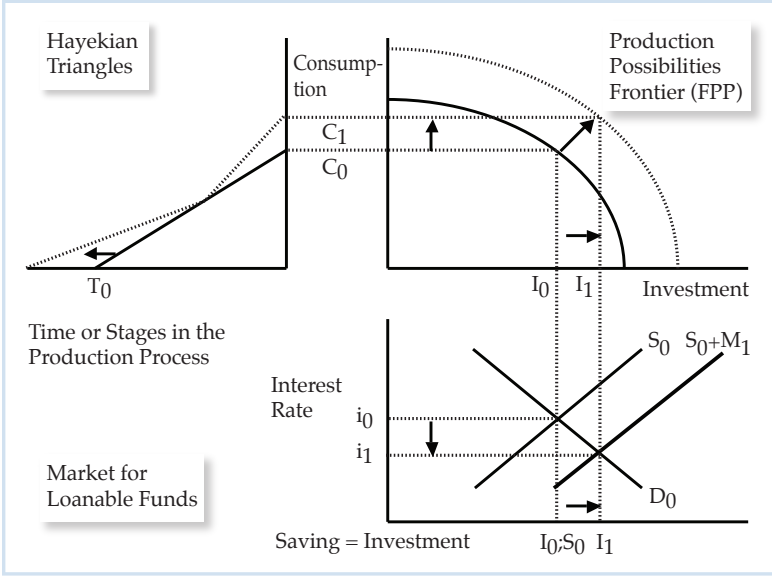
From the perspective of the entrepreneur, this "created credit" is indistinguishable from savings, as Ludwig von Mises explained (1949, pp. 433–434). Credit creation therefore results in malinvestment in the sense that projects that would not have been considered in the absence of a credit creation policy now proceed.

[2] As already mentioned, in his first attempt to develop a model, Garrison (1978) used the "Aggregate Time Market" associated with Rothbard (1962, p. 332) instead of the "Market for Loanable Funds." This is not the place to elaborate on this, but it is likely that the original tool was better suited to conveying the Austrian message, since it represents more accurately how the time preference of individuals with respect to present and future goods determines the rate of interest.

This effect is observed in the second of the tools: the Production Possibilities Frontier (PPF). Without any increase in savings, the economy attains higher levels of consumption and investment, which is represented by a shift of the PPF upward and to the right in Garrison's model. He explained that such a shift implies over-consumption and "*over-investment*." This displacement is unsustainable because it is not supported by voluntary savings. Garrison represented the PPF with a dotted line for this reason.

The crucial element of the model is the third tool—the Hayekian Triangles—which simply represents the inter-temporal structure of production. In Figure 2, the horizontal and vertical expansion of the Hayekian Triangles represent the over-consumption and *mal-investment* which take place as a consequence of the credit expansion policy adopted by the monetary authority. Garrison (2001, p. 72) observes:

Figure 2. Short-Run Effects of the Credit Expansion



In effect, the Hayekian Triangle is being pulled at both ends (by cheap credit and strong consumer demand) at the expense of the middle—a

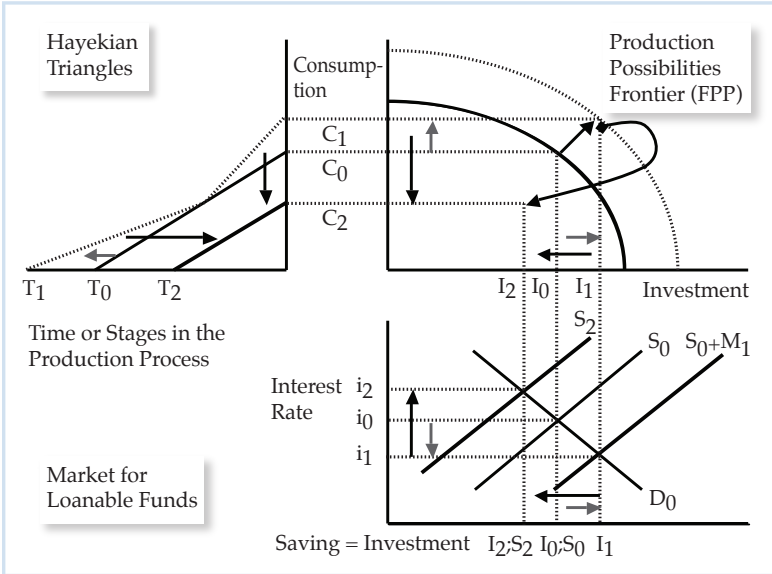
> tell tale sign of the boom´s unsustainability. Our two incomplete and differentially sloped hypotenuses bear a distinct relationship to the aggregate supply vector and aggregate demand vector suggested by Mark Skousen (1990, p. 297) and are consistent with the exposition provided by Lionel Robbins ([1934] 1971, pp. 30–43) and Murray Rothbard ([1963] 1972, pp. 11–39).

However, these are only the short-run effects. In the long run, the effects are reversed—as illustrated in Figure 3—which is why Garrison calls it "the theory of the unsustainable boom."

Garrison therefore concludes:

> In sum, credit expansion sets into motion a process of capital restructuring that is at odds with the unchanged preferences and hence is ultimately ill-fated. The relative changes within the capital structure were appropriately termed malinvestment by Mises. The broken line in the upper reaches of the less steeply sloped hypotenuse indicates that the restructuring cannot actually be completed. The boom is unsustainable; the changes in the intertemporal structure of production are self-defeating. Resource scarcities and a continuing high demand for current consumption eventually turn boom into bust (2001, p. 72).

Figure 3. Long-Run Effect of Expansionary Monetary Policy



Garrison's graphic treatment of credit expansion therefore confirms the outcome Ludwig von Mises anticipated in his *Theory of Money and Credit*:

> Certainly, the banks would be able to postpone the collapse; but nevertheless, as has been shown, the moment must eventually come when no further extension of the circulation of fiduciary media is possible. Then the catastrophe occurs, and its consequences are the worse and the reaction against the bull tendency of the market the stronger, the longer the period during which the rate of interest on loans has been below the natural rate of interest and the greater the extent to which roundabout processes of production that are not justified by the state of the capital market have been adopted (1953, pp. 365–366).

Garrison uses the "Market for Loanable Funds" to demonstrate that the interest rate rises when the monetary authorities—perhaps fearing an upsurge in inflation—decide to restrict credit. The rise in interest rates makes it impossible to continue investment projects initiated during the "easy money" interlude. At this point, over-consumption and over-investment are evident, illustrated as

a retrenchment of the PPF to a point *below* its original position, indicating a level of unemployment exceeding the *status quo ante*. The Hayekian Triangles contract horizontally and vertically, representing the excessive destruction of capital caused during the artificially stimulated business cycle. Garrison also shows the effect on employment and wages, with unemployment higher and real wages lower than they were at the beginning of the process.

PART II: RETHINKING CAPITAL-BASED MACROECONOMICS

In an interview, Garrison (2000) claimed his model was an attempt to "defeat the Keynesians at their own game." In effect, his model is an attempt to develop an alternative to the Investment and Savings, Liquidity Preference and Money Supply (ISLM) model developed by Hicks, and subsequently elaborated by Mundell-Fleming.[3]

However, John Maynard Keynes never concerned himself with the *causes* of the Great Depression that afflicted both the American and British economies. Instead he sought to identify economic policies which would allow these economies to recover from such a Depression. By the time of his *Treatise on Money* (1930), Keynes had already abandoned speculation on equilibrium and full employment to analyze the real world, one in which savings and investments are not always equal. He expressed his doubts that

[3] In a sense, Garrison completes the work that Hicks suggested. John Hicks (1967, pp. 204–205) notes that "[s]everal of us made attempts at that translation; the journals of the 1930s are full of them. But what emerged, when we tried to put the Hayek theory into our own words, was not Hayek. There was some inner mystery to which we failed to penetrate." In contrast, Hicks (1937) himself was able to mathematize Keynes' framework almost immediately in what today is known as the IS-LM model, work valued by Hayek (1995) as a significant contribution to the most pressing question of the day. Bruce Caldwell adds that "[a]s the formalistic revolution progressed, models like Hayek´s became curious antiquities." See the introduction that Caldwell wrote on the Hayek versus Keynes debate (1995, p. 33). Hence the relevance of Garrison's contribution: although it does not advance mathematical development of the ideas of Hayek, it does express simply and consistently in the form of graphs the controversy that dominated economic thinking in the early years of the 1930s.

the market alone could coordinate market processes sufficiently to restore equilibrium between savings and investment.

> Need we be fatalistic about the future also? *If we leave matters to cure themselves, the results may be disastrous*. Prices may continue below the cost of production for a sufficiently long time for entrepreneurs to feel that they have no recourse except an assault on the money-incomes of the factors of production (1930, Vol. 2, p. 385). (Emphasis added.)

Garrison, in common with Mises, Hayek and Machlup, begins his analysis at a full employment stage in the cycle.[4] Keynes, in contrast, starts at a stage characterised by extreme unemployment. From start to finish his "*General Theory*" (1936) addresses the problem of unemployment. Our reading of Keynes suggests that, in his mind, the full employment alternative was both difficult to verify and too obviously susceptible to inflation if demand stimulating policies were applied at the "wrong" stage in the cycle.[5]

However, in the thirties Hayek was looking for a "real general theory." It is for this reason that in his *The Pure Theory of Capital* (1941, pp. 373–374) he criticized Keynes' preoccupations with an unemployment situation and the "economics of abundance":

> Now such a situation, in which abundant unused reserves of all kinds of resources, including all intermediate products, exist, may occasionally prevail in the depths of a depression. But it is certainly not a normal position on which a theory claiming general applicability could be based. Yet it is some such world as this which is treated in Mr. Keynes' *General Theory of Employment, Interest and Money*, which in recent years has created

[4] For example, Fritz Machlup (1931, pp. 194–195): "In its original formulation, the Mises-Hayek theory started from a state of full employment and on this basis, it was possible to argue that investment inflation will draw productive factors away from the stages of production nearest to the consumer goods end, that this situation is not tenable in the long run, and that it is bound to lead to a reaction. It was easy to challenge this thesis of production structure distortion by arguing that it is invalid whenever there is a supply of unemployed factors. This argument finally led Keynes to propose that complete disappearance of involuntary unemployment should be regarded as the proper limit of credit expansion. Until the point at which this 'full employment' has been reached, Keynes sees no particular danger in financing increased investment by means of credit creation."

[5] In Chapters 10 and 12 of his *Treatise*, Keynes (1930) explains that the relationship between money supply and the price level in the old quantity theory is only true at the theoretical equilibrium.

> so much stir and confusion among economists and even the wider public. Although the technocrats, and other believers in the unbounded productive capacity of our economic system, do not yet appear to have realised it, what he has given us is really that economics of abundance for which they have been clamouring so long. Or rather, he has given us a system of economics which is based on the assumption that no scarcity exists, and that the only scarcity with which we need concern ourselves is the artificial scarcity created by the determination of people not to sell their services and products below certain arbitrarily fixed prices. These prices are in no way explained, but are simply assumed to remain at their historically given level, except at rare intervals when "full employment" is approached and the different goods begin successively to become scarce and to rise in price.

Garrison's work was heavily influenced by the concept of equilibrium. The same is true of Hayek's work in the early 1930s when he was formulating his business cycle theory that included his famous triangles and actively sparring with Keynes. As Bruce Caldwell (1995, p. 14) explains:

> For Hayek, any adequate theory of the business cycle must be consistent with what he called "equilibrium theory." This theory states that in a free-market system, changes in underlying conditions of demand and supply bring about adjustments in relative prices, adjustments that continue until demand and supply in all markets are equalized. So long as relative prices are free to adjust, the price mechanism coordinates the actions of agents on both sides of any market.

And then he adds:

> One such market is the market for loanable funds, where the interests of savers and borrowers meet. In analyzing this market, Hayek used Wicksell's concept of a "natural rate of interest," a rate that just equalizes savings and investment.

As noted by Ebeling, Salerno, and even Garrison himself in the articles referenced above, the capital-based macroeconomics framework is based on the contribution Hayek developed in the thirties. Garrison's Hayekian Triangles do not just represent capital structure in its narrower sense, but includes the "market for loanable funds" in the broader sense in which both Wicksell and Hayek understood it.

Herein lies the problem: Hayek never reworked his business cycle theory after recognizing the weakness of the equilibrium concept in 1945.[6] Nonetheless in his debate with Keynes and Sraffa, one finds references to problems anticipated in the demand stimulation policies advocated to revive the economy. Caldwell underlines this point:

> Once the crisis had started, Hayek felt that the best policy was simply to allow it to play itself out. Attempts to stimulate the economy through further injections of money would only keep the market rate artificially lowered that much longer, further distorting the structure of production, prolonging and deepening the crisis. Attempts to stimulate consumer demand would likewise be adding fuel to the fire, since excessive consumption demand was a characteristic of this stage of the cycle. Indeed, the slump stage of the cycle was the painful medicine by which equilibrium in the system was ultimately restored (Caldwell, 1995, p. 17).

And he continues (1995, p. 17) quoting Lachmann's explanation of Hayek's position:

> For Hayek Paretian general equilibrium was the pivot of economic theory, the centre of gravity towards which all major forces tended. For him the task of trade cycle theory was to show how it came about that these major forces were temporarily impeded and their effects delayed, and since the cycle was supposed to start with a boom and end with a depression, he saw in the depression the ultimate triumph of the equilibrating forces (Lachmann, 1986, p. 227).

In the model, Garrison essentially follows Hayek's lead, explaining to Keynes and his followers by means of graphs how the economy went from full employment to high unemployment. He is, in effect, pointing out that one cannot expect to remedy a

[6] Ulrich Witt (1997) explains that in his earlier work Hayek focused his research on capital theory and business cycles. Later, he changed his research program to social philosophy and the theory of spontaneous order. These two phases, Witt argues, correspond to two basically incompatible research programs: general equilibrium theory versus the theory of adaptation, collective learning and the formation of expectations. Hayek never reconsidered his business cycle theory in the light of his later thinking. Witt's article discusses the role business cycle theory might play in a theory of spontaneous order.

lamentable situation without first understanding how that state of affairs arose in the first place.

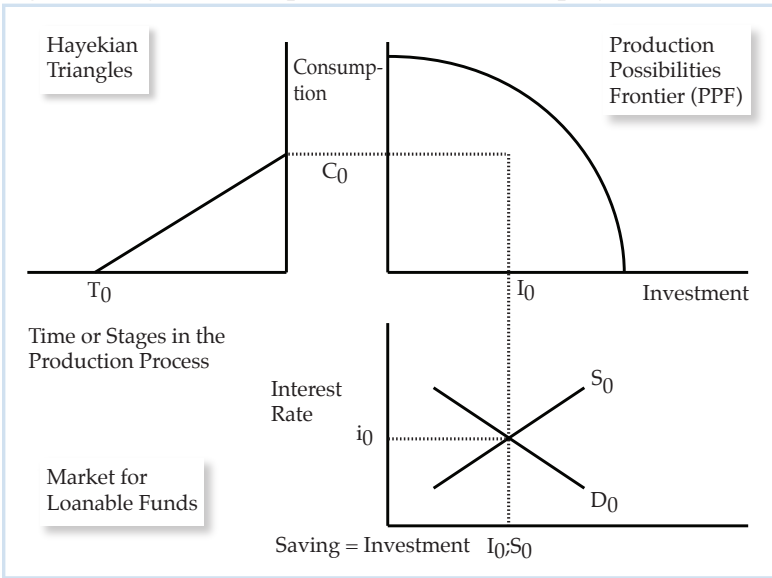
However, in "Prosperity and Depression," Gottfried von Haberler (1937, p. 284) explains:

> It has often been argued—e.g., by Professor Hayek—that an analysis of the cycle must start from an equilibrium with full employment. One cannot assume unemployment from the beginning, it is said, because it is the thing which has to be explained. But surely it must be possible and legitimate to investigate what happens when business has begun to expand after a depression which has created much unemployment and over-capacity, without first explaining how the depression has been brought about.

However, what we are attempting to show here, using the same framework, is the answer to quite a different question, namely why the Keynesian policies currently so much in vogue as a response to the sub-prime crisis of 2008 will fail yet again to return the economy to a sustainable "full employment equilibrium situation" (O'Driscoll, 2009; Ravier, 2010b). For this reason, and in contrast to the original model, our starting point shown in Figure 4 is *below* the PPF, and symbolizes a situation of resource underemployment (both human and capital). To put it more clearly, here we are assuming an "equilibrium with unemployment" situation (to use Keynesian terminology) as our point of departure. This allows us to revisit the debate from the point where savings and investments are balanced despite some unemployment.

It should be clear that this situation is the legacy of the previous economic cycle, analysed in Garrison's original framework. This was the case in the Great Depression of the 1930s which Lionel Robbins (1934), Benjamin Anderson (1949), Murray Rothbard (1963) and other economists blamed on the pre-existing economic crisis. It should also be clear that this unemployment situation would only persist if central banks continue manipulating the money supply or if the government interferes with wage rates. As Mises stated: "[t]here prevails on a free labor market a tendency toward full employment. In fact, the policy of letting the free market determine the height of wage rates is the only reasonable and successful full employment policy" (1952, p. 153).

Figure 4. Keynesian "Equilibrium with Unemployment"

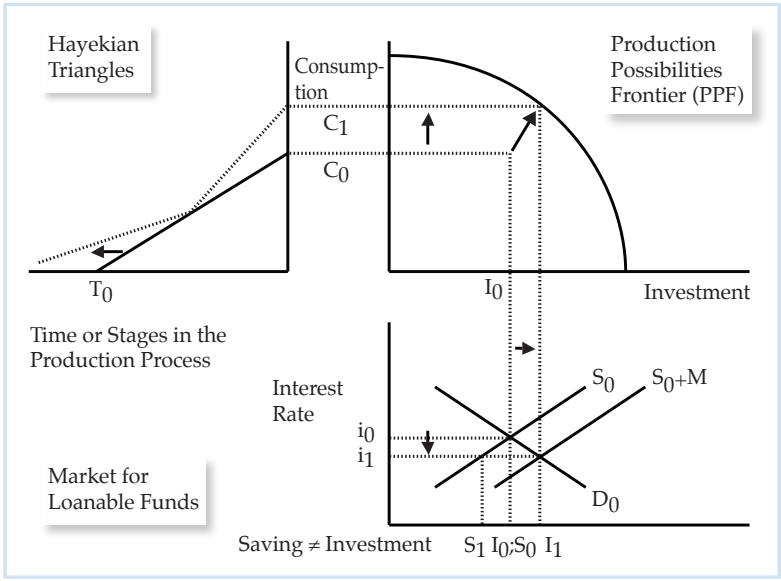


Austrian business cycle theory addresses the consequences of credit expansion by a monetary authority that reduces market interest rates below their "natural" level. In Figure 5, we show this by the shift to the right of the loan supply curve and the loss of equivalence between savings and investments, which is consistent with Garrison's model. However in contrast to Garrison's model we show the result of monetary expansion not as an economic boom beyond the PPF, but rather full employment at the PPF.[7]

It is important to note that what we have said about the short-term effect is consistent with both the Hayekian and Keynesian approaches. In this sense, as Krugman (2010) suggests: "In practice, Austrians seem to be Keynesians during booms."

[7] James Ahiakpor (2008) questioned the validity of Garrison's capital-based macroeconomic analysis on the grounds that it extends into the area beyond the PPF which is, by definition, outside the absolute maximum limit of output. Garrison (2008) offers his own response. This is not the place to elaborate on this, except to emphasize that our modification avoids that particular issue.

Figure 5. Full Employment in the Short-Run



A completely different situation arises if the economic system is at full employment or close to it when monetary expansion occurs. The Hayekian Triangles then show that it *is* possible to increase production of capital goods *but only if consumer goods production is sacrificed in the short-run to release the factors of production required*. However, time will elapse before additional investment causes an increase in the availability of consumer goods. In the case of the Great Depression, Keynes addressed the possibility that the economy would remain in an unemployment situation from which only active demand stimulation policies would enable it escape.

To this end, it should be remembered that Keynes' essay "*The Great Slump of 1930*" (1932) recommends reducing the cost of money below its natural level to attain full employment. In his opinion, use of the banking system "properly at all times"[8] to adjust the interest rate appropriately encourages or discourages investment.

[8] This of course suggests omniscience, the major point of divergence between Hayek and neo-classical economists once Hayek revised his theory with respect to equilibrium's role after 1945.

In the specific case of the Great Depression, Keynes asked the Bank of England and the Federal Reserve in the United States to pressure banks to act in concert and reduce interest rates, for example to one half of one per cent, in order to stimulate beneficial economic activity and employment. He felt it would suffice to convince the general public of the political will to sustain the short-term interest rate at a low level over a long period of time for this strategy to succeed. Recent attempts to replicate this strategy demonstrate not only that the balance between consumption and investment alters, but also the structure of investments. Spiraling demand for inflation-proof assets such as gold and property suggest that the public are not easily deceived, just as Hayek anticipated.

Hayek's criticism of Keynes' *Treatise* essentially points out that *without a capital theory, he cannot understand the effects of the monetary policy he proposes on relative prices, interest rates and capital structure*. Hence in his review of the "*Method Problem*," Hayek took Keynes to task both for relying on a macroeconomic model lacking microeconomic foundations and for ignoring the crucial role—emphasized by Böhm-Bawerk and Wicksell—capital theory played in determining the interest rate.[9]

In Hayek's own words (1931b, p. 277):

> *Such an explanation can, however, only be reached by a close analysis of the factors determining the relative prices of capital goods in the different successive stages of production*—for the difference between these prices is the only source of interest. But this is excluded from the outset if only total profits are made the aim of the investigation. Mr. Keynes' aggregates conceal the most fundamental mechanisms of change. (Emphasis in the original.)

Hayek's emphasis on capital-based macroeconomics in his criticism of Keynes highlighted Keynes' focus on the aggregate output effect—represented by the PPF—resulting from the "market for loanable funds" part of the model, which was precisely

[9] Even Sraffa (Hayek, 1995), in his criticism of *Prices and Production*, accepted the emphasis on relative prices: "Taken as a whole, there is this to be said in favour of the book—that it is highly provocative. Its one definite contribution is the emphasis it puts on the study of the effects of monetary changes on the relative prices of commodities, rather than on movement of the general price level on which attention has almost exclusively been focused by the old quantity theory."

the component derived from an incomplete understanding of Wicksell. We can therefore show here that Keynes omitted a crucial dimension of the model, specifically the inter-temporal structure of production simplified in the Hayekian Triangles. It is precisely this tool which animates the whole system and allows us to understand the micro-foundations affecting the movement of *all* relevant variables. The short-term duration of any positive effects of monetary policy is highlighted as a consequence (see Horwitz, 2000, especially ch. 2).

In his review of Keynes' *Treatise*, Hayek explains that:

> If the increase of investment is not the consequence of a voluntary decision to reduce the possible level of consumption for this purpose, there is no reason why it should be permanent and the very increase in the demand for consumers' goods which Mr. Keynes has described will put an end to it as soon as the banking system ceases to provide additional cheap means for investment. Here, his exclusive insistence on new investment and his neglect of the process of reinvestment makes him overlook the all-important fact that an increase in the demand for consumers' goods will not only tend to stop new investment, but may make a complete reorganization of the existing structure of production inevitable—which would involve considerable disturbances and would render it impossible, temporarily, to employ all labor (1932, p. 43).

Keynes might well have retorted that Hayek's *laissez-faire* implies deflation, the very factor that contributed to the emergence of Hitler and National Socialism in Germany. But Hayek (1932, p. 44), would then counter that:

> This deflation is, however, a secondary phenomenon in the sense that it is caused by the instability in the real situation; the tendency will persist so long as the real causes are not removed. Any attempt to combat the crisis by credit expansion will, therefore, not only be merely the treatment of symptoms as causes, but may also prolong the depression by delaying the inevitable real adjustments. It is not difficult to understand, in the light of these considerations, why the easy-money policy which was adopted immediately after the crash of 1929 was of no effect.

In conformity with Hayek, we show in our model that even if full employment is reached through active demand stimulation policies, this will be unsustainable due to the inability of a monetary authority to maintain low interest rates in the longer term. It

should be noted too that this is not a process of over-investment, but mal-investment, which we believe is more consistent with the Austrian literature in general and Mises in particular, as Salerno (2011) recently emphasized.[10]

Figure 6. Unemployment and Destruction of Capital in the Long-Run

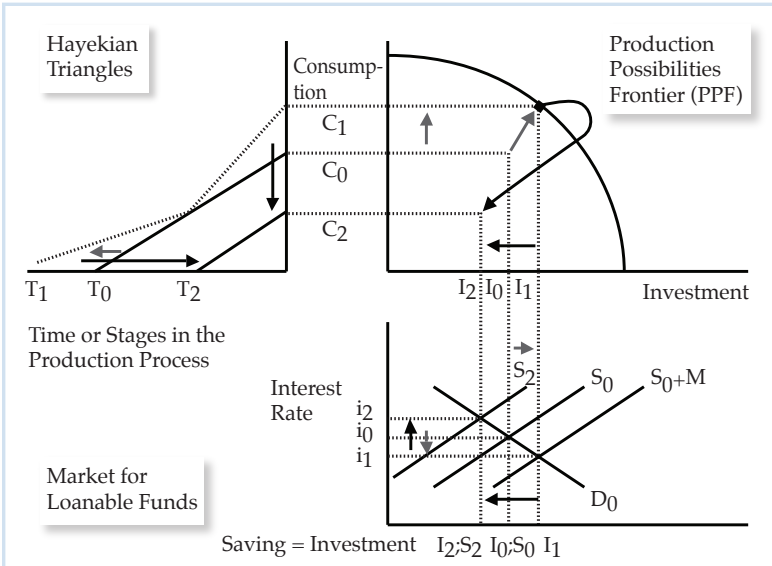


Figure 6 shows the unsustainability of the boom phase. As pointed out earlier, the monetary authorities' fear of inflation leads them to abandon credit expansion. The lowest level of savings then determines the equilibrium interest rate: rates rise and investment suffers as a consequence. Under such circumstances the interest rate rises well above its initial level prior to the credit

[10] Salerno (2011, p. 14) has recently shown that ABCT is not an "overinvestment" theory at all. In fact, Mises, Rothbard and, somewhat less emphatically, Hayek argued explicitly that "overconsumption" and "malinvestment" were the essential features of the inflationary boom.

expansion.[11] The economy retreats from the "stimulus PPF." The full employment, which was entirely attributable to the stimulus, evaporates. The resultant level of unemployment, one that is higher than that existing at the start of the economic cycle, precipitates a new crisis phase and with it the risk of renewed stimulus. In each iteration, the severity of the crisis is determined by the extent to which government intervention in the economy prevents prices and wages from adjusting (Rothbard, 1963, p. 14; Hayek, 1979; Cochran, 2010). This explanation confirms all the consequences that flow from Garrison's original use of the Hayekian Triangles, as shown in Figure 3, including the lengthening of the duration of production that results from the horizontal and vertical expansion of the triangle and representing the "misguided" allocation of resources during the boom phase.

To conclude this section it is worth recalling Hayek's own comments on Keynes' *Treatise*, particularly his interpretation of the reason Keynes ignores his analysis of capital theory:

> From Mr. Keynes' Reply to the first part of these Reflections (see *Economica*, November 1931, p. 395), I gather that he considers what I have called changes in the structure of production (i.e. the lengthening or shortening of the average period of production) to be a long-run phenomenon which may, therefore, be neglected in the analysis of a short-period phenomenon, such as the trade cycle. I am afraid that this contention merely proves that Mr. Keynes has not yet fully realised that *any* change in the amount of capital per head of working population is equivalent to a change in the average length of the roundabout process of production and that, therefore, all his demonstrations of the change in the amount of capital during the cycle prove my point (see *Treatise*, Vol. 11, Chapters XXVII–XXIX) (1932, p. 42):

Mises underlines a similar point in his *Human Action* (1949) when he points out the dangers of distinguishing between short- and long-term effects.[12] Offering the excuse that shortening the

[11] In *The Pure Theory of Capital* (1941, p. 372) Hayek explains: "Where will the rate of interest be fixed in this final equilibrium? If we assume the quantity of money to have remained constant, it will evidently be above the rate which ruled before the initial change occurred and even above the somewhat higher impact rate which ruled immediately after the change occurred, since every revolution of the process we have been considering will have raised it a little further."

[12] Mises points out that "we must guard ourselves against the popular fallacy of drawing a sharp line between short-run and long-run effects. What happens in

productive process is completed only in the longer term does not conceal the on going distortion of both relative prices and the capital structure initiated when a monetary authority expands the money supply.

PART III: THE IMPLICATIONS OF THE PROPOSED MODIFICATION

We consider the approach outlined here an extension to the original model with two important implications. First it makes it easier to contrast the Keynesian and Austrian strategies for dealing with an economic downturn; second, it leverages the concept of the non-neutrality effect of monetary policy as a route towards a more complete understanding of why capital (and potentially other resources as well) are irrevocably consumed in artificially stimulated booms.

The first derives from our treatment of the PPF. The second reflects some qualitative aspects of resource utilization under the stimulus of monetary expansion. Each of these claims is briefly elaborated in turn.

1) Adopting a point below the PPF as a common starting point makes contrasting the Keynesian and Austrian strategies for dealing with economic downturns more straightforward:

We consider the effects of monetary policy from the same starting point as Keynes in both his *Treatise* (1930) and *General Theory* (1936), namely unemployment of resources. We demonstrate that expansionary monetary policy is effective at achieving a new "equilibrium with full employment" in the short run, but also that in the longer-term the positive effects inevitably reverse themselves and the economy contracts into a new crisis and deeper depression.

It is important to emphasise that we use the term "equilibrium" not merely to express the Austrian message to a Keynesian

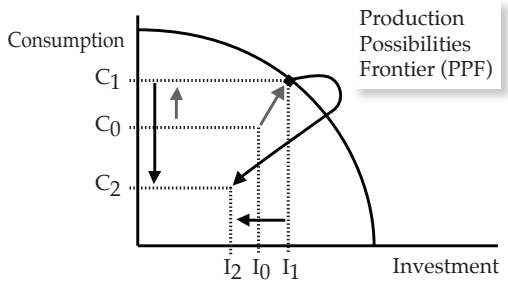
the short run is precisely the first stage of a chain of successive transformations which tend to bring about the long-run effects" (1966, p. 296).

audience, but rather in order to demonstrate that the resulting full employment situation is both inefficient and temporary, just as Hayek intimated. As Garrison (1996, p. 169) pointed out: "It is clear in his discussion following the call for socialized investment that Keynes is concerned with the 'volume' and not the 'direction' of employment." In contrast, the Austrian perspective in general and Hayek's in particular is that not *every* point on the PPF implies optimum efficiency, but only one point—the one that reflects the individual preferences of economic agents.

2. The failure of monetary expansion as a long-term cure for economic downturns is a function of the non-neutrality of monetary policy, particularly the irreversible use of resources that results from monetary stimulus.

One of the most important aspects of ABCT as it applies to monetary policy is the non-neutrality of money in both the short *and* the long run (Ravier, 2011). Basically, any monetary policy affects relative prices. If relative prices change because of monetary policy they inevitably affect such variables as economic activity and employment (Ravier, 2010a). To illustrate this point, it is necessary to distinguish between two complementary processes which occur at the stage of crisis and depression.

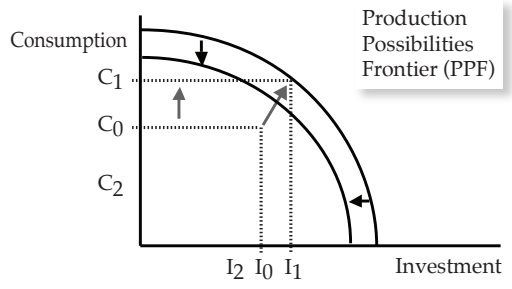
Figure 7. Credit Expansion Ends with Unemployment



On the one hand, as illustrated effectively by Garrison's framework, at some point crisis and depression in the economy reaches a point at which widespread "frictional" unemployment results from bankruptcies. Resources, including significant quantities of labor are idle and available for re-deployment. Figure 7 illustrates the resultant under-utilization of resources, but is silent on the potential capacity of the economy. In our modification, the same consequence results when stimulation of employment by artificially low interest rates ceases.

On the other hand, and this is the most relevant aspect, due to the mal-investment process during the stimulus phase we also face a situation in which the potential productive capacity of the economy and thus the real wages potentially earned once the economy returns to normal levels of employment is reduced as a consequence of the *partial destruction of capital*. Many authors, including for example Huerta de Soto (1998, pp. 413-415), focus attention on the "partial destruction of capital" that inevitably occurs because there is a category of resources which are lost when investment projects are abandoned. Stimulus significantly increases the volume of resources that ultimately fall in the "sunk cost" category: at the end of the stimulus phase, some resources have already been committed to investment projects but are not yet productive; when the stimulus phase ends and it turns out that these projects are not going to be completed, these resources are "sunk" costs and not re-assignable to new projects.

Figure 8. Credit Expansion Ends with Consumption of Capital



What we therefore need to illustrate as a sequel to Figure 7 is the common misconception of those working in the Chicago tradition, namely that it is possible to use apparently idle resources to return to the situation existing prior to the cycle. Thus in Figure 8 the PPF is lower than we had in the initial situation. This graph is silent on the idleness of resources (both human and capital) but shows the reduction of potential production capacity that results from mal-investment during the previous stimulus phase. We believe this dimension of the problem, which was ignored in Garrison's graphs, deserves explicit recognition in future work.

Furthermore, it is worth noting that it follows from the premises laid out above that our extension of capital-based macroeconomics framework will not be consistent with a Phillips curve with a vertical slope (Friedman and Phelps), but does conform to the logic behind a Phillips curve with a positive slope (Hayek, 1979; Ravier, 2010a; Mulligan, 2011).[13]

PART IV: CONCLUSIONS

We consider Garrison's work one of the most important contributions by the Austrian School in the past decade. In addition to the model's pedagogical value and its role in re-kindling interest in the contributions Hayek made in the 1930s (over-shadowed at the time by Keynes), capital-based macroeconomics appears to have potential applications in the field of comparative economics. In this paper we have attempted to take some tentative steps down that road.

The following Table summarizes the arguments laid out, comparing the original model with the extension suggested here.

[13] For similarities and diferences between the Austrian and the Chicago approach, see also Ravier and Schenone (2007).

	Original Model	Revised Model
Starting Point	Full employment situation. Represented by a point on the PPF.	Unemployment situation. Represented by a point below the PPF.
Objective	To explain the cause of the crisis and depression, along with the consequent unemployment.	To explain the reason why expansionary monetary policy will fail to stimulate the economy in the long term and thus is incapable of facilitating recovery from a recession.
The Short-Run Effect of Monetary Policy	Over-consumption and over-investment. The monetary policy moves the economy temporarily to a point that is above the PPF.	Full employment. Monetary policy has a transitory impact on consumption and investment, moving the economy to a point on the PPF. We have mal-investment, but not over-investment (Salerno, 2011).
The Long-Run Effect of Monetary Policy	The effect of monetary policy is reversed. A new "equilibrium with unemployment" attained.	The effect of monetary policy is reversed. A new "equilibrium with unemployment" is reached, but potential productive capacity is consumed in the process.
Austrian School versus Keynesianism	Solves a problem that Keynes does not raise.	Facilitates comparison with the Keynesian 'remedy'. Shows that the benefits of the Keynesian prescription are only short-term effects.
Phillip's Curve	Consistent with Friedman and Phelp's Phillips Curve.	Consistent with a Phillips Curve having a positive slope (Hayek, 1979; Ravier, 2010a; Mulligan, 2011).

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