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# Expectation in Austrian business cycle theory: Market share matters

Nicolas Cachanosky

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**Abstract** One of the most important objections to the Mises-Hayek business cycle theory is the rational expectations critique. The debate between supporters and critics of the Mises-Hayek theory has not paid sufficient attention to the problem of differences in expectations and the market share in the allocation of production factors. I represent financially the effects that occur under the Austrian business cycle theory in the market of production factors as well as how economic imbalances occur when a central bank follows an expansionary policy and entrepreneurs have different expectations.

**Keywords** Austrian business cycle theory · Rational expectations · Market share · EVA(R) · Economic value added

## 1 Introduction

One of the most important objections to the Austrian, or Mises-Hayek, business cycle theory (ABCT) is the rational expectations critique. According to the Austrian theory, a monetary policy that expands the credit supply and lowers interest rates below the equilibrium rate results in a cluster of errors that eventually transform a boom into a bust. The rational expectations critique holds that it is unwarranted to base a theory on systematic errors on the part of otherwise reasonably smart entrepreneurs.

In answering this objection, the debate has not paid sufficient attention to the problem that monetary policy distorts the market structure through marginal entrepreneurs and not through a representative economic agent. An exception is Evans and Baxendale (2008), who mention but do not develop this issue. This problem deserves further scrutiny.

The question of expectations is important. The debate regarding the disagreement between the ABCT and the rational expectations critique not only contributes to a better understanding of the dynamics of the theory but also relates directly to the concept and

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use of expectations in economic theory. Rational expectations are not only part of business cycle theories but also a cornerstone of general economic theory.

This article contributes to the recent literature on the ABCT in three ways. First, the role of expectations in the ABCT literature is addressed by focusing on how the marginal entrepreneur affects the market share of resource allocations. To this end, I extend the works of Callahan and Horwitz (2010), Carilli and Dempster (2008) and Evans and Baxendale (2008) to demonstrate how expectations affect the market share of unsustainable investments in the presence of a loose monetary policy. It is difficult to assert that the market share of resource allocation has never been mentioned in this debate. However, this topic has not received the attention that it deserves. To the best of my knowledge, no study on this subject focuses on the market share of resources among different types of economic activity.

Second, this paper offers a modern representation of ABCT insights using the economic value added (EVA<sup>®</sup>) literature, which is a largely unexamined connection.<sup>1</sup> J. C. Cachanosky (1999) is the only attempt I am aware of that tries to embed Austrian theory in the EVA<sup>®</sup> framework. The present paper demonstrates how the capital theory insights of the ABCT have a straightforward financial interpretation. The EVA<sup>®</sup> presentation aids the understanding of the business cycle problem in general and the role of expectations in particular. Contrary to economic models that assume that entrepreneurs act *as if* they were in the world described by the model, to frame the ABCT in the EVA<sup>®</sup> literature demonstrates how economic agents *actually* make decisions.

Third, this paper adds to the literature that updates the ABCT with respect to modern economic institutions. N. Cachanosky (2012, 2014), Hoffmann (2010, 2012), Kollar (2008) and White and Selgin (2010) study the ABCT under fiat currencies rather than the gold standard and in an international context. Cowen (1997) and Young (2012) focus on the role of risk in the ABCT. Wagner (1999) argues that one requirement in modernizing the ABCT is to study divergent expectations. The present paper updates the expectations assumed to be in place in the ABCT in the manner suggested by Wagner.

The article is structured as follows. The first section reviews the rational expectations critique of the ABCT literature. The second section develops in further detail the role of expectations in the ABCT. The third section discusses why this problem does not occur in the absence of an expansive monetary policy.

## 2 Review of the rational expectations critique

The ABCT posits that an expansive monetary policy distorts the capital structure in the economy. Because capital intensive and long-term projects are more sensitive to the interest rate than short-term projects, the capital structure undergoes structural changes when the monetary policy decreases the interest rate below the equilibrium (natural) interest rate. Because capital goods are heterogeneous, the monetary policy has non-neutral effects on the capital structure. A bust implies a costly adjustment of the distortions accumulated in the capital structure.<sup>2</sup>

<sup>1</sup> On EVA<sup>®</sup>, see Stern, Shiely and Ross (2001), Stewart III (1991) and Young and O'Byrne (2001). EVA<sup>®</sup> is a rearrangement of the free-cash-flow (FCF). EVA<sup>®</sup> is a registered trademark of Stern Stewart & Co.

<sup>2</sup> For a more detailed discussion of the Mises-Hayek business cycle theory, see Ebeling (1978), Garrison (2001), Hayek (1931, 1933) and von Mises (1949).

According to the rational expectations critique, for instance, as found in Caplan (1997) and Tullock (1988, 1989), the theory needs to explain how otherwise rational entrepreneurs are so easily deceived by a publicly known monetary policy.<sup>3</sup> As a hypothesis, rational expectations imply that the economic agents' expectations of economic variables equal the true expectations of economic variables, and therefore, there is no place for systemic errors. That is, the agent's expectations are model-consistent, and this consistency requirement is what the criticism of the ABCT is based on. If entrepreneurs had rational expectations, they would not produce systematic errors.

Notwithstanding the importance of the rational expectations critique, this problem is hardly new. Hayek (1931, pp. 83–85) asserts that if “entrepreneurs entertain correct views about the price changes,” the “new rate of interest should correspond to the system of prices which will ultimately be established,” and “all extensions of production, for which additional funds would not be sufficient, will be excluded.” The ABCT implies a “loose” sense of rational expectations in which Lincoln's law holds you can fool some of the people some of the time but not the strong version: you cannot fool all of the people all of the time (Garrison 1989). In this sense, the rational expectations critique of the ABCT is peculiar: it is the principle expressed in Lincoln's law that inspired the evolution of rational expectations in the first place. The economic agents in the ABCT are not assumed to be irrational; they are simply not assumed to be omniscient in the sense that they know and understand the correct model of the world. Therefore, a policy that affects a price in the market, such as interest rates, can confirm wrong expectations rather than correct them.

Broadly speaking, the answers to the rational expectations challenge to the ABCT can be divided into two groups: (1) A friendly approach to the rational expectations critique that acknowledges a need for revision but concludes that the theory still holds and (2) a less friendly approach that maintains that the problem does not lie with the theory but with the initial rational expectations assumption.

The first group can be represented by Carilli and Dempster (2001) and Evans and Baxendale (2008), who treat the rational expectation critique as a “valid challenge and accept the fundamental claim that in its present form the Austrian theory requires revision” (pp. 83–84.) Carilli and Dempster's (2001) argument is that the expansive monetary policy of the monetary authority places the entrepreneurs and banks in a prisoner's dilemma. In short, seizing capital gains during a boom by investing in long-term and capital intensive projects and selling them to other investors before the boom ends is rational behavior. Because this exposition falls within the framework of the prisoner's dilemma, the rational behavior is implicitly embedded in the exposition.

Evans and Baxendale (2008) accept the rational expectations challenge but argue that because entrepreneurs are heterogeneous, the cluster of errors is driven not by a representative entrepreneur but by entrepreneurs on the margin. For Evans and Baxendale (2008), the critic still must offer a convincing explanation why entrepreneurs can be assumed to be homogeneous. Even if the entrepreneurial heterogeneity argument may put Evans and Baxendale (2008) between the two groups, they still offer a friendly reception to the rational expectations challenge.

<sup>3</sup> For others critics, see Friedman (1993), Hummel (1979) and Yeager (1986). Replies to these criticisms can be found in the references mentioned in this article and in Garrison (1996). The problem of expectations was already discussed by Lachmann (1943) and von Mises (1943).

Rationality is a key aspect in economic theory. If decisions are irrational, then economic agents cannot optimize the outcome of their strategies. Therefore, the assumption of rational expectations becomes nearly unquestionable. However, rational expectations are an assumption, not a fact. To use an assumption to criticize a theory is no more valid than using the theory to criticize the assumption. Here is where for the Austrian theory the rational expectations critique falls short. For the rational expectations critique, the ABCT fails the rationality test. However, for the ABCT, the rational expectations critique fails the reality test. A theory can be consistent and unrelated to the real world at the same time. This debate offers an example of differences in the 'hard core' of two research programs, as described by Lakatos (1978, chapter 1).<sup>4</sup> This role of rational expectations makes this debate important for supporters and critics and is the reason why the critics consider their objection to be on strong grounds even if it is based on a non-observable assumption, as is the case of rational expectations. The debate not only concerns the consistency of a theory but also the validity of a foundational piece in the context of a particular business cycle theory.

In this context, a more plain rejection of the rational expectations critique can be found, in Barnett and Block (2005, 2006), Block (2001), Callahan and Horwitz (2010), Garrison (1991, 2001) and O'Driscoll and Rizzo (1985, pp. 213–226), who argue that the critique is "unrealistic in a way that vitiates [its] analysis."<sup>5</sup> From this perspective, the center of the disagreement is not in the consistency of the theory *given* rational expectations but the *plausibility* of rational expectations in the first place. Theoretical consistency is not enough if the underlying assumptions are not a credible reflection of the problem to be explained. This position should be understood from at least three viewpoints.

First, the construction of expectations is not a mechanical process but the outcome of the entrepreneur's interpretation of data and information that is transformed into subjective knowledge in the form of expectations. Different entrepreneurs can produce different expectation using the same input information. For instance, radical uncertainty must be subjectively assessed because it involves unique events. In contrast, this problem is not captured by the use of a representative agent with rational expectations.

Second, expectations are not entirely endogenous or exogenous. Given that agents use market information (i.e., prices) to form expectations, the latter are not independent of a monetary policy that distorts relative prices. Therefore, rational expectations cannot be assumed to be independent of monetary policy.<sup>6</sup> More specifically, the knowledge that an ABCT is occurring does not help solve the signal extraction problem. That is, to avoid a bust, it is not enough to know that there is an expansionary monetary policy without perfect knowledge of how and when are prices distorted. However, such perfect knowledge is not feasible and the reason why there are prices in the first place.

Third, whereas the rational expectations assumption may be plausible in a simple framework, it is not plausible in the context of a complex phenomenon. If a complex phenomenon, as studied by Hayek (1967, chapters 2, 3 and 6, 1973, chapter 2), is a

<sup>4</sup> See Buchanan (1964), Caldwell (1984), Kirzner (1965), Kohn (2004), Kuhn (1962) and Zanotti and N. Cachanosky (2013).

<sup>5</sup> Callahan and Horwitz (2010, p. 212).

<sup>6</sup> See Butos (1997), Garrison (1986, 2001, chapter 1) and Lachmann (1977).

process too complicated to be envisioned by human rationality, then rational expectations begs the question of where the correct model of the world originates.<sup>7</sup>

These objections do not imply that economic agents behave irrationally but that there are other *arational* aspects that are as relevant as rational expectations, although the focus on the latter obscures the roles of the former. To remain uninformed of an unknown is neither rational nor irrational (Evans and Friedman 2011).

There are two other important critical accounts of the ABCT that deserve to be mentioned and differentiated from a pure rational expectations critique. Wagner (1999) argues that the ABCT requires passing through a process of renovation to become a serious contender among alternative business cycle theories. His primary point is that the ABCT must function in developing an agent coordination framework that distinguishes *ex-ante* decisions from *ex-post* results as an alternative approach to general equilibrium (where there is no distinction between *ex-ante* and *ex-post*). Wagner argues that is no longer possible to base the ABCT on the claim that agents cannot distinguish between an increase in savings and an expansion of credit because today monetary policy information is readily available. Rather, the ABCT must allow for entrepreneurs with divergent instead of homogeneous expectations.<sup>8</sup>

Cowen (1997) argues that the ABCT must replace the focus on capital intensity with an emphasis on risk. This view echoes Young (2012), who argues that the ABCT provides a better explanation of the 2008 crisis if the emphasis is on risk rather than capital intensity or the average period of production. In fact, because for the ABCT production takes time risk is already implicit in the ABCT. An extended version of the ABCT that explicitly addresses risk and capital-intensity does not adversely affect the structure of the business cycle theory. However, Cowen (1997, p. 77) also argues that the “postulated entrepreneurial mistakes in the traditional Austrian theory, which are systematic, violate the rational expectations hypothesis.”

Although the rational expectations critique alludes to a relevant characteristic of the ABCT, the case that the rational expectation is to be accepted as given is not as straightforward as the critique assumes. The rational expectations critique has blurred the dynamics that occur in the market of production factors and capital goods by assuming that systemic errors cannot occur given rational expectations in a representative agent. As long as heterogeneous expectations in a multiplicity of agents are

<sup>7</sup> See also Caballero (2010, p. 91). “Rational expectations is a central ingredient of the current core [DSGE] of macroeconomics; however, this assumption becomes increasingly untenable as we continue to add the realism of the periphery [real world] into the core. While it often makes sense to assume rational expectations for a limited application to isolate a particular mechanism that is distinct from the role of expectations formation, this assumption no longer makes sense once we assemble the whole model. Agents could be fully rational with respect to their local environment and everyday activities, but they are most probably nearly clueless with respect to the statistics about which current macroeconomic models expect them to have full information and rational information.”

It might be argued that economic agents do not know the correct model of the world but that they act *as if* they do. Probably for most Austrians this view assumes the answer to the problem that needs to be explained. For a discussion on rational expectations, see McAuliff (1985) and Sargent (2008). For a review of macroeconomics after the introduction of rational expectations, see McCallum (1982).

<sup>8</sup> Wagner (1999, p. 71) seems to consider that the canonical version of the ABCT does not assume rationality in the entrepreneurs when he asserts that “Austrian cycle theory can well incorporate rationality in expectations, indeed, must to do so.”

accepted, the imbalances described by the ABCT occur in the market of production factors and capital goods.<sup>9</sup>

### 3 Role of expectations in the allocations of resources in the ABCT

Let us assume that the monetary authority determines to follow an expansionary monetary policy so that interest rates are lowered below the equilibrium values. Following Callahan and Horwitz (2010), let us also assume two types of entrepreneur: the naïve and the savvy. The naïve group thinks that the new interest rate is the correct one, whereas the savvy group thinks that the market interest rate should be higher. Because the equilibrium conditions are unknown, the naïve group thinks the equilibrium rate is the new one. However, the savvy group thinks otherwise. Although this approach is a strong simplification, to divide entrepreneurs into these two groups suffices to indicate how the inefficient use of production factors occurs. To assume a distribution of entrepreneurial expectations rather than two groups would not affect the result and add unnecessary complications. The distinction between the two types of entrepreneur should not be odd or controversial. For instance, economists are divided whether the Federal Reserve was too expansive before the 2008 Financial Crisis (and the same division of opinion exists with respect to other important crisis, such as the Great Depression.)

For the moment, let us also assume that the banks behave homogeneously and are ready to offer credit at the lowered interest rates and that both groups of entrepreneurs are evaluating the same project.

Additionally, it should be considered that Hayek (1933, p. 147, emphasis in original) argued that the “situation in which the money rate of interest is below the natural rate need not [...] originate in a *deliberate lowering* of the rate of interest by the banks. The same effect can be obviously produced by an improvement in the expectations of profit or by a diminution in the rate of saving, which may drive the ‘natural rate’ [...] above its previous level; [...] but the banks continue to lend at the previous rate, and thus enable a greater demand for loans to be satisfied than would be possible by the exclusive use of the available supply of savings.” However, it is easier to perceive the effects by assuming a monetary policy that lowers the interest rates than the situation described by Hayek.

With these simplifications, the next section centers on the business cycle problem. The subsequent sections will relax some of these assumptions and offer a more detailed analysis.

#### 3.1 Effects of monetary policy on the economic calculation of entrepreneurs

Because each type of entrepreneur has different expectations, the discount rate they use to value alternative projects differs. The naïve group feels comfortable by discounting at a lower interest rate than the savvy group. Given that projects are discounted at different rates, each type of entrepreneur assigns a different economic value to the

<sup>9</sup> However, the Mises-Hayek business cycle theory is not the only theory that presents challenges to rational expectations. See Eusepi and Preston (2011) and Fuster et al. (2010).



project and therefore will be willing to bid for production factors differently. That is, because the naïve entrepreneur discounts at a lower interest rate, he or she sees him- or herself in a position to bid up the prices in the market of production factors to secure the required resources. This scenario can be analyzed financially.

Let  $EVA^{\otimes}$  be the expected economic value added of the project,  $ROIC$  be the return over invested capital,  $K$  be the financial capital and  $c$  be the cost of opportunity of the invested capital. Subscripts  $n$  and  $s$  denote naïve and savvy, respectively. To simplify, I assume the same discount rate for all periods.<sup>10</sup> Then, the economic value added for any year  $t$  for each entrepreneur will be as follows:

$$EVA_{t,i} = (ROIC_t - c_i)K,$$

where  $i = \{s, n\}$ .

Let  $NOPAT$  be the net operating profit after taxes. Then,  $ROIC = \frac{NOPAT}{K}$ . Therefore,

$$EVA_{t,i} = \left( \frac{NOPAT_t}{K} - c_i \right) K = NOPAT_t - c_i K$$

Because the project under evaluation is the same for both groups,  $ROIC$  and  $K$  are the same for the naïve and savvy entrepreneurs. The project's  $MVA$  (market value added) will be the present value of the expected future  $EVA$ s:

$$MVA_i = \sum_{t=1}^{\infty} \frac{NOPAT_t - c_i K}{(1 + c_i)^t}$$

Because  $c_n < c_s$ ,  $MVA_n > MVA_s$ , which means that the naïve entrepreneur assigns a higher expected market value to marginal projects than the savvy entrepreneur. Therefore, when the naïve and savvy entrepreneurs meet one another on the market of production factors and capital goods, the former will be willing to assign more financial capital to bid and secure the required production factors and capital goods.

Therefore, it is not the same to err up or down with respect to where the equilibrium rate of interest is supposed to be. Because naïve entrepreneurs are willing to increase their financial capital, in relative terms  $K_n/K_s$  increases. The market share of naïve capital allocation increases with respect to savvy capital allocation.

### 3.2 Effects on capital structure

The previous section assumed that the same project is valued by both types of entrepreneur. This assumption was intended to emphasize the process that occurs as a result of different discount rates. However, the problem is not *who* makes the investment but *what type of project* is undertaken. If projects were the same, it would be unimportant who invests, whether the naïve entrepreneur or the savvy entrepreneur. However, not all projects are affected evenly by a change in the discount rate. Long-term and capital intensive projects are more sensitive to changes in interest rates. Low interest rates make capital intensive projects that would not appear to be profitable at

<sup>10</sup> This assumption also means that the ABCT is valid if the central bank's monetary policy affects the discount rate of the economic projects used in the market.

the free market rate rise in the profitability ranking and exclude capital goods and production factors from less capital intensive investment at the natural rate.

This scenario can also be easily perceived if we compare the effects of two discounted EVA<sup>®</sup> cash-flows with similar *MVA* values but different time horizons, i.e., long-term (LT) and short-term (ST) projects that at the same discount rate have the same present values (*MVA*).

$$MVA_{ST} = \sum_{t=0}^{T_{ST}} \frac{NOPAT_{ST} - c K_{ST}}{(1 + c)^t}$$

$$MVA_{LT} = \sum_{t=0}^{T_{LT}} \frac{NOPAT_{LT} - c K_{ST}}{(1 + c)^t}$$

where  $MVA_{ST} = MVA_{LT}$  and  $T_{ST} < T_{LT}$ . Note, first, that the relationship between the discount rate and changes in the *MVA* is non-other than the modified *duration*, which is the semi-elasticity of the present value of the cash flow and the discount rate. A downward movement of the interest rate will increase both *MVA* values. However, the long-term project's *MVA* increases more than the short-term project's *MVA*. That is,  $MVA_{LT}/MVA_{ST}$  increase as the discount rate decreases.<sup>11</sup>

Second, to assume that  $MVA_{ST} = MVA_{LT}$  requires that either  $NOPAT_{LT} < NOPAT_{ST}$  or that  $K_{LT} > K_{ST}$ , i.e., that the cash flow of the long-term project “takes more time” (i.e., *Macaulay duration*) or that the long-term project is more capital intense. This EVA<sup>®</sup> representation and the modified and *Macaulay duration* relationships are more precise and familiar concepts than the difficult term “roundaboutness” and the controversial “average period of production.”

The opposite movement occurs when the central bank increases the interest rate. Now, it is the *MVA* of the long-term project that decreases more than the *MVA* of the short-run project. Additionally, it can be the case that the *MVA* of the long-term project is now negative ( $NOPAT < cK$ ). That is, the entrepreneur will be better off by stopping the project because the return is below the cost of opportunity of the invested capital. This upward-downward movement of discount rates shifts capital allocation from short-term to long-term projects and manifests itself as a business cycle when the resources must be reallocated back to short-term projects.

In our example, the naïve group is willing to invest in more forward-looking and capital-intensive projects. If the naïve entrepreneurs outbid the savvy entrepreneurs in the market of production factors and capital goods, the capital structure is affected in a different way than if the savvy group made the investment. By gaining market share, the naïve entrepreneurs contribute to forming the cluster of errors that proves inefficient when the monetary policy is revised and interest rates increase again. The aggregate value of *K* undergoes microeconomic distortion as  $K_n/K_s$  increases. This distortion occurs in two ways. First, non-specific factors are reallocated to naïve projects. Second,

<sup>11</sup> The following remarks by von Mises (1912, pp. 399–400) seem to capture this effect: “Now if the rate of interest on loans is artificially reduced below the natural rate as established by the free play of the forces operating in the market, then entrepreneurs are enabled and obliged to enter upon longer processes of production. [...] a reduction of the rate of interest on loans must necessarily lead to a lengthening of the average period of production.”

the production of specific factors of production shifts from those required in savvy projects to those required in naïve projects.

Because the naïve group bids up the price of production factors and capital goods, the savvy entrepreneurs find themselves in a difficult position. Given that the cost of production has increased, savvy entrepreneurs must increase their financial resources to be able to acquire the production factors that they require. Even if a savvy entrepreneur resists changing his or her production structure, his or her increased debt exposure can become a financial problem when the monetary authority revises the monetary policy and increases the interest rate. In this context, Carilli and Dempster (2001) invoke the prisoner's dilemma and argue that the savvy entrepreneur can be considered to act rationally in acting as a naïve entrepreneur *if* he or she thinks that he or she can sell the project to another entrepreneur before a bust occurs. In addition, the savvy entrepreneur may be tempted to invest in a naïve project, sell the portfolio to a naïve entrepreneur before the bust, and invest the proceedings in an asset that would protect his or her wealth.

Although there are similarities with the prisoner's dilemma argument, the exposition in this paper is not exactly an extension of the prisoner's dilemma that accounts for market share. In the prisoner's dilemma, both players have the same expectations regarding the outcome of the game. That is, there is no difference between savvy and naïve entrepreneurs. Both players are aware of the sub-optimal outcome. The case in which players can be naïve or savvy is different. The prisoner's dilemma assumes that both players are of the savvy type and engaged in a sub-optimal strategy. Conversely, the naïve player thinks that the savvy player is mistaken. The problem is that if savvy entrepreneurs resist behaving as predicted in the prisoner's dilemma, the savvy entrepreneurs are still driven out of the market. This problem cannot be solved with repeated games. That is, the savvy entrepreneur cannot invest in less time-consuming projects because the naïve entrepreneur is willing and able to bid up the production factors.<sup>12</sup> In other words, the prisoner's dilemma expresses the problem faced by the savvy entrepreneurs but does not fully consider the role of the naïve entrepreneurs in the market of production factors. As long as there are naïve entrepreneurs, the savvy entrepreneurs can expect to find buyers for their portfolios before the bust, which increases the savvy entrepreneur's inclination to behave naïvely as opposed to the scenario in which relative to where all entrepreneurs are of the savvy type.

The fact that the savvy entrepreneur is aware that the interest rate is too low does not mean he or she can shorten his or her position because the capital structure consists of specific projects with no close liquid substitutes. The short strategies practiced in the financial market occur in a highly different context. In such a market, the asset shorted is liquid at the market price. In the real sector, projects are unique. Therefore, this type of short strategy cannot be pursued. The assets in the financial market are homogeneous and perfect substitutes, whereas the assets in the real sector are heterogeneous and not perfect

<sup>12</sup> In the Buck Hill Falls Seminar, 1955, Mises offered a similar argumentation: "It is very difficult for a businessman not to be fooled, let us say, when easy money is being offered. When a policy of easy money is being practiced, everybody is optimistic. Business is booming. Now, it is very difficult under such circumstances for a businessman to say: 'There is something questionable in the whole thing; this boom is only produced by the printing press.' It is very difficult. And even if the businessman is very clever, clever enough to understand what is going on, he may say, 'Why should I remain outside? I will also participate in the boom. Of course, I will try to withdraw in time'" (von Mises 1955, pp. 83–84, emphasis added).

substitutes. In addition, the capital goods in a firm are not only heterogeneous with a particular structure. They are also a complementary piece of the capital structure of the entire market. The capital structure of any firm is only functional in the structure of a broader market, similarly to how a jigsaw piece fulfills a particular role in a puzzle.<sup>13</sup>

Capital theory is a key characteristic of the ABCT that draws attention to two important features. First, the naïve and savvy entrepreneurs do not compete to invest in similar projects. The naïve entrepreneur is comfortable investing in more long-term projects than the savvy entrepreneur because each group discounts at different interest rates. This different behavior results in inefficient structural changes that are costly to correct. Capital goods of one type do not cancel out the capital goods of other type. The level of aggregation implicit in the rational expectations critique does not enable capital heterogeneity to appear. Second, it contributes to explaining why the savvy group cannot shorten its position and alleviate the bust. The investment projects are not only conformed with by heterogeneous capital goods but also each project in itself is a piece of a larger capital structure. If a short strategy is unfeasible, the prisoner's dilemma behavior becomes a rational strategy for the savvy entrepreneur who expects to sell to a naïve entrepreneur before the central bank revises its monetary policy. However, this strategizing does not eliminate the ABCT problem. Those who hold unsustainable projects when the boom ends will bear the cost. The savvy entrepreneur who sold beforehand saves his or her wealth but does not undo the ABCT process.

### 3.3 Naïve and Savvy Banks

The assumption that all banks behave homogeneously and are ready to loan the excess of funds at the lowered interest rate simplifies the scenario to a situation similar to one in which the entrepreneurs demand credit directly from the central bank. However, even if we allow for banks to be naïve or savvy, the overall result remains the same. Because the naïve banks think that the expansive monetary policy is sound, they see fit to increase the size of their portfolio by taking new funds from the monetary authority and offer credit at a lowered interest rate. In addition, I assume that banks cannot distinguish between naïve and savvy entrepreneurs.

An increase in relative naïve investment occurs through two channels. First, because credit from each group of banks is a close substitute for credit from another group of banks to each other, the decision to offer credit at a lowered interest rate on part of the naïve banks affects the decision on interest rates by the savvy banks. If naïve banks lower their interest rates, the savvy banks must do the same if they do not want to lose their customers. This behavior confirms the naïve entrepreneur's expectations of low interest rates.

Second, even if the savvy banks determine to not extend credit to projects that they consider to be unsustainable at the equilibrium interest rate, the misallocation of resources still occurs among entrepreneurs. Savvy banks can reduce their exposure to unsustainable projects at the expense of lowering their market share. At a lower interest rate, the savvy bank must determine whether it wants to extend new credits or to let the monetary expansion be channeled through the naïve banks. In the former case, the savvy bank behaves like a naïve bank. In the latter case, the naïve bank crowds out the

<sup>13</sup> I borrow the jigsaw puzzle example from Horwitz (2011).

savvy bank from participation in the market. In either case, the market share of naïve banking increases with respect to savvy banking.

The role of the banks is to finance sound investments. Banks use (among other things) interest rates to accommodate asymmetric information and differentiate between profitable and unsustainable investments. However, given the monetary policy, naïve banks do not find their expectations to be mistaken and savvy banks are driven out of the market or start to behave like naïve banks. The same problem occurs on the side of the entrepreneurs. Because rational expectations are formed based on *given* market information, the monetary policy confirms rather than corrects the naïve expectations.

Similar to the case of naïve and savvy entrepreneurs, the savvy bank can be considered to behave rationally in extending credit to naïve entrepreneurs and selling its portfolio to naïve banks before a bust. Because naïve and savvy banks will also value their customer's projects by discounting at different discount rates, the same problem translates to the allocations of credit by the banking sector.

### 3.4 From one business cycle to repeated business cycles

If naïve entrepreneurs drive the savvy entrepreneurs out of the market during a boom, the opposite should occur during a bust. Either the savvy entrepreneurs start to find their projects profitable or the naïve entrepreneurs learn from their mistakes and become savvy. As naïve entrepreneurs are driven out of the market during a bust, future business cycles should become less severe. Eventually, a large proportion of savvy entrepreneurs will be able to avoid the business cycle that follows from an expansionary monetary policy. However, there are three reasons why this may not occur.

First, the monetary policy described in the ABCT does not occur in a vacuum but in a changing context under different market conditions. Entrepreneurs do not have the luxury to analyze a business cycle process under *ceteris paribus* conditions. A former savvy entrepreneur can become a naïve entrepreneur if he or she mistakenly assesses the monetary policy under different market conditions. For instance, an entrepreneur may correctly evaluate the effects of monetary and fiscal policies but may mistakenly assign a low weight to the distortions caused by the expansionary monetary policy with respect to the effects produced by other policies and regulations (i.e., moral hazard or inefficient financial regulation).

Second, the turnaround in the population of entrepreneurs cannot guarantee that the newcomers will possess the same knowledge and interpretation than the leaving entrepreneurs. Because entrepreneurial population and market conditions change and naïve entrepreneurs consider themselves to be savvy, it cannot be concluded that each business cycle must be less severe than the former ones. Naïve entrepreneurs with a wrong theory of what produces a business cycle can pass the wrong knowledge to future generations of entrepreneurs. For instance, the causes of the Great Depression remain controversial many years of its occurrence. Empirical experience and evidence do not suffice to resolve these disagreements.

Third, even if the ABCT's macroeconomic aspects remain the same, the particular microeconomic effects can differ. In Hayek's terminology, because the knowledge required to predict the effects of time and circumstance are unavailable, economic agents can only rely on patterned, but not specific, predictions. Specific predictions

require the implausible assumption of perfect foresight.<sup>14</sup> The type of intelligence and knowledge that entrepreneurs require to understand these difficulties is not the type of intelligence that the entrepreneur is assumed to possess in the Austrian theory.

#### 4 Effect of the marginal entrepreneur absent an expansionary monetary policy

The previous sections discussed the problem of expectations and resource allocations in the ABCT. However, the dynamics discussed differ significantly in the absence of an expansive monetary policy. The naïve entrepreneurs can secure a larger quantity of funds to the extent that the financial sector can supply these funds without an increase in the interest rate. That is, for the ABCT to occur, the naïve entrepreneur does not only need to be mistaken in his or her expectations. He or she also must be able to finance his or her mistake. Without an expansive monetary policy, the increase in demand for loanable funds by the naïve entrepreneurs results in an increase in the interest rates.

The problem explained so far has some similarities with the problem of the financial accelerator, which explains how small shocks can produce large effects on the economy through the financial markets.<sup>15</sup> Because financial institutions are supplied with asymmetric information, they rely on collateral values to allocate loanable funds to different projects. Therefore, a shock that affects a firm's net worth changes the firm's collateral value and creditworthiness. In turn, this reduction in creditworthiness reduces the access to loanable funds, which results in a decrease in investment that further affects the firm's net worth. Through this process of mutual feedback between a firm's net worth and the access to loanable funds, a small shock can produce a large impact on economic activity. The process discussed in this paper is related but not equivalent to the financial accelerator process. The similarity lies in the effect that the lowered interest rate has on the valuation of marginal projects. The difference lies in the microeconomic concern of the ABCT. For this theory, the problem is not overinvestment but malinvestment.

#### 5 Conclusions

The assumption of homogeneous entrepreneurs that hold rational expectations results in the conclusion that errors could not be systematic and therefore that the ABCT is ill-founded. In this paper, I discuss the role of expectations in the ABCT and argue that the rational expectations critique of the ABCT is inadequate as long as it is accepted as plausible that different entrepreneurs can have different expectations regarding unknown equilibrium conditions.

The rational expectation critique overlooks or dismisses the problems that occur in the market of production factors when expectations are allowed to differ across different entrepreneurs. Because different expectations regarding the optimal interest rate affect projects with different time horizons unevenly, the market share of the

<sup>14</sup> See O'Driscoll and Rizzo (1985, p. 222).

<sup>15</sup> See Bernanke and Gertler (1989, 1990), Bernanke, Gertler and Gilchrist (1996, 1999), Kamber and Thoenissen (2011) and Ćorić (2011).

resources allocated to long-term projects with respect to short-term projects increases as interest rates are moved downward. Whereas the presence of heterogeneous entrepreneurs has been acknowledged in the literature, the effect on the market share has not received the deserved attention. The rational expectations critique misdirects the critique by assuming a representative agent because the dynamics of the Austrian imbalances are driven by the marginal entrepreneur and not by a representative entrepreneur.

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