

Hayek's Theory of Business Cycles: A Theory That Will Remain Obscure?*

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Abstract

Hayek's theory of business cycles has been criticized for its unfeasible policy prescriptions, weak empirical support, and lack of technical rigor. Although the theory can be defended against these criticisms, it violates the rational expectations hypothesis, a criterion by which economists tend to judge the quality of economic arguments. Since Hayek and his followers failed to remedy the violation, the theory in its present form cannot capture the interest of the economics profession. This outcome might be avoidable. However, to change it, Hayek's theory either needs a satisfactory restatement, or it must wait until economists change their criteria for judging the quality of arguments.

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I. Introduction

Hayek presented his theory of business cycles in the early 1930s with great success, as documented by Kaldor (1942, p. 359), Hicks (1967, pp. ix, 203), Caldwell (1988, pp. 516–17; 2004, p. 176), and Snowdon and Vane (2005, pp. 86–87). That success, however, faded by the early 1940s (Caldwell 2004, p. 176). Professional interest in Hayek's theory, also known as the Austrian business cycle theory, has not

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recovered to its 1930s levels despite the theory's higher visibility after the Great Recession, as documented by Cachanosky and Salter (2017). That no economics article was published in highly ranked journals—the *American Economic Review*, *Econometrica*, the *Journal of Political Economy*, or the *Quarterly Journal of Economics*—from 2000 through 2014 referencing the theory's most influential statement, Hayek's *Prices and Production*,¹ illustrates the theory's relatively low status within the economics profession (cf. Calvo 2013, p. 15).

Unlike Calvo (2013, p. 15), who argues that Hayek's theory does not have to violate the canons of rationality, I suggest that the theory is driven by these violations. This, in turn, explains why the profession lacks serious interest in the theory in its present form and will lack interest unless the theory or the standards of theorizing change, even though there are potential “gains of trade” between Hayekian macroeconomics and the prevalent macroeconomics, as Koppl and Luther (2012) and Cachanosky and Salter (2017) convincingly argue.

My conclusion comes despite persuasive counterarguments against Hayek's theory. First, De Long (1991, 1996, p. 44) and Laidler (1999, p. 46; 2003, p. 15), among others, have dismissed the theory for being associated with a “liquidationist” policy of inaction in the face of collapsing monetary aggregates. As White (2008) points out, however, Hayek uses his theory to recommend maintaining a constant “total money stream,” or MV in the quantity equation (pp. 754–55). The recommendation thus calls for changes in the money supply that offset changes in its velocity, contrary to “liquidationism.”

The second argument against Hayek's theory—raised, for example, by Lucas (1977, p. 23, n. 15), Haberler (1986, pp. 427–29), and Yeager (1986, pp. 381–82, [1990] 1997, pp. 255–56)—focuses on the lack of empirical support. While few empirical studies address the theory, a majority of those that do, demonstrate its relevance (cf. Calvo 2013, pp. 15–16). An exception is Young (2005), who finds that 1972–1993 US job reallocation data are in line with Hayek's theory but are not economically significant. The other exceptions include Lester and Wolff (2013) and Luther and Cohen (2014), who

¹ JSTOR search, February 03, 2017. I did a full-text search for all articles published from 2000 through 2014 and stored in JSTOR database of the four journals that jointly mention the terms “prices and production” and “Hayek.” To put the results of the search into perspective, I used the same methodology to search for articles that mention both “general theory” and “Keynes” and I found thirty-six articles.

do not find evidence of relative-output and relative-price effects across different stages of production in the United States, as the theory predicts.

These two papers' findings are challenged by Luther and Cohen (2016), who argue that the stages of processing data used in the two studies are not appropriate proxies for the stages of production in Hayek's theory. The results of Lester and Wolff (2013) and Luther and Cohen (2014, 2016) are, however, at odds with Balke and Wynne (2007, pp. 29–32), who divide goods by stages of processing and find that monetary shocks do tend to change relative prices between goods of different stages. Balke and Wynne (2007) discuss the case of negative monetary shocks, whereby prices of goods from stages of processing further from completion become lower with respect to prices of goods from stages closer to completion, a conclusion Clark (1999, pp. 427–28) supports. Balke and Wynne (2007, pp. 33–34) also point out the failure of prominent models—such as Lucas (1972), Calvo (1983), and Mankiw and Reis (2002)—to account for these relative-price changes. One can contrast the theories that Balke and Wynne criticize with Hayek's theory, which in fact does explain the observed price changes. In Hayek's terminology, the price changes across stages of production are integral to the theory, and evidence of their existence makes the theory empirically more plausible.

Turning now to some of the other recent supporting studies, Eichengreen and Mitchener (2003) find Hayek's theory plausible as a complement to other explanations of the Great Depression; White (2009) uses the theory to explain the Great Recession; and Calvo (2013, pp. 15–16) refers to the growing literature that links credit and economic recessions (cf. Borio 2012, or Schularick and Taylor 2012), a relationship that is at the heart of Hayek's theory. Using correlation analysis and an error correction model, Keeler (2001) looks at the United States from 1950 through 1990 and identifies components of the transmission mechanism of Hayek's theory at work, connecting monetary policy with changes in the structure of production and the business cycle. Bismans and Mougeot (2009) analyze panel data for Germany, the United States, England, and France during the period from 1980 through 2006, finding the relationship between interest rates, the structure of production, and GDP to be consistent with Hayek's theory. Young (2012), using industry-level input-output data, shows that the US structure of production was behaving consistently with Hayek's theory from 2002 through 2009. Cachanosky and Lewin (2016a), building on the theoretical foundations of their previous

work (2014, 2016b, 2016c), use the concept of duration to decide whether a given company is more or less roundabout. They find that the investment of relatively more roundabout companies is negatively related to interest rates, which is the dynamic that is consistent with Hayek's theory.

The third argument is that Hayek's theory is not technical enough because it does not use mathematics and modern tools of general-equilibrium analysis (cf. Lucas 1996, p. 669). The objection is justified; however, it is unlikely that Hayek's lack of technique is the critical constraint preventing the theory from making a successful comeback. The theory's three main building blocks have analogs in the existing technical literature, and the wedge between this foundation and that found in the technical literature is therefore not as wide as one might think. The first building block relates monetary expansion to liquidity effects and, as Kiyotaki (2003, pp. 29–30) notes, it has its counterpart in the limited-participation model with a cash-in-advance constraint like Grossman and Weiss (1983). The second building block, the view of production as taking place in time, finds its modern analog in time-to-build models. Kydland and Prescott (1982, p. 1345) thus trace their time-to-build model to Hayek's intellectual predecessor Böhm-Bawerk ([1888] 1891) (cf. also Montgomery 1995). And the third building block, which considers factors of production to be specific to their current employments, has its counterpart in the models with irreversible investment in the vein of Dixit and Pindyck (1994).

Analogies between modern technical models and their older, less technical counterparts are imperfect. However, existing technical analogs to a potentially insightful older theory are good starting points for its full restatement. Since Hayek's theory has not yet been restated formally in spite of the analogs, it likely faces more fundamental problems that hold regardless of the language it is expressed in.

The weakness of these three arguments against Hayek's theory suggests that something else should explain professional economists' lack of interest in the theory in the top professional outlets that I noted earlier. And their lack of interest is even more striking when contrasted with the significance assigned to the theory by laypersons. For example, two music videos presenting Hayek's and Keynes's ideas on the causes of business cycles (Papola and Roberts 2010, 2011) had, as of August 2021, more than 12.6 million views combined. Another illustration of the significance laypersons have

assigned to the theory is the repeated criticisms against it in public discussions, as illustrated by a number of Krugman's popular articles (1998, 2010a, 2010b, 2011, 2014). The contrast between public and professional interest in Hayek's theory, then, gives additional motivation to explain why economists lack interest in the theory.

To explain the lack of serious professional interest, I first make a systematic statement of the theory with an explicit account of expectations, which, to my knowledge, has not been done before. I then show how Hayek's assumptions about expectations deter economists today. Hayek's theory treats people during monetary expansion as biased in one particular direction by assuming that they underestimate future real interest rates and underestimate future prices of consumer goods. In other words, people's subjective expected probabilities of future outcomes are different than the objective probabilities of these outcomes.

On the one hand, Hayek's theory needs these assumptions to reach its conclusions (Butos 1985; White 1999, p. 114). On the other hand, the ad hoc assumptions put the theory at odds with the rational expectations hypothesis and cause it to fail by current standards of economic theorizing. With this finding, I turn to make what is, to my knowledge, the first systematic review of the attempts addressing the assumption about expectations in Hayek's theory. I find that these attempts have failed in their goal, which leads me to conclude that the theory in its present form cannot repeat the academic success of the 1930s. Although the conclusion is inevitable for the time being, it might be upsetting given the discussed strengths of the theory pertaining to its reasonable policy prescriptions, empirical plausibility, and technical analogs.

II. Revisiting Hayek's Theory

Hayek's theory describes how a cluster of errors arises when people respond to changes in monetary policy (cf. Hayek [1935] 1967, [1939] 1975b; Machlup 1974, pp. 499–511; O'Driscoll 1977, pp. 35–134; Garrison 2001, pp. 33–83). The errors follow from the theory's assumptions about the requirements for intertemporal coordination and people's expectations about monetary policy. I first discuss the requirements, emphasizing production as a process unfolding in time, characteristics of factors of production, and the interrelationship between the market for loanable funds and monetary policy. I then turn to the role of expectations during monetary expansions that accompany economic booms.

A. Prices and Production: Equilibration across Production Processes

Hayek's theory follows Menger ([1871] 2007) and Böhm-Bawerk ([1888] 1891), both of whom view the economy as a set of production processes in which every process consists of a number of consecutive stages of production that lead, in the end, to a consumer good (Hayek [1935] 1967, pp. 37ff.; [1939] 1975b, pp. 21–23). In emphasizing the temporal dimension of production, the theory focuses attention on how relative-price changes affect the profitability of production processes of different lengths.

To illustrate the effects of relative-price changes, assume that two production processes, x and y , have identical production functions and lead to the same type of consumer good—for example, bread. Factors of production enter at the beginning of each of two consecutive stages of equal length. In the case of bread making, one can imagine that complementary production factors in the first stage transform wheat into flour, which in the second stage is transformed into bread. Among other factors of production in my example, units of homogenous capital, K , enter both stages of both processes; note that I invoke here the assumption of homogeneity of capital only to illustrate the equilibrating tendencies and that I drop this assumption later in the paper. Loaves of bread, or finished consumer goods, are sold and consumed at the end of the final stage.

The difference between processes x and y lies in their position in time. The earlier stage of process x starts at time t , the later stage starts at $t + 1$, and the resulting loaves of bread are consumed at $t + 2$. The earlier stage of process y starts at $t + 1$, the later stage starts at $t + 2$, and people consume bread at $t + 3$.

Let me now focus on time $t + 1$. Assuming an initial equilibrium, decreasing returns, and perfect divisibility of production factors, owners of existing units of capital K are indifferent at $t + 1$ about whether to sell an additional unit to owners in process x , who are about to make bread, or to owners in process y , who are still making flour. Both processes offer the same return, and the present value of the expected marginal value product of capital K is the same in each process (Hayek [1935] 1967, p. 72). In other words,

$$\frac{E_{t+1}[MV_{K,x,t+2}]}{1+E_{t+1}[r]} = \frac{E_{t+1}[MVP_{K,y,t+3}]}{(1+E_{t+1}[r])^2}, \quad (1)$$

where $E_{t+1}[MVP_{K,i,j}]$ is the expected real marginal value product of one unit of capital K used in process i ending at time j , and $E_{t+1}[r]$ is

the expected real interest rate for the period between $t + 1$ and $t + 2$. I assume the same expected real interest rate for the two considered time periods between, first, $t + 1$ and $t + 2$, and second, $t + 2$ and $t + 3$.

Although it hardly matters in static equilibrium, it is important from the dynamic perspective that processes x and y differ in their length at time $t + 1$: while process x leads to bread after just one period—at $t + 2$ —process y leads to bread at $t + 3$. Changes in the expected real interest rate and the expected real price of bread then affect the allocation of units of capital K between the two processes. If producers at $t + 1$ expect the interest rate to decrease in all future periods, employing capital K becomes more profitable in process y than in process x (Hayek [1935] 1967, pp. 79–83; cf. [1939] 1975b, pp. 68–69).

$$\frac{E_{t+1}[MVP_{K,x,t+2}]}{1+E_{t+1}[r]} < \frac{E_{t+1}[MVP_{K,y,t+3}]}{(1+E_{t+1}[r])^2} \quad (2)$$

Yet, an increase in the expected real marginal value product of the output of both processes by the same amount causes capital K to become more profitable in process x than in process y (Hayek [1935] 1967, pp. 75–78; [1939] 1975b, pp. 8–10, 48–50).

$$\frac{E_{t+1}[MVP_{K,x,t+2}]}{1+E_{t+1}[r]} > \frac{E_{t+1}[MVP_{K,y,t+3}]}{(1+E_{t+1}[r])^2} \quad (3)$$

The formula for computing present values implies both results. First, a given change in the interest rate, which determines the discount rate, affects to a higher extent the present value of revenue from the relatively more-distant future. Second, a given increase in future revenue has higher present value if it is in the less-distant future.

Hayek's theory applies the conclusions about the relative profitability of production processes of different lengths to all production processes in the economy. An expected permanent decrease in the real interest rate increases the profitability of longer production processes as compared to shorter processes, *ceteris paribus*. An expected permanent increase in the price of consumer goods increases the profitability of shorter processes in comparison to longer processes, *ceteris paribus*.

B. Factors of Production: Why Equilibration across Production Processes Takes Time

However, changes in the profitability of different types of processes do not always work out across the economy smoothly. On the

contrary, Hayek makes three assumptions related to the limited flexibility with which producers shift factors of production across production processes. First, the economy starts in a recession, with unused factors (Hayek [1935] 1967, pp. 96–97; [1939] 1975b, pp. 5–6, 38, 53–54), which, because of unspecified frictions, enter production processes only step by step (Hayek [1935] 1967, pp. 83–84). The step-by-step increase in the amount of employed resources initiates the boom (Hayek [1939] 1975b, pp. 38–41).

Second, factors of production vary in how specific they are to their current use. If factors are employed in what turn out to be unprofitable production processes, as happens to many factors at the end of the boom, their expected marginal value product might steeply decline because their expected marginal value product is low in alternative employments (Hayek [1935] 1967, pp. 71–72, 77–78; [1939] 1975b, pp. 12, 23–24).

Third, the uncertainty and the temporal lags with which production processes of changing lengths accept new production factors constitute frictions. These hinder the reallocation of factors to other uses during the recession, which, again, takes time. The frictions are particularly important in the labor market, as they lead to increased and prolonged unemployment rates during the recession (Hayek [1935] 1967, pp. 92–93; [1939] 1975b, pp. 5, 35).

C. Effects of Monetary Policy: How Monetary Expansion Lowers Interest Rates and Increases Investment

Having discussed in the previous two subsections the properties of equilibrium of the structure of production and the properties of its equilibration, I turn here to the properties of monetary policy, which is the initial disequilibrating shock in Hayek's theory. I focus on monetary expansions, and not contractions, because it is the expansion that drives Hayek's business cycle.

Expansionary monetary policy is in Hayek's theory linked with three underlying assumptions. First, monetary expansion takes place over time. Therefore, it has a beginning and an end (Hayek [1935] 1967, pp. 89–90, 148; 1969, pp. 277–81; O'Driscoll 1977, p. 83; cf. Cowen 1997, pp. 67–68). Second, the money supply increases through the market for loanable funds and leads to liquidity effects. An increase in the nominal money supply decreases the real interest rate (Hayek [1935] 1967, pp. 85–86). Third, the demand for loanable funds comes from investors in future production processes (Hayek [1935] 1967, p. 85). Changes in real interest rates at the market for

loanable funds therefore tend to affect investment rather than consumption.

Putting the three previous subsections together, I will present how Hayek portrays the business cycle as an unsustainable change in the structure of production caused by monetary expansion and mistaken expectations.

D. Monetary Policy and Expectations: How Monetary Expansion Induces Overly Long Production Processes

Starting with unused resources entering production processes step by step during the boom, assume that the monetary authority begins a monetary expansion that will end at some uncertain point in the future. People observe that real interest rates decline as the money supply expands. Because longer processes look more profitable as rates decline, people plan for longer production processes when they expect the real interest rate to be lower. While doing so, they make two mistakes.

First, people use current interest rates to form their expectations about future real interest rates (Hayek [1939] 1975a, p. 142). They overestimate the length of the monetary expansion and thus the length of the period of lower real interest rates. In line with my discussion of inequality (2) above, where lower expected real interest rates induce investment into longer production processes, the overestimation gives people the incentive to invest in correspondingly long production processes. Such processes turn unprofitable at the end of the monetary expansion when people learn about their mistake.

People make a second mistake early in the boom: they underestimate the prices that consumer goods will have later in the boom (cf. Hayek [1939] 1975b, p. 31). As per my discussion of inequality (3), where lower expected prices of consumer goods increase the profitability of longer production processes, the underestimation gives people, again, the false impression that their overly long production processes will be profitable. Despite what people expect, the prices of consumer goods do tend to increase (cf. Hayek [1939] 1975b, p. 12, n. 1). One of the two reasons for the increase is that factors of production differ in their availability during different phases of the boom. The new, longer, investment projects draw on the pool of unemployed factors of production in the early phases of the boom; however, the pool gets thinner in later phases (Hayek [1939] 1975b, pp. 53–54). As this happens, the people

running these projects have to attract factors of production already employed in shorter projects. The transfer of the factors toward longer projects shifts the supply of consumer goods down and increases their prices (Hayek [1935] 1967, pp. 87–88).

The second reason why the prices of consumer goods increase in the later phases of the boom is because higher nominal incomes, such as wages, accompany the ongoing monetary expansion. Once nominal incomes increase, expenditures on consumer goods increase, as do their prices (Hayek [1935] 1967, pp. 88–89; [1939] 1975b, pp. 41–42, 53–56).

The cluster of mistaken expectations about future real interest rates and future prices eventually leads to a recession. A number of people realize their previous mistakes, either when monetary expansion comes to its end, or when consumer goods become too expensive. They view the overly long production processes started in the earlier phases of the boom as unprofitable and shut them down. Specific factors of production employed in the overly long processes become idle, and even the less-specific factors that have to change their employment become unemployed because of rigidities (Hayek [1935] 1967, pp. 91–95).

III. The Trouble with Hayek’s Theory and Repeated Failures to Address It

Hayek’s assumptions about expectations are critical, as Rosenstein-Rodan concluded in the 1930s (Ebeling and Short 1978). The assumptions have become the theory’s major weakness in at least two respects. First, a number of foundational works of the theory do not make explicit its assumptions about expectations (cf. Mises [1924] 1971, pp. 339–64; Hayek [1933] 2008;² Robbins [1934] 1971, pp. 30–54;³ Machlup 1940; Rothbard [1963] 2000, pp. 3–36; [1962] 2009, pp. 989–1024).⁴ This made it harder for the profession to understand the

² Hayek ([1933] 2008, p. 33) briefly recognizes the relationship between people’s incorrect expectations about future prices during monetary expansions and the business cycle dynamics of his theory. He then changes the topic and does not revisit the problem of expectations.

³ Robbins ([1934] 1971, p. 39) discusses the problem of unfulfilled expectations but does not state the assumptions.

⁴ Salerno ([1995] 2010, pp. 214–19) and Butos (1997, pp. 76–81) try to explain the insufficient discussion of expectations in the works of Mises and Rothbard. Mises, and arguably also Rothbard, understands expectations as thoughts that are contingent on particular circumstances of time and place. Because economic laws should, in his view, be general and should hold for all possible data, general

theory (cf. Hicks 1967, pp. 204–5) and for the theory to keep up with developments in the profession.

Second, whether implicit or explicit, the assumptions are questionable. As long as the assumptions hold, people commit a specific type of biased error by investing during monetary expansions in overly long, rather than overly short, production processes. Hoover (1988, pp. 251–52) correctly points out that the assumption conflicts with the rational expectations hypothesis, which assumes that people understand their environment and do not commit systematic errors (cf. Muth 1961, pp. 315–17; Sargent 1993; pp. 2, 44, n. 3; Sargent 2007). This element of arbitrariness makes it hard to defend the theory, as other authors have pointed out (Lachmann 1943; Tullock 1987; Caplan 1997; Cowen 1997; Hülsmann 1998; Wagner 1999).

Many contributors have recognized the importance of the problem of expectations and have tried to justify or remedy the original version of the theory. I discuss these attempts and point out their problematic features. In doing so, I divide arguments into four defenses. The first and second defenses assume that people suffer during monetary expansion from a systematic bias, where the resulting cluster of errors causes them to invest in overly long production processes. The third defense explains why people commit errors during the monetary expansion but fails to explain the cluster of errors. The fourth defense mixes the problems of the previous three.

A. First Defense of Hayek's Theory: Justification of Biased Expectations

Contributors to the first defense want to justify why people overestimate the duration of low real interest rates and underestimate the future prices of consumer goods. In his 1933 Copenhagen lecture (Hayek [1939] 1975a, pp. 140–42), for example, Hayek argues that people use present prices to predict future prices (cf. Hayek [1935] 1967, p. 137; cf. Hicks 1967, p. 206; O'Driscoll 1977, pp. 102–3). While people often find this to be a useful heuristic, it fails them during times of expansionary monetary policy. According to Hayek, people then believe that current low real interest rates will last for a long time and make longer production processes more profitable.⁵

economic laws cannot explain expectations of a given time and place. Expectations are therefore not an interesting research topic.

⁵ In Hayek's words:

Mises (1943) is more specific. He argues that people fail to link monetary expansion to the market for loanable funds because they lack economic education (cf. also Barnett and Block 2006, pp. 35–36, 46, 71–72).⁶

Lachmann (1945, [1956] 1978, pp. 29–34) assumes that people each have their own mental range of feasible prices. If the present price is within the range, people expect the price to persist. Although Lachmann does not apply this model to Hayek's theory, it does suggest why people form biased expectations that during monetary expansion lead toward the overly long production processes described by Hayek.

The most important problem of the first defense is that it violates the rational expectations hypothesis. It also fails on its own terms by not explaining the sources of the bias. One can ask whether it is appropriate to assume that people use spot prices as predictors of future prices. Explaining the bias by insufficient education unfortunately invites the question why people would choose to remain uneducated—especially since doing so is particularly costly (cf. Cowen 1997, pp. 81–83). It sounds implausible that learning Hayek's theory is more costly than the expected costs of one's malinvestment, and if this is the case, the authors of the first defense should have provided some supporting evidence.

B. Second Defense of Hayek's Theory: Biased Expectations Revisited

Garrison (1986, p. 446), Block (2001, pp. 66–67), Barnett and Block (2005, p. 433), and Cachanosky (2012) argue that the assumption of biased expectations is more reasonable than it appears. They believe that Hayek's theory holds even with only a segment of biased people. Overly long production processes might still lead to an economy-

In general it is probably true to say that most investments are made in the expectation that the supply of capital will for some time continue at the present level. Or, in other words, entrepreneurs regard the present supply of capital and the present rate of interest as a symptom that approximately the same situation will continue to exist for some time. And it is only some such assumption that will justify the use of any additional capital to begin new roundabout methods of production which, if they are to be completed, will require continued investment over a further period of time. ([1939] 1975a, p. 142)

⁶ “Nothing but a perfect familiarity with economic theory and a careful scrutiny of current monetary and credit phenomena can save a man from being deceived and lured into malinvestment” (Mises 1943, p. 252). Cf. Salerno ([1995] 2010, pp. 228–30), Butois (1997, pp. 76–77), and Cachanosky (2012, p. 4).

wide build-up because the unbiased people have an incentive to participate in overly long processes as suppliers of projects enacted by biased people. The unbiased people just have to plan to sell their assets before the biased people realize the errors in their own plans.

The most important problem with the second defense, as with the first, is that it violates the rational expectations hypothesis. If one group's expectations are unbiased and the other group's are biased in a particular direction, one still needs to explain the one-sided bias. The second defense does not provide such an explanation.

The second defense faces another problem. The unbiased segment of people can participate in overly long production processes only if the demand for their products permits. Because the demand depends on how highly the biased people value their own projects, one is led to ask what factors determine the scale of those projects and how likely such factors lead toward an economy-wide cluster of errors.

Cachanosky (2012) argues that a minority of biased people can create a strong aggregate tendency toward investment in overly long production processes when biased bankers accommodate the demands of the biased investors for additional credit. The biased investors then use the credit to outbid other people for the factors of production, and unsustainable projects thereby crowd out sustainable ones. However, Cachanosky's (2012) argument does not explain the systematic error of the banking system. It assumes that banks can create a sufficient amount of credit and are willing to fund the biased projects.

C. Third Defense of Hayek's Theory: Assuming Unbiased Errors

The third defense responds to two objections to the previous two defenses. The first objection relates to the unexplained mistakes underlying the business cycle mechanism in Hayek's theory. The second objection relates to violating the rational expectations hypothesis.

Responding to the first objection, the third—current—defense attempts to explain why people commit errors when they form expectations about monetary expansions and their consequences. Block (2001, pp. 67–68) and Barnett and Block (2005, p. 432) point out that people have heterogeneous expectations, and therefore some of them have to commit errors; Barnett and Block (2006, p. 62) note that people are endowed with free will, which makes perfect

forecasting impossible; and O'Driscoll and Rizzo ([1985] 1996, pp. 207–8) recognize that people have imperfect knowledge.

These general insights take form in specific arguments. First, free will and imperfect knowledge imply that policy makers' actions are unpredictable (O'Driscoll and Rizzo [1985] 1996, p. 218; Barnett and Block 2005, p. 432; Simpson 2008, pp. 120–21; Callahan and Horwitz 2010, pp. 220–22). Second, even if people correctly predict economic policies, people's free will and imperfect knowledge make the outcomes of policies unpredictable (Barnett and Block 2005, p. 432). Third, imperfect knowledge and heterogeneity prevent people from agreeing on the one correct economic model, which also means that some people must predict incorrectly (O'Driscoll and Rizzo [1985] 1996, pp. 218–19; Garrison 1986, p. 444; Block 2001, p. 65; Barnett and Block 2005, p. 432; Simpson 2008, p. 119). Fourth, even if people were to have the correct model, with imperfect knowledge they would not know the correct values of the variables of the model (O'Driscoll and Rizzo [1985] 1996, pp. 222–23, 227; Garrison 1986, p. 444; Simpson 2008, pp. 120–21). Fifth, imperfect knowledge also implies that monetary expansion leads to monetary misperceptions, like those of Lucas (1972), because people have problems distinguishing between permanent real and temporary monetary sources of changes in demand for their products (Garrison 1986, pp. 446–47, 2001, pp. 26–29, 77–79, 82–83; Block 2001, p. 68; Barnett and Block 2006, p. 39).

Though it complies with the rational expectations hypothesis, the third defense fails to conform to Hayek's formulation of the theory. While the arguments might well explain why people commit errors when forming expectations about monetary policy and its consequences, the errors do not tend to direct investment into overly long production processes. People without systematic biases during monetary expansion might invest in both overly long and overly short production processes. The errors therefore do not lead to the business cycle as depicted in the original versions of Hayek's theory, and one would expect the authors of the third defense to attempt to explain the gap between their arguments and the original theory. It does not mean that such defense is impossible. However, the attempt does not come, and these authors do not place Hayek's theory on a footing of less questionable assumptions and arguments.

A recent paper by Salter and Luther (2016) follows the monetary misperception type of argument that I mentioned above and is one of the most sophisticated attempts to solve the above problems. It

argues that an equilibrium result of monetary shocks will be a cluster of errors, although not necessarily in terms of overly long production processes. The paper assumes that gathering information is costly and it is, therefore, optimal for people to commit some errors, including the ones that pertain to monetary policy. When there is a monetary expansion and the consequent liquidity effect, people misperceive the reasons for the lower interest rate, respond to it, and reallocate production factors accordingly. Salter and Luther (2016) argue that if people knew about the expansion, they would not reallocate the resources. The reallocation then later leads to a recession because it is inconsistent with people's preferences. This argument is problematic outside of the representative individual setting. Whether people are aware of it or not, monetary expansion benefits the first recipients of the new money, likely the participants of the market for loanable funds, where new money usually enters the economy. The corresponding liquidity effect changes the real interest rate and redistributes resources across people.

But while redistributions affect the composition of output and lead to reallocations of production factors, the result is not the Hayekian business cycle with observable clusters of errors. Rather, it is a new reality, with different allocations of production factors than there would have been without the monetary expansion. Such reality does not necessarily mean that people suddenly realize previous mistakes on a large scale, which is one of the main features of Hayek's theory.

The root of the problem with Salter and Luther (2016) in their attempt to restate Hayek's theory is their focus on people's misperceptions of what is happening in the economy when monetary expansion starts. In contrast, the mistake that people, agents, make in the traditional version of Hayek's theory is not about whether monetary factors or some other factors have changed the current real interest rate—a real change is a real change and it by itself does not lead to additional mistakes. Instead, the driving factor of the theory is the uncertainty over how long the change in the real interest rate will last. The uncertainty translates into mistakes in assessing the discount rate that entrepreneurs use to compute the profitability of their investment projects. Again, entrepreneurs' mistakes in this matter are not ones of misperception, but of imperfect foresight.

D. Fourth Defense of Hayek's Theory: Monetary Policy and Rise of Risky Projects

Carilli and Dempster (2001) and Evans and Baxendale (2008) present the fourth defense of Hayek's theory. Both papers claim monetary expansion increases the proportion of risky projects in the economy, which implies more projects will fail. Evans and Baxendale (2008) try to justify the claim of higher risk during monetary expansions by arguing that banks allocate the additional funds from monetary expansion to projects of less experienced people who are more prone to fail. Inexperienced people might receive the funds because the winner's curse leads them to outbid experienced people's more-realistic and less-risky projects (Evans and Baxendale 2008, p. 87). The winner's curse, however, cannot explain the proposed sudden increase in the proportion of risky projects during monetary expansions because it does not depend on monetary expansion (Cowen 1997, p. 82). Carilli and Dempster (2001), meanwhile, do not explain where the assumed errors are coming from and how they relate to monetary expansion. Thus, similar to the first and second defenses, both works do not have an explanation for the assumed cluster of errors accompanying monetary expansions.

Further, as with the third defense, Carilli and Dempster (2001) and Evans and Baxendale (2008) do not conform to the dynamics of the original version of Hayek's theory because they fail to link monetary expansion, the specific types of errors that people commit by investing in overly long production processes, and the cluster of errors.

IV. Conclusion: A Theory That Will Remain Obscure?

Hayek's theory of business cycles in its current form remains on the sideline of professional discussions about the causes of business cycles because it violates the profession's standard: the rational expectations hypothesis. Restatements of the original theory do not remedy the problem because they either remain in conflict with the hypothesis or abandon the theory's business cycle mechanism altogether.

However, that it is sidelined does not suggest whether it should be: after all, good ideas might get discarded merely because they do not fit with the spirit of the day, as Blanchard (2003, p. 24) notes in the context of discussing Hayek's theory. My discussion in the introduction about the theory's reasonable policy prescriptions, empirical plausibility, and existing modern technical analogs suggests

that Hayek's theory might be Blanchard's case in point. This being said, the theory in its present form in conjunction with the current standards for economic theorizing is, for the time being, bound to remain on the fringe of discussions among professional economists. This outcome might be avoidable. However, to change it, Hayek's theory either needs a satisfactory restatement, or it must wait until economists change the criteria for judging the quality of arguments.

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