EXPANSIONARY MONETARY POLICY AND DECREASING ENTREPRENEURIAL QUALITY

LUCAS ENGELHARDT

ABSTRACT: Austrian business cycle theory has been criticized on the basis of "rational expectations." That is, reasonably high quality entrepreneurs—which are required for economic growth—should be able to foresee the business cycle and thereby avoid making malinvestments. As noted by Evans and Baxendale (2008), this argument ignores the fact that entrepreneurs are heterogeneous in quality. American housing data from the past 25 years suggests that entrepreneurs are more likely to make errors when interest rates are unusually low. This suggests that during the boom either entrepreneurs become foolish—or, as suggested by Evans and Baxendale (2008), fools become entrepreneurs.

INTRODUCTION

One of the greatest contributions of Austrian economics is the theory of the business cycle. The Austrian theory explains how

Lucas M. Engelhardt (lengelha@kent.edu) is Assistant Professor of Economics at Kent State University, Stark Campus.

booms driven by expansionary monetary policy lead inevitably to busts. The theory has the benefit of being built on a foundation of premises that many find intuitive or undeniable. Interest rates do impact the choice of capital investments. So changes in interest rates can lead to potentially devastating changes in the value of particular types of capital. While much of modern mainstream macroeconomics ignores the fact,[1] capital is, in fact, meaningfully heterogeneous. Monetary policy does impact interest rates and, as emphasized by Evans and Baxendale (2008), the availability of funds for starting investment projects. Once we acknowledge the insight of Mises (1980 [1934]) that monetary policy cannot keep interest rates low indefinitely, Austrian business cycle theory flows naturally from the premises.

Despite the fact that the premises are true[2] and that the conclusion of Austrian business cycle follows, there are criticisms of the theory. Some follow the form of the argument of Milton Friedman, who declared, "The Hayek-Mises explanation of the business cycle is contradicted by the evidence" (1969). A careful reading of the statement in light of the logical positivism of Milton Friedman suggests that Friedman is not criticizing the Hayek-Mises theory as a theory. He does not seem to deny its premises or the process by which the conclusion is reached. Rather, his criticism[3] seems to be that the evidence suggests that there are other, more important forces that determine the shape of economic fluctuations. So, while the Austrian theory might be "true" in the sense that it is "valid," it is not a "true explanation" of business fluctuations, as other forces are more important.

Other criticisms—such as that presented by Caplan—suggest that there are actually internal problems. In particular, Caplan suggests that:

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[1] This fact is supported directly by a handful of mainstream economists such as Solow (1955), and, more recently, Altig, Christiano, Eichenbaum, and Linde (2004). It is probably fairest to say that the mainstream "ignores" capital heterogeneity—not that the mainstream "denies" it.

[2] The essential elements of the Austrian business cycle theory are three: that monetary policy temporarily lowers interest rates, that interest rates impact different investments differently, and that capital is heterogenenous. Few economists—regardless their school of thought—deny any of these.

[3] This is made most clear when considering Friedman's "Plucking Model," as presented, for example, in Friedman (1993).

> Given that interest rates are artificially and unsustainably low, why would any businessman make his profitability calculations based on the assumption that the low interest rates will prevail indefinitely? No, what would happen is that entrepreneurs would realize that interest rates are only temporarily low, and *take this into account*. [Emphasis in original.]

That is: artificially low interest rates wouldn't affect the choice of capital investments—at least not in a way that would lead to entrepreneurs later wishing they could undo those choices. This particular type of objection has been called the "rational expectations" criticism of Austrian business cycle theory.[4] This objection is far from new—in fact, Mises himself suggested it. So, those that support Austrian business cycle theory have offered a number of responses to this criticism. This paper will provide additional argument and some empirical evidence supporting one of these defenses: that offered by Evans and Baxendale (2008). In short, their explanation suggests that entrepreneurs differ in quality and that, during the boom, lower quality (that is more error-prone) entrepreneurs are the "marginal entrepeneurs"[5] who determine the course that capital goods markets take.

This paper uses data from the US housing market[6] from the past 25 years and shows that: (1) contra Caplan, the prices in the housing market are more responsive to short-term than long-term interest rates despite the fact that short-term interest rates are more likely to be distorted by monetary policy, (2) the sensitivity to short-term interest rate levels increases as interest rates fall, which can be interpreted as a sign of increasing entrepreneurial

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[4] Though not dealt with in detail in this paper, Tullock (1987), Cowen (1997), and Wagner (1999) present similar arguments—all relying on the fact that entrepreneurs with rational expectations would not make systematic errors resulting in malinvestments.

[5] That is, the additional entrepreneurs that are now able to make investments. Though, as noted by an anonymous referee, the difference may be in the entrepreneurs' plans as much as in the entrepreneurs.

[6] Housing is a reasonable focus for a few reasons. Most obviously, the boom and bust of the early 2000s was clearly closely connected to the housing market. Housing also has the benefit of being a common capital good with a long "period of production" for the services it provides. Finally, data is readily available that focuses on housing prices and mortgage interest rates for various lengths of mortgages—allowing us to examine the differing impacts of short-term vs. long-term interest rates.

"foolishness" (in support of Evans and Baxendale [2008]), and (3) that these tendencies do a reasonably good empirical job of explaining the movement of housing prices over the past 25 years (contra Friedman).

AN OVERVIEW OF AUSTRIAN BUSINESS CYCLE THEORY

Austrian business cycle theory suggests that business cycles are largely the result of entrepreneurial errors that are caused by unsustainable monetary policies. The process begins when the banking system engages in credit expansion, increasing lending without any increase in real savings. This process may occur from lending of money that was previously held in reserve, or, as noted by Rothbard (2008 [1983]), by the issuance of additional demand deposits with no need for reserves to leave the bank doing the lending, or by an increase in the reserves provided by the central bank which then provide a foundation for additional lending by commercial banks. The newly available funds tend to push down interest rates, which creates the illusion that there are more resources available for investment in long-term projects. From the borrowers' perspective, there is no difference between funds made available through credit expansion and funds made available through real savings. Therefore, the lower interest rate has the same effect as a real decrease in social time preference: entrepreneurs invest more in longer term projects. At the same time, the decrease in interest rates tends to decrease the quantity of real savings, so that real resources are becoming less available for long-term investments than they were before the credit expansion.

So, there is a contradiction in the structure of production. On the one hand, entrepreneurs are attempting to use resources to begin more long-term projects. On the other hand, consumers are consuming more resources to satisfy their present desires. Eventually, the contradiction has to work itself out. One way in which the contradiction can work itself out is by an increase in interest rates. Since the change in interest rates was brought about by credit expansion rather than by a real change in time preference, those that receive income as entrepreneurs try to expand their long-term projects will consume and save based on their time preferences, and their level of savings is not sufficient to keep interest rates as

low as they were during the credit expansion. Therefore, as long as the expansion in credit is temporary, the low interest rates will be temporary as well. Once interest rates increase, those long-term investments that entrepreneurs began will be shown to be unprofitable. Therefore, many will be abandoned as the capital structure adjusts back to a sustainable configuration that is consistent with the social level of time preference. Alternatively, if credit expansion does not halt, the boom comes to an end in a runaway inflation. Since resources are limited, the new money created by credit expansion will drive down money's purchasing power. As market participants come to expect a decreasing purchasing power in the future, they become less willing to hold the depreciating money. As demand for money dries up, the money loses value, and eventually falls from use. Once the market reaches this point, credit expansion is impossible.

The lesson of Austrian business cycle theory is clear. Credit expansion results in an investment boom. However, many of the investments made during the boom were errors and will prove unprofitable. At some point (often because of rising interest rates) the errors are revealed, and boom turns to bust.

THE IMPORTANCE OF ENTREPRENEURIAL QUALITY

It has long been known that this theory rests on an important assumption: that entrepreneurs are fooled by the process. That is, when interest rates are (temporarily) low, entrepreneurs cannot expect them to rise in the future. If they did, one expects that they would be more hesitant to borrow to fund long-term projects. If no one borrows to fund long-term projects, then the boom never starts. If the boom never starts, then the bust cannot follow. While this is not the only criticism of the Austrian theory of the business cycle, it is perhaps the criticism that shows the most understanding of the underlying theory. That being the case, it should not be surprising that this criticism was leveled against the theory by Ludwig von Mises himself in his *Theory of Money and Credit* (1980 [1934]):

> It is... possible for all the consequences of variations in the value of money to be eliminated if the individuals engaged in economic activity clearly recognize that the purchasing power of money is constantly sinking and act accordingly. If in all business transactions they allow for what

the objective exchange-value of money will probably be in the future, then all the effects on credit and commerce are finished with. (Chapter 7, Section 3)

Also, when discussing the business cycle in *Human Action*, Mises stated of even the least disastrous malinvestments: "It is, of course, true that one would not have embarked upon putting capital goods into them if one had correctly calculated." (Chapter 20, Section 6) This suggests that proper entrepreneurial calculation is one of the possible factors that can counterbalance "the boom-creating tendency of credit expansion." Mises states that if, for example, an excess profit tax were imposed at the same time as the credit expansion occurred, then "entrepreneurs will abstain from expanding their ventures with the aid of the cheap credits offered by the banks because they cannot expect to increase their gains." (Chapter 20, Section 6) In the realm of pure theory, it is possible that people will one day figure out that easy money policies always come to unfortunate ends. If they do figure this out, we will find that easy money policies fail to create any boom whatsoever in the first place.

So, the question remains: why have entrepreneurs not learned that easy money policies breed a boom-bust cycle? Why do easy monetary policies still tend to stimulate investment in long-term projects that are doomed to failure? Here, there are a number of possibilities. One of the more obvious is that entrepreneurs may simply be ignorant of the effects of monetary policy (as suggested by Block [2001]). While the nature of entrepreneurship requires that entrepreneurs have a keen judgment of what the future holds in their own market, they may not have developed as keen an eye for the effect that monetary policy has on their businesses. This explanation certainly appears reasonable. After all, how many entrepreneurs know any business cycle theory at all—let alone the Austrian theory? However, this explanation has two significant weaknesses. First: it is obvious that every business is impacted by business cycles, and therefore every business person has an incentive to gain an understanding of business cycles. Of course, having an incentive to do something and being able to do it are two different things. But recent experience has shown that business cycles are, to some degree, predictable by people who have the right theory (and

sometimes by those who have the wrong theory),[7] and who have a keen eye for relevant indicators. The second reason we should doubt this theory comes from the profit and loss system's ability to sort entrepreneurs by their quality. Entrepreneurs who do a poor job forecasting future demand for their product (or the future costs of production) will tend to suffer losses, while those that do a good job forecasting future demand and costs of production will tend to outperform. So, over time, poor entrepreneurs will be driven out of the market while those that remain are relatively high quality. If an understanding of business cycles helps an entrepreneur predict the future demand for or cost of producing their product, then we would expect entrepreneurs that do not understand business cycles to be "weeded out" by the market process. Therefore, over time, business cycles should become less severe, as the relatively poor entrepreneurs are removed from the marketplace.[8]

Another possibility is advocated by Roger Garrison (1986). Garrison suggests that the problem is really game theoretic in nature. Individually, there is no particular problem with an entrepreneur taking advantage of temporarily low interest rates. The business cycle only occurs because many individual entrepreneurs try to take advantage of this opportunity. So, what is individually rational is collectively irrational. Individually, there are profits to be made during the boom, so market participants have every reason to participate—even if they know that the boom is going to come to an end. This argument is further developed by Carilli and Dempster (2001). Their version of the Prisoner's Dilemma entrepreneurs face during the boom makes the following assumptions:

> Assume that the market rate of interest has fallen below the natural rate of interest. Assume that a particular firm, Firm X, knows that the decrease in the market rate of interest is the result of an increase in the availability of credit and not the result of a decrease in the underlying rate of time preference…. Firm X is faced with the decision to either increase investment or maintain the current level of investment. Assume Firm

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[7] After all, both the Austrian-influenced Peter Schiff—the well-known star of the YouTube video "Peter Schiff was right"—and the Keynesian Paul Krugman saw that the housing bubble was, in fact, an unsustainable bubble.

[8] Of course, the fact that entrepreneurs are mortal suggests that this process is never complete.

X does not know what the other firms will do and that Firm X wishes maximizes its profits relative to all other firms….

If Firm X increases its investment while all other firms increase investment, its profit level will remain unchanged relative to all other firms; that is, the change in Firm X's relative profit is zero. If Firm X increases its investment while all other firms maintain current level of investment, Firm X will find its relative profits increasing. If Firm X maintains its current level of investment, there will be no change in relative profits.

The resulting payoff matrix resembles that in Figure 1:

Figure 1. Carilli and Dempster's Payoff Matrix

The result is that the dominant (and maximin—that is "best worst case") strategy for Firm X is to increase investment. If the other firms increase investment, then Firm X experiences no change in relative profits (as opposed to a relative loss). If other firms maintain investment, Firm X experiences an increase in relative profits (as opposed to no change in relative profits). So, individually, Firm X has a strong reason to increase investment regardless what other firms do.

Carilli and Dempster make three problematic assumptions in their argument. First, that an entrepreneur's payoff is captured by relative profits. Second, that a firm's only options are to increase or maintain investment. Third, that firms are concerned only with

short-term boom-time profits rather than long-term post-bust losses. Let us consider each in turn.

Assuming that entrepreneurs care about relative profits implies that, if there are two entrepreneurs, and both are taking equal losses, then they are just as content as if both were earning equal profits. This is clearly false. Payoffs should be listed on the basis of absolute—not relative—profits. (Just to highlight the absurdity of the argument here: Carilli and Dempster's payoffs create the appearance that if everyone participates in the boom by increasing investment, then no one is any worse off than if no one participated in the boom. Austrian business cycle theory suggests this is false. The waste of capital that occurs in the boom implies that, in the end, firms—and society—are worse off if the boom occurs than if it does not.)

Second, Carilli and Dempster's strategies are too limited—there is certainly a possibility of entrepreneurs decreasing (or halting) investment entirely. In fact, it seems plausible that an entrepreneur who understands Austrian business cycle theory might choose to exit the market entirely once the boom sets in. Since the timing of the crisis is unpredictable and society ends up poorer after the bust than it was before the boom, exiting the market and waiting for the unprofitable firms to liquidate may be the best available strategy. In fact, we can modify Carilli and Dempster's strategies and payoffs and find that a rational entrepreneur may choose not to invest during the boom, if they take a long view.[9] Suppose that Firm X expects other firms to invest during the boom. In that case, Firm X knows that, ultimately, the bust will come and those firms that have increased or maintained investment will suffer losses. So, Firm X has a choice: either join in the boom and—eventually— take losses, or exit the market, avoiding the losses. Clearly, profits of zero are better than losses, so if Firm X expects other firms to increase investment, creating an unsustainable boom, then a long-sighted Firm X will exit the market. In fact, this argument is sufficient to show that if we follow Carilli and Dempster in

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[9] In a similar way, one could imagine the traditional prisoners breaking their dilemma by recognizing that their associate was waiting to kill any snitches once their sentence was up. Prisoners with a long view will recognize that the loss of their lives more than offsets the shorter prison sentence, and will refuse to confess.

applying the maximin criterion to predict Firm X's behavior, we will predict that Firm X sits out. Since the maximin criterion only considers the worst case scenario for each available choice, it is clear that the possibility of post-bust losses from maintaining or increasing investment will lead a maximin-playing Firm X to not invest at all, as the worst case—in fact, the guarantee—is that not investing will result in zero profits.

The above argument would be answered by Carilli and Demp-ster's assumption (albeit implicit) that entrepreneurs care about short-run profits, rather than the long-run post-bust losses. If an individual firm expects to be able to profit during the boom and exit before the crisis, then they may participate in the boom and plan to exit before the crisis. This is a real possibility and it may lead to even informed investors participating in the boom—but this answer simply denies that rational expectations are common, because it must assume the existence of a significant number of foolish investors. Consider the case of an individual, rational, Austrian-informed, entrepreneur. Clearly, this entrepreneur would not want to be caught with investments on the eve of the crisis. So, such an entrepreneur will seek to sell the investments they have before the crisis occurs. As long as there are a substantial number of poor-quality entrepreneurs that do not foresee the crisis, a rational, Austrian-informed entrepreneur can reasonably expect to be able to invest in the early stages of the boom and exit the market shortly before the crisis.[10] However, the claim of the rational expectations critique is that poor-quality entrepreneurs are rare (or, in the extreme case, nonexistent). But, in that case a rational entrepreneur will not enter the boom, because they will know that no market participant will buy from them shortly before the crisis, since the other market participants are all (or nearly all) rational, and therefore would be trying to exit at the same time.[11] So, this answer to the rational expectations critique only applies

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[10] Block (2001) rightly points out the importance of not all market participants having rational Austrian-informed expectations for this process to take place.

[11] Here, the mainstream literature on "rational bubbles" is relevant. This literature has shown that asset bubbles can only happen in the presence of rational expectations if the bubble is expected to grow continuously. So, put differently, since the Austrian-informed rational entrepreneurs expect the bust to happen eventually, the boom cannot get started.

if rational expectations are rare—a claim that the rational expectations hypothesis denies. Thus, though this answer is true (and plays a part in the argument in this paper), it answers the rational expectations hypothesis by claiming that the hypothesis is false, not by showing that Austrian business cycles will happen even in a rational-expectations world.

To be clear: these answers certainly have truth in them. The reality is that not all entrepreneurs know Austrian business cycle theory, and the entrepreneurs that do know it can, at times, expect to find greater fools to sell to before the bust happens. But, when faced with a criticism like that posed by rational expectations, one must have a good reason that normal market forces are not as effective during the boom as during other times. We all agree that the profit and loss system typically sorts out "bad" entrepreneurs—limiting their ability to do harm, and thereby limiting the size and prevalence of error. Yet, during the boom, it seems that many entrepreneurs fall into the same types of errors—they underestimate future interest rates, and so overestimate the value of capital goods and the desirable length of the productive process.

I suggest that the key is that the statement is framed incorrectly. At the beginning of this section, I stated that "entrepreneurs are fooled by the process." This statement is reversed. The reality is not that entrepreneurs become fooled. The reality is that, during the boom, fools become entrepreneurs. Evans and Baxendale (2008) suggest that "irrationality" on the part of market participants is not a widespread phenomenon during the business cycle—rather the expansion of credit draws in "marginal" entrepreneurs. Evans and Baxendale (2008) point out that entrepreneurs differ in their quality, and that different qualities of entrepreneurs (or entrepreneurial projects) have an easier (or more difficult) time securing funds. In a free economy without "easy money," marginal entrepreneurs would be denied funds. Because these entrepreneurs (or their projects) are of relatively poor quality, they will tend not to receive investment funds—if funds are sufficiently limited. Once monetary injections can breed credit expansion, funds are less limited than when credit was relatively "tight." As a result, there is a set of entrepreneurs that will receive funds when credit is "easy" that would not when credit is "tight." So, the "average quality" of entrepreneurs has declined during the boom.

Evans and Baxendale (2008) points us in the right direction—but their argument can be taken a step further. It is true that relatively low quality entrepreneurs will find it easier to come by funds for investment when money is easy by virtue of the fact that there are more funds available. At the same time, those entrepreneurs that are high quality and foresee the path that the economy will follow have an incentive to get out of—or at least more strictly limit their participation in—those industries that are dependent on the persistence of the boom, especially as the boom continues and the crisis looms. For example, during an investment boom, the price of capital goods will tend to rise. While Evans and Baxendale (2008) correctly point out that capital goods cannot be "shorted" in the same sense that financial instruments can be shorted, existing capital goods can certainly be sold by those owners who recognize that they are temporarily overvalued and that a crisis is coming. This multiplies the problem that Evans and Baxendale (2008) point out. Thanks to the credit expansion, there are more funds available than before, so marginal entrepreneurs are drawn in. Meanwhile, a growing number of higher quality entrepreneurs sell their temporarily overpriced capital to entrepreneurs who are overestimating its value, which puts even more resources into the hands of lower quality entrepreneurs. That is, Evans' and Baxendale's "marginal" entrepreneurs tend to become a significant part of who is running the booming industry.

So the reason that error becomes so much more prevalent during the boom is not that entrepreneurs turn into fools. Rather, it is that fools are empowered to become entrepreneurs.

EVIDENCE FROM THE HOUSING MARKET

The recent boom and bust in the American housing market provides an excellent demonstration of the Austrian business cycle theory, and provides a fitting anecdote to demonstrate the importance of fools joining the market when credit becomes easy. In broad terms, the housing boom began in the early 2000s, as the Federal Reserve pushed interest rates to what were, at the time, record lows. (Figure 2) As the policy rates (like the federal funds rate) fell, mortgage rates also fell—especially short term rates on adjustable-rate mortgages. Since cheap credit was available (often

with little to no money down), new homeowners entered the market. However, starting in 2005 or 2006, interest rates started a steady uphill climb. As adjustable rate mortgages saw their interest rates and payments adjust upward, many homeowners found that their homes were unaffordable, and ended up losing them to fore-closure. At the same time, the higher interest rates and tighter credit markets led to a decreased demand for houses. The fall in home prices combined with low levels of initial equity to push many homeowners to the point where they were "underwater" on their mortgages—providing a strong incentive for such homeowners to simply walk away from their homes.

Figure 2. Evidence from the Housing Market
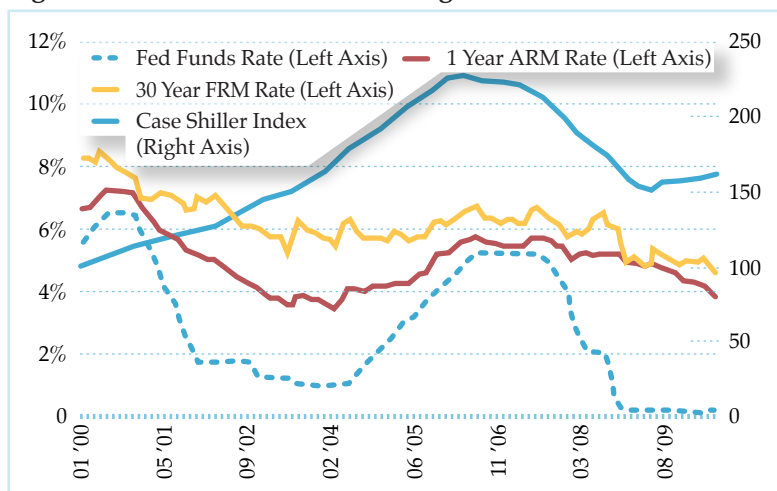
The basic elements of the entrepreneurial errors that happen during a typical Austrian business cycle are all present in this example. The purchase of a home is a long-term investment in much the same way that buying or building a factory is, and therefore includes an entrepreneurial component. Though a homebuyer may not be an entrepreneur in the sense that Henry Ford was, the decision to buy a home is an entrepreneurial one—that is, it is heavily informed by the homebuyer's expectations regarding the

future.[12] When a person buys a home, he has expectations about the value of the home going forward (just as those that buy factories have expectations about the future value of the factory). When a person buys a home, he has expectations about the value of the services that that home will provide in the future (just as those that buy factories have expectations about the future value of the product the factories produce). When a person buys a home, he has expectations about the costs associated with homeownership (just as those that buy factories have expectations about the future costs of production). Austrian business cycle theory claims that, because entrepreneurs underestimate future interest rates, they underestimate the future cost of production and overestimate the value of capital goods. The behavior of the housing market during the recent boom was consistent with an analogous error. Those purchasing homes overestimated the value of the house and underestimated the future cost of ownership. All of this happened because interest rates were artificially—and temporarily—low.[13] So fools became entrepreneurs, and made investments in housing that were doomed to perform poorly.

However, we can take the evidence a step beyond anecdotes and broad strokes. Through the use of statistical methods, we can do some economic history to get an idea of the influence that interest rates had on changing the quality of entrepreneurial homebuyers. It seems to be a fact of recent economic history that shorter term interest rates are more volatile than longer term rates. For example, the interest rate on adjustable rate mortgages tends to be more

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[12] As noted by an anonymous referee, the argument here relies on the fact that we are all entrepreneurs—which is certainly true, in that we all act based on expectations regarding the future. The universal nature of entrepreneurship becomes especially important when individuals make long-term investments, like in housing, while the entrepreneurial component in making a ham sandwich—though present—is less important, as the uncertainty is less.

[13] It may be worth noting that some entrepreneurs who saw how the housing market was going to go—most notably Peter Schiff—made the decision to rent rather than buy a house during the boom. This provides some anecdotal support for the idea that high quality entrepreneurs that foresee the inevitability of the bust do in fact remove themselves from the market during the boom. As a referee notes, it is also possible that some homebuyers sold for reasons other than good foresight, and were therefore just lucky. But those homeowners that remained almost certainly did not see the crisis coming, and were therefore "low quality."

volatile than that on fixed rate mortgages. Rothbard (2001 [1962]) argues that, in a free market with a well-established secondary market for debt, there is no particular reason that a free market should display these tendencies (see Chapter 6, Section 11)—interest rates on long-term bonds are just as flexible as on short-term bonds, since the prices in the secondary market can adjust quickly. In mortgage markets, adjustable-rate mortgages and fixed-rate mortgages in the data are for new mortgages—and there is no particular reason that the interest rate on mortgages previously issued should impact those issued later. That being the case, there is no particular reason that adjustable rate mortgages should have more volatile interest rates in the data than fixed rate mortgages do. However, the reality in the hampered market in which we live seems to be that interest rates on short-term loans are more volatile than interest rates on long-term loans. I would suggest that the observed difference in interest rate volatilities derives largely from the fact that central banks tend to focus their interventions on loan markets with shorter terms.[14] When the central bank increases the money supply, there is a new supply of funds for short-term loans—without any immediate corresponding change in the supply of funds available for long-term loans. As a result, during the intervention, short-term rates are driven below long-term rates. When the central bank decreases (or slows the increase) in the money supply, there is a decrease in the availability of funds for short-term loans—without any immediate corresponding change in the supply of funds available for long-term loans. As a result, short-term rates are driven up more quickly than long-term rates.[15] If this is the case, then only foolish entrepreneurs will respond in any significant way to short term rates, as long-term rates are not as distorted by intervention, and therefore provide a better signal for social time preferences—and therefore a better guide toward appraising capital values.

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[14] As noted by an anonymous referee, this tendency has been violated with the Fed's recent policies of Operation Twist, and potentially Quantitative Easing. Though not dealt with here, it may be interesting to pursue the question of whether this change in focus had an impact on the relative volatility of long and short term interest rates.

[15] This is also consistent with the fact that the yield curve tends to flatten or invert prior to recessions.

Taking these insights that intervention tends to create larger distortions in short term than in long term interest rates, and that foolish entrepreneurs will be more likely to respond to the more distorted rates, we can develop a few predictions about how home values should respond to interest rates. First, if entrepreneurs are wise and pay more attention to long-term rates, then long-term interest rates should have a bigger statistical impact on home prices than short-term rates do. Second, if entrepreneurs are foolish and pay more attention to short-term rates, then short-term interest rates should have a bigger impact on home prices than long-term rates do. These are both interesting predictions—but neither really speak to the hypothesis suggested by Evans and Baxendale (2008), and also advocated here. The claim here is that fools "become" entrepreneurs during the boom. Once we aggregate to the level available in the data used here, it is impossible to distinguish this claim from the claim that entrepreneurs become fools. However, we can come to some conclusions about changes in the "level of foolishness" held by those marginal entrepreneurs that are having a significant impact on housing prices. Since we know that foolish entrepreneurs will pay more attention to short-term rates, we should expect that as entrepreneurs become more foolish, they will tend to pay more attention to short-term interest rates. As a result, the lower short-term interest rates are, the larger the impact they will have on housing prices.

These insights can be summed up by two statistical equations that will be estimated to demonstrate that this process has been happening to a significant, measurable degree in the housing market.

$$Housing\ Prices = \alpha + \beta_1 1\ Year\ ARM\ Rates + \beta_2 Disposable\ Income + \epsilon_1$$
$$\beta_1 = \gamma_1 + \gamma_2 1\ Year\ ARM\ Rates + \epsilon_2$$

Our claims about housing prices imply that the coefficient β_1 should be less than zero for our observed sample. That is: the higher interest rates are, the lower housing prices will be, and vice versa. At the same time, γ_2 should be positive. Since β_1's magnitude gives us a sense of how large an impact interest rates have on housing prices, and β_1 is negative, as interest rates rise, we would expect β_1 to decrease in magnitude—that is, become less negative.

For that to happen, γ_2 must be positive. When we combine these two equations into a single equation for estimation, we have:

$$Housing\ Prices = \alpha + \gamma_1 1\ Year\ ARM\ Rates +$$
$$\gamma_2 (1\ Year\ ARM\ Rates)^2 + \beta_2 Disposable\ Income + \epsilon$$

To estimate this equation, I used Standard and Poor's Case-Shiller 10-City Home Price Index for housing prices. One year ARM rates come from the monthly data collected by Freddie Mac in their Primary Mortgage Market Survey. Disposable Income is included as a control. Data on disposable income (measured in billions of dollars) come from the Bureau of Economic Analysis. I used monthly data starting in January 1987 and continuing through July 2010—so these data include both the small home price boom and bust of the early 1990s and the more recent—and more significant—one throughout the 2000s.

Using standard least-squares regression analysis,[16] the following results are obtained:

Parameter	Estimate (Standard Error)	P-Value
α	85.835 (24.486)	0.0005
γ_1	-40.427 (7.703)	3.05×10^{-07}
γ_2	3.531 (0.616)	2.6×10^{-08}
β_2	0.018 (0.001)	1.64×10^{-83}
R^2	0.813	

The first point to note: none of the signs are a surprise. The coefficient on β_1 will be negative over every interest rate in the data set (the maximum interest rate in the data set is 9.4 percent—which would result in a β_1 estimate of -7.236). The coefficient on γ_2 is positive—which indicates that short-term interest rates matter more the lower they are. The coefficient on β_2, which is not part of the

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[16] For those concerned about whether this type of analysis is strictly "valid," the analysis can be interpreted as uncovering "conditional correlations" between the series.

theory discussed in this paper, also has the sign one would expect. As incomes rise, house prices also rise. All of these are significantly different from zero at any reasonable level of confidence.

When it comes to interpreting the results, the complexity of the equation makes a direct interpretation difficult for the most interesting point. So, just to choose a single point, suppose one-year adjustable rate mortgages are currently 5 percent. In that case, β_1 is equal to –22.772. So, other things equal, an increase in mortgage rates of 0.1 percent will decrease the Case-Shiller home price index by approximately 2.277 points. However, if interest rates are 4 percent, then β_1 is equal to –26.303, so an increase in mortgage rates of 0.1 percent will decrease the home price index by approximate 2.630 points.

So it does appear that home prices become more sensitive to short term interest rates as short term interest rates fall. Seeing that short-term rates are so influenced by the credit expansions that breed the boom-bust cycle, we can take this increasing sensitivity to short-term rates as a sign of increasing entrepreneurial foolishness.

By means of comparison, we can perform the same regression, but using interest rates on 30 year mortgages from the Primary Mortgage Market Survey (which reports interest rates on newly issued 30 year fixed rate mortgages, whether these are new mortgages or refinancing), giving these results:

Parameter	Estimate (Standard Error)	P-Value
α	-17.498 (43.37)	0.6853
γ_1	-12.196 (8.936)	0.1734
γ_2	1.194 (0.521)	0.0225
β_2	0.020 (0.001)	1.25×10^{-48}
R^2	0.805	

These results suggest that the impact of 30 year interest rates is quite small relative to the impact of 1 year interest rates. In fact, γ_1's estimate is not statistically significantly different from zero at any reasonable level. At heart, this suggests that long-term interest rates do not seem to have a big impact on the changes in the housing prices

we have seen over the past 25 years or so, but short-term interest rates do have a significant impact. Since roughly half of the last 25 years of housing prices were observed during a housing boom and bust, it is reasonable to view this evidence as support for the idea that some capital prices (in our case, housing prices) have been heavily impacted by short term interest rates, despite the fact that these interest rates are heavily distorted by the interventions of central banks. Since entrepreneurs appear to be more influenced by these short term rates the lower they fall, entrepreneurs do become more foolish (or more fools become entrepreneurs) as interest rates fall.

CONCLUSIONS

Austrian business cycle theory—like all true business cycle theories—is essentially a theory of clusters of error (see Hulsmann [1998]). Some critics—and even such famous advocates as Ludwig von Mises himself—have suggested that a world in which entre-preneurs are not fooled by credit expansion is conceivable. In fact, entrepreneurs have every reason to try to avoid errors, and the profit-and-loss system does a reasonable good job—under normal conditions—of sorting out error-prone entrepreneurs from those that are wiser. Over time, the same profit-and-loss system will take control of resources away from entrepreneurs that waste resources in their errors and will give control of resources to entrepreneurs that are better at anticipating future market conditions. This process is hampered during a business cycle. Wise entrepreneurs understand that interest rates are artificially and temporarily low and look for a way to avoid the inevitable bust. For example, prior to the crisis, they may sell their (temporarily overvalued) factories and stocks to those who are overvaluing them. The entrepreneurs who buy these factories—and build new ones as well—are precisely those entrepreneurs who do not understand that the boom will come to an end. They foresee a "permanently high plateau" in their market, not realizing that the "plateau" is only as high as it is because interest rates are being held to an unsustainably low level. Therefore, while normal market conditions would result in fools losing their status as entrepreneurs, by the end of the Austrian boom only (entrepreneurial) fools are willing to invest in the booming industries. In the terms of Evans and Baxendale (2008), the "marginal entrepreneur"—who is the one that plays

the decisive role in capital markets—is of lower quality during the boom than in normal times. Credit expansion makes more funds available for lower quality entrepreneurs, and, at the same time, the knowledge that the boom will end in a bust results in relatively high quality entrepreneurs eventually exiting the market, further freeing resources for foolish entrepreneurs to control.

This paper has suggested that housing market data from the past 25 years provides a reasonable demonstration of this tendency. Despite the facts that housing is typically a long-term investment, and that long-term interest rates are less distorted by monetary policy, housing prices have been more responsive to the more distorted—and seemingly less relevant—short-term rates. Not only do short-term interest rates seem to matter more statistically, but their importance grows as interest rates fall. Put another way: home-buyers are more influenced by interest rates when interest rates are unusually low. This suggests that people making investments in housing do, in fact, get more foolish as interest rates fall. Despite the fact that very low interest rates must eventually rise (resulting in falling housing prices), people rush in to buy when interest rates are low. Anecdotally, people have also tended to use more adjustable-rate mortgages during the recent housing boom. This suggests another layer of foolishness that was not explored in this paper—not only are investors in homes buying when prices are temporarily high because of low interest rates, but they are also buying using mortgages that will get more expensive as interest rates rise.[17]

What then are the consequences for Austrian business cycle theory? First, Austrian business cycle theorists need not fear the allegations of rational expectations critiques. As has been noted by Garrison (1986), Austrians should not be overly concerned about these critiques for a simple reason: rational expectations appears to be a false assumption. This paper adds to the evidence for that fact. Investors in housing markets do not take into full account the likelihood that interest rates will rise when they are unusually low. Second, this paper provides evidence that the errors that occurred

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[17] As noted by an anonymous referee, it is also possible that there were policy changes that made adjustable rate mortgages more attractive. This would lead to an increased use of these mortgages. However, given how history played out, a homebuyer with good entrepreneurial foresight would know that such mortgages would eventually end up being a losing proposition once rates rose.

during the recent business cycle have resulted from an increasing level of "foolishness" among entrepreneurs. Part of this effect arises because the credit expansion provides resources to entrepreneurs who could not have secured them before. Another part of this effect arises because wise entrepreneurs have a good reason to leave a market that is temporarily overvalued, especially as the crisis nears. If anything, the more "fragile" theory is one resting on rational expectations. The rational expectations critique against Austrian business cycle theory only really works if all—or at least an overwhelming majority of—entrepreneurs are "rational" in the very strict sense implied by rational expectations theory. Introducing a reasonable handful of less "rational" entrepeneurs into the mix allows for the conclusions of Austrian business cycle theory to take hold—the "average entrepreneur" is of lower quality in the credit-expansion-driven boom than in normal times. If, on the other hand, we start with entrepreneurs of heterogeneous quality as suggested by Evans and Baxendale (2008), introducing a reasonable handful of perfectly "rational" entrepreneurs will have little impact. Throughout the boom, rational entrepreneurs should move toward sidelines.[18]

Naturally, we cannot rule out, a priori, that some day entrepreneurs will all come to understand the distorting effects of monetary policy so well that they cease to be fooled by expansionary monetary policy. In fact, someone who wants to see society escape from business cycles as we know them should hope for the day in which all business cycle theories cease to be relevant. However, recent experience has shown us that business cycle theories are still required if we want to understand the economy as it actually operates. Recent experience has also confirmed that the business cycle operates very much like Austrian busincess cycle theory suggests.

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[18] The result suggests that Alexander Pope's dictum applies to business cycles—"fools rush in where angels fear to tread"!

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