Towards a microeconomic theory of the finance-driven business cycle

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I sketch a broad program for a microeconomic theory of the business cycle as a recurring episode of disequilibrium, driven by incompleteness of the financial market and by information asymmetries between borrowers and lenders. This proposal seeks to incorporate five distinct but connected processes that have been discussed at varying lengths in the literature: the leverage cycle, financial panic, debt deflation, debt overhang, and deleveraging of households. In the wake of the 2007 financial crisis, policy responses by central banks have addressed only financial panic and debt deflation. Debt overhang and the slowness of household deleveraging account for the Keynesian “excessive saving” seen in recessions, which raises questions about the suitability of the standard Keynesian remedies.

Keywords: financial instability, incomplete markets, positive feedback, principal-agent problem, mortgages

JEL Classification: D53, E32

I. INTRODUCTION

The business cycle is the recurrence of large macroeconomic fluctuations about the long-term growth trend in a free-market economy. Understanding this phenomenon is a central and longstanding problem in economic theory. Knowing how best to alleviate it is a matter of great political significance in the modern world.

Finance fulfills the useful function of transferring the control of capital from those who own it to those who can put it to productive use. The vastly higher living standard of industrialized countries compared to more traditional societies would not be possible without private finance. There is, however, a widespread and longstanding sense that the most severe fluctuations in free-market economies are driven by an instability associated with financial speculation.

The evidence of business cycles is clear, but the phenomenon has proved challenging to understand theoretically. One reason is that, if applicable, the microeconomic equilibrium theorems would rule out the kind of mis-coordination between economic agents that marks the most severe crises. Those theorems assume that markets are complete (so that all possible voluntary transactions can be carried out) and that all agents enjoy perfect information. Those conditions are obviously not achieved in practice, but markets usually equilibrate quite well under more realistic circumstances, both in the real world and in controlled experiments.

In order to understand what drives the business cycle and how best to cure it, it is necessary to understand just how and why financial markets sometimes fail to equilibrate.

Here I shall sketch, in broad outline, a program for a microeconomic theory of the business cycle: i.e., for an understanding based on the choices made by rational agents. In this view, the business cycle appears as a recurring form of market disequilibrium, driven by the incompleteness of financial markets and by information asymmetries between borrowers and lenders. This proposal brings together five distinguishable but connected processes. Each of these has been treated by previous researchers but they have not, to my knowledge, been articulated as a coherent theoretical framework for the business cycle as a whole. These are the leverage cycle, the financial panic, debt deflation, debt overhang, and deleveraging of households.

The application to the business cycle of ideas taken from control theory, non-linear dynamics, and non-equilibrium thermodynamics has a long but not particularly fruitful history. I believe that the basic shortcoming of such efforts has been the absence of adequate microeconomic foundations, which is what a physical scientist is least likely to contribute. I have nonetheless been motivated to draw up this “memorandum” by the sense that the separate strands of what could be a complete understanding of the finance-driven business cycle exist already but are not being drawn together in a wholly satisfactory way by economists. Moreover, the policy implications of such a theory could be significant, but I have not seen them clearly articulated in the public debates that have followed the financial crisis of 2007.

The theory outlined here cannot apply to all phenomena that have been historically regarded as “business cycles”. However, I believe that it offers a framework for understanding the dynamics responsible for the post-1929 Great Depression, the post-2007 Great Recession, as well as other of the most serious cases of decline in free-market economies. This scheme seems to me sufficiently compelling, and its practical implications sufficiently important, to merit the effort of summarizing it clearly for the benefit of non-specialists.
II. LEVERAGE CYCLE

It is widely recognized that asset markets (in which the same good may be purchased and sold many times) are susceptible to speculative bubbles, in which prices rise well above the fundamentals because of a self-reinforcing but ultimately unsustainable expectation that prices will continue to rise. This process ends with a rapid collapse of the asset price. Despite the widespread recognition that this phenomenon has recurred throughout history, the microeconomic understanding of why such bubbles recur and how they can harm the economy as a whole remains incomplete and contentious.

That self-reinforcing fads should cause temporary spikes in the prices of some assets may not require an explanation much deeper than the obvious psychological one. Nothing in the equilibrium theorems prevents people’s preferences from changing over time. But the sheer size of certain speculative bubbles and the serious damage that they can cause to the economy at large pose major challenges for economic theory and policy.

According to Max Weber’s General Economic History, the great Mississippi and South Sea Company bubbles of the 1710s “can be explained only by the fact that short selling was impracticable since there was as yet no systematic exchange mechanism.” That is, the sheer size of the bubble resulted from a market incompleteness that made it considerably easier for optimists than for pessimists to bet on future price changes.

Modernly, the relevant incompleteness lies in finance, rather than in the asset market itself: it is usually easier for optimists than for the pessimists to leverage their bets (i.e., to make them with borrowed money). As the price of an asset begins to climb, it may happen that it can be increasingly leveraged. As the leverage increases, the asset will be purchased by more and more optimistic investors, who need to provide smaller and smaller percentages of the price up front. This positive feedback between prices and leverage can continue until they reach unsustainable levels and collapse. A sophisticated model for this process has recently been developed by John Geanakoplos.

Geanakoplos points out that in the run-up to the 2007 financial crisis, credit default swaps (CDS) did offer a way to borrow money with which to bet against the housing market. (A CDS is a negotiable contract that promises to compensate the buyer if some underlying financial instrument goes into default.) However, CDS became widely available for residential mortgages only in late 2005, when the bubble was already approaching its peak. In those circumstances, the introduction of CDS may have helped to precipitate the housing market crash.

A point worth highlighting is that the standard equilibrium theorems allow for differences in individual preferences, but not for differences in beliefs (e.g., of optimists versus pessimists), which would not exist in a state of perfect knowledge. Hayek, Stigler and other pioneers in the economics of information have emphasized that, in the real world, economically relevant knowledge is not a given, but rather emerges through the market process itself. Therefore, the absence of CDS in the housing market may have been significant not only as an incompleteness per se, but also because it prevented the information possessed by the more pessimistic potential investors from being incorporated into the asset prices in a timely way.

III. FINANCIAL PANIC

When the growth phase of the leverage cycles ends with a steep decline of the asset prices, many of those who borrowed to purchase the asset are forced to default on their loans. Since the now-depressed asset served as collateral for those loans, those defaults may cause serious losses for the lenders. Borrowers whose debts are now worth more than the collateral are especially likely to default. Furthermore, financial institutions often hold those same assets in their balance sheets. They are therefore suddenly faced with large accounting shortfalls and acute uncertainty about their ability to meet their obligations. A panic ensues in which depositors withdraw their funds, forcing financial institutions to liquidate assets at “fire sale” prices, further depressing their market value. Many financial institutions may become illiquid and the financial sector as a whole may cease to function properly, doing immediate harm to the real economy.

Such a financial panic may be either alleviated or aggravated by financial regulations and governmental intervention. Since the early 20th century, it has been widely accepted that one of the key roles of central banks is to act as lender of last resort, providing liquidity to distressed financial institutions that are actually solvent. Nonetheless, some questions remain about how best to implement this in practice. It may be difficult for the lender of last resort, in the midst of a panic, to make fully rational decisions about which distressed institutions are merely illiquid (so that the loans are likely to be repaid when conditions normalize) and which institutions are actually insolvent (in which case efforts to keep them from facing bankruptcy may hinder the financial sector’s return to health and drag out the consequences of the bursting of a leveraged asset bubble). The bailing out of financial institutions with taxpayer money may also create a “moral hazard”, encouraging others to make high-risk speculative investments in the future.
III. DEBT DEFLATION

Irving Fisher, who famously failed to see the stock market crash of 1929 coming, developed a deep understanding of the role of finance and money in the ensuing Great Depression. His principal contribution in this area was the theory of debt deflation. In the modern financial system, money can have a “perverse elasticity”, i.e., its supply can shrink as the demand for it increases. The underlying reason for this is that the currency actually issued by the central bank (the “monetary base”) is only a fraction of the total money supply. The rest of the money is generated by commercial banks in the process of lending out a part of their demand deposits. When a financial panic strikes, demand for liquidity rises across the board and lending by commercial banks contracts, causing the supply of money to drop. The value of money may therefore rise sharply, leading to deflation.

Unanticipated deflation makes it more difficult for borrowers to meet their obligations to lenders. This worsens the debt overhang situation, which we will discuss in the next section. Thanks to the work of Milton Friedman and other “monetarists” who followed in Fisher’s footsteps, avoiding deflation during economic downturns is now widely recognized as a priority for central banks. Since modern central banks can create new money ex nihilo, it seems possible in general to avoid deflation by a sufficiently aggressive intervention, though political considerations and concerns over long-term price stability may complicate this in practice.

IV. DEBT OVERHANG

It has long been recognized that indebtedness may, in some circumstances, reach such high levels that overall economic output is negatively affected. This can breed social unrest and political pressure for government-mandated debt relief. Clearly, an important factor in this is the information asymmetry between lender and borrower, which can lead to serious principal-agent problems. In particular, when a borrower’s equity is negative (i.e., when his debts are worth more than his assets, a situation referred to as being “underwater”), the bulk of the borrower’s new income must go to the lender. The borrower therefore has a reduced incentive to undertake profitable projects. Lenders will recognize this and become unwilling to extend further credit, even when it could help the borrower to improve his financial situation and repay his debts.

This situation, commonly called “debt overhang”, is avoided in the normal course of private finance because it is in the interest of neither borrowers nor lenders. It may, however, emerge suddenly as a consequence of the leverage cycle. After the bursting of a finance-driven asset bubble, the net borrowers (henceforth, for simplicity, “households”) will be left as owners of the depressed assets and the net lenders (henceforth simply “banks”) will be left as owners of the debt. Once the fog of the financial panic has cleared, a new landscape is revealed in which a large amount of wealth has passed from households to banks. This may leave many households underwater and unable to spend or invest at normal levels.

In this situation, banks will have reduced incentives to extend further credit to households, making it all the more difficult for the households to dig themselves out from under their load of debt. Banks will instead direct new investment towards the very safest assets, such as government bonds and gold (“flight to quality”). The situation may be exacerbated by deflation (if the central bank does not combat it successfully), which induces further transfer of wealth from households to banks. This “financial accelerator” effect seems to account for some of the dynamics of the economy after a financial panic.

A question of both theoretical and practical importance is why the banks do not voluntarily condone some of the debt of the underwater households. It may be simply that a bank usually lacks the information to make rational decisions about which debts to forgive in order to improve its own revenue stream. (This is somewhat akin to the point raised earlier about the difficulty for the lender of last resort in discriminating between merely illiquid institutions and those that are actually insolvent.) Uncertainties about the government’s regulatory, monetary, and fiscal response to the crisis may make it even more difficult for individual banks to pursue rational policies of debt relief or renegotiation.

VI. DELEVERAGING

Empirically, it is clear that conditions of depressed aggregate demand may continue long after the financial panic phase of the cycle is over. Keynes merely asserted the reality of such episodes of persistent disequilibrium, in which “excessive saving” is not cured by low interest rates. He then invoked the rigidity of nominal wages and other prices in order to explain why this could cause chronic unemployment.

Household debt overhang may provide a microeconomic foundation for the otherwise mysterious fall of aggregate demand and for the fact that additional money pumped into a depressed economy tends to be hoarded rather than spent (what Keynesians dub a “liquidity trap”). According to the scheme that I have sought to outline here,
these would be manifestations of the principal-agent problem between banks and the households left underwater after the end of the leverage cycle’s growth phase. Under such conditions, additional money provided to households goes primarily towards paying down their debts, while banks are unlikely to reinvest those payments in the households as long as they remain underwater.

In other words, the principal-agent problem between the banks and the underwater households impairs the ability of the financial sector to achieve its purpose of finding efficient uses for capital. Macroeconomically, this is manifested as a Keynesian episode of “excessive saving” and reduced aggregate demand. This is consistent with the evidence that serious recessions often follow a large fall in housing prices, since residential mortgages are the most widespread form of leveraged investment, while housing is the main asset held by ordinary households. The slow recovery from a serious recession would then be tied to the difficult deleveraging of underwater households.

VII. IMPLICATIONS FOR POLICY

The monetary component of the business cycle is the best understood by both academic economists and policy makers. The aggressive efforts of the US Federal Reserve (the “Fed”) to combat deflation probably helped prevent the post-2007 Great Recession from achieving destructive proportions comparable to those of the Great Depression. The policy of “quantitative easing” (under which large amounts of new money are created and used to purchase government bonds from the banks) can be seen as meeting the banks’ greatly elevated demand for liquidity. Since providing that liquidity in the form of new money is a useful service on which the Fed has a monopoly, it will probably end up generating a significant net profit for the Fed. Monetary policy, however, can only address the problem of debt deflation and it leaves the rest of the dynamics of the business cycle untouched.

Perhaps the most problematic element of the scheme outlined here, both theoretically and in terms of policy response, is the growth phase of the leverage cycle. Many of the greatest economists of their day (Fisher and Bernanke, to name just two) conspicuously failed to see the asset price bubbles that would soon burst and trigger a major economic crisis. Indeed, as Bernanke has recently pointed out, the Modigliani-Miller theorem on the irrelevance of the capital structure of firms appeared to rule out the possibility of the financial system having such significant and destructive macroeconomic consequences. Geanakoplos’s theory of the leverage cycle does not offer a clear criterion for when the rate of leverage has become dangerous.

If the leverage cycle is indeed the principal mechanism behind asset price bubbles, it is crucial to understand just how it evades the equilibrium theorems. If the problem lies chiefly with the market incompleteness that makes it more difficult for pessimists than for optimists to leverage their bets on asset prices, then it might not require much further regulation or government intervention to keep the amplitude of the leverage cycle in check. Perhaps it would suffice for instruments such as CDS to become widely available. If this were insufficient, however, it might be necessary to mandate minimum margin requirements for mortgage markets, like the ones that have long applied in stock exchanges.

If the microdynamics of the fall of aggregate demand and of the liquidity trap associated with deep recessions are indeed tied to households being underwater, then the usual Keynesian remedies appear problematic. Deficit spending by the government (which transfers some of the household debt to the public sector) and inflation (which reduces the value of outstanding debts) can ease deleveraging and therefore help alleviate a recession. However, neither policy can be focused on the problem of underwater households. Moreover, they can have major undesirable consequences, particularly in the way in which they are likely to be pursued by elected governments.

VIII. CONCLUSIONS

Financial markets normally help the approach to an efficient equilibrium, a condition in which every economic agent would enjoy the greatest satisfaction possible without making another worse off. Here I have outlined a possible theory of the business cycle that, if successful, would explain how and why those same financial markets sometimes exhibit instabilities that have the opposite effect, driving the economy into recurring episodes of disequilibrium.

The long-term growth and general resilience of free-market economies, compared to other forms of economic organization, suggest that the gains from financial speculation have substantially outweighed the pain of the business cycle. But the recurrence of financial crises has long been a political liability of the free-market system. Nearly a century ago (and well before the Great Depression) Max Weber taught his students of economic history that

Crises in the broader sense of chronic unemployment, destitution, glutting of the market and political disturbances which destroy all industrial life, have existed always and everywhere. But there is great difference between the fact that a Chinese or Japanese peasant is hungry and knows the while that the
Deity is unfounded to him or the spirits are disturbed and consequently nature does not give rain or sunshine at the right time, and the fact that the social order itself may be held responsible for the crisis, even to the poorest laborer. In the first case, men turn to religion; in the second, the work of men is held at fault and the laboring man draws the conclusion that it must the changed. Rational socialism would never have originated in the absence of crises.\textsuperscript{30}

In the 1930s, the effects of the Great Depression greatly contributed to the political advance of socialism, which in its various forms sought to bring capital under state control. Socialism, however, is faced with the great challenge of defining and implementing rational criteria for the allocation of scarce resources, in the absence of market competition.\textsuperscript{31} By the late 20th century, socialism had lost much of its prestige and credibility. Improvements in the theoretical understanding of the business cycle, and therefore in the effectiveness of the policy responses to it, probably helped to mute the reaction against free markets in the wake of the 2007 crisis.

A successful theory of the business cycle would be a major scientific achievement, as well as a matter of great practical and political significance. A plausible qualitative understanding of the relevant microeconomics seems a prerequisite for any serious effort to formulate a rigorous quantitative theory of the cycle. The basic outline of such a qualitative understanding can, I think, finally be discerned, though much empirical and theoretical work necessarily remains to be done.

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\textsuperscript{5} Ref. 3 p. 288.
\textsuperscript{6} J. Geanakoplos, “The Leverage Cycle” in \textit{NBER Macroeconomics Annual} \textbf{24}, eds. D. Acemoglu, K. Rogoff and M. Woodford, (Chicago: University of Chicago Press), pp. 1–66 (2010).
\textsuperscript{7} Ref. 4 “Summary of Discussion on the ‘Leverage Cycle’”, \textit{NBER Macroeconomics Annual} \textbf{24}, eds. D. Acemoglu, K. Rogoff and M. Woodford, (Chicago: University of Chicago Press), pp. 85–87 (2010).
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\textsuperscript{13} J. Tobin, “Irving Fisher (1867–1947)”, in \textit{New Palgrave Dictionary of Economics}, eds. J. Eatwell, J. M. Milgate and P. Newman, (London: Macmillan, 1987), vol. 2, pp. 369–376. Reprinted in \textit{Celebrating Irving Fisher}, eds. R. W. Dimand and J. Geanakoplos, (Malden, MA: Blackwell, 2005), pp. 19–42.
\textsuperscript{14} I. Fisher, “The Debt-Deflation Theory of Great Depressions”, Econstometr\textit{ica} \textbf{1}, 337 (1933). Reprinted in \textit{Works of Irving Fisher}, vol. 10, ed. W. J. Barber, (London: Pickering & Chatto, 1997).
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This point has recently been stressed by Vernon Smith and his collaborators. See 12 and references therein.

The old “Austrian theory” sought to explain the business cycle entirely in terms of distortions caused by central banks’ manipulation of the money supply, a view that is now untenable. There is, however, still some debate on whether loose monetary policy may be a factor in the growth of asset bubbles and whether the usual measures of inflation are always adequate in such circumstances; cf. Refs. 10, 12, and J. Dokko et al., “Monetary Policy and the Housing Bubble”, Econ. Policy 26, 237 (2011).

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