ARE WE IN THE LARGEST BUBBLE IN HISTORY?

AN AUSTRIAN SCHOOL ANALYSIS

By
Steve Baker MP FRSA
Max Rangeley FRSA

EXECUTIVE SUMMARY

It is often discussed how central banks saved the world economy following the 2008 Global Financial Crisis. In reality, monetary policy has created an even larger bubble than that which burst in 2008. But the trend has now been going on for a generation – from the 1980s onwards, every recession has been met by creating an even larger debt bubble. This has been done by cutting interest rates to "stimulate" the economy out of recession, but when they are raised they do not return to where they were. As a consequence, we have lived in an era of chronic credit expansion – money creation through new debt.

Friedrich von Hayek won the Nobel Prize in Economics in 1974 in part for articulating that interest rates, like other prices in a market economy, should be set by the market rather than by central banks. Over the last seventy years, and for thousands of years preceding this, price fixing has failed in every area it has been attempted – from food, to consumer goods to energy. In most developed economies, the last bastion of price fixing is central banks setting interest rates. Soon this will be shown to have failed, with devastating consequences for the global economy as a generation of ever-larger debt bubbles created by ever-lower interest rates and QE unravels. The solution is for interest rates, like other prices, to be set by the market rather than bureaucratic committees at central banks. The transition will be painful but only the market path can lead to lasting prosperity.

This superb paper provides powerful insights into the most pressing financial and economic matters facing Britain and the wider Western world. It should be read and debated by everyone concerned with the future well being and prosperity of our society and more broadly our civilisation.

Tim Evans B.Sc (Hons), M.Sc, MBA, Ph.D, FRSA
Professor of Business and Political Economy. Middlesex University London
Senior Fellow, The Cobden Centre

When you keep interest rates at 'emergency' levels for over a decade, print money to keep the government going, double an already record national debt, manipulate markets, and put up taxes on job-creating and innovative businesses, you've created a fantasyland economy. But as the authors show, very starkly, someday you have to face up to reality, and the sooner the better.

Eamonn Butler, Adam Smith Institute

A highly original contribution to a hugely important policy problem facing all the developed countries. The damage done by loose monetary policies over the last thirty years is profound. These policies are making our economies ever more zombified and must be reversed before they destroy what is left of the foundations of economic prosperity. The monetary meddling highlighted in this report has to stop. All our futures depend on it.

Professor Kevin Dowd, Durham University

A guide to how we got here, and why we'd rather be somewhere else.

Charlie Morris, Founder of ByteTree & Editor of the Fleet Street Letter

For decades, our monetary authorities have been getting drunk on false credit booms that inevitably produce recessionary hangovers. It is well past time for them to sober up and let interest rates be set by demand and supply, not bureaucratic wishful thinking. This important study shows how our system has gone wrong and calls for a restoration of sound thinking and responsible finance. It is required reading for anyone who wishes to understand the mess we're in and the catastrophe we may be headed for.

Roger Koppl, Professor of Finance, Whitman School of Management, Syracuse University

I started my investment career in the early 1980s and was forced, decade after decade, to put up with the ever-more-distortionary effects of official interest-rate manipulation illustrated in this brilliant paper. Let us hope that when the era of the 'all knowing' central banker comes to an end, those who are tasked with designing a new monetary system will have learned its lessons.

Geoff Blanning, Investment Manager, Former Head of Emerging Market Debt & Commodities and Member of Group Management Committee, Schroders Plc

Will we ever learn that these are the most dangerous words in economics: "this time it's different"? Perhaps not. However, if we look back towards the old wisdom of Hayek, Mises, Wicksell, Bohm Bawerk and what became their theory of the business cycle, we can see that excessive stimulation to the economy will create the conditions of boom and bust. This monograph is in that tradition and it recommends a very simple start point for reform, let the interest rates, as with all other prices, be set by market forces. This is surely a sensible option as the central bank has been so woeful in its hour of need.

Toby Baxendale, Entrepreneur/Investor & Co Founder of the Cobden Centre

CONTENTS

INTRODUCTION

Throughout history, many forms of price setting have been experimented with by state bureaucracies. For much of the twentieth century, in Britain, the US and other Western countries, government bureaucracies set prices in sectors ranging from energy and fuel to consumer goods and housing. There is scarcely a better-established set of rules in economics than those demonstrating that governments setting prices leads to distortions and economic problems – and in many cases calamity. In the year 301, the Emperor Diocletian passed a series of laws setting prices in Ancient Rome. At the time, the philosopher and (although the term was not used at the time) economist Lactantius predicted that this would lead to further economic crises; indeed, as any modern economist would predict, the setting of prices by the Roman emperor led to shortages, hunger, black markets and dislocations in supply chains across the empire. Thankfully, it is now taught in all microeconomics textbooks that states should allow prices to be set by the market, that when government bureaucracies intervene and set prices, they distort the economy. Microeconomics textbooks use equations and graphs to show the damage caused by interference in the pricing mechanisms of the economy.

Nevertheless, there is still one area where we have prices set by a government—or pseudo-government—bureaucracy, and that is central banks setting interest rates. This paper will show that this domain of economics, the final area where price-setting takes place, is also leading to distortions and will similarly bring about a calamity. Friedrich von Hayek won the Nobel Prize in Economics in 1974 in part for his work showing that interest rates, like other prices in a free market economy, should be set by the market rather than by central banks. When central banks set interest rates they distort the natural pricing mechanisms of the free market in a similar fashion to when bureaucrats set the price of butter or fuel. The main difference is that the distortions caused by interest rate manipulation by central banks are more systemic than those caused by setting localised prices such as grain. Those same economics students that in microeconomics classes drew graphs and used equations to show that prices should be set by the market then move on to study macroeconomics and proceed to learn how a central bank can "stimulate" the economy by cutting interest rates, that whereas committees of government officials setting the price of food is largely limited to countries such as Venezuela in which there are frequent food shortages, we must have committees at central banks setting interest rates to "stabilise" the economy and provide counter-cyclical support during the business cycle. The absurdity of the approach ought to be obvious.

The Austrian School originated in Vienna in the 1870s with Carl Menger's *Principles of Economics.* Menger developed a subjectivist approach to economics that focused on the choices individuals made due to their personal situations, values and views which could not be measured by an economist. Menger also developed

a key part of modern mainstream economics, the concept of marginal utility. Eugen von Böhm-Bawerk and Friedrich von Wieser advanced Menger's subjectivist approach, applying it more widely within economic theory. Hayek and Ludwig von Mises were shaped by their teachings and went on to develop the Austrian theory of the business cycle.[1]

During the 1930s, an intense debate took place between Hayek, at the London School of Economics, and John Maynard Keynes, at Cambridge. The responses to the Great Depression, and the intellectual challenges presented, would shape economics for generations.[2] The Keynesian framework became dominant, while the Austrian School fell into near obscurity. Today there are scarcely any courses on the Austrian School at universities, yet following the 2008 Global Financial Crisis there has been a resurgence of interest in the ideas of Hayek, Mises, Menger, Rothbard and Böhm-Bawerk. The Austrian School has made major contributions to economics, including opportunity cost, marginal theory of value, the theory of interest rates and methodological subjectivism. Yet perhaps the most important insight from the Austrian School that modern economists must get to grips with is the business cycle theory, in particular the idea that when central banks set interest rates, rather than "stimulating" the economy, they distort the economy and only worsen the situation.

[1] Butler (2010).
[2] An interesting account is provided in Robert Skidelsky, *Keynes: The Return of the Master* (2009).

UNDERSTANDING HAYEK-MISES BUSINESS CYCLE THEORY

When a government sets the price of butter, fuel or consumer goods, a number of negative developments take place. First, the amount consumers demand goes up as they see that the price has fallen; consumers will often buy more than is necessary while prices are low. Producers, seeing that prices have been set below their natural level, do not produce as much of the good. This may involve simply producing less than they were previously, but more frequently involves shifting into a new sector which is not subject to price controls. In Venezuela, where you can be severely punished for raising the prices of food, selling food is not a desirable sector to be involved in. In Britain during the 1970s, while less draconian, similar effects took place as suppliers did not want to sell goods in sectors where prices were set artificially low. When prices are set by the market, as economics textbooks teach, in the event that there is a shortage of a good like coffee the price rises concomitantly; this higher price has a number of effects. First, it sends signals to consumers to reduce their consumption while there is a shortage. Second, it incentivises coffee producers to bring more coffee to market, which then brings the price back down as the amount supplied increases. Additionally, the floating prices mean that supply chains adapt to the shortages quickly and effectively. When a government tries to fix the shortage by setting prices artificially low, the supply chain becomes distorted and, just like consumers and suppliers, does not respond to the shortage in a productive way. Specifically, when a government sets the price of a good like coffee below its natural rate, it gives the *illusion of abundance* in that the market has been sent false price signals that there is a glut of the product.

The pricing mechanisms with respect to interest rates are similar. In a free market, when people and companies save more, this expands the pool of savings from which others can borrow. Interest rates thus come down, which enables increased borrowing. The price signal indicating more abundant credit reflects a true increase in available credit. This interest rate mechanism coordinates borrowing and lending plans, ensuring their mutual consistency. Borrowers want to borrow the amounts lenders want to lend. Importantly, interest rates coordinate time preferences – the value an individual places on receiving a good now versus receiving it at a later date. When people save more, bringing down the interest rate, they also signal to the market that they are delaying their consumption to future time

periods. Consequently, while interest rates are lower for companies to borrow and invest more today, in future time periods, as the investments come to fruition and new goods are brought to market, consumers will have more wealth available to buy those new goods as they saved in previous time periods. Interest rates are therefore a crucial pricing mechanism for the economy; they not only coordinate the demand and supply of credit, but also coordinate time preferences for the economy as a whole.

Additionally, in an economy where interest rates are set by the market, if there is a rapid increase in demand for credit, as often happens during a speculative asset bubble, this drives a rise in interest rates, which then has a number of effects. First, the higher interest rates dampen the demand for credit, just as with higher prices of other goods when there is a sudden increase in demand. Second, saving is incentivised, which brings the demand and supply of credit back into equilibrium. Third, time preferences are re-coordinated, for instance an incipient housing bubble is corrected by the higher interest rates so that mortgage rates reflect the ability of people to defer consumption. This resource-allocation mechanism of interest rates is the market's way of preventing speculative bubbles driven by rapid increases in debt, just as the pricing mechanisms of other goods are how the market deals with rapid increases in demand relative to supply.

When a central bank sets interest rates artificially low, false price signals are sent to the market, much as false price signals are sent when governments set the price of coffee artificially low. The false price signals give the illusion of abundant credit, but the artificially low interest rates discourage potential savers and the pool of available savings actually contracts. Companies see that interest rates are lower and will borrow more – more than the pool of savings in the economy. The pricing mechanism for borrowing and saving has been distorted and the time preferences of the economy are no longer coordinated. The artificially low interest rates send inconsistent signals to the market – producers are getting a signal that consumers are delaying consumption to future time periods while consumers are getting a signal to spend now rather than save. Debt-fuelled asset bubbles, rather than being contained through the market's natural mechanism of rising interest rates, are instead fuelled by the artificially low interest rates as credit creation becomes detached from the supply of available savings. The quality of debt will fall in line with the ersatz low interest rates, which no longer reflect the underlying risk in the economy.

Furthermore, artificially low interest rates divert resources to those sectors of the economy which benefit disproportionately from these false prices, such as the speculative financial sector, which can take larger positions by using greater leverage.[3] After a central bank has set interest rates artificially low, there will be a boom period; "boom" in the sense of increased GDP. But GDP measures economic activi-

[3] A modern analysis presented using conventional macroeconomic diagrammatic techniques can be found in Garrison's 2000 work *Time and Money: The Macroeconomics of Capital Structure.*

ty rather than the macro-capital structure of the economy. Companies, responding to artificially low interest rates, invest more than they would have with market-set rates. The increase in the speculative sector similarly raises metrics of economic "growth" such as GDP without contributing to the economy. But the "boom" is illusory, based on malinvestment and a speculative mania, and will sooner or later collapse. As Ludwig von Mises put it:

> True, governments can reduce the rate of interest in the short run. They can issue additional paper money. They can open the way to credit expansion by the banks. They can thus create an artificial boom and the appearance of prosperity. But such a boom is bound to collapse soon or late and to bring about a depression.[4]

What can be done at this point? The most important lesson from economics is that once false price signals have been sent to the economy, once a government has set prices at an artificial level and brought about the inevitable distortions, they should allow prices to be set by the market and re-equilibriate.[5] The food shortages during the time of Diocletian only came to an end when the Roman government once again allowed prices to be set by the market. Once central banks have caused a false boom by setting interest rates artificially low, the only way to bring about a re-coordination of savings and borrowing is to allow interest rates to be set by the market. Once the false bubble bursts, the worst thing the central bank can do is set interest rates even lower. Hayek adumbrated as follows: "to combat the depression by a forced credit expansion is to attempt to cure the evil by the very means which brought it about."[6] The poison is temporarily intoxicating before making the subject even sicker.

[4] Mises (1944, p. 251).
[5] For a precursor to much Austrian School thinking see Knut Wicksell's *Interest and Prices* (1898).
[6] Hayek (1933, p. 20).

THE FORMATION OF THE SUPER BUBBLE

Over the last generation, we—in the UK, US, Europe, Australia and other parts of the developed world—have seen a series of iteratively lower interest rates. Each recession from the 1980s onwards has been responded to by setting even lower interest rates, creating an even larger bubble. In the US, for instance, the falling interest rates of the 1980s initiated a number of bubbles which then began to burst in the late 1980s once interest rates rose again. The recession of 1990 was responded to by even lower interest rates of 3%, followed by several years of the "Greenspan Put", thereby creating an even larger bubble – the Dot Com Bubble. When this burst in 2000, the response was even lower interest rates, of 1% from 2003-4, which then created a yet larger bubble, the Housing Bubble. When this burst in 2007/8, the response was even lower interest rates of 0% and in some cases even negative interest rates which has now created a larger bubble. In 2007, global aggregate debt—households, companies and governments combined—was around $157tn, already by far the largest debt bubble in history; a decade later, following years of zero percent interest rates, this had reached $250tn, and is now close to $300tn.[7]

As would be predicted by Hayekian theory, the growth of this bubble has not just been an increase in debt, but has also led to speculative bubbles in various asset classes. It has also brought about malinvestment shown in metrics ranging from the ratio of zombie companies to a suite of metrics of productivity. Each iteration of the formation of the Super Bubble has brought about worse distortions than the previous. After more than a decade of zero percent interest rates, we are now likely in the largest bubble in human history. It will burst and all our imaginations may be unequal to foreseeing the consequences.

[7] A good outline of debt following 2008 can be found in the McKinsey paper by Dobbs, Lund, Woetzel and, Mutafchieva *Debt and (not much) deleveraging* (2015). McKinsey now provide an interactive visualisation online for global debt levels.

THE AUTHORS

This paper is jointly written by a British member of Parliament and the manager of an Austrian School think tank in Britain.

Steve Baker has been MP for Wycombe for twelve years, and was until recently the longest-serving member of Parliament on the Treasury Select Committee. At the time he became an MP, Mr Baker founded the Cobden Centre, an economics think tank which has developed a speciality in Austrian School economics.

@SteveBakerHW

Max Rangeley has run the Cobden Centre economics think tank from 2014 onwards and has served on the boards of other think tanks in London and Brussels. During this time, he has given speeches and seminars on the Austrian School in the European Parliament and the OECD among other institutions. He is one of the first millennials to become a member of the Mont Pelerin Society.

@MaxRangeley

This monograph will not only present data to show the catastrophic effects of the last generation of monetary policy, but will also bring in the experience of Baker and Rangeley from Treasury Select Committee meetings, Parliamentary debates and debates with people at the IMF and other institutions.

Much of the research for this paper on Parliamentary debates and on the Treasury Select Committee was done by Harry Richer. Harry graduated from the University of Cambridge in 2018 and has four years of experience as a political aide in Parliament. He has worked as a political aide to Lucy Frazer QC MP and Steve Baker MP.

Insight: The Nature of Money Creation in a Modern Economy

The setting of interest rates by central banks, like all bureaucratic interference in market prices, is always detrimental to prosperity, but the nature of money creation in a modern economy means that it is especially pernicious. Most university macroeconomics textbooks teach that when banks make loans, they take money which has been deposited with them and lend it to a borrower. Through the fractional reserve process, the textbooks teach, the money multiplier means that the monetary base is expanded through the banking system.

In reality, in a modern economy when a bank makes a loan, it does not "lend out" money to the customer, it creates new money when it makes the loan.[8] Specifically, when someone borrows a mortgage of £500,000, the bank expands both sides of its balance sheet – it creates the money out of nothing, which is then added to the customer's current account, balanced by the customer's debt to the bank. The bank does not take the savings of a depositor and then lend them to the borrower, as is often assumed and generally taught in economics courses. Whereas in previous monetary eras attempts by central banks to "stimulate" the economy using artificially low interest rates would be restricted by the monetary system—gold cannot be created out of thin air—the post-Bretton Woods era saw these restrictions on credit creation largely removed.

In his paper "Can banks individually create money out of nothing? — The theories and the empirical evidence," Werner provides a number of examples of economics textbooks that have misunderstood the nature of money and specifically how banks themselves create money when they make loans.[9] He notes that one of the most popular macroeconomics textbooks, by Paul Samuelson, specifically argues against the idea in a section titled "Can banks really create money?":

> According to these false explanations, the managers of an ordinary bank are able, by some use of their fountain pens, to lend several dollars for each dollar left on deposit with them. No wonder practical bankers see red when such behaviour is attributed to them. They only wish they could do so. As every banker well knows, he cannot invest money that he does not have

[8] A good outline is provided in Moore's 1988 work *Horizontalists and Verticalists: The Macroeconomics of Credit Money*.
[9] Werner (2014 p. 7).

Similarly, the post-graduate textbook *Modern Banking in Theory and Practice* describes the process as follows:

> To summarise, all modern banks act as intermediaries between borrowers and lenders, but they may do so in a variety of different ways, from the traditional function of taking deposits and lending a percentage of these deposits, to fee-based financial services.[10]

In 2015 the Cobden Centre interviewed William White, former head of the Monetary and Economics Department at the BIS, the central bank of central banks, who remarked:

> I find it extraordinary that some economists still do not recognize that we have a fiat money system. Banks do not lend money that has been saved. They create money by making loans and simply writing up both sides of their balance sheet. This system clearly greases the wheels of commerce, but it can also get badly out of control as we have seen in recent years. There really is an issue here.[11]

The Bank of England has explained that banks create new money when they issue loans. In their 2014 paper "Money Creation in the Modern Economy," they state:

> Whenever a bank makes a loan, it simultaneously creates a matching deposit in the borrower's bank account, thereby creating new money.[12]

The combination of banks being able to create credit *ex nihilo* with central banks' manipulation of interest rates—the market's natural pricing mechanism for credit—has been the engine and fuel for the creation of the Super Bubble.

[10] Werner (2014 p. 8) quoting Heffernan (1996 p. 18).
[11] The Cobden Centre (2015).
[12] McLeay, Radia and Thomas (2014, p. 14).

Perspective: Steve Baker MP on the "Money Creation and Society" Parliamentary Debate[13]

Despite money and the economy being a key aspect of most issues debated by politicians, the creation of money is almost never discussed. In November 2014, I organised a debate in the UK Parliament on the nature of money, titled "Money Creation and Society". One Labour MP during the debate dubbed money creation the "elephant in the room" when it comes to the economy. This was the first-time the monetary system itself had been debated in the UK Parliament since Peel's Bank Charter Act in 1844. MPs from three of the UK's major political parties – the Conservative Party, the Labour Party and the Scottish National Party – participated in the debate.

I opened the debate quoting American industrialist Henry Ford, "it is well enough that people of the nation do not understand our banking and monetary system, for if they did I believe there would be a revolution before tomorrow morning." I then quoted the Bank of England on the creation of money: "whenever a bank makes a loan, it simultaneously creates a matching deposit in the borrower's bank account, thereby creating new money." While the state maintains a monopoly on the creation of money, the UK possesses a hybrid system as private banks can create claims on money, and those claims are precisely equivalent to notes and coins in their economic function. This seemed to be the first time that many of my colleagues were confronted with the realities of our monetary system. Indeed, as Henry Ford made clear, there is no revolution as almost all of the population is not aware of this reality.

I once discussed this with a banker who told me I was wrong and that this couldn't possibly be the case. Upon conducting his own research, he found the truth and apologised to me. A former FDIC regulator and I went through much the same. If individuals at the centre of the system don't seem to be aware of the basic facts about how it operates, how can we expect politicians and the general population to understand the implications? Throughout the debate, there was engagement from some MPs on how money itself is created by banks through loans – there were even moments of self-reflection were MPs admitted that they themselves did not understand the issue well and that it is not understood by most MPs – but there seemed to be little appetite to engage on the morality of the system and the revolt it might cause if it was well understood. Other MPs would argue later in the debate that to speak about how capitalism works to most ordinary people is to speak about something at the end of the universe. They merely need money to survive and do not view it in any other way. I

[13] HC Deb (20 November 2014). vol. 588.

understand this. Throughout my parliamentary career it has been a rare occurrence that a constituent of mine has contacted me about our monetary system. The reality of most of the public's problems seem disconnected from the monetary system: will I be able to pay my bills? Why are prices of the products I buy rising? Will I be able to buy a house?

In reality, many of the public's problems are related to how our monetary system operates.

Throughout the debate, there were discussions of the alternatives to the current system. Some argued for the greater regulation of banks, others argued against fractional reserve banking. I highlighted the many different opinions on an alternative to the current system: there are groups that argue for the complete nationalisation of the production of money, to those who want a return to a gold standard, to those who support cryptocurrencies as the future of money. While I have a clear preference for free choice in currency following Hayek's work on the denationalisation of money, ultimately, we must begin with a recognition that our current system is badly understood and that it is manufacturing colossal problems with real, even existential, consequences for our civilisation.

If we remember our society is founded on the division of labour, then the implications of how money creation works are more likely to heave into view. The price system guides entrepreneurs and investors to allocate resources to meet the needs of society. Money creation feeds into the price system, causing false signals across the whole of society, which are bound to mislead economic actors of all kinds.

The end of the Bretton Woods system, the last link of currency to gold, which was key in keeping credit expansion under control, led to an explosion in consumer price inflation which had been relatively flat from 1750 until the 20th century with some inflation during the world wars. From 1971 onwards, the value of money collapsed.

There was some discussion from several MPs about Quantitative Easing and its dangers. While Conservative MPs criticised QE, particularly for its inflationary effects, MPs from other political parties were tempted by the potential use of QE for fiscal purposes.

Despite all of the disagreements between MPs during the debate – from the effects of Quantitative Easing to where the focus of ire should be within our current system – there were moments of deep agreement during the debate. MPs from parties across the political spectrum agreed that banks

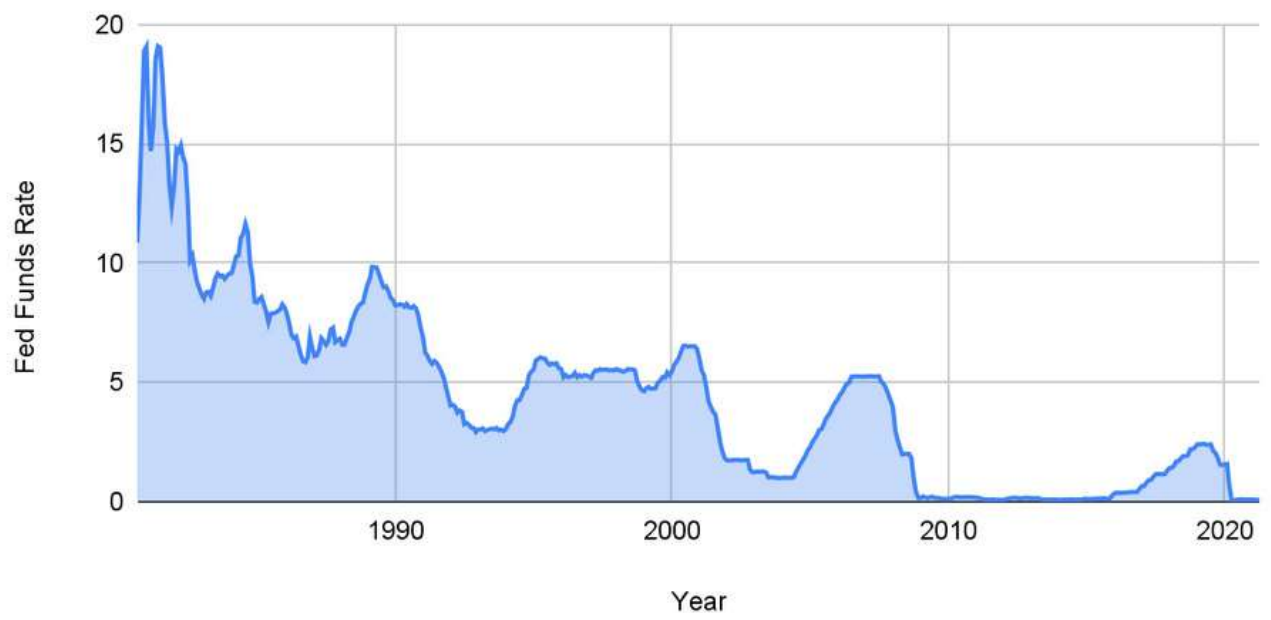
have been granted enormous privileges and possess too much power, which they often abuse. Since I was first elected in 2010, I have raised the problems with our monetary system whenever I have had the opportunity. It is clear to me that prosperity, economic justice, environmental sustainability and freedom can only be sustained and developed for the long term through money reform.

Steve Baker speaking during the UK Parliament debate “Monetary Creation and Society” in November 2014 and the House of Commons Chamber during the debate

ANALYSIS OF THE SUPER BUBBLE

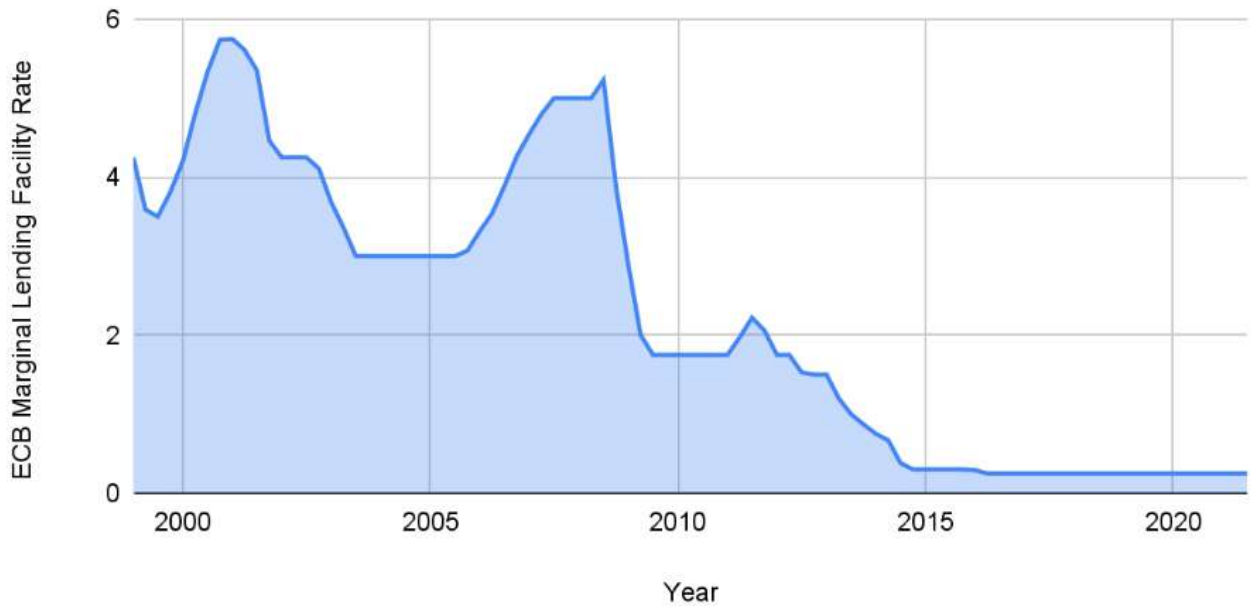
From the 1980s onwards, central banks have introduced a series of ever-lower interest rates, with each recession being responded to with lower interest rates creating an even larger bubble.

Figure 1: Fed Funds Rate
Source: Federal Reserve



This has been seen not only in the US, but also in most of the developed world. The European Central Bank has followed suit since its inception at the turn of the millennium.

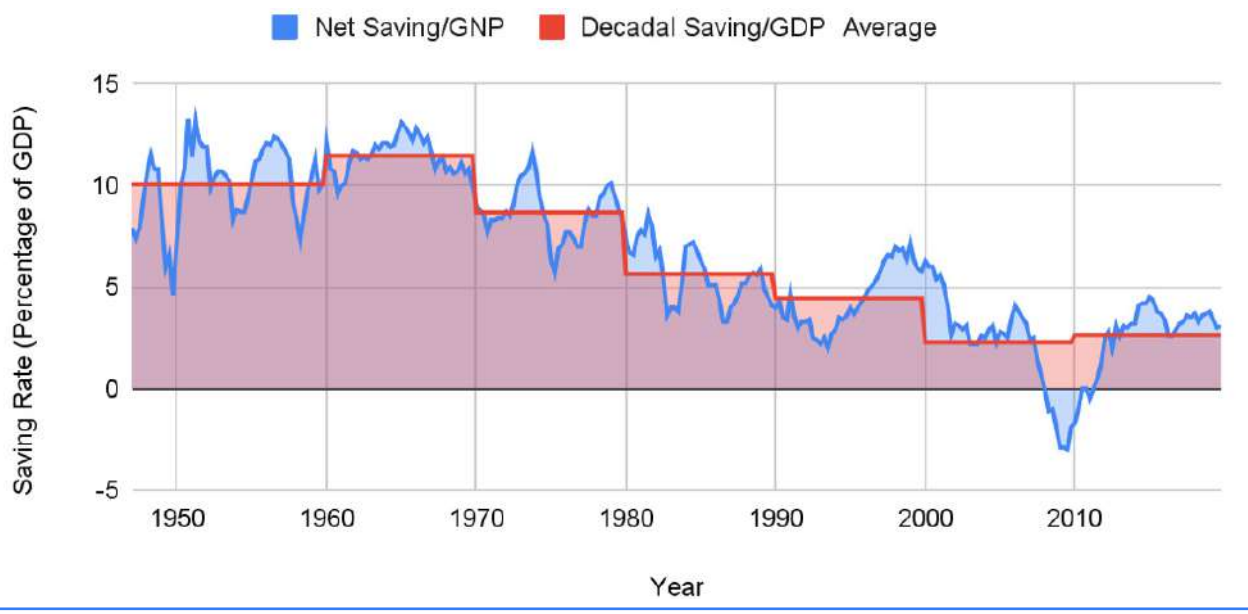
Figure 2: ECB Marginal Lending Facility Rate
Source: European Central Bank



As we have seen, Hayek outlined how when a central bank sets interest rates artificially low, one of the first indicators of the distortions is that debt will grow out of proportion to savings; as the false price signals transmit to the economy, people save less while companies and households borrow more, with the modern money-creation mechanism allowing for distortions that would have been prevented in previous decades. With each phase of lower interest rates from the 1980s onwards, larger debt bubbles have been initiated while savings rates have fallen. The 1980s started with historically high interest rates in order to combat inflation, but from the mid-1980s onwards credit creation has outpaced economic growth.

Figure 3: Nonfinancial Corporate Debt/GDP (US)
Source: US Bureau of Economic Analysis

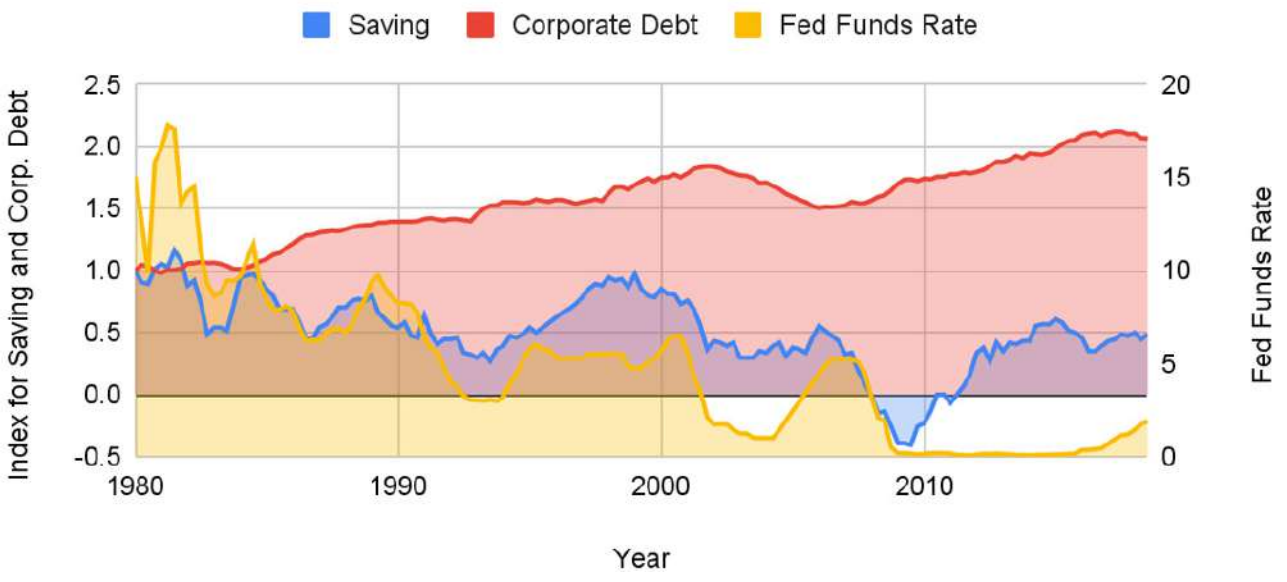
Figure 4: Net Saving Rate/GDP (US)
Source: US Bureau of Economic Analysis



With each iteration of lower interest rates, the gap between saving and borrowing grew. As we shall see, this manifested in larger asset bubbles and worse malinvestment with each phase of the growth of the Super Bubble. Figure 5 shows the Fed Funds Rate and the divergence of savings and debt over the last generation as central banks brought interest rates down with each recession, but did not return them back to previous levels.

Figure 5: Saving Rate, Corporate Debt (Non-Financial)/GDP (US) and Fed Funds Rate

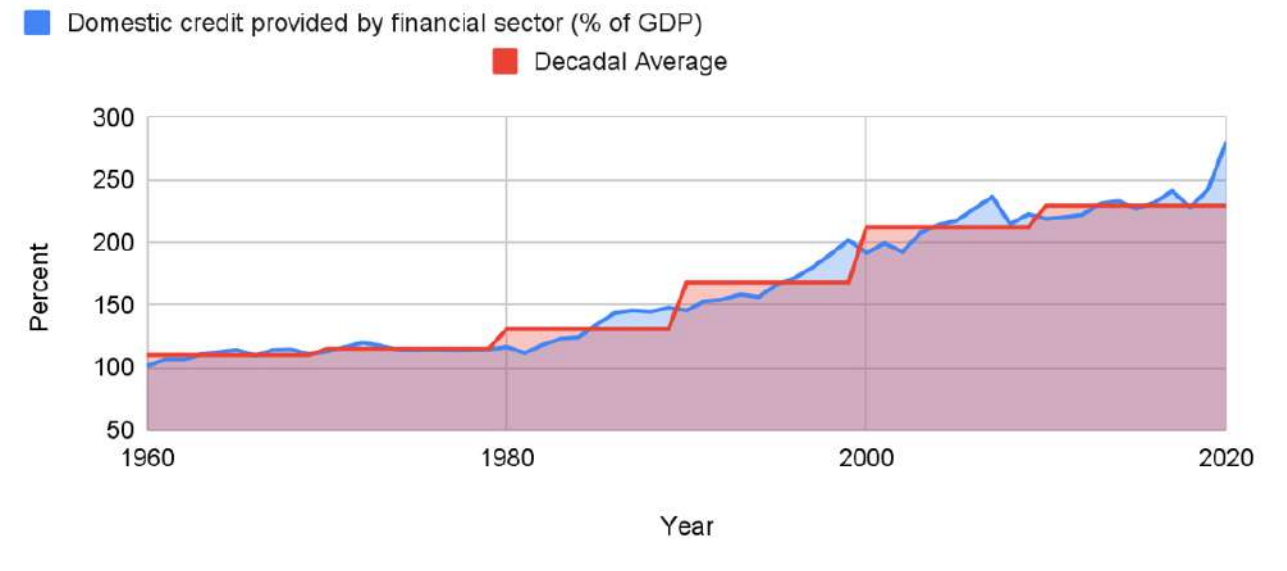
Sources: US Bureau of Economic Analysis, Federal Reserve



As we would expect in a Hayekian debt bubble, credit creation during this period was largely endogenous – Figure 6 shows domestic credit by the financial sector in the US.

Figure 6: Domestic Credit Provided by Financial Sector (US, % of GDP)

Source: World Bank



ASSET BUBBLES DURING THE FORTY YEARS

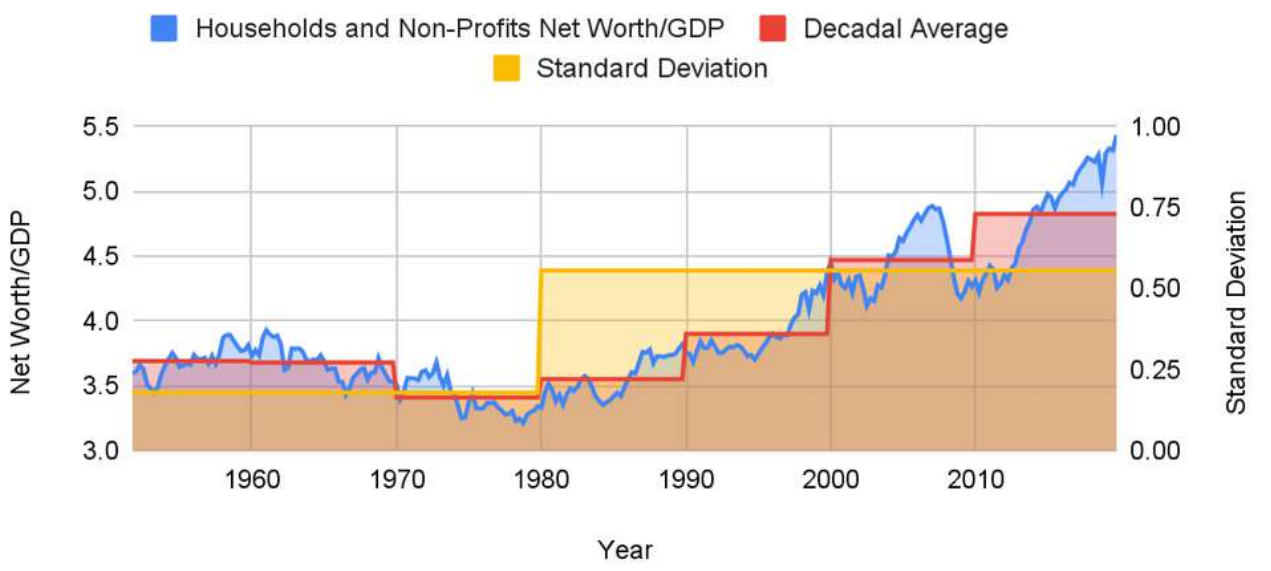
The Austrian School posits that when interest rates are set artificially low, the excess credit created will generally flow into asset bubbles. The artificially low interest rates of the 1920s led to bubbles in the stock market but also in housing and other asset classes.[14] Whereas the bubble of the 1920s built over the course of a decade, the Super Bubble has been inflated over the course of an entire generation; each time the aggregate asset bubble has begun to deflate through natural market mechanisms, central banks have set interest rates even lower, to generate an even larger asset bubble. With each phase of the forty years, the Super Bubble has manifested in different asset classes in different parts of the world, but the world as a whole has moved towards the current situation where almost all asset classes are in a bubble. To capture the effects on all asset classes, we can see below that net worth in relation to GDP remained largely constant following World War 2, varying from 3.2 times GDP in 1978 to a high of 3.9 in 1961. These trends largely followed savings rates, reflecting consumption deferred to future time periods. During the period of our analysis, it would reach 4.9 at the peak of the third phase of credit expansion in 2007, and then 5.4 times GDP in 2019.[15] From the credit expansion of the 1990s, it would never again go below 3.9, the peak for the previous generations. The standard deviation for net worth over GDP from 1950 to 1980 was 0.179; during the forty-year period of our analysis this rose to 0.555.

[14] An excellent account is given in Murray Rothbard, *America's Great Depression,* (1963).

[15] Board of Governors of the Federal Reserve System (US), "Households and Nonprofit Organizations; Net Worth, Level" [TNWBSHNO], *Federal Reserve Bank of St. Louis.*

Figure 7: Households and Non-Profits Net Worth/GDP, Average for Each Decade and Standard Deviation (US)

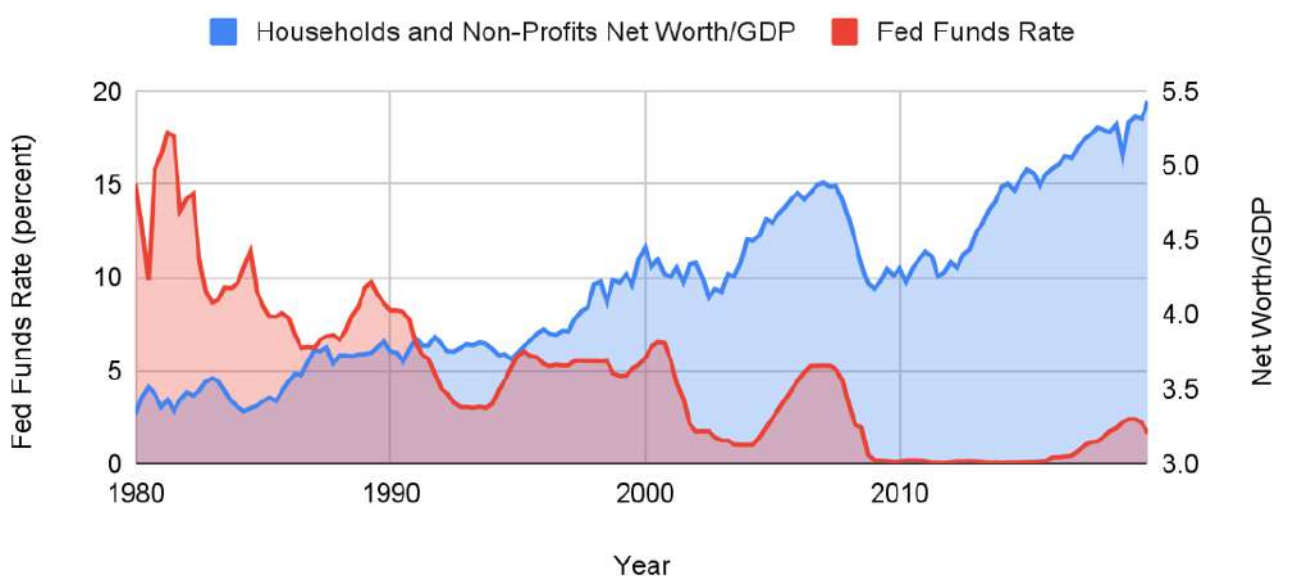
Source: Federal Reserve



As well as the historically unusual patterns in asset price appreciation, below we can see the patterns that we have come to expect from the four phases of monetary policy generating successively larger bubbles.[16]

[16] For an interesting analysis with almost a century of patterns which indicate the monetary influence, but do not suggest free market interest rates as a policy, see Bordo & Landon-Lane, "Does expansionary monetary policy cause asset price booms; Some historical and empirical evidence" (2013).

Figure 8: Households and Non-Profits Net Worth/GDP (US) and Fed Funds Rate
Source: Federal Reserve



Below, one can see three of the most important indicators of equity valuations. Tobin's Q, actually developed by Nicholas Kaldor in 1966, but brought to wider attention by James Tobin some years later as "the nexus between financial markets and markets for goods and services"; the Wilshire 5000 over GNP, "the Buffett Indicator", which famed investor Warren Buffett called "probably the best single measure of where valuations stand at any given moment" and the Shiller P/E Ratio, which has gained popularity in recent years.[17] The decade averages and standard deviations are a simple but useful tool as they shed more light on systemic bubbles built over years—or even generations. P/E Ratios of recent years have been compared to 1929, but perhaps more interesting and concerning is that, whereas the 1929 bubble was short and sharp, every decade average from the 1990s onwards has been higher than any other previous decade since the series starts in the 1870s.

[17] The quote from Warren Buffett is from a 2001 interview with Fortune magazine: Carol Loomis, "Warren Buffett On The Stock Market" (December 10, 2001); Tobin and Brainard (1977, p. 2); Kaldor (1966).

Figure 9: Shiller PE, with Decadal Averages and Standard Deviations
Source: Robert Shiller

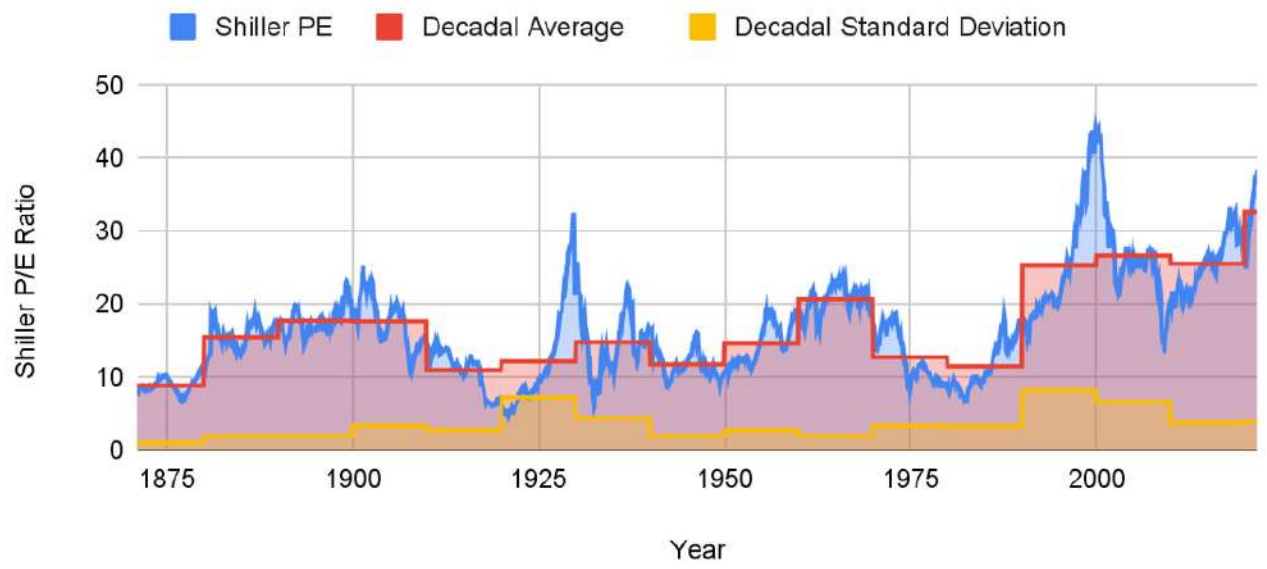


Figure 10: Wilshire 5000/GDP (The "Buffett Indicator") with Decadal Averages and Standard Deviations
Sources: Wilshire Associates

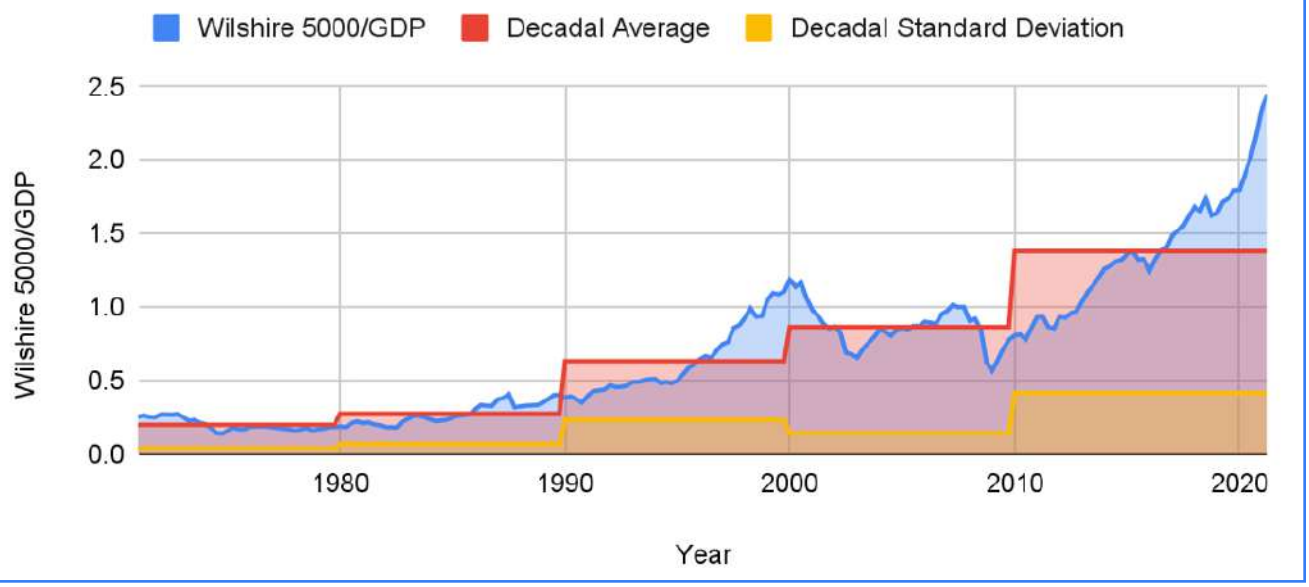
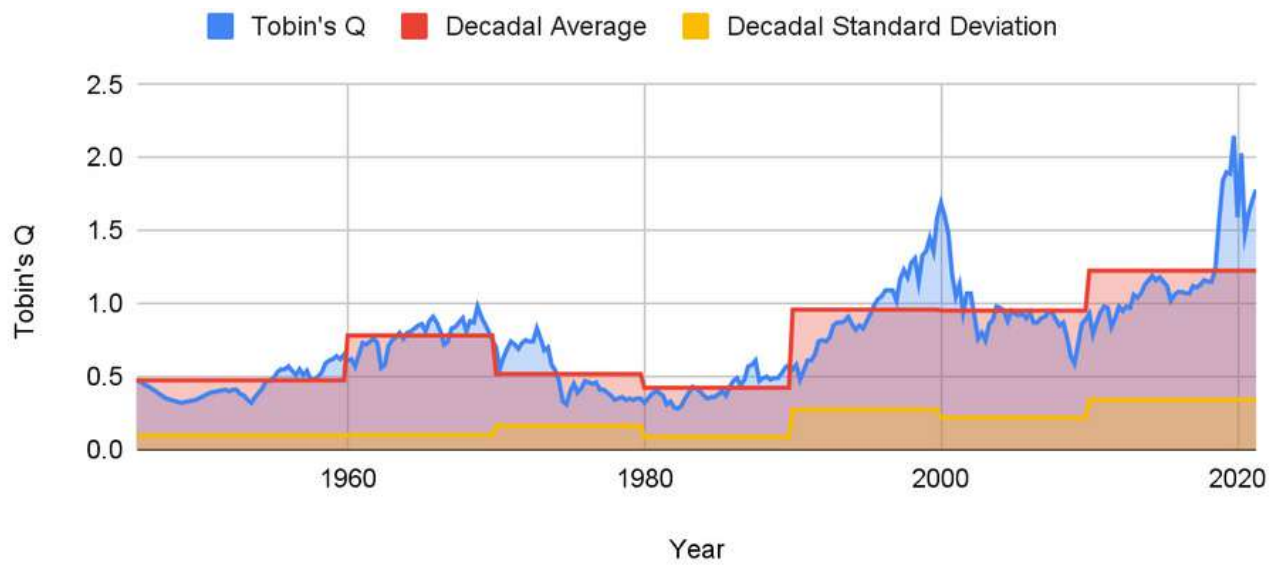


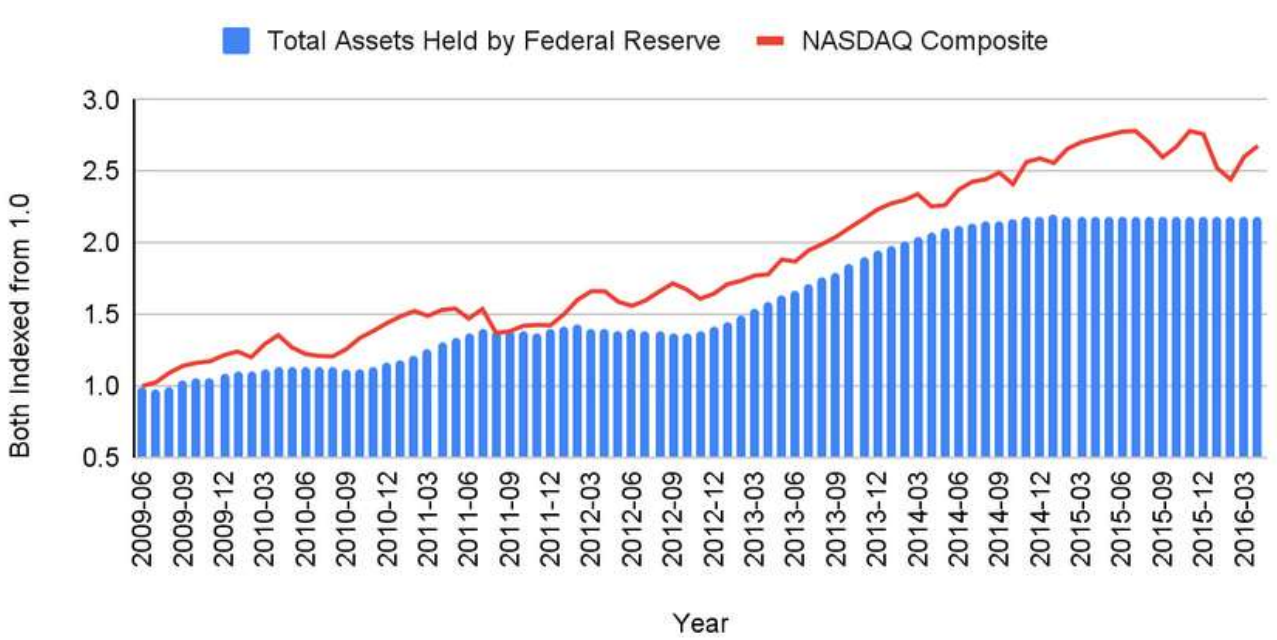
Figure 11: Tobin's Q, with Decadal Averages and Standard Deviations
Source: GuruFocus



It is useful to note that during the third phase of the Super Bubble, the 1% interest rates of 2003-4, stock markets did not grow in the same outsized manner as in the other phases, even though in the aggregate asset bubble metric we can see assets ballooning; during this phase, much of the credit creation went into the housing market, most famously into subprime mortgages, but also into other property sectors, too. Once zero percent interest rates were implemented following the bursting of this phase of the bubble, both stocks and all other asset classes resumed their upward trajectory together.

During the latter phase of the Super Bubble, quantitative easing played a larger role in inflating bubbles. From the beginning of QE in 2009 to the relative tightening of monetary policy some six years later, the correlation for the Federal Reserve balance sheet and the Nasdaq was 0.983. The Nasdaq rose by a factor of more than 2.5 during this six year period of stagnant or falling wages and productivity, a pleasant development for those whose wealth is largely derived from assets rather than wages.

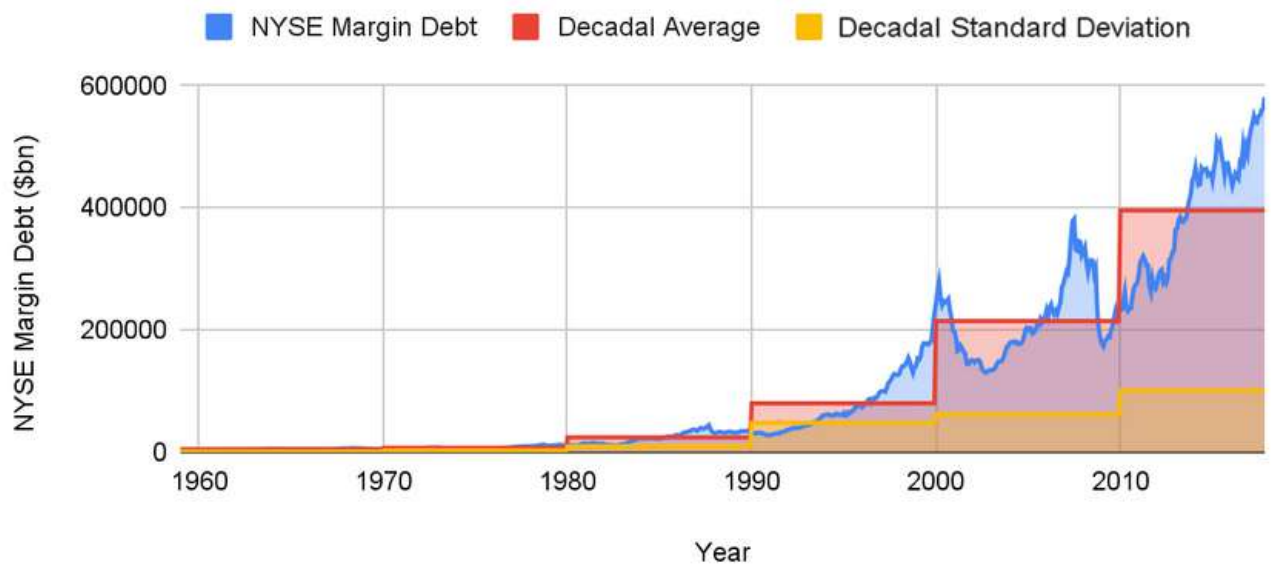
Figure 12: The Effects of the Fed Balance Sheet on the Nasdaq
Sources: Federal Reserve, Nasdaq OMX Group



Nevertheless, these metrics of stock market bubbles should not be taken in isolation and may reflect projected innovations.[18] Recent work by McGratton and Prescott at the Minneapolis Fed has even supported Fisher's hypothesis from the 1920s that equity valuations reflected innovations at the time.[19] We should therefore look more closely at the extent to which the equity valuations are fuelled by artificially cheap credit. In his classic, *The Great Crash, 1929*, John Kenneth Galbraith wrote of the importance of margin debt as an indicator of stock market bubbles, yet since publication in 1955 there have been episodes when margin debt has accompanied healthy economic expansions.[20] An Austrian School analysis would hypothesise that when margin debt is driven by artificially low interest rates it contributes to bubbles and other systemic distortions as false price signals are transmitted to credit markets.[21] Prior to the phases of credit expansion of our analysis, the highest margin debt reached was 0.87% of GDP in 1963, indeed roughly the time that the aggregate asset valuations peaked in that cycle. From the 1990s phase onwards, margin debt to GDP would never go below 1%, meaning every year exceeded the previous all-time high in the post-WW2 era reached in 1963. At the beginning of the Super Bubble in 1980, total NYSE margin debt was $24bn; at the peak of the 90s bubble it was $279bn, by the end of the 2008 phase of monetary expansion it had reached $381bn; during the Covid monetary bonanza of subsidised mass-financial speculation, margin debt reached $822bn.

[18] Ahrend, Cournede and Price (2008).
[19] McGrattan and Prescott (2003).
[20] The concept of margin debt as a driver of bubbles is threaded throughout Galbraith *The Great Crash, 1929* (1955) but see in particular pages 46 and 49.
[21] Another account of the importance of margin debt can be found in Kindleberger's 1978 classic *Manias, Panics, and Crashes. A History of Financial Crises*.

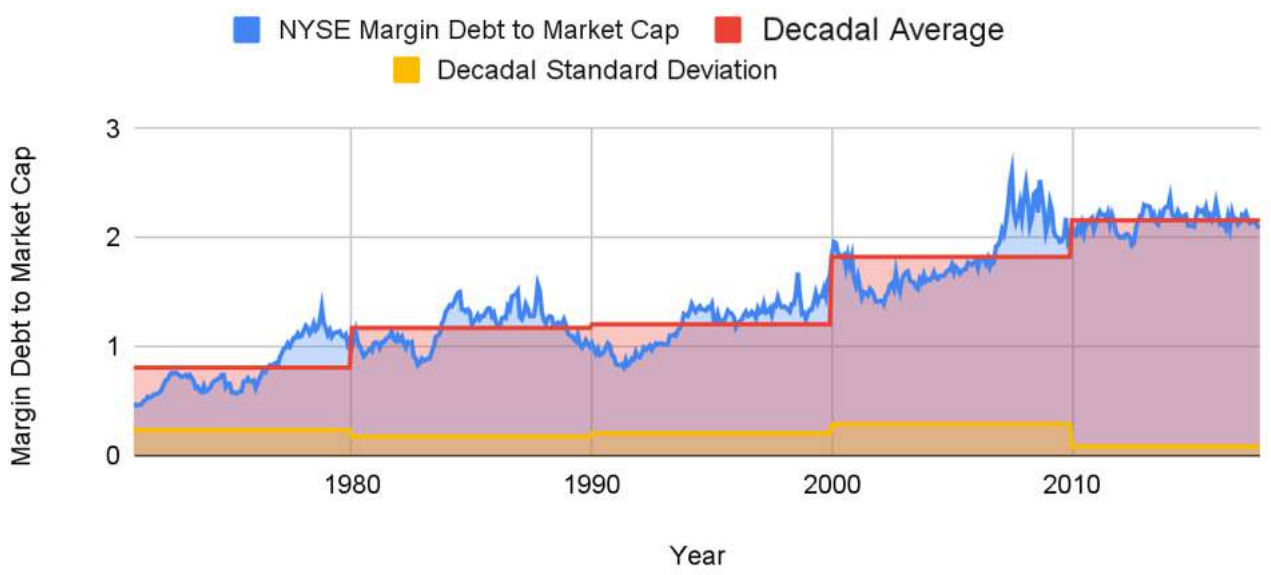
Figure 13: NYSE Investor Margin Debt With Decadal Averages and Standard Deviations
Source: NYSE/Gurufocus



Hayek and Mises wrote that following a crash an even larger credit expansion is required to perpetuate the bubble due to the accumulated malinvestment.[22] In Figure 14 we can see the extent to which the total market capitalisation was reliant on margin debt through each of the phases; the phase of the early 2000s required 32.6% more margin debt to sustain the bubble than the Dot Com phase, which was in turn 24.8% higher than the 1987 peak.[23]

[22] Mises particularly recommends against larger credit expansions throughout *The Theory of Money and Credit* (1912).
[23] Some predictions from Austrian School economist Ludwig von Mises from the 1920s can be seen in *The Causes of the Economic Crisis, and Other Essays Before and After the Great Depression* (2006).

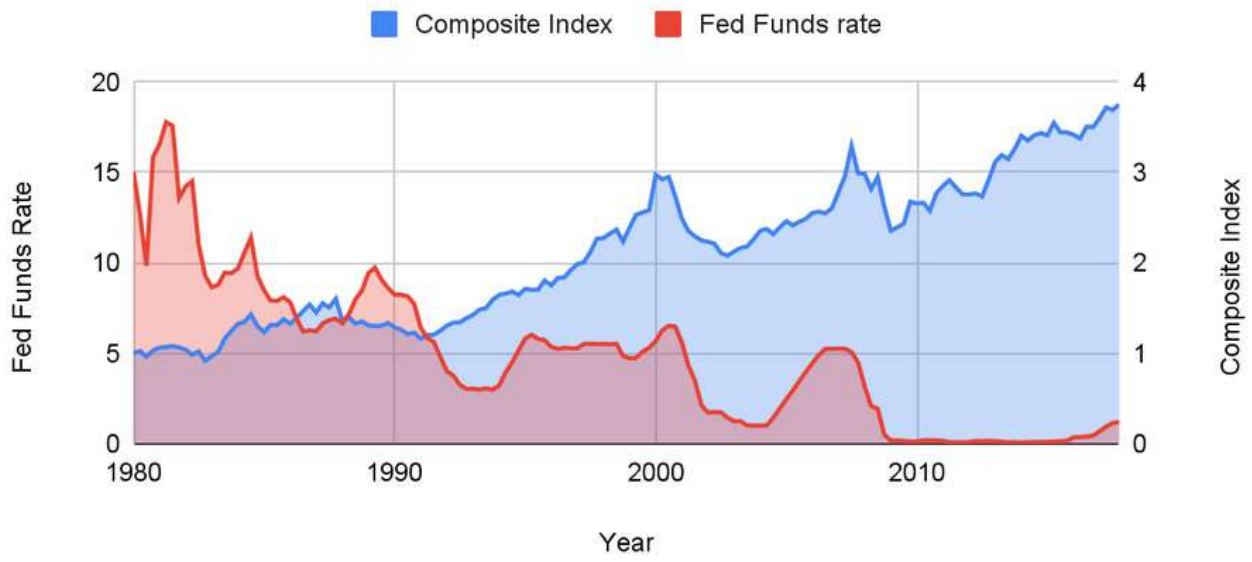
Figure 14: NYSE Margin Debt % of Market Cap. with Decadal Averages and Standard Deviations
Source: NYSE/GuruFocus



A useful metric for Austrian School analysis of stock market bubbles should therefore combine equity valuations with some form of credit dynamics. In Figure 15 below we create a composite index combining the "Buffett Indicator" and margin debt as a percentage of market cap (what we might call the "Galbraith Indicator") – in other words how large the stock market is relative to the economy and how much of the stock market is fuelled by credit. Both components are given equal weight as, from an Austrian School perspective, it is the combination of outsized asset valuations and artificially induced credit expansions which is dangerous. Over time, this composite index shows us the cumulative effects of each phase of credit expansion.[24]

[24] We looked at several ways of combining equity valuation metrics with the extent to which the stock market is fuelled by credit and a composite index shows the nature of the growth while keeping simple and avoiding bias.

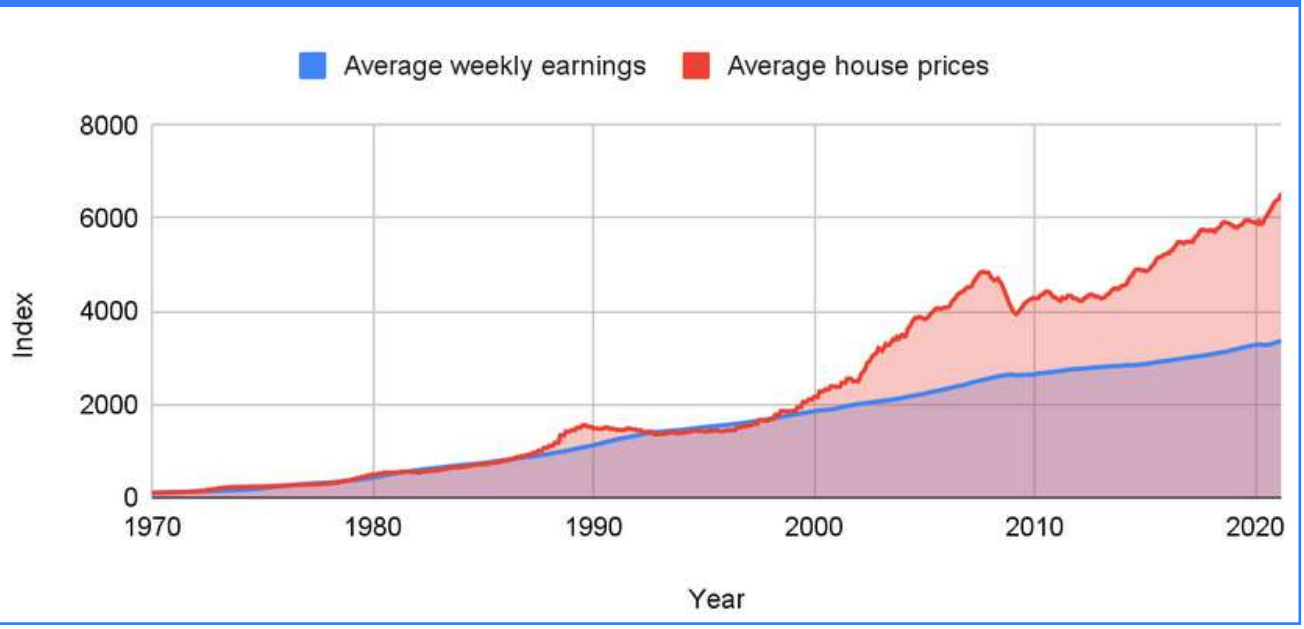
Figure 15: Fed Funds Rate and Composite Index of "Buffett Indicator" and Margin Debt to Market Cap
Source: Wilshire Associates, NYSE/Gurufocus, Federal Reserve



While almost all of the developed world has seen an historically unprecedented credit expansion, where this new money has flowed takes different characteristics by country.[25] Cultural factors have also affected where credit has flowed – stock trading is more popular with the public in the US than most other countries; in the UK, on the other hand, more than 70% of the money that has been created by banks is in the form of mortgages. Nevertheless, in all of these cases, in each countries' relevant asset classes we can see each phase of the credit expansion creating further distortions. In London, in 2021 median house prices reached 13.7 times median incomes.

[25] For a good analysis of the Japanese bubble see Shiratsuka, in BIS Papers No 21, "The asset price bubble in Japan in the 1980s: lessons for financial and macroeconomic stability" (2003).

Figure 16: Average Weekly Earnings and Average House Prices in the UK both indexed from 100
Source: Office for National Statistics



It has been suggested by several think tanks that the primary factor driving house prices in the UK is a shortage of suitable, permitted land. It is worth noting, however, that Australia, Canada and other more spacious countries have actually had larger property bubbles when house prices are compared to average incomes. All of the housing bubbles around the world, like the other asset bubbles, have manifested in much the same pattern with each phase of the Super Bubble. As well as the standard problems related to economic distortions, housing bubbles are also a recipe for inter-generational strife as most young people are unable to afford a house while those who bought a house at the beginning of the Super Bubble have profited handsomely.

In an economy with interest rates set by the market, there would have been a number of self-correction mechanisms that would have kicked in during the formation of the Super Bubble. Just as a sudden rise in demand for other goods leads to a rise in prices, if there had been such a dramatic increase in demand for debt in a free market, then this would have driven a substantial rise in interest rates. This would then have had a number of effects: first, it would have dampened the demand for credit as the higher interest rates make borrowing less attractive, deflating the incipient debt bubble; second, it would have made saving more appealing, leading to a larger pool of savings available for genuine investments; third, the higher interest rates would have made lenders more discerning, lending for productive uses rather than purely speculative endeavours; finally, and most importantly, it would have equilibrated the demand and supply of credit so that stock markets—an important pricing mechanism for the economy—would reflect the time preferences of the economy at large, especially the extent to which consumers are delaying consumption for future time periods

and companies are investing for the future. The falls in asset valuations in 2000 and 2008 were the market sending signals that we were in a bubble; regrettably, the response by central banks in both instances has been to create an even larger debt bubble with even more outlandish interest rate manipulation. Each asset bubble over the last forty years has resulted in monetary policy-makers stuffing the economy with more debt, leading to almost all asset classes becoming bloated. When one combines this with the other effects we will come to, such as malinvestment and bond degradation, Hayekian theory indicates that asset valuations will face a significant reckoning once malinvestment reaches the level of saturation that makes monetary policy ineffective.

Perspective: Max Rangeley's Debate with the Head of IMF Europe

In 2018, at the Economic Freedom Summit in the European Parliament, I had a debate with the head of IMF Europe, Jeff Franks, on the nature of the monetary policies enacted following the 2008 financial crisis. The debate was titled "Central Banks: The Solution or the Problem?", with the audience composed of both members of the European Parliament and delegates from other countries around the world. The event was interesting in that it is rare that senior people at the IMF debate such ideas. The IMF has proven itself to be one of the most effective of the global institutions in the post-World War 2 global order. Given the level of incompetence of politicians in much of the world, the global economy has held together surprisingly well and much of the IMF's advice has been useful. Nevertheless, from an Austrian School perspective the IMF has made an historical error in promoting radical monetary policy such as zero percent interest rates and quantitative easing as the remedy to our economic problems.

Max Rangeley and Jeff Franks Debate at the Economic Freedom Summit in the European Parliament

In my debate with Dr Franks, he noted that central banks made recessions "less nasty, brutish and short" and that without central banks economic contractions would be more painful. This is of course an orthodox neoclassical interpretation of the modern economy; in the event of a recession, a central bank cuts interest rates which then "stimulates" the economy back to growth. From a Hayekian perspective, however, we posit that false price signals have been transmitted to the economy through artificially low interest rates, which then propagate through the economy. GDP increases, but at the expense of malinvestment and asset bubbles which inevitably burst later on. A major part of the problem is the focus on GDP as the primary metric of economic health. In our debate, Dr Franks opined that during the period leading up to the financial crisis, and more broadly

during the "Great Moderation" era, central banks could have done more to prevent the growth of bubbles; I made the case that in fact it has been central banks that led to the Dot Com bubble of the 1990s and then, with even lower interest rates, the Housing Bubble of the early 2000s. By using interest rates as a method of "stimulating" the economy, central banks have succeeded in creating ever-larger debt bubbles for the last generation.

The nineteenth century economist Frederic Bastiat noted the cause of many of our modern policy errors in his essay *The Seen and the Unseen.*[26] When governments introduce "protectionist" tariffs to protect politically favoured companies, what is seen is their growth in profits and the jobs "protected", what is not seen is the cost to everybody else in the economy and the lost jobs elsewhere. When interest rates are cut to "stimulate" the economy, the boost in GDP is the "seen" effect, while the malinvestment and distortions are the "unseen" aspect. By focussing on the seen rather than the unseen, the IMF and other institutions have contributed to the problems this paper outlines. Most of the metrics used to judge whether we were in a bubble in 2007/8 are now worse, from debt levels to asset prices as a percentage of GDP. As we shall see in this paper, the nature of the bubble goes well beyond debt and asset bubbles; in fact the entire (unseen) macrostructure of the economy has been distorted by the false price signals of zero percent interest rates.

[26] This essay can be read online at the Online Library of Liberty.

ARTIFICIALLY LOW INTEREST RATES AND GRESHAM'S LAW FOR BONDS

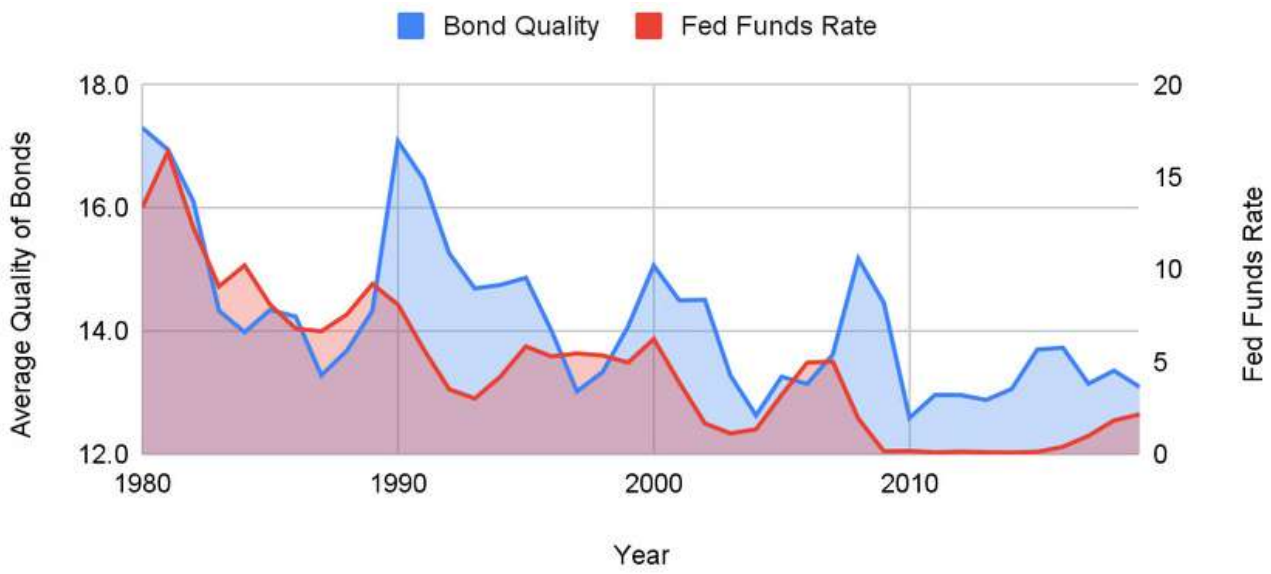
During the forty years of falling interest rates, each phase saw a further divergence between saving and debt, with much of the artificially cheap debt coagulating in bond markets. In order to examine other indicators of a Hayekian bubble, we must dig down into where and how this debt proliferated. Interest rates carry information about risk; for a particular borrower they embody idiosyncratic risk for that situation, but aggregate interest rates also carry information about the risk in the economy.

Sir Thomas Gresham, a financier during the Tudor period, wrote of how when relative values are fixed, bad money drives out the good.[27] The Austrian School posits that once interest rates are manipulated by a central bank bureaucratic committee they, like other prices when set by central planning, deliver incorrect signals to the market.[28]

The empirical link between monetary policy and risk-taking has been documented recently by a number of non-Austrian School authors.[29] While corporate debt increased substantially during the era, from $412,059bn in Q1 1980 to $10,745,179tn in Q1 2020 in the US alone—a factor of 26—perhaps more interesting for our analysis are the characteristics of this debt, both as a whole and within classifications such as investment-grade.[30] Figure 17 shows the average bond quality for 60,712 bond issuances from 105 countries during the forty years in question using the OECD's Global Corporate Bond Rating Index. Each phase of central banks' artificially low interest rates—with much of it initiated from the Federal Reserve and the dollar as the global reserve currency—preceded a reduction in the quality of bonds.

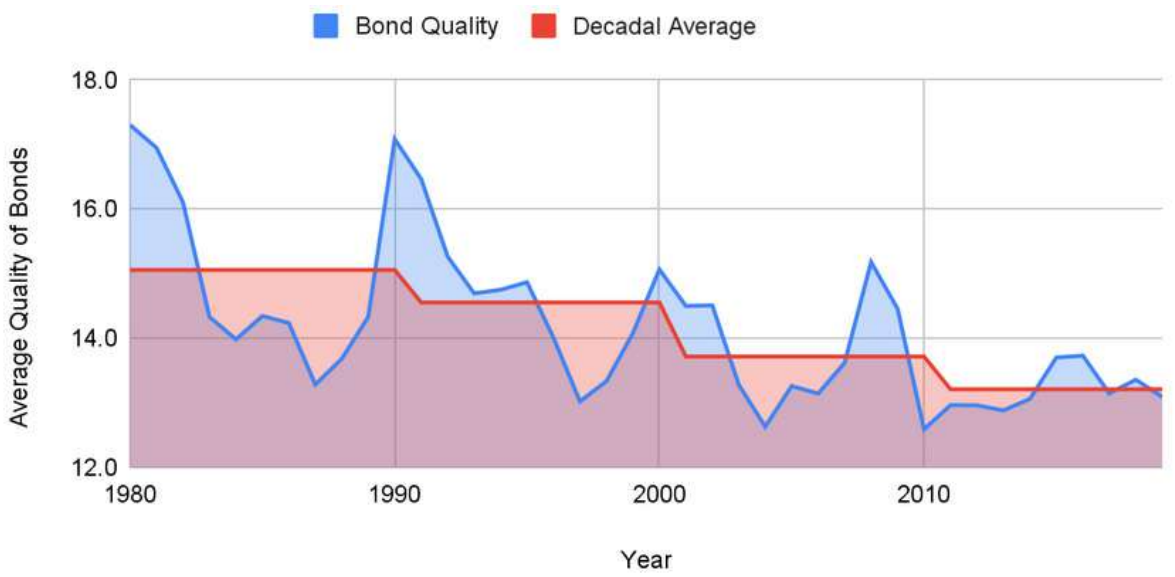
[27] A good work on Gresham is F. R. Salter's *Sir Thomas Gresham (1518–1579),* (1925).
[28] Eugen von Böhm-Bawerk's *Capital and Interest: A Critical History of Economical Theory* (1884) sets out the first generalised framework.
[29] For analysis from the BIS, see Borio and Zhu (2012); for another interesting account see Jiménez, Ongena, Peydró and Saurina, "Hazardous Times for Monetary Policy: What Do Twenty Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk Taking?" (2014).
[30] Board of Governors of the Federal Reserve System (US), "Nonfinancial Corporate Business; Debt Securities; Liability, Level" [NCBDBIQ027S], *Federal Reserve Bank of St. Louis*.

Figure 17: OECD Global Corporate Bond Rating Index and Fed Funds Rate
Source: OECD Capital Markets Dataset, Federal Reserve



The average bond quality for each decade dropped from 15.058 in the first monetary phase during the 1980s, to 14.555 to 13.717 during the phase of the housing bubble and finally 13.211 in the phase of zero percent interest rates. During the era of zero percent interest rates following the 2008 crisis, bond quality would never again go above 14, the watermark corresponding roughly to BBB+ average bond quality.

Figure 18: Bond Quality and Phase Average
Source: Constructed from OECD Capital Markets Dataset



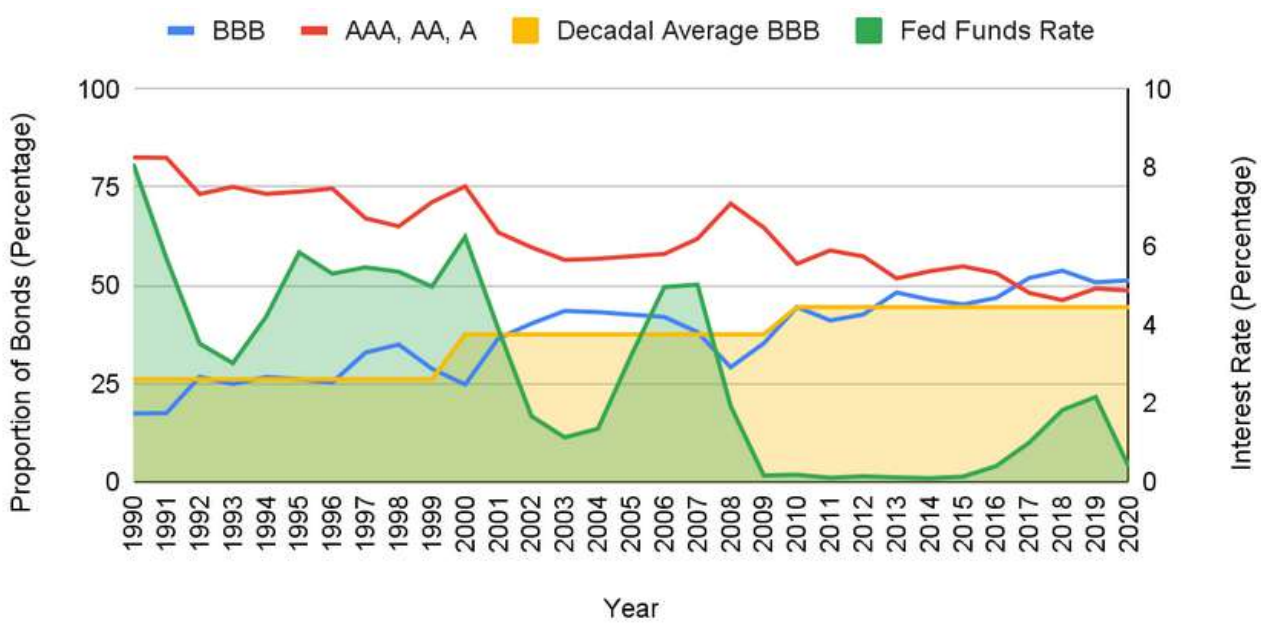
Even within each stratum there has been a degradation; data from PIMCO show that the net leverage ratio for BBB issuers rose from 1.7 in 2000 to 2.9 in 2017, while data from the Fed corresponding to this shows that the yield on BBB actually fell from 8.79% to 3.44% in this same period.[31] There therefore appears to be an effect comparable to Gresham's Law for bonds during periods of artificially low interest rates as low quality bonds drive out the higher quality with each phase of lower interest rates. Over the forty years, investment-grade (IG) debt that was of the lowest quality comprised a larger proportion of portfolios with each phase of monetary policy. BBB rated debt was only 17.4% of IG debt in 1990, but would eventually come to constitute 53.8% in 2019. In Figure 19 we can see Gresham's Law operating with each phase of lower interest rates until the point is reached where BBB exceeds all other IG ratings put together.[32]

[31] This and more data are given in Brons and Lin, "Investment grade credit: Be actively aware of BBB bonds" in *PIMCO Viewpoints* (2018); ICE Benchmark Administration Limited (IBA), ICE BofAML US Corporate BBB Effective Yield [BAML-C0A4CBBBEY], *Federal Reserve Bank of St. Louis.*

[32] This, like the other bond issuance data, is constructed from the OECD Capital Markets dataset featuring more than 100 countries' bond issuances.

Figure 19: Fed Funds Rate and Investment Grade Bonds

Sources: Constructed from OECD Capital Markets Dataset, Federal Reserve

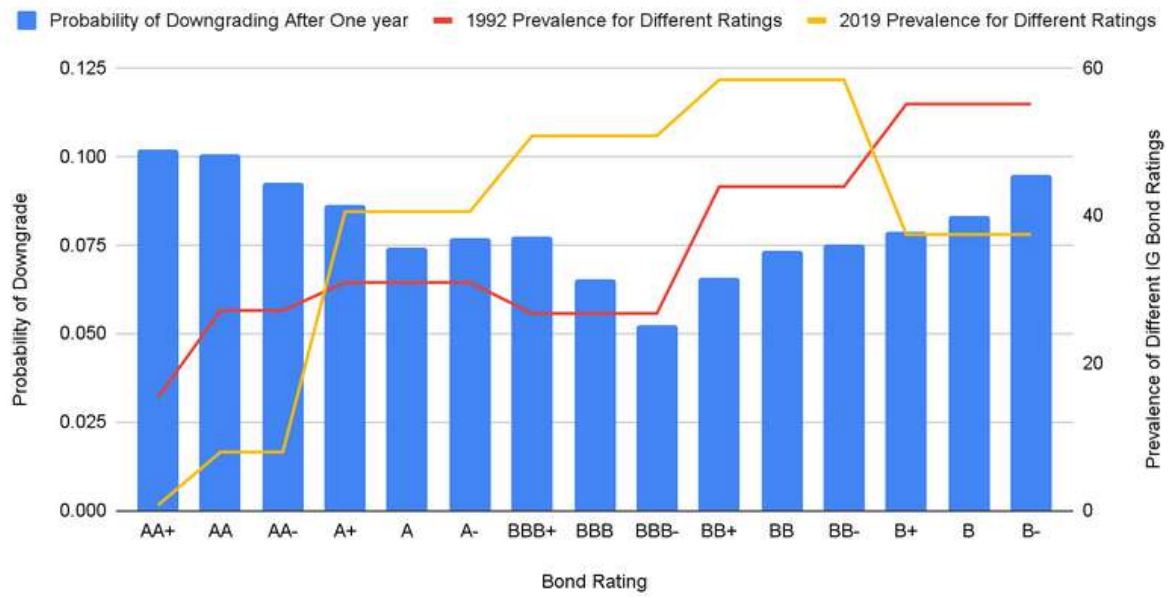


The tendency for lower grade bonds to drive out higher quality can also be seen in the probability of downgrades. Research as early as 1992 found BBB-rated bonds are statistically less likely to be downgraded; we find that this trend increased more with each phase of credit expansion.[33] Figure 20 combines data from Moody's, Fitch and S&P to show the aggregate likelihood of downgrades during the forty years of analysis and compares the prevalence of IG ratings in 1992 and 2019.[34]

[33] Altman and Kao (1992).

[34] The data are constructed from the OECD Capital Market Dataset, for which the OECD (2021) "based [the data] on the average one-year transition matrix of all global corporate issuers over the 1983-2018 period for Moody's, 1990-2018 period for Fitch and 1981-2018 period for S&P."

Figure 20: Probability of Downgrading And Prevalence of Different Ratings
Source: Constructed from OECD Capital Markets Dataset



When bond bubbles burst, BBB bonds are not only more liable to default, but additionally the downgrade then pulls them out of investment grade status. The term "fallen angels" is increasingly used for bonds that fall out of investment grade status – it should therefore be of considerable concern that more than half of bonds in pension funds and other "low risk" investment portfolios that people rely on and spend their lives saving for are in danger of becoming "fallen angels."

In 2008, market-realities asserted themselves over false price signals and sub-prime debt was shown to be largely junk; after more than a decade of zero percent interest rates, much of the debt sitting in people's pension funds is considerably more risky than the securitised mortgage portfolios of the third phase of the bubble. The quality of covenants has also fallen in step with each phase; there has been considerable concern recently over the quality of covenants in putatively low risk bond portfolios, yet the effects of Gresham's Law manifest in multiple dimensions once prices are set by a bureaucratic committee as false price signals cascade through the market.

Perspective: Steve Baker MP on Experiences from the Treasury Select Committee

I was a member of the Treasury Committee of the UK Parliament from 2014-2021, leaving to serve as a Minister in 2017-2018. The Treasury Committee provides an opportunity that is unique in the political world: the ability to regularly question the highest central bankers of the land. Members of the committee are able to scrutinise the Governor and Deputy Governors of the Bank of England, as well as members of the Monetary Policy Committee who set interest rates.

When we ask why there has not been more engagement from central bankers regarding free market interest rates, we must recognise that it is not in the interests of central bankers to reform the system that they operate in even if it would lead to more prosperous outcomes. This has become clear to me during my years of questioning them on the Treasury Committee. My exchange with the now Governor of the Bank of England below illustrates the unwillingness to even engage with the concept at the Bank of England:

Treasury Committee: October 2015[35]

Steve Baker MP: *Let me just put three names to you and ask you what you think these three names have in common. Walter Bagehot, Milton Friedman and Alan Greenspan.*
Andrew Bailey (Deputy Governor, BofE, 2013-2016 & current Governor, BofE, 2020-): *They are all authors in economics.*
Mr Baker: *Indeed, yes.*
Andrew Bailey: *Are they all people who you particularly read?*
Steve Baker MP: *They are all people who at some stage in the course of their careers advocated the abolition of central banks. Is that something that is ever discussed in the course of discussing the work of these authors within the Bank of England?*
Andrew Bailey: *That is really for Parliament, if you do not mind me saying so. We discuss a lot how we fulfil the responsibilities that we are given as a central bank. I know you take a particular view on the role of central banks, or the lack thereof. I know my colleagues and I are happy to debate this in what I might call a more academic set-*

[35] "Treasury Committee Oral Evidence", *Bank of England*, October 2015 Bank of England Bill, HC 445.

ting, but we do not sit down at the Monetary Policy Committee or the Financial Policy Committee and say, "Shall we have a central bank or shall we not?"

Even though the current system often does not operate as intended – current levels of inflation in the UK heading towards double digits makes clear that 2% inflation targeting has not been a success – alternatives to the current system are not even considered to be possibilities at the Bank of England. And the idea that Parliament would redesign the monetary system is absurd. Bagehot thought there should be no central banks but that proposing to alter the system would be in vain. Fast forward to today's monetary orthodoxy and we ought to ask how a failure to confront central planning in monetary policy is working out and what incentives monetary economists face when asked to consider fundamental questions. Why would they engage with Austrian School ideas that would lead to the downgrading of the role of the Bank of England or even its complete abolition? Why engage with those challengers outside the established system who wish to change it? Central bankers benefit from the orthodoxy that has developed and have an intellectual and financial interest in maintaining it.

Ultimately, this mistake of uniformity of opinion is a key reason that has led to failure among central banks. It has been shown by Professor Roger Koppl's work on expert failure[36] that failure among experts often develops when uniformity of opinion takes hold. Individuals like central bankers earn their livelihoods through their recognition as the official orthodoxy. Engaging with the idea that centrally planned interest rates are damaging would hurt the livelihood of a central banker and hurt their reputation among colleagues. Many will innately think it is not worth the risk.

Throughout my time on the Treasury Committee, I have found that those who criticise the entrenched orthodoxy – even from a position of power such as being an elected member of Parliament – are regarded as iconoclasts. Leading members of the Bank of England of course engaged with me during sessions, often with apparent interest, but their responses made clear questions of fundamental reform were not seriously considered.

If the present monetary orthodoxy is leading the world economy onto

[36] Koppl (2018).

the rocks, eventually central banks and central bankers will have to engage with fundamental questions, irrespective of their intellectual investment over many years and their personal incentives. Then we may see the paradigm shift we need as mainstream economics comes to understand the problems of epistemology, time and method which make successful central planning of monetary policy impossible. Only that paradigm shift among economists seems likely to catalyse a much-needed change in the global political economy. Much may depend on it.

Steve Baker questioning Mark Carney at a Treasury Select Committee oral evidence session

Insight: Global Institutions and Hayekian Philosophy

Among the global institutions, the IMF, World Bank and Bank for International Settlements, along with their smaller and less well known siblings, have each developed their own intellectual ecosystem which relates to how they understand interest rate manipulation as a policy tool. The IMF has tended to be not only the most favourably disposed towards radical expansionary monetary policy, but also less concerned about the potential negative consequences, and where concern is shown it is often about inflation. Inflation, as we are finding in this paper, is perhaps the least damaging of all the effects of monetary expansion.[37] The Bank for International Settlements has put more of a focus on understanding the systemic, structural problems arising from monetary policy and what this means for the global economy.

It is generally accepted that the track record of the Bank for International Settlements, the central bank of central banks, is significantly better than the other institutions in predicting recessions and other economic problems. The Economist magazine called William White, the previous head of the Economic and Monetary Department at the BIS, one of the very few economists who predicted the 2008 crisis.[38] In 2012 White wrote of how the Austrian School has been able to predict financial crises as "the Austrian school of thought, spearheaded by von Mises and Hayek, warned that credit driven expansions would eventually lead to a costly misallocation of real resources ("malinvestments") that would end in crisis."[39] He also added in the footnotes:

> On returning from a visit to the US in the late 1920s, Hayek foretold a deep slump. On being told this was impossible, because US prices were essentially stable, Hayek apparently responded that this was precisely the evidence of an underlying problem. Increases in productivity should have been pushing prices down, but credit expansion was holding them back up.[40]

In 2015 the Cobden Centre interviewed William White to get his thoughts

[37] For an interesting outline to the debate in the inter-war years, see Laidler, "The Price Level, Relative Prices, and Economic Stability; Aspects of the Interwar Debate" presented at BIS conference "Monetary Stability, Financial Stability and the Business Cycle" (2003).
[38] The Economist, "The Curious Case of William White" (2012).
[39] White (2012, p.19).
[40] Ibid. p.19.

on monetary developments. He discussed how he had warned about the previous financial crisis, the third phase of the Super Bubble, and was now warning of an even larger crisis resulting from even looser monetary policy following the 2008 crisis:

> We wrote papers about these issues over a decade ago basically saying, "If you ratchet down, time after time, you're going to hit the zero lower bound and what are you going to do then?" I remember a meeting in 2002 or maybe 2003 at the BIS. It was mostly the deputy governors in charge of monetary policy and I was in the chair. The Representative from the Fed had already written a couple of papers with Ben Bernanke on this topic. He concluded that there was no problem with the zero lower bound because there were many other things a central bank could do and he outlined them. However, the next person to speak was Masaaki Shirakawa, before he became Governor, who responded by saying "We've already done all of this stuff in Japan and it didn't work."[41]

He later continued, discussing the credit bubble leading up to the Asian Crisis:

> The [IMF's] Independent Evaluation Office looked back at the Funds advice prior to the Asian Crisis and basically said the IMF just got it wrong. They ignored the rapid expansion of credit and the rising stock of debt and all the other imbalances that the BIS had been concerned about.[42]

Whether Hayekian business cycle theory does indeed have this predictive capacity is of interest both for academia and policy-makers in central banks and global institutions like the IMF.[43] Even if such institutions do not accept the complete Hayekian intellectual framework, it is clear that considering such ideas can be beneficial in policy-formation and analysis.

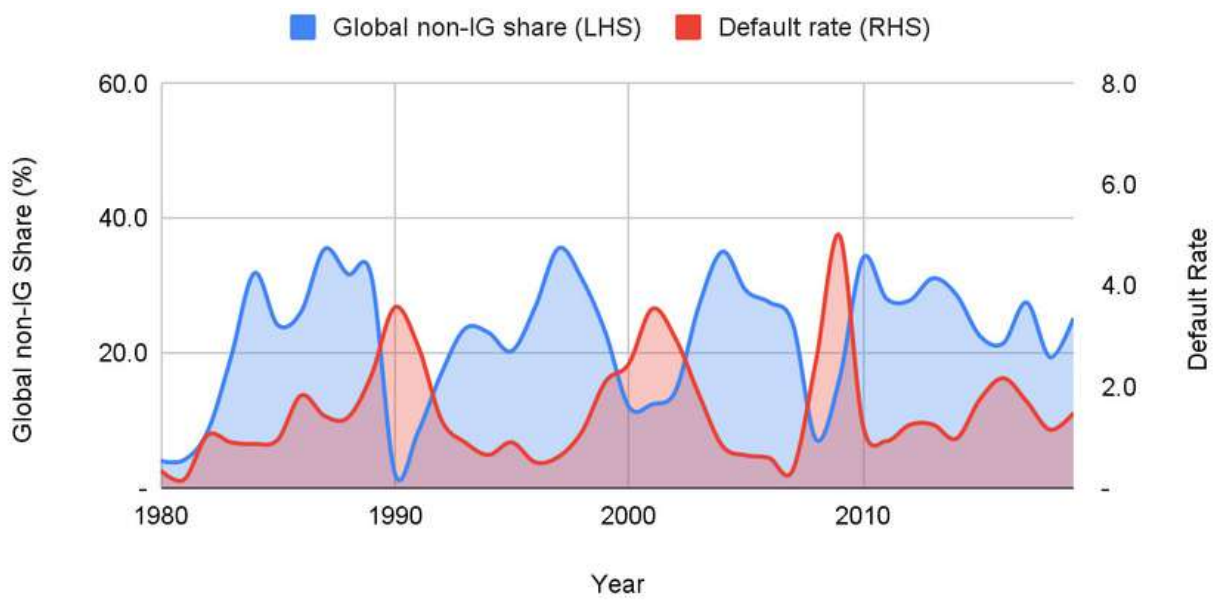
[41] The Cobden Centre (2015).
[42] Ibid.
[43] For the opposing view to this, see Christine Lagarde's speech "Learning the right Lessons from the Past" on the occasion of the awarding of the Prix Turgot (2021).

SYSTEMIC RISK AND THE BOND RISK RATIO

We have examined some ratios for asset bubbles, but given the historically unprecedented increases in debt over the last generation, it would also be of use to find a metric for systemic risk in debt markets. John Maynard Keynes once quipped that economists as a profession should be reliable like dentists, yet many bond risk metrics tend to show problems only when they become acute; a good economist—like a good dentist—should be able to diagnose problems before they become irreparable. There have been a number of projects to develop a measure of bond bubbles that would be the equivalent of the P/E Ratio or Tobin's Q for bonds. Greenwood and Hanson, two professors at Harvard, provided the most successful so far, using the relative prevalence of investment grade and non-investment grade bonds as a measure of risk within bond markets. Their analysis indicates that during a credit boom "the debt issuance of low quality firms [rather than aggregate debt] is particularly useful for forecasting bond returns."[44] Figure 21 displays Greenwood and Hanson's metric constructed with 63,705 corporate bond issuances from 105 countries using the OECD's extensive global dataset.

[44] Greenwood and Hanson (2013, p. 1).

Figure 21: Non-IG Bonds and Default Rates
Source: Constructed from OECD Capital Markets Dataset

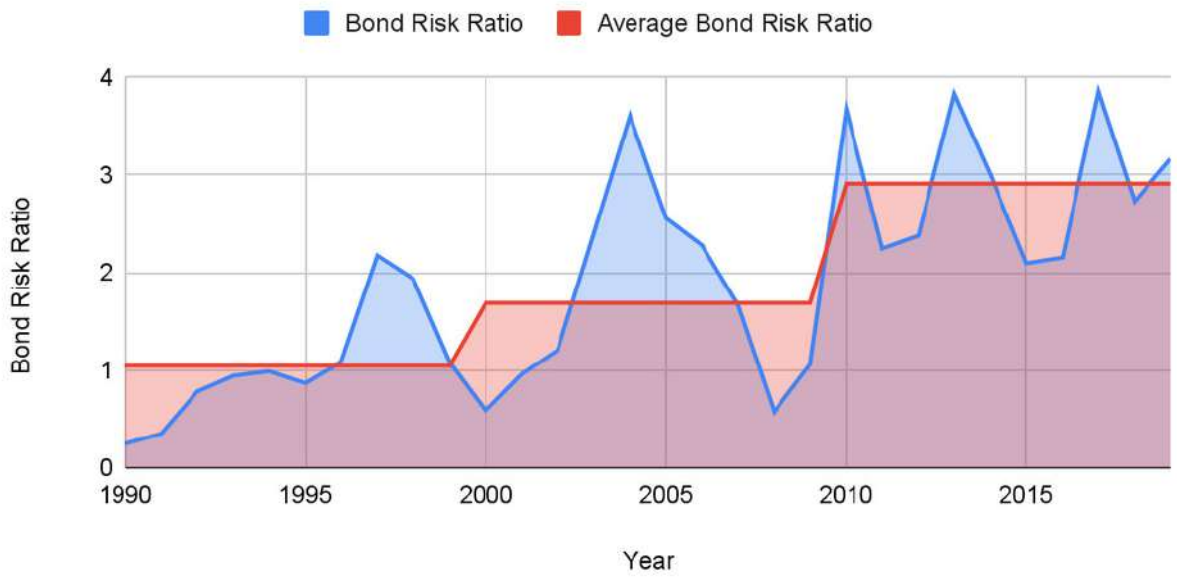


We can see that Greenwood and Hanson's metric indeed has good predictive capacity, yet the structure of investment grade bonds themselves and in particular such a preponderance of bonds at the BBB level and their risk of becoming fallen angels indicates it may understate systemic risk accumulated over time. Here we therefore construct a new metric, the Bond Risk Ratio, potentially a more accurate method to measure bond bubbles which accumulate over longer periods. By having BBB and non-IG bonds in the numerator and other IG bonds in the denominator, we may find a clearer picture of when risk accumulated.

Bond Risk Ratio = (Non-Investment Grade Bonds + BBB) / (Investment Grade Bonds - BBB)

The Bond Risk Ratio is shown graphically in Figure 22, constructed from 60,712 bond issuances from 105 countries. Preceding the expansionary monetary policies of the 1990s—including Greenspan's 3% interest rates in the US and the infamous "Greenspan Put" through the following years—the Bond Risk Ratio was at 0.24, indicating little acute, or accumulated, risk. It is interesting to note that while the late '90s are often considered a speculative mania in stocks, the Bond Risk Ratio rose as high as 2.17 during the bubbles in East Asia and US technology stocks among other sectors.

Figure 22: Bond Risk Ratio
Source: Constructed from OECD Capital Markets Dataset



Greenspan discussed before the Senate in 1994 how "strength has been particularly evident in interest-sensitive sectors" which, as we have seen, is a classic Austrian School indicator of monetary policy distorting the economy and diverting resources to sectors which benefit from artificially low interest rates.[45] We also see the Bond Risk Ratio shooting up to 3.6 when 1% interest rates were implemented in 2003-4; this was the period when mortgage-backed securities were being given AAA approval by the ratings agencies and being sold to banks, pension funds and insurance companies around the world and central banks and institutions like the IMF were reassuringly talking of healthy economic growth and the "Great Moderation."[46] As QE and zero percent interest rates were implemented from 2009-10, the Bond Risk Ratio had its most explosive one year increase, from 1.05 to 3.67. In each case, the Bond Risk Ratio peak preceded the coming recession, unlike many fabled bond indicators which turn out to be useful only in hindsight; the implication is that, after more than a decade of zero percent interest rates, we now have far more accumulated risk than during the Dot Com Bubble or Housing Bubble.

The Bond Risk Ratio indicates a generational build up of risk which is not shown in Greenwood and Hanson's metric using the percentage of bonds which are non-investment grade. During relatively tranquil periods, the Bond Risk Ratio—re-formulated as a percentage to make it comparable to Greenwood and Hanson's methodology—remained steady relative to their metric, but during the growth of the Dot Com Bubble and then the Housing Bubble it shot up to being 3 times as

[45] "Federal Reserve Bulletin: July 1994 Volume 8, Number 7" *Board of Governors of the Federal Reserve System* Washington D.C. Publications Committee (1994).
[46] The term comes from a speech by Ben Bernanke in 2004, "The Great Moderation" at the Eastern Economic Association, Washington, D.C.; an interesting paper written four years before Bernanke's speech is McConnell and Perez-Quiros "Output Fluctuations in the United States: What Has Changed since the Early 1980s?" (2000).

high and 5 times as high respectively as risk accumulated during the periods of artificially low interest rates. Greenwood and Hanson are correct in their analysis that the quality of outstanding debt is as important as quantity in deconstructing debt bubbles, by modifying the methodology to look at the ratios of different types of debt, including that which has been granted "investment grade", we can build a better picture of debt bubbles which accumulate over longer periods.[47] Using the Bond Risk Ratio, we can see clear indicators that high risk is associated with periods of artificially low interest rates as false price signals divert resources to riskier loan portfolios. It has been suggested in Basel and in central banks that macroprudential measures will reduce risk. From a Hayekian perspective, it is the artificially low interest rates that cause the bubbles—macroprudential measures would be the equivalent of pushing the accelerator and the brake at the same time.

Much of Austrian School analysis over previous decades has focussed on asset bubbles and debt growth during periods of artificially low interest rates but often failed to be more forensic with the underlying structures. In fact a closer examination of the structure of debt markets strengthens the case for Hayek's business cycle theory; not only have artificially low interest rates led to extraordinary increases in debt, but they have also completely distorted the underlying structure of global debt markets. When economic historians come to look at the current historical epoch, they will note similarities with other economies that collapsed due to central planning. Gosplan in the Soviet Union meant that prices no longer reflected the respective quantities of goods available – or indeed their qualities, as anyone who visited the Soviet Union can attest. With our current system of centrally planned interest rates, similar effects have happened in bond markets; the pricing mechanisms are now so far from what they would be in a free market that the structure of debt in the global economy bears little relation to underlying risk levels. Artificially low interest rates have boosted GDP, as traditional macroeconomic analysis would predict, but once the bubble bursts and people see their pension funds evaporate the consequences will be far worse than they would have been otherwise.

[47] Greenwood and Hanson (2013, p. 36).

Perspective: Max Rangeley on Think Tanks, Political Institutions and the Austrian School

In running the Cobden Centre from 2014, I have had the opportunity to interact with a number of different political institutions with respect to how they relate to the Austrian School of Economics and Hayek's business cycle theory in particular. Through giving a series of speeches in the European Parliament, in central banks and at institutions such as the Mont Pelerin Society, I have learned that there are a number of aspects of modern intellectual frameworks which will have to be overcome if the world is to move towards free-market interest rates.

Max Rangeley giving a speech in the European Parliament on the Super Bubble

First, it is noteworthy that many policy-makers, whether politicians, central bankers or think tank analysts, are not even aware of the theory that interest rates should be set by the market rather than central bank committees. In one of the first speeches I gave in the European Parliament on the Super Bubble, I had several senior people at think tanks comment afterwards that the very concept of free market interest rates had never been raised in economic discussions. In my experience, those who have some understanding of economics, particularly those who understand the damaging effects of politicians meddling in other prices such as food or consumer goods, quickly intuitively grasp that interest rates are a pricing mechanism which, similarly, is integral in the allocation of scarce resources in a market economy. Nevertheless, those of us who would like to see market-interest rates are starting from a difficult position in that we must explain before we persuade; hopefully this paper will be of use in this respect.

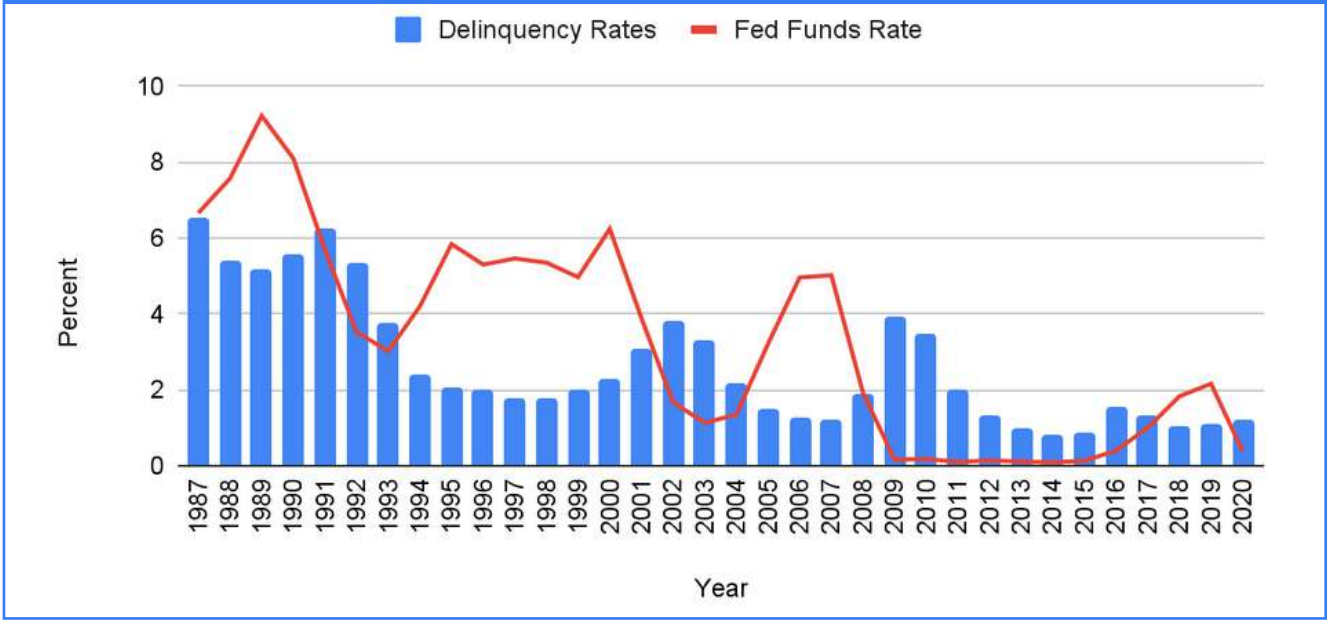
Second, many of those within the pro-free market sphere in the political world nevertheless advocate the setting of interest rates as an important component of a market economy. Money is, in this view, different from other aspects of a market economy. Whereas other pricing mechanisms should be set by the market, interest rates should be used as a "policy tool" to "smooth the business cycle." In order to decompose this viewpoint, it is often useful to draw an analogy with other forms of price-setting by bureaucracies which have been used historically by governments as a policy tool. The government could also, as an example, use a suite of other price interventions as a way to stimulate a faltering economy or cool an "overheating" economy. Such policies may have some initially beneficial effects on the surface, but it would be at the expense of a pricing mechanism which reflects the underlying production processes of the economy. Once the world moves to free market interest rates, when we look back in another generation the idea that governments can "tame the business cycle" by setting interest rates will seem no less absurd than the idea that the government should control the business cycle through setting the price of grain or other goods.

Third, a critique which has been raised a number of times in the speeches and seminars I have given at central banks, the OECD and elsewhere is the idea that policy-makers will be more vulnerable if interest rates are set by the market. A remark I have heard several times is "Zero percent interest rates were necessary – would you have just let everything collapse in 2008?" Austrian School analysis, however, argues that the bubble which burst in 2008 was initiated by the 1% interest rate response to the 2000 crash, and the zero percent interest rates following 2008 initiated the even larger bubble that will burst once this phase of monetary expansion reaches its denouement. It is now widely accepted that price interventions in other sectors of the economy, such as those implemented in the 1970s, were not helpful and are no longer used as a policy tool in developed countries. The setting of interest rates, similarly, distorts the economy rather than stimulating it; the effects are not only fleeting but, unlike other policy options, both damaging in the medium term and also a blunt and crude policy, the putative benefits of which, even if taken at face value, do not go to the most vulnerable in society. Just as you cannot fix a product shortage with artificially low prices, so you cannot fix a $250 trillion global debt bubble with artificially low interest rates. We should cease viewing the setting of interest rates as a way of "saving" the economy, but rather focus on policy options which do not bring about systemic distortions to the pricing mechanisms of the financial system and wider economy.

SCHUMPETER, HAYEK AND MALINVESTMENT

Austrian School economist Joseph Schumpeter wrote of how economic growth requires "the perennial gale of creative destruction" so that unproductive companies give way to newer, more creative businesses; this entrepreneurial aspect ties into Hayek's macro-analysis on artificially low interest rates diverting resources to stagnant, unproductive companies.[48] In Figure 23 we can see delinquencies falling with each phase of lower interest rates. Empirical research has previously shown that loose monetary policy propped up the economy, preventing bankruptcies; falling delinquency rates have been presented as a success for central banks, yet Schumpeterian insights raise questions.[49]

Figure 23: US Delinquency Rates and Fed Funds Rate
Source: Federal Reserve



In 2014, Mario Draghi, in his acceptance speech upon receiving the Schumpeter Award from the Austrian National Bank in Vienna, commented that:

> By encouraging creative destruction in the banking sector, we can facilitate creative destruction in the wider economy and support the recovery...The rationale for what we are doing actually connects two of Schumpeter's most important and better known insights. First, it acknowledges the importance

[48] Schumpeter (1934, p.37).
[49] For an eloquent exposition of the view that central banks' monetary responses have cushioned the economy, see Bernanke, Geithner and Paulson (2019).

> of a well-functioning financial sector for the efficient allocation of capital and credit. And second, it contributes to the Schumpeterian notion of "creative destruction" which drives innovation and productivity growth.[50]

There is clearly understanding within central banks that Schumpeterian forces are necessary for economic growth, yet is Hayek correct that their policies lead to the opposite? Shortly after Draghi's speech, the Cobden Centre interviewed William White, who offered a more Hayek-influenced interpretation of ECB policies:

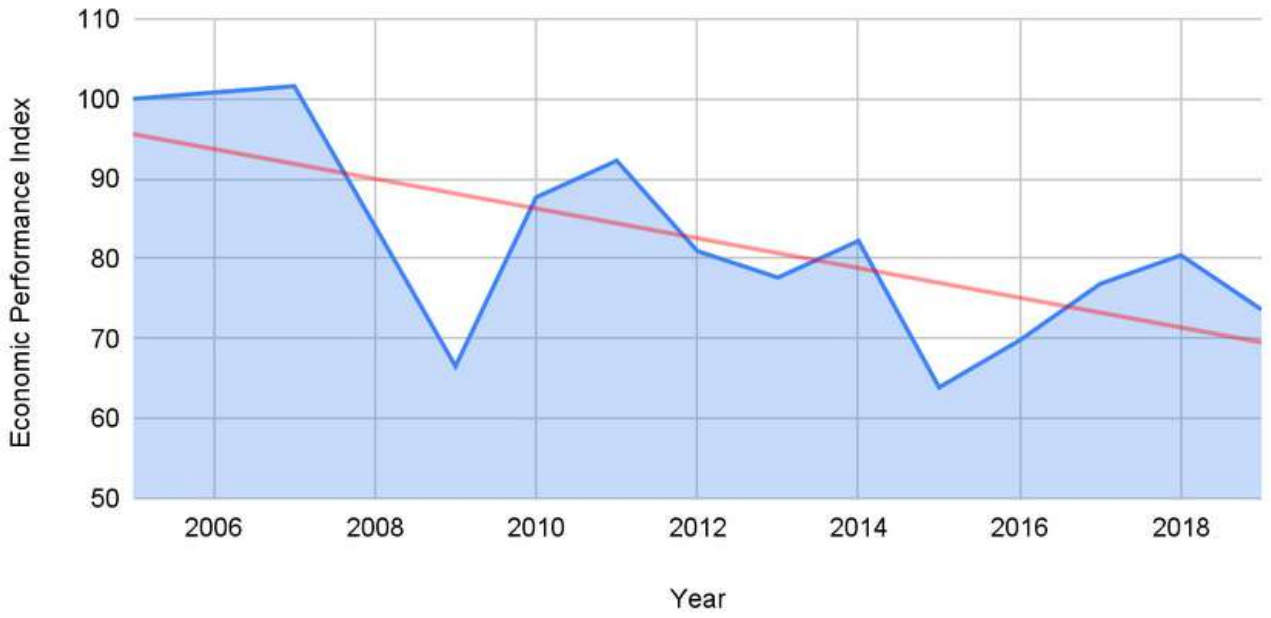
> So my general sense is that I don't think QE was needed and I am dubious that it will work in stimulating aggregate demand as intended. Moreover I remain worried that its implementation might bring with it other unintended and undesirable consequences that we haven't even thought about.[51]

Hayekian theory would indicate that artificially low interest rates, sending false price signals to the economy, are preventing delinquencies at the expense of accumulated malinvestment which will make the eventual collapse even worse, with ever-larger debt loads required to prop up increasingly stagnant companies. Recent research by Decker et al. has found a broad fall in business dynamism.[52] Gopinath et al. tie stagnant productivity to a systemic misallocation of resources.[53] Andrews et al. have tied this empirically with bank health, with less healthy banks having 13% to 19% higher zombie incidence.[54]

There have been a number of attempts to find a useful way of measuring malinvestment, and in particular whether increased debt is being used effectively or being malinvested. Perhaps the most prominent has been the marginal productivity of debt, which looks at how much GDP is generated by each new unit of debt. This has proven useful in some respects, indeed showing a falling marginal productivity of debt, but nevertheless debt-fuelled spending also increases GDP; when consumers, or for that matter the managers in a company, splash out on expensive flat screen televisions on their credit cards this leads to a short-term boost in GDP. Below we therefore construct a new metric, the Economic Performance Index, which combines the Asset Turnover Ratio, Return on Assets and Return on Equity into a single metric, which we can analyse relative to growth in debt over time. Figure 24 is constructed using 49,607 companies in 131 countries.

[50] "Speech by Mario Draghi, President of the ECB, at the presentation ceremony of the Schumpeter Award", *Oesterreichische Nationalbank,* (2014).
[51] The Cobden Centre (2015).
[52] Decker, Haltiwanger, Jarmin and Miranda (2016).
[53] Gopinath, Kalemli-Ozcan, Karabarbounis, and Villegas-Sanchez (2017).
[54] Andrews and Petroulakis (2017).

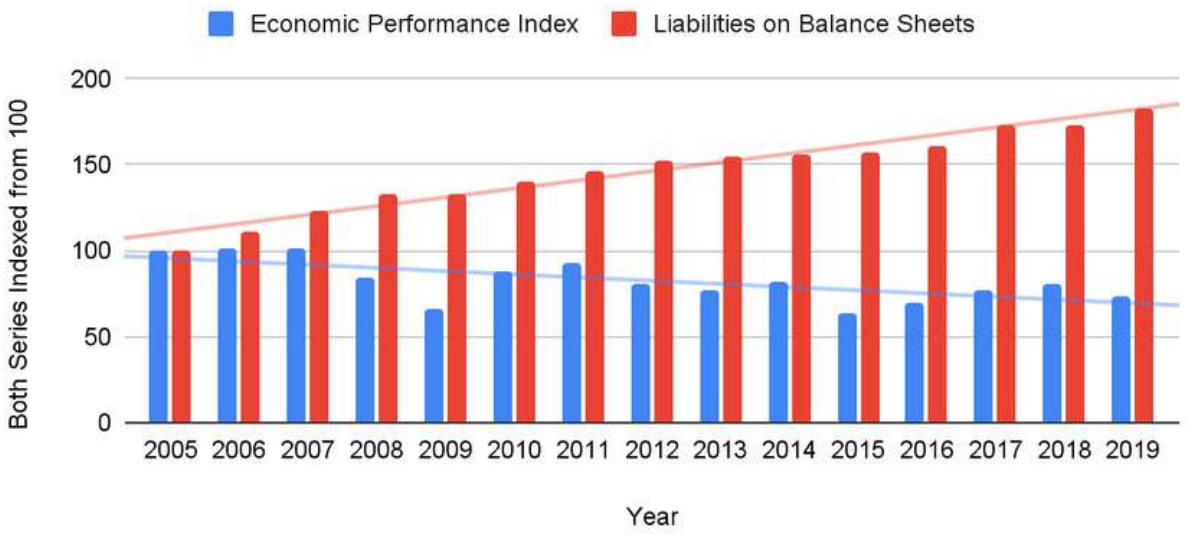
Figure 24: Economic Performance Index
Source: Constructed from OECD Capital Markets Dataset



A number of researchers have provided econometric analyses of the weaker growth trajectory in recent years, yet most conclude that monetary stimulus is the antidote rather than the poison.[55] Figure 25 shows the Economic Performance Index relative to growth in liabilities, both indexed from 100, for the same 49,607 companies in 131 countries, indicating much of the unprecedented growth in debt propping up the economy has been malinvested.

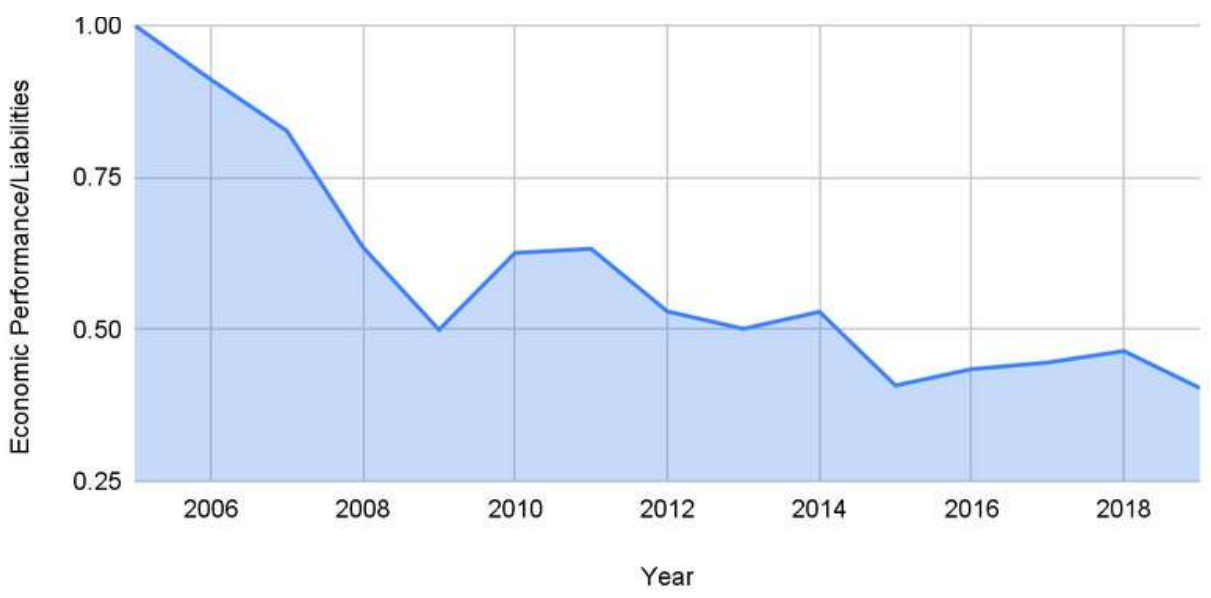
[55] A detailed analysis of sub-standard growth post-2007 is Reifschneider, Wascher and Wilcox, "Aggregate supply in the United States: recent developments and implications for the conduct of monetary policy" published in the *IMF Economic Review* (2015).

Figure 25: Economic Performance Index and Liabilities on Balance Sheets
Source: Constructed from OECD Capital Markets Dataset



As we have seen, there have been a number of recent attempts to construct a useful metric for marginal productivity of debt, but debt-based consumption can bias the figure for how much GDP is boosted by each unit of extra debt. In Figure 26, we construct a ratio with the Economic Performance Index as the numerator and liabilities as the denominator; if debt is generating economic performance—or malinvestment—then this should show it clearly.

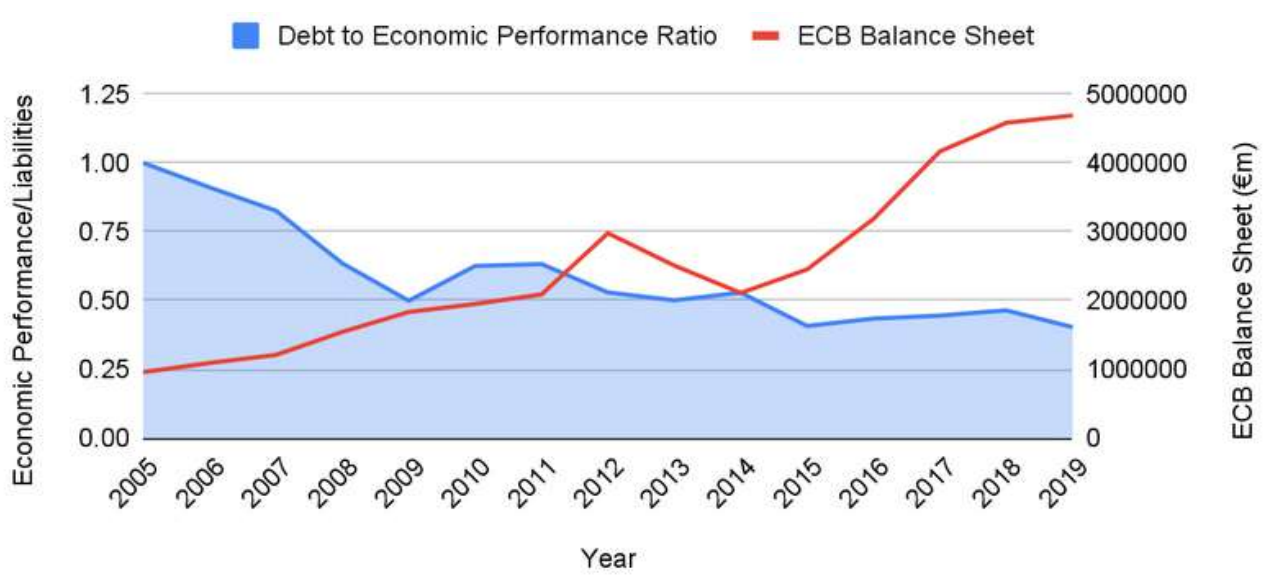
Figure 26: Economic Performance Index/Liabilities Ratio
Source: Constructed from OECD Capital Markets Dataset



We find that the marginal productivity of debt using the Economic Performance Index is less than half what it was in 2005. But is there a closer relation between the Economic Performance Index and central bank balance sheets? Figure 27 compares the ratio of the Economic Performance Index to debt (our metric of the marginal productivity of debt) with the balance sheet of the ECB, the largest purchaser of assets in the world at the time and also the central bank which disproportionately purchased corporate bonds.[56]

[56] This uses the same 49,607 companies as the previous figures.

Figure 27: Economic Performance Index/Liabilities Ratio and ECB Balance Sheet
Sources: Constructed from OECD Capital Markets Dataset, ECB



A Hayekian explanation for this trend is clear; when central banks engage in QE and other forms of monetary intervention, there is a short term boost to GDP but resources are diverted to less efficient uses. The eighteenth century Irish-French economist Richard Cantillon described what is now known as the eponymous Cantillon Effect – when new money is created, the resources of the economy are diverted towards those areas of the economy that receive the new money.[57] In the days of Cantillon, it was, for instance, those closest to the French Royal Court that received the new money. They could then buy assets and goods before prices increased; not only is there a transfer of wealth towards the receivers of newly created money, but they will also thereby pull resources from the rest of the economy, bringing about distortions. Today, it is generally large corporations and financial speculators that have benefited from new money creation. The modern Cantillon Effect is QE diverting money—and therefore the underlying resources of the economy—to those corporations who can sell bonds, and in many cases negative interest rate bonds, to central banks, as well as speculators who can use artificially large amounts of leverage.[58] These corporations then become inefficient and sluggish due to monetary subsidies and become pools of malinvestment. At the Treasury Select committee in 2017, Andy Haldane, Chief Economist at the Bank of England, reflected that: "[the financial crisis] was a very significant forecasting error. The large rise in levels of leverage in the banking system was there for everyone to see, and they sowed the seeds of the crisis...There was a degree of collective amnesia or oversight."[59] Yet not only is there now more debt,

[57] For a paper summarising some of these effects see Bordo (1983).
[58] For a look at Cantillon as a "proto-Austrian" see Hülsmann (2002).
[59] "Treasury Committee Oral Evidence", *Bank of England*, February 2017 Inflation Report, HC 1027.

but we see evidence that debt is being malinvested more chronically than in the time preceding the Financial Crisis.

Evidence that artificially cheap credit suppresses Schumpeterian forces can be seen in the proportion of bond issuances from established companies relative to newcomers both in Europe and the US. As the number of bond issuances in the US grew from 510 in 2000 to 924 twenty years later, the percentage of active issuers expanded from 55% to 71% while first-time issuers almost halved from 39% to 20%. Despite an initial surge following the Financial Crisis, the rate of first time issuers in Europe fell from 43% to 24%.

Figure 28: Fed Funds Rate and Bond Issuer Incumbency
Source: Constructed from OECD Capital Markets Dataset

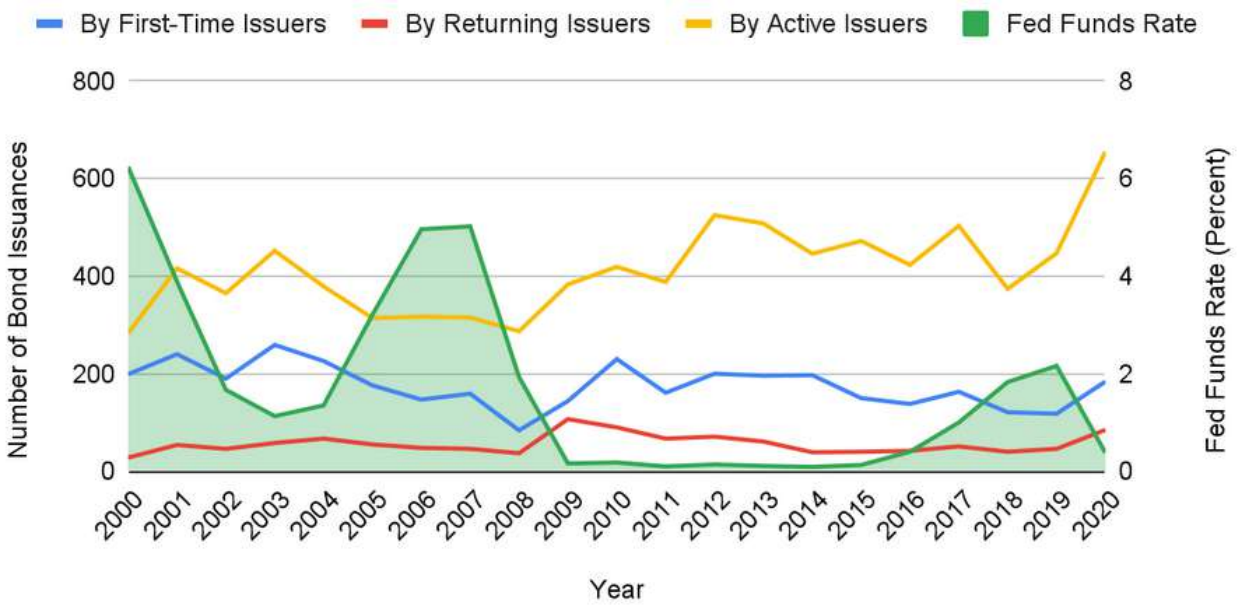
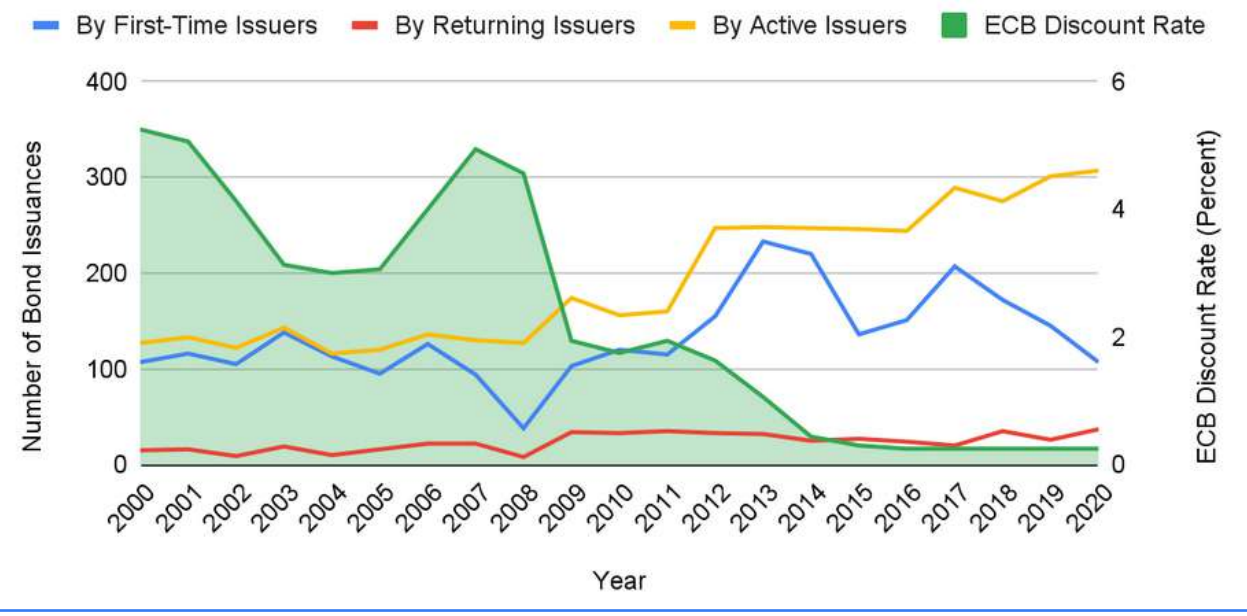


Figure 29: ECB Discount Rate and Bond Issuer Incumbency
Source: Constructed from OECD Capital Markets Dataset



Treating the natural interest rate as the full employment real interest rate (FERIR)—as Lawrence Summers among others has done—implies that in our current environment interest rates must be held as low as possible until growth rebounds, yet if this brings about further distortions then it is, in the most literal sense of the word, counterproductive and will continue to depress growth.[60] Summers has written of secular stagnation, following in the footsteps of Alvin Hansen in the 1930s.[61] The solution proposed is that the real interest rate is driven still lower to "stimulate" the economy. Once one views the interest rate as a pricing mechanism that allocates scarce resources and should therefore be allowed to be set by the market, one can see that trying to fix secular stagnation and depressed growth with even lower interest rates is like trying to fix a food shortage by setting food prices even lower. The artificially low interest rates have diverted resources from productive uses to bubble activities, and even lower rates will compound this.

If Hayek is correct that central banks setting interest rates brings about resource misallocation, then as well as generalised productivity statistics we must also examine if there is evidence for chronic malinvestment in the form of zombie companies.[62] The term "zombie company" was coined by Caballero et al. in their paper on 1990s Japan; it may well not be coincidental that Japan was the first country to implement zero percent interest rates and other exotic monetary policy and then experienced the rise of zombie companies during their lost decade, which has since become a generation.[63] BIS researchers found empirical evidence that lower rates were correlated with more zombie firms, noting that "Lower rates boost aggregate demand and raise employment and investment in the short run. But the higher prevalence of zombies they leave behind misallocate resources and weigh on productivity growth. Should this effect be strong enough to reduce growth, it could even depress interest rates further. Our study cannot answer this question. We leave the exploration of this trade-off to future research."[64] The Austrian School potentially provides a framework to explain the BIS's empirical findings. Below we can see the growth in zombie companies from the early 1980s onwards; the coefficient of determination for the Fed Funds Rate driving zombie companies in fourteen economies is 0.847. As with other trends, we can clearly see visually the four phases of monetary policy manifesting in the level of zombification.[65]

[60] Summers has written several pieces, but in particular see "U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound", (2014). For a more general outline from Teulings and others see the VoxEU book Baldwin and Teulings (eds.), *Secular Stagnation: Facts, Causes and Cures,* (2014).

[61] Hansen (1939).

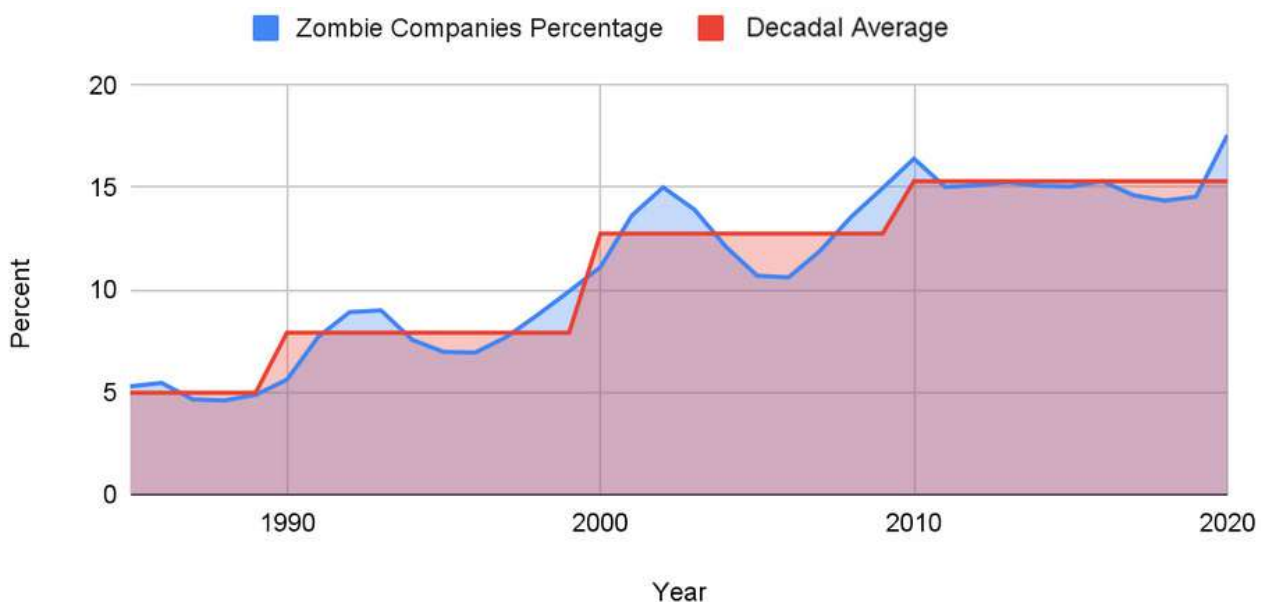
[62] The BIS, OECD and others have tended to use slightly different definitions for zombie companies, but broadly speaking they are "firms that are unable to cover debt servicing costs from current profits over an extended period" (Banerjee and Hofmann, 2018, p. 1).

[63] Caballero, Hoshi and Kashyap (2008).

[64] Banerjee and Hofmann (2018, p. 77).

[65] The fourteen economies are Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom and the United States; 32,000 companies from these countries were used.

Figure 30: Zombie Companies Percentage for 14 Economies
Source: Bank for International Settlements



The relationship between low interest rates and zombification has not been without controversy and the responses are worth considering. At a joint conference held by the IMF, OECD and BIS to discuss the productivity slowdown crisis, Maurice Obstfeld, former Chief Economist at the IMF, gave a speech on how the share of capital drawn into zombie firms was so varied around the Eurozone countries that the theory that low interest rates were to blame is unlikely.[66] Gamberoni et al. have written of the heterogeneity of capital and labour misallocation in Europe preceding the Global Financial Crisis, noting that it does not suggest a systemic effect of low interest rates.[67] Nevertheless, not only do we find zombie companies in aggregate increased proportionally with each phase of monetary expansion, but also in each phase they reflected the other aspects of a Hayekian bubble we have examined, from bond quality to asset bubbles to systemic debt risk. Differences in business-friendly policies are indeed, as one would expect, reflected in the proportion of zombie companies in different countries, yet in almost all countries zombie companies have grown with each monetary phase. There have actually been improvements in insolvency regimes in many countries during the period analysed by the OECD, shown in Table 1 below, with a fall in only one country, yet zombie companies in aggregate prevail and continue to squander the resources of the global economy – as Hayekian thinking would predict during a period of artificially low interest rates.

[66] The Obstfeld speech was at the "BIS-IMF-OECD Joint Conference on Weak Productivity" (10-11 January 2018).
[67] Gamberoni, Lopez-Garcia and Giordano (2016).

Table 1: Insolvency Policies Improvement for 32 Countries
Source: Constructed from OECD Capital Markets Dataset

Country Name	Personal costs to failed entrepreneurs	Lack of prevention and streamlining	Barriers to restruc-turing	2016 total	Value in 2010	Improvement During Period
Chile	0.25	0.33	0.40	0.98	2.25	1.27
Greece	0.50	0.67	0.20	1.37	2.25	0.88
Slovenia	0.50	0.33	0.20	1.03	1.90	0.87
Portugal	0.75	0.33	0.10	1.18	1.95	0.77
Japan	0.25	0.33	0.20	0.78	1.45	0.67
Germany	0.75	0.33	0.00	1.08	1.62	0.53
Switzerland	0.50	0.33	0.10	0.93	1.37	0.43
Spain	0.50	0.33	0.20	1.03	1.38	0.35
Finland	0.50	0.33	0.20	1.03	1.37	0.33
Ireland	0.50	0.33	0.20	1.03	1.37	0.33
Italy	0.50	0.33	0.50	1.33	1.67	0.33
Korea	0.75	0.33	0.30	1.38	1.72	0.33
Israel	0.75	0.33	0.20	1.28	1.48	0.20
Latvia	0.50	0.67	0.40	1.57	1.67	0.10
United Kingdom	0.25	0.00	0.00	0.25	0.25	0.00
France	0.50	0.00	0.20	0.70	0.70	0.00
Russia	0.25	0.33	0.20	0.78	0.78	0.00
United States	0.00	0.67	0.20	0.87	0.87	0.00
Costa Rica	0.50	0.67	0.00	1.17	1.17	0.00
Austria	0.50	0.33	0.40	1.23	1.23	0.00
Slovak Rep.	0.50	0.67	0.20	1.37	1.37	0.00
Turkey	0.00	0.67	0.80	1.47	1.47	0.00
Australia	0.25	0.67	0.70	1.62	1.62	0.00
Norway	0.50	0.67	0.50	1.67	1.67	0.00
Canada	0.00	1.00	0.70	1.70	1.70	0.00
Sweden	0.75	0.67	0.30	1.72	1.72	0.00
Belgium	0.75	0.67	0.40	1.82	1.82	0.00
Czech Rep.	1.00	1.00	0.00	2.00	2.00	0.00
Netherlands	0.75	0.67	0.60	2.02	2.02	0.00
Hungary	0.75	1.00	0.50	2.25	2.25	0.00
Estonia	0.75	1.00	0.60	2.35	2.35	0.00
New Zealand	0.50	0.33	0.30	1.13	1.13	0.00
Poland	0.75	0.67	0.20	1.62	1.37	-0.25

John Taylor has been one of the most prominent critics of recent monetary policy, yet Hayekian insights suggest that even the Taylor Rule would be distortive when malinvestment becomes systemic—low inflation and depressed growth may be features of chronic malinvestment and would be made worse by even lower interest rates.[68] This also has implications for research such as Bordo's widely-cited 2013 paper which used the Taylor Rule as a guide to monetary "looseness" over the last century, as did Hott and Jokipii's work on housing bubbles at the Swiss National Bank.[69] Rather than "optimal" interest rates, a Hayekian approach would be that any deviation from free market interest rates will bring about distortions, eventually leading to feedback loops of further malinvestment and low growth which suppress aggregate demand, thereby implying—from orthodox models—further interest rate cuts.

At the Treasury Select Committee in September 2014, in response to questioning from Steve Baker MP, Governor Carney commented that "You can run a more capital-light economy certainly today than 20 or 30 years ago," yet do Hayekian distortions take place in such a capital-light economy?[70] Hayek's business cycle theory emphasises how speculative endeavours fuelled by artificially cheap credit can pull resources from other sectors, yet in the twenty-first century it is often human capital which is the most important. With each phase of artificially cheap credit, more STEM graduates have gone to work in finance – a classic distortion brought about by Cantillon Effects as resources flow to those corporations that benefit from newly created money. A report by the Institute of Physics showed that finance had become a more popular destination among physics graduates than "scientific and technical industries," "government" or "energy and the environment;" the report also found that those with first class degrees were more likely to work in finance than those with lower class degrees, with the same holding true for Russell Group university graduates.[71] As speculative financial institutions absorb more resources through artificially cheap credit, the stagnation and zombification of the rest of the economy makes working in financial speculation more lucrative in both absolute terms and relative to other opportunities. The recent UK Commission for Employment and Skills noted the frequent complaints about "poaching" of the best mathematicians by the financial industry; their analysis found more mathematics graduates going into finance than all scientific occupations put together.[72] The human capital reallocation became more pronounced during the third phase of credit expansion leading up to the Global Financial Crisis: The Roberts Review in 2002 found that a quarter of mathematics graduates went to work in finance, while a Royal Society study in 2006 found this number had increased to 43%.[73] The Smith Review in 2009 similarly found a third of math-

[68] See in particular Taylor's "A Historical Analysis of Monetary Policy Rules" in *Monetary Policy Rules* (1999) as well as Taylor's "Getting Off Track" (2009).
[69] Bordo and Landon-Lane, (2013); Hott, and Jokipii, (2012).
[70] "Treasury Committee Oral evidence" *Bank of England* August 2014 Inflation Report, HC 636.
[71] The Institute of Physics (2012).
[72] UKCES (2013, p. 46).
[73] The complete analysis is useful to read: *SET for Success: the Supply of People with Science, Technology,Engineering and Mathematics Skills. (The Roberts Review) (2006) and A Degree of Concern? UK First Degrees in Science, Technology and Maths* from The Royal Society (2006).

ematics graduates going into finance, while noting that in the technology sector the amount of innovation is, not surprisingly, strongly correlated with the number of STEM graduates working in that sector.[74] In the same year, the Department for Innovation, Universities and Skills found that only 25% of mathematics graduates were actually going to work in science.[75] A DTI report from 2006 supported the idea that a disproportionate number of mathematics graduates went to work in finance.[76] The distortions to human capital may be long-lasting as skills adapt to the debt-bubble economy and the Austrian School should therefore henceforth pay more attention to human capital distortions and their consequences for the economy. We may well find that the distortions to the human capital structure of the economy are the most damaging of the Super Bubble; when a physicist goes to work for a hedge fund fuelled by zero percent interest rates and QE they cannot easily just retrain to build nuclear power stations, green technologies or space stations. The Cantillon effects driving STEM graduates to work in finance also become a national security issue as rival countries may produce thousands of engineering graduates every year who can contribute to their military technological prowess while those in debt-bubble economies work in those sectors fuelled by the debt bubble.

[74] *A Review of the STEM Skills Supply Chain (The Smith Review)* from The Council for Industry and Higher Education (2007).
[75] *The Demand for Science, Technology, Engineering and Mathematics (STEM) Skills* from the Department of Innovation, Universities and Skills (2009) (which is now the Department for Business, Innovation and Skills).
[76] It is useful to read both DTI papers from 2006, *Science, Engineering and Technology Skills in the UK. DTI Economics Paper No.16 and Innovation in the UK: Indicators and Insights. DTI Economics Occasional Paper No. 6.*

WHAT CAN BE DONE?

The last forty years have witnessed the growth of what is likely the largest global debt bubble in all of history. Whereas most previous bubbles were inflated in a few months or years, the current global bubble has been inflated through a series of distinct phases, with each phase of lower interest rates creating an even larger bubble with more debt over an entire generation. The question therefore presents itself – what can be done to rescue ourselves from this predicament? It was mentioned earlier in this paper that the way to recover from distortions caused by price fixing by governments is to allow prices to be set by the market; this will also apply to interest rates, but with some modifications to take into account the nature of money and our current monetary system.

In the period immediately following World War 2, prices of goods in much of occupied Germany were set by the Allies' administration. At the time, Ludwig Erhard, who as Finance Minister would later become known as the father of the German Economic Miracle in the generation following the war, was elected director of economics by the Bizonal Economic Council. Erhard saw that the problems of shortages and capital destruction were being made worse by the pricing mechanisms of the market being corrupted by government central planning of prices. Without notifying the allied commanders, whom he knew would not approve such a strategy, and exceeding his authority, Erhard, almost overnight, freed almost all prices in the German economy. The recovery started almost immediately, with goods that Germans had not seen for years becoming available. Within weeks the economy had regained much of its health and capital formation was taking place. Britain, on the other hand, persisted with rationing and price controls until well into the 1950s; this initial period following the war would represent an important springboard for West Germany to become the powerhouse of Europe, while Britain had the worst economic performance of almost any developed country.

Erhard and Adenauer in 1956

Current policy-makers who understand the destructive capacity of government price-fixing will have to have similar courage as Ludwig Erhard did in allowing prices to be set by the market rather than by central planners. After a generation of distorted interest rates, we will have to re-learn that borrowing money should cost something – that negative real interest rates (or even negative nominal interest rates) are not a feature of a natural, functioning market. Similarly, people will have to re-learn that if you save money then it should deliver some kind of return over time, as previous generations understood. Nevertheless, the faster we can move to free market interest rates, the faster we can begin economic recovery. An added problem is that all economists are taught in university that setting interest rates "stimulates" the economy. In Erhard's day, economists understood the benefits of allowing prices to be set by the market, therefore the current challenge will be as much intellectual as it will be structural and political. Once economists accept that interest rates are a pricing mechanism that should be set by the market like any other, then how we move to such a system will become a function of political policy-making.

A considerable benefit of recent years is the rise of alternative forms of lending, including decentralised finance. When people lend to each other, for instance on peer-to-peer lending platforms, interest rates are effectively set by the market (although of course still somewhat distorted by the general interest rate environment set by central banks). In such a setting, interest rates charged are closer to the natural rate than through commercial banks, and therefore the shift to a pricing mechanism set by the market rather than by bureaucracy is already happening naturally. Decentralised finance, which applies the same principles but takes place on blockchain technology, is currently attracting billions of pounds, dollars and euros in venture capital; one of the major benefits alongside better services for customers will be that the demand and supply of savings/credit will be in equilibrium. In such a scenario, any sudden demand for credit will lead to a rise in interest rates (rather than the money creation process of new debt being created out of thin air by banks), thereby dampening any incipient debt bubbles.

As of writing, central banks are raising interest rates. This will burst the bubbles that have accumulated during the most recent monetary phase of zero percent interest rates. When the bubble bursts, much like in 2008, commentators will say that "nobody could have predicted this" and that "central banks must save the economy." Central banks will then have to stimulate the economy with even more flamboyant monetary policy; it is likely that many countries will move to negative interest rates, the *reductio ad absurdum* of the current monetary system.[77] With negative interest rates, it becomes difficult to predict the size of the debt bubble that will then be created—they represent an inversion of the natural laws of economics through the central planning of prices.

[77] It is worth reading an IMF working paper on negative interest rates by Agarwal and Miles: "Breaking Through the Zero Lower Bound" (2015).

In *The Oresteia*, Aeschylus' masterpiece of Ancient Greek tragedy, in the final part, *The Eumenides*, the Chorus issue their summation:

> *"The truth has to be melted out of our stubborn lives by suffering. Nothing speaks the truth, nothing tells us how things really are, nothing forces us to know what we do not want to know except pain. And this is how the gods declare their love. Truth comes with pain."*

For the last generation, central banks have sought to delay economic pain by responding to each recession by creating an even larger debt bubble. The levels of malinvestment that have accumulated are now so great that pain will be inevitable—and it will be considerably worse than it would have been had we learned the proper lessons during previous recessions and allowed a liquidation of bad debt and malinvestment to take place.

CONCLUSION

Over the last few generations, and previous millennia, price fixing by emperors, commissars and civil servants has been shown to be some of the most disastrous of all economic policies that can be implemented. Thankfully, most economists have learned the lessons. Nevertheless, regrettably, there still exists one last form of price fixing, that of interest rates by central banks. This paper has presented the case that interest rates, like other prices in a market economy, should be set by the market rather than by central planners. The last generation has seen historically unprecedented distortions to the pricing mechanisms of credit and saving; the consequences are that we are now likely in the largest bubble in history. This is shown not just in asset prices, but also, as Hayek noted, in the general distortions caused by false price signals sent to the economy – zombie companies, debt quality, systemic risk in debt markets, productivity and other metrics we have seen.

The way out of this mess, like the mess created by all forms of price-fixing, is to allow prices to be set by the market, in this case, interest rates. The greatest challenge for economists of our generation will be to get the global economy to a system of market-driven interest rates without bringing about a collapse similar to the 1930s, and the disastrous consequences that followed.

What is required is an intellectual shift, a scientific revolution founded on discovering the fundamental errors in the present economic orthodoxy. Once economists understand the importance of interest rates as a pricing mechanism, then the details of how we move to such a system will vary in different countries and economies. None of us wants the pain which lies ahead but it will now inevitably come: our choice is whether to engage with the truth and learn from it.

Bibliography

Agarwal R. and K. Miles. 2015. "Breaking Through the Zero Lower Bound", *IMF Working Paper. The Middle East and Central Asia Department* WP/15/224.

Ahrend R., B. Cournede, R. Price. 2008. "Monetary Policy, Market Excesses, and Financial Turmoil", *OECD Economics Department* Working Paper No. 597.

Altman, E. and D. Kao. 1992. "The implications of corporate bond ratings drift", *Financial Analysts Journal*, Vol. 48, No. 3, 64-75.

Andrews, D., M. Adalet McGowan, and V. Millot. 2017. "Confronting the zombies: Policies for productivity revival", *OECD Economic Policy Papers*, No. 21, OECD Publishing, Paris.

Andrews, D. and F. Petroulakis. 2017. "Breaking the Shackles: Zombie Firms, Weak Banks and Depressed Restructuring in Europe", *OECD Economics Department Working Papers*, No. 1433.

Ahmed, S., A. Levin, and B. Wilson. 2004. "Recent U.S. Macroeconomic Stability: Good Policies, Good Practices, or Good Luck?" *Review of Economics and Statistics,* 86(3): 824–32.

Bailey, A «Treasury Committee Oral Evidence", *Bank of England*, October 2015 Bank of England Bill, HC 445.

Baldwin R. and C. Teulings (eds.). 2014. *Secular Stagnation: Facts, Causes and Cures*. VoxEU.

Banerjee R. and B. Hofmann. 2018. "The rise of zombie firms: causes and consequences", *BIS Quarterly Review* |September 2018.

Bank for International Settlements, Dataset for BIS zombie papers including Banerjee and Hofmann's papers, *BIS,* Basel.

Bean, C. 2009. "The Great Moderation, the Great Panic and the Great Contraction", speech at the Annual Congress of the European Economic Association, Barcelona, 25 August 2009.

Bekaert, H. and L. Duca. 2010. "Risk, Uncertainty and Monetary Policy", *NBER* working paper, nr. 16397.

Benigno, G and L Fornaro. 2018. "Stagnation traps", *Review of Economic Studies* 85(3): 1425–70.

Bernanke, B. 2004. "The Great Moderation." Speech at the meeting of the Eastern Economic Association, Washington, D.C., *Federal Reserve*, 20 February 2004.

Bernanke, B., T. Geithner and H. Paulson Jr. 2019. *Firefighting: The Financial Crisis and its Lessons.* Penguin Publishing; Main edition.

Board of Governors of the Federal Reserve System (US), "Households and Nonprofit Organizations; Net Worth, Level [TNWBSHNO]", *Federal Reserve*

Bank of St. Louis.

Board of Governors of the Federal Reserve System (US), "Delinquency Rate on Business Loans, All Commercial Banks [DRBLACBS]", *Federal Reserve Bank of St. Louis.*

Board of Governors of the Federal Reserve System (US), "Effective Federal Funds Rate [FEDFUNDS]", *Federal Reserve Bank of St. Louis.*

Board of Governors of the Federal Reserve System (US), "Nonfinancial Corporate Business; Debt Securities; Liability, Level [NCBDBIQ027S]", *Federal Reserve Bank of St. Louis.*

Böhm-Bawerk, E. 1884. *Capital and Interest: A Critical History of Economical Theory*. (William A. Smart, trans.) London: Macmillan and Co.

Bordo, M. 1983. "Some Aspects of the Monetary Economics of Richard Cantillon", *Journal of Monetary Economics*. 12 (2): 235–58.

Bordo, M. and J. Landon-Lane. 2013. "Does Expansionary Monetary Policy Cause Asset Price Booms; Some Historical and Empirical Evidence", *NBER*, Working Paper 19585.

Bordo M. and D. Wheelock. 2004. "Monetary Policy and Asset Prices: A Look Back at Past U.S. Stock Market Booms" *NBER* Working Paper 10704.

Borio C, E. Kharroubi, C. Upper and F. Zampoll. 2016. "Labour reallocation and productivity dynamics: financial causes, real consequences" *BIS Working Papers | No 534 |* 05 January 2016.

Borio, C and H Zhu. 2012. "Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism?", *Journal of Financial Stability*, 8(4): 236–251. Also available as BIS Working Paper 268.

Brons J. and L. Lin. 2018. "Investment-grade credit: Be actively aware of BBB bonds", *PIMCO Viewpoints*, January 2018.

Butler, E. 2010. Austrian Economics. London: ASI (Research) Ltd

Carmichael, J and Esho, N. 2003. "Asset Price Bubbles and Prudential Regulation", in W Hunter, G Kaufman and M Pomerleano (eds), *Asset price bubbles: the implications for monetary, regulatory, and international policies*, Cambridge: MIT Press.

Carney, M. 2014. "Treasury Committee Oral Evidence" *Bank of England* Inflation Report, HC 636 Wednesday 10 September 2014.

Caballero, R, T Hoshi and A Kashyap. 2008. "Zombie lending and depressed restructuring in Japan", *American Economic Review* 98 (5): 1943–77.

Çelik, S., G. Demirtaş and M. Isaksson. 2019. "Corporate Bond Markets in a Time of Unconventional Monetary Policy", *OECD Capital Market Series*, Paris .

Christiano, L., C. Ilut, R. Motto and M. Rostagno. 2010. "Monetary Policy and

Stock Market Booms" in *Macroeconomic Challenges: The Decade ahead*, A Symposium Sponsored by the Federal Reserve Bank of Kansas City. Jackson Hole Wyoming.

CIHE. 2007. A Review of the STEM Skills Supply Chain. (The Smith Review). The Council for Industry and Higher Education. London.

Clarida, R., J. Gali, and M. Gertler. 2000. "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory." *Quarterly Journal of Economics,* 115(1): 147–80.

Clark, T. 2009. "Is the Great Moderation Over? An Empirical Analysis". *Federal Reserve Bank Of Kansas City.*

Decker, R., J. Haltiwanger, R. Jarmin and J. Miranda. 2016. "Changing Business Dynamism: Volatility of Shocks vs. Responsiveness to Shocks", Working Paper.

DIUS. 2009. *The Demand for Science, Technology, Engineering and Mathematics (STEM) Skills*. London: Department of Innovation, Universities and Skills (now Department for Business, Innovation and Skills).

Dobbs R, Lund S, Woetzel J, Mutafchieva M. 2015. *Debt and (not much) deleveraging*. McKinsey Global Institute

Draghi, M. 2014. "Speech by Mario Draghi, President of the ECB, at the presentation ceremony of the Schumpeter Award", *Oesterreichische Nationalbank*, Vienna, 13 March 2014.

Drian, T and H Shin. 2010. "Financial intermediaries and monetary economics", in B Friedman and M Woodford (eds.), *Handbook of Monetary Economics, Vol 3,* Amsterdam: North-Holland: 601–650.

DTI. 2006a. Science, Engineering and Technology Skills in the UK. DTI Economics Paper No.16. Department for Trade and Industry. London.

DTI. 2006b. Innovation in the UK: Indicators and Insights. DTI Economics Occasional Paper No. 6. Department for Trade and Industry. London.

European Central Bank, "Key ECB Interest Rates", *ECB*, Frankfurt.

Filardo A. 2004. "Monetary policy and asset price bubbles: calibrating the monetary policy trade-offs", *BIS,* Working Papers No 155, by Monetary and Economic Department; June 2004.

Galbraith, J K. 1954. *The Great Crash 1929*. Boston: Houghton Mifflin Company.

Gamberoni, E, P Lopez-Garcia and C Giordano. 2016. "Capital and labor (mis)allocation in the Euro Area: Some stylized facts and determinants", *ECB*, Working Paper no 1981.

Garrison, R. 2000. *Time and Money: The Macroeconomics of Capital Structure*. New York: Routledge.

Gerlach, S. and K. Assenmacher-Wesche. 2008. "Financial Structure and the Impact of Monetary Policy on Asset Prices", *Swiss National Bank,* Working Paper 2008-16.

Gerlach S. and K. Assenmacher-Weshe. 2008. "Monetary Policy, Asset Prices, and Macroeconomic conditions; A Panel VAR Study", *National Bank of Belgium* Working Paper 149.

Gopinath, G, S Kalemli-Ozcan, L Karabarbounis, and C Villegas-Sanchez. 2017. "Capital Allocation and Productivity in South Europe", *Quarterly Journal of Economics* 132(4): 1915–1967.

Greenspan, A. 1994. Federal Reserve Bulletin: July 1994 Volume 8, Number 7; *Board of Governors of the Federal Reserve System* Washington D.C. Publications Committee.

Greenwood, R. and S. G. Hanson. 2013. "Issuer quality and corporate bond returns", *Review of Financial Studies*, Vol. 26, No. 6, 1483-1525.

GuruFocus, Economic Indicators. 2021. "Tobin's Q for the New York Stock Exchange, Historical Data", *GuruFocus,* Plano, Texas.

GuruFocus, Economic Indicators. 2021. "NYSE Margin Debt Relative to GDP, Historical Data", *GuruFocus,* Plano, Texas.

GuruFocus, Economic Indicators. 2021. "NYSE Margin Debt Relative to Market Cap, Historical Data", *GuruFocus,* Plano, Texas.

Haldane, A. 2017. "Treasury Committee Oral Evidence", *Bank of England* February 2017 Inflation Report, HC 1027.

Hansen, A. 1939. "Economic progress and declining population growth", *American Economic Review* 29(1).

Hayek F.A. 1931. *Prices and Production*. London: Routledge.

Hayek F.A. 1941. *The Pure Theory of Capital*. Chicago: University of Chicago Press

Hayek, F.A..1933. *Monetary Theory and the Trade Cycle*. London: Jonathan Cape.

Heffernan, S. 1996. *Modern Banking in Theory and Practice*. Chichester: John Wiley and Sons

Helbling, T and T Bayoumi. 2003. "Are they all in the same boat? The 2000-1 growth slowdown under the G-7 business cycle linkages", *IMF* working paper.

HC Deb (20 November 2014). vol. 588. Available at: https://hansard.parliament.uk/commons/2014-11-20/debates/14112048000001/MoneyCreationAndSociety (Accessed: 24 May 2022).

Hott, C, and T Jokipii. 2012. "Housing Bubbles and Interest Rates", *SNB*, Mimeo.

Hülsmann, J. 2002. "More on Cantillon as a Proto-Austrian". *Journal des Economistes et des Etudes Humaines.* 11 (4): 693–703.

IMF. 2009. “Lessons for monetary policy from asset price fluctuations”, chapter 3 *World Economic Outlook*, October.

Jiménez G, S Ongena, J-L Peydró and J Saurina. 2014. “Hazardous Times for Monetary Policy: What Do Twenty‐Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk‐Taking?” *Econometrica*, vol. 82, issue 2, 463-505.

Kaldor, N. 1966. “Marginal Productivity and the Macro-Economic Theories of Distribution: Comment on Samuelson and Modigliani”, *The Review of Economic Studies.* 33 (4): 309–319.

Keynes, J. M. 1936. *The General Theory of Employment, Interest, and Money*. London: Macmillan.

Kindleberger, C P and R Aliber. 2005. *Manias, Panics, and Crashes. A history of financial crises*. Fifth Edition. Hoboken, New Jersey: Wiley Investment Classics.

Koppl, R. 2018. Expert Failure. Cambridge: Cambridge University Press.

Lagarde, C. 2021. “Learning the right Lessons from the Past” Speech by Christine Lagarde, President of the ECB, on the occasion of the awarding of the Prix Turgot 2021, Paris, *ECB*.

Laidler D. 2003. “The Price Level, Relative Prices, and Economic Stability; Aspects of the Interwar Debate” *BIS conference “Monetary Stability, Financial Stability and the Business Cycle”*.

Laubach, T. and J. Williams. 2003. “Measuring the Natural Rate of Interest “, *Review of Economics and Statistics* 85(4), 2003, 1063-1070.

Loomis, Carol. 2001. “Warren Buffett On The Stock Market”, *Fortune magazine*, December 10, 2001.

Łukasz R. & L. Summers. 2019. “On Secular Stagnation in the Industrialized World”, *NBER Working Paper* 26198; DOI 10.3386/w26198; August 2019; Cambridge, MA.

Maddaloni, A. and J. Peydro. 2010. “Bank risk-taking, securitization, supervision, and low-interest rates. Evidence from the euro area and the U.S. lending standards”, *ECB working paper*, nr. 1284.

McConnell, M., and G. Perez-Quiros. 2000. “Output Fluctuations in the United States: What Has Changed since the Early 1980s?” *American Economic Review*, 90(5): 1464 –76.

McGrattan E. and E. Prescott. 2003. “The 1929 Stock Market: Irving Fisher Was Right.” *Federal Reserve Bank of Minneapolis Research Department* Staff Report 294.

McLeay, M., A. Radia and R. Thomas. 2014. “Money Creation in the Modern Economy”, *Bank of England Quarterly Bulletin* 2014 Q1, Bank of England.

Mises von, L 1953. *The Theory of Money and Credit*. New Haven, Conn.: Yale University Press.

Mises von, L 1923. "The Causes of the Economic Crisis, and Other Essays Before and After the Great Depression", collection of works reposted from 1923 and 1928. Auburn: Ludwig von Mises Institute.

Moore, B. 1988. *Horizontalists and Verticalists: The Macroeconomics of Credit Money*. Cambridge, UK: Cambridge University Press.

Nasdaq OMX Group. 2021. "Nasdaq Historical Data", *Nasdaq*, New York.

New York Stock Exchange. 2021. "Margin Debt, Historical Data", *NYSE*, New York .

Obstfeld, M. 2018. "The role of financial factors and policies" *BIS-IMF-OECD Joint Conference on Weak productivity*: 10-11 January 2018; OECD, Paris.

OECD. 2011. "Countercyclical economic policy," *Economic Outlook*, Spring 2010.

OECD. 2021. Capital Markets Dataset, *OECD*, Paris.

OECD. 2021. "The Future of Corporate Governance in Capital Markets Following the COVID19 Crisis", *OECD*, Paris.

ONS. 2022. "House price to workplace-based earnings ratio". *Office for National Statistics*, London

Reifschneider, D., W. Wascher and D. Wilcox. 2015. "Aggregate Supply in the United States: recent developments and implications for the conduct of monetary policy", *IMF Economic Review* 63: 71–109.

Roberts, G. 2002. *SET for Success: the Supply of People with Science, Technology, Engineering and Mathematics Skills*. (The Roberts Review) HM Treasury. London.

Rothbard, M. 1963. *America's Great Depression*. Princeton, N.J.: Van Nostrand.

Royal Society. 2008. *A Higher Degree of Concern? 2010 and Beyond*. The Royal Society. London.

Salter F. R. 1925. *Sir Thomas Gresham (1518–1579)*. Parsons, London

Schumpeter, J., 1934/2008. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. New Brunswick (U.S.A) and London (U.K.): Transaction Publishers.

Shiller R. 2000. *Irrational Exuberance*. Princeton, N.J.: Princeton University Press.

Shiller, R. 2021. "Stock Market Data from 1871 to Present".

Shiratsuka, S. 2003. "The asset price bubble in Japan in the 1980s: lessons for financial and macroeconomic stability". *BIS* Papers No 21.

Skidelsky, R. 2009. *Keynes: The Return of the Master*. PublicAffairs, London.

Stock, J. and M. Watson. 2003. "Has the Business Cycle Changed and Why?" In *NBER Macroeconomics Annual 2002*, ed. Mark Gertler and Kenneth Rogoff, 159 –218. Cambridge, MA: MIT Press.

Summers, L. 2014. "U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound", *Business Economics*, Vol. 49, No. 2, National Association for Business Economics.

Summers, L. 2013. "Crises Yesterday and Today", speech at the 14th Jacques Polak Annual Research Conference, Washington, DC, 7 November.

Summers, L. 2013. "Perspectives on global interest rates", Panel Remarks at IMF Fourteenth Annual Research Conference in Honor of Stanley Fischer, *IMF World Economic Outlook*, Chapter 3, April.

Taylor J. 1999. "A Historical Analysis of Monetary Policy Rules "in John B. Taylor (ed) *Monetary Policy Rules* Chicago: University of Chicago Press for the NBER. 319-348.

Taylor J. 2009. *Getting Off Track*. Hoover Press. Stanford CA.

The Cobden Centre. 2015a. "Interview with Lord Turner on Monetary Reform" *The Cobden Centre.*

The Cobden Centre. 2015. "Interview with Dr Bill White, Former Head of the Economic and Monetary Department at the BIS" *The Cobden Centre.*

The Economist. 2012. "The Curious Case of William White", *The Economist Group*, London

The Institute of Physics. 2012. *The Career Paths of Physics Graduates A longitudinal study 2006–2010*. London.

Tobin J. and W.C. Brainard. 1977. "Asset Markets and the Cost of Capital.", *Economic Progress, Private Values, and Public Policy.*

US Bureau of Economic Analysis, "Nonfinancial Corporate Debt to GDP" *BEA*, US Department of Commerce.

US Bureau of Economic Analysis "Net Saving to GDP" *BEA*, US Department of Commerce.

US Bureau of Economic Analysis "Households and Non-Profits Net worth as a percentage of GDP" *BEA*, US Department of Commerce.

White, W. 2012. "Ultra easy monetary policy and the law of unintended consequences", *Federal Reserve Bank of Dallas* Working Paper No. 126.

White, W. 2006. "Is price stability enough?" *Bank for International Settlements,* Working Paper No 205.

Wicksell, K. 1898. *Interest and Prices.* London: Andesite Press.

Wilshire Associates; *Wilshire 5000 Index Series*; Wilshire Advisors, LLC, New Jersey.

World Bank; *Domestic Credit to Private Sector as a Percentage of GDP*; International Monetary Fund, International Financial Statistics and data files, and World Bank and OECD GDP estimates.

"The curious task of economics is to demonstrate to men how little they really know about what they imagine they can design."
Friedrich von Hayek