

Memoirs of a Would-be Macroeconomist

by Arnold Kling

Introduction

You reach a stage in life where the horizon ahead of you starts to look narrow and the shadows from behind you begin to loom large. The concern that gnaws at you in the present is the task of integrating the past. You try to come to terms with how your life has worked out.

I remember Charlie Kindleberger, who taught a graduate seminar in economic history at MIT, musing to the class about a former student who had gone on to attain wealth and success as a top executive at a chemical firm. “He never did finish his degree,” Kindleberger said, shaking his head ruefully. To him, the successful chemical executive was a washout.

I did finish my degree, in January of 1980. However, like the chemical executive, I attained my highest achievements far from Charlie Kindleberger's world of economic research. In that sense, I too became a washout.

I'm not going to get into what my “highest achievements” were. You can Google me if you like. The point here is that, basically, between 1980 and 2007, I got along fine without doing macroeconomic research and, macroeconomic research certainly seemed to get along fine without me.

Then the “subprime mortgage crisis” hit. I was immediately impelled to comment on it. Part of my work experience had been at Freddie Mac, in the late 1980s and early 1990s, so I thought I knew something about mortgage finance. Actually, I did not know how exposed Freddie Mac had become to high-risk mortgages, and my first thoughts were that I expected Freddie and Fannie to come out fine.

In 2008, the subprime crisis morphed into the financial crisis, leading to drastic policy measures which nonetheless were followed by years of severe dislocation in terms of employment. This revived everyone's interest in macroeconomics, and I found myself drawn to revisit Mole End.¹

In this book, I am going to get around to sharing my perspective on macro in the wake of the financial crisis. But my approach is going to be gradual and autobiographical, so that you can see how I arrived at what I now believe.

Insiders and Outsiders

Bob Shiller is striking a pose of self-pity. In the video, you see him, shoulders hunched, hands between his knees, talking about his professional humiliations the way that an awkward kid will confess to having been hurt by the jeering and abuse that he suffered on the playground. Thick-haired and with a boyish face, Shiller looks to be about half of his 63 years, his age at the time of the interview. It was conducted for *The New Yorker* on May 5, 2009.² Shiller appears, along with Nassim Taleb, author of several top-selling iconoclastic books on economics and investing.

1 Mole End is the home of one of the characters in Kenneth Grahame's classic, *The Wind in the Willows*. The book begins with Mole abandoning his home and all of the action occurs elsewhere, except for a brief interlude where he returns with a friend from his new life.

2 <http://www.newyorker.com/online/blogs/newsdesk/2009/05/new-yorker-summit-video-nassim-n-taleb-and-robert-shiller.html>

Shiller tells of his course being dropped from the required graduate macroeconomics sequence at Yale (the equivalent of not being chosen for a team at recess). He tells of being removed by Timothy Geithner from the group of academic economic advisers that meets occasionally with the leaders of the New York Federal Reserve Bank. He describes how it feels to have his theoretical framework regarded as “flaky.”

Indeed, a lot of playground politics goes on in macroeconomics. Consider another interview³, conducted by Charlie Rose on August 20, 2013, with Stanley Fischer, who had recently retired as head of the central bank of Israel. Then 69 years old, Stan Fischer is the dean of modern macroeconomics. For decades, he has conferred credentials on the powerful figures in academic and policy circles. I like to say that he is the Genghis Khan of macroeconomics, because so many macroeconomists are descended from him: if they do not have his signature on their Ph.D dissertations, then they have the signature of an economist who was supervised by him, or one who was supervised by one who was supervised by him.

Of course, temperamentally Stan Fischer does not resemble the leader of the Mongol horde. Born in Rhodesia (now Zimbabwe), he speaks in a courtly British-colonial accent with calm, quiet assurance. In the interview, he praises the policies followed by Federal Reserve Board Chairman Ben Bernanke and by the economists of the Obama Administration (Bernanke and Obama's first chief economic adviser, Christina Romer, were both Ph.D students of Fischer. So was George W. Bush's first chief economic adviser, Greg Mankiw.). He does not offer any specific justification for this praise; instead, Stan Fischer argues from authority. Every respectable economist he knows agrees that without the bailouts and the stimulus the United States was headed for another Great Depression.

Fischer's smooth, Insider confidence contrasts with Shiller's Outsider hesitancy. I will tell you right now that my own sympathy is with the Outsiders, not with the Insiders. Stan Fischer is not going to win a Nobel Prize (neither am I), but some resentful Outsiders have done so, including Shiller, Paul Krugman, and Joseph Stiglitz.

Outsiders have their own form of confidence. When they look at the Insider, they think that they see a naked emperor. They understand the Insiders' methods well enough. But the Outsiders are convinced that these methods are narrow-minded and limiting.

During the housing bubble, when he wanted to confirm his hypothesis that home buyers were expecting unsustainable rates of house price appreciation, Shiller took surveys of consumers, inquiring how much they expected prices to rise. He found that, indeed, they were expecting home prices to go up 10 percent per year, consistent with then-recent experience but way out of line with overall inflation trends. Still, the idea of examining consumers' expectations by *asking them* was a flaky thing for an economist to do. If you had posed the problem to nearly any other economist, the response would have been to write down a mathematical model, perhaps involving complex stochastic calculus. This model would have been presented to you as the way that consumers *ought* to form their expectations, and therefore one could presume that this is how they *did* form their expectations.

In the playground politics of macroeconomics, even a Nobel Prize may not grant you membership in the Insider club. For that, you have to conform to the norms of the Insiders, which means above all treating Stan Fischer, Olivier Blanchard, Ben Bernanke, and other certified members of the club with

3 <http://www.bloomberg.com/video/fischer-on-global-economy-charlie-rose-8-20-ieCPW7RoRMmlXKGrSe1U1A.html>

the utmost respect. If you question their wisdom, then you are automatically an Outsider. When Stan Fischer makes a mental tally of the views of “every respectable economist,” yours will not count.

In 2009, Olivier Blanchard, a long-time MIT professor who has spent several years as chief economist at the International Monetary Fund, told me that what I am calling the Insider macroeconomists have “passed the market test.” That is like saying that the Mafia's protection racket has passed the market test.

Apart from playground politics, another factor that pervades macroeconomics is ideology. If macroeconomics is a science, then the macroeconomic analysis of economists should not be related to their political views. In particular, the question of whether or not an increase in government spending during a recession will reduce unemployment should be an analytical question. On the other hand, the question of whether government spending in general should be high or low is mostly ideological.

If the analytical issue and the ideological issue were separate, then the correlation could be zero between one's analytical position on countercyclical fiscal policy and one's ideological views on whether government ought to be bigger or smaller. You could favor small government and yet believe analytically that countercyclical fiscal policy is effective. (You might propose temporary bursts of spending during a recession, with cutbacks when the economy recovers.) Conversely, you could favor large government and yet believe that countercyclical fiscal policy has no effect. (You would favor a level of government spending that is high, but not countercyclical.)

It is probably the case that macroeconomists sincerely try to approach their subject with scientific objectivity. Whatever your views, you want to believe that they are grounded in analytical rigor and that it is the other guy who is blinded by ideology. However, the odds are that you over-estimate your own rigor and over-estimate the extent to which others' views are ideological.

As it happens, the correlation between analytical views and ideological views is far from zero. Economists tend to break either to the left, in which case they favor large government and believe that countercyclical fiscal policy is effective, or to the right, in which case they hold the opposite views. As for economists who believe that fiscal policy is effective and yet who lean toward smaller government, I believe that Greg Mankiw might fall in that category, but there are not many others. I cannot name any economists who believe that countercyclical fiscal policy is ineffective and who also favor larger government.

In my case, I was on the left both analytically and ideologically when I was in my twenties, and I am on the right today. I moved to the right on the ideological issue of the size of government before I changed my position on the effectiveness of fiscal policy.

The ideological correlation probably best explains why my macroeconomic views differ from those of Shiller, Krugman, or Stiglitz. I have my own Outsider perspective on macro, which I will get to in due course. What I share with them is frustration over the narrow-minded dogma and group smugness of the Insiders.

My own history makes it easier for me to articulate Keynesian economics using the framework that prevailed in the early 1970s, which I once sincerely believed, than using newer models which I never bought into. Those are biases of mine that you should bear in mind as you read the rest of this book.

In what follows, I am going to give you my perspective on *some* of the intellectual history of

macroeconomics in the United States from 1960 up until 2013, when this is being written. Where your macroeconomics textbook gives you equations that are supposed to represent the Truth, I instead offer a narrative of shifting beliefs and doubts. This narrative attempts to describe how various strands of thought emerged and how I reacted at the time, eventually leading up to my current point of view.

I emphasize the word “some,” because trying to present a complete catalog or treatise on the intellectual history of macro would be a much more demanding enterprise than what I have in mind. Instead, consider this an idiosyncratic memoir, emphasizing my own intellectual journey regarding macroeconomics. The focus is on ideas and developments that made a strong impression on me. There are plenty of ideas that other economists have found significant but which have failed to have an impact on my own thinking, and such ideas will not be covered here.

Organizing this intellectual history has been a challenge. There is a multi-dimensional matrix to be filled in.

One dimension consists of different macroeconomic viewpoints. These tend to go by the pretentious term “models,” such as the IS-LM model or the DSGE model. I hope that you are familiar with these models, although you will not need such familiarity to follow my arguments. It's just that I think it might be better for you to encounter my Outsider view after you have read an Insider textbook. Your first exposure to religion should not come from an apostate.

Another dimension is methodological. How well must macroeconomic theories conform to established microeconomic principles? Is mathematical formalism a scientific necessity or is it a straitjacket? Can statistical precision and empirical testing be decisive, or are they fundamentally unsatisfying in the context of macroeconomics? More than in any other sub-field of economics, it seems difficult to avoid arguments over such methodological issues in macroeconomics.

Another dimension of macroeconomic intellectual history consists of substantive issues over which the various viewpoints disagree. Under what circumstances is fiscal policy effective? Should we be looking at the financial sector primarily in terms of the conditions of credit markets, or is it sufficient to look at the money supply and the short-term interest rate? Is unemployment caused by an above-equilibrium real wage rate, or are there other factors? Etc.

Yet another dimension is chronological. I have settled on time as the primary organizing dimension for this book. I believe that one can only appreciate the significance of alternative approaches by seeing them in the context of the events that were taking place as those viewpoints emerged.

A Drama in Four Acts

I divide the period from 1960-present (late in 2013) into four eras—a drama in four acts, if you will. These acts are summarized in the table on the following page. In subsequent chapters, I will discuss each of these acts in more detail.

Continuing with the drama metaphor, I will occasionally present viewpoints in dialogue format, with various characters speaking on behalf of the viewpoints presented. One reason for taking this approach is that it is often the case that two opposing points of view have offsetting strengths and weaknesses, with neither side strictly superior.

The Four Acts, 1960-2012

Time Period	1960-1969	1970-1985	1986-2007	2008-2013
Nickname	The Forgotten Moderation	The Great Stagflation	The Great Moderation	The Financial Crisis Aftermath
Median Unemployment Rate	4.9 percent	7.2 percent	5.5 percent	8.5 percent
Highest Unemployment Rate	6.7 percent (1961)	9.7 percent (1982)	7.5 percent (1992)	9.6 percent (2010)
Median Inflation Rate	1.5 percent	6.2 percent	2.9 percent	1.9 percent
Highest Inflation Rate	5.4 percent (1969)	13.5 percent (1980)	5.4 percent (1990)	3.8 percent (2008)
Median Misery Index	6.8	13.6	8.3	9.9
Highest Misery Index	8.9 (1969)	20.7 (1980)	11.1 (1991)	12.0 (2011)
Number of Recessions	1	4	2	1
Average recession-months per year	1	3.3	0.8	3.1
Fed Chairmen	William McChesney Martin	Arthur Burns, Paul Volcker*	Alan Greenspan**	Ben Bernanke

*In between Burns and Volcker, G. William Miller served a brief term as chairman from March of 1978 to August of 1979. **Greenspan was succeeded by Bernanke in February of 2006.

To arrive at the median unemployment rate, I take the annual average for each year, and then take the median of the annual averages within the period. Similarly for inflation, as measured by the Consumer Price Index.

The misery index (Arthur Okun coined the expression) is the sum of inflation and unemployment.

The average recession-months per year is obtained by dividing the total number of months the economy spent in recession during a time period, using the official dates proclaimed by the National Bureau of Economic Research, by the number of years in the time period. For example, during the Forgotten Moderation, the economy experienced one recession, lasting from April of 1960 to February of 1961. Ten months divided by ten years gives an average of one recession-month per year. I include the entire recession of December 2007 through June of 2009 in the Financial Crisis Aftermath period.

I refer to the first act, the 1960-1969 period, as the Forgotten Moderation. Economic performance was generally good, with only one recession and generally low unemployment and inflation. However, I call it forgotten because neither the events nor the dominant macroeconomic ideas of the sixties decade are much discussed today.

The Forgotten Moderation was followed by what economists have come to call the Great Stagflation. Both inflation and unemployment soared, and the period from 1970-1985 includes four recessions.

The period from 1986-2007 has been termed the Great Moderation. Inflation and unemployment returned to low levels, and there were only two mild recessions spread over this long period.

I call the last act, the 2008-2013 period, the Financial Crisis Aftermath. Many economists call it the Great Recession. However, although the entire period has felt like a recession, the official recession dates are narrower. According to the recession-dating committee of the National Bureau of Economic Research, the recession began in December of 2007 and ended in June of 2009. Instead, I think that most people believe that the economic distress became serious in the latter part of 2008 and remained serious many years afterward.

The popular impression is supported by labor market statistics, particularly the civilian ratio of employment to population. Back in the 1990s, this ratio gradually rose, reaching a peak of 64.7 percent in April of 2000. It drifted down to 62.0 percent in September of 2003, edged back up to 63.4 percent in December of 2006, and stood at 62.9 percent in November of 2007, just prior to the official onset of the recession.

During the official recession, the employment to population ratio fell to 59.4 percent, but *after* the recession officially ended, the ratio continued falling, reaching a low of 58.2 percent in November of 2010 and again in June and July of 2011 and yet again in October of 2013. In December of 2013, the employment to population ratio stood at 58.6, which was still lower than in any month during the official recession! Evidently, weakness in the labor market persisted *more than four years* after the official end of the recession. Thus, it seems reasonable to say that, as of the end of 2013 we were still in the period of the Financial Crisis Aftermath.

Inflation and Unemployment

The table above summarizes the behavior of inflation and unemployment during the four acts. Start by looking at the two statistics separately.

In terms of unemployment, the Financial Crisis Aftermath was the worst of our four acts. The median unemployment rate was 8.5 percent in 2008-2012. During the Great Stagflation, performance was also poor by this measure, with median unemployment of 7.2 percent. Performance was much better during the Great Moderation, when the median was 5.5 percent, and better still during the Forgotten Moderation, when the median was 4.9 percent.

The only one of our four acts with really bad inflation was The Great Stagflation, where the peak annual inflation rate was 13.5 percent and the median annual inflation rate was 6.2 percent. The median annual inflation rate during the Great Moderation was only 2.9 percent, during the Financial Crisis Aftermath it was 1.9 percent, and back in the Forgotten Moderation the median annual inflation rate was only 1.5 percent.

Next, consider the correlation between inflation and unemployment across the four Acts. The Forgotten Moderation had both the lowest median inflation rate and the lowest median unemployment rate. The Great Stagflation had the highest median inflation rate, the highest peak unemployment rate, and the second-highest median unemployment rate. Not knowing any better, one might conclude that inflation and unemployment are *positively* correlated.

If we instead look at the relationship between inflation and unemployment within each Act, the story is mixed. During the Forgotten Moderation, as unemployment came down, inflation increased, showing strong negative correlation. During the Great Stagflation, there is no apparent correlation, positive or negative, between inflation and unemployment. The same is true of the Great Moderation. The Financial Crisis Aftermath has only six years of data, which makes it difficult to establish correlation.

As you probably know, many macroeconomists have employed an equation (often on a diagram) that traces out a negative relationship between inflation and unemployment, and that this Phillips Curve has been at the center of controversy. I will have plenty to say about it in later chapters.

When I first learned of the Phillips Curve, during a freshman economics course in 1971, it was an empirical regularity in search of a theory. Today, one might say that it is a theoretical construct in search of empirical support. This modern Phillips Curve typifies the equations used by macroeconomists, in that it is not necessarily embedded in the data, but instead it must be taken on faith. When physicists manipulate equations, these are equations that can be verified experimentally. In contrast, macroeconomists use two types of equations, neither of which is driven by data in a verifiable, replicable way.

One type of equation in macroeconomics, called an identity, is true by definition. For example, there is an equation that says that nominal GDP, which is the annual output of goods and services measured in current prices, is equal to the stock of money times the velocity of money. This identity is true because there is no direct measure of velocity. Instead, velocity is defined as the ratio of nominal GDP to the money supply. Because it is true by definition, the velocity equation can neither be verified nor falsified by any observations.

The second type of equation is a behavioral equation, like the Phillips Curve. In principle, such equations are verifiable or falsifiable, but this is only true if the data behave in a consistent manner that is subject to just one possible interpretation. Unfortunately, macroeconomic statistics are not that definitive. In the case of the Phillips Curve, the basic data appear to show something in between zero correlation and a slight positive correlation. Economists who insist that an inflation-unemployment trade-off exists, meaning that the relationship is negative, have been able to sift through and massage the data to confirm their views.⁴ However, skeptics have no difficulty casting doubt on the existence of the trade-off.

Looking at our drama in four acts, we will see that macroeconomists' perceptions of the relationship between inflation and unemployment have been shaped by context. During the Forgotten Moderation, many economists thought in terms of a stable trade-off, because that is what they were observing. During the Great Stagflation, they focused on factors that shifted this trade-off, because that is what appeared to be happening in that era. During the Great Moderation, they focused on the idea that stabilizing inflation would stabilize unemployment, and that was consistent with economic performance during those years. During the Financial Crisis Aftermath, many economists have

4 See, for example, Robert J. Gordon (2013), "The Phillips Curve is Alive and Well: Inflation and the NAIRU During the Slow Recovery," NBER working paper 19390.

suggested that the macroeconomic policy challenge is to escape a low-inflation “trap,” and, indeed, inflation was low and unemployment remained stubbornly high.

Throughout this intellectual history, a main thread is the contrast between Keynesian viewpoints and Classical viewpoints, as well as attempts to synthesize the two. Accordingly, I introduce the drama with a prologue that sets out this basic contrast.

Prologue

The ghost of John Maynard Keynes, who died in 1946, haunts this entire drama. Keynesian economics was intensely debated in the two decades following the publication of *The General Theory of Employment, Interest, and Money* in 1936. I am not going to attempt to reproduce those debates here. Instead, I want to bring out what I see as the fundamental contrast between the Keynesian tendency and the Classical tendency. I believe that the viewpoints expressed during the Forgotten Moderation, the Great Stagflation, the Great Moderation, and the Financial Crisis Aftermath all can be usefully classified as Keynesian, Classical, or Synthesist, with the latter representing a conscious effort to blend Keynesian and Classical propositions.

Let me introduce two characters to portray the tension between the Classical tendency and the Keynesian tendency. They are Mr. C, representing classical economics, and Mr. K, representing Keynesian economics. Their dialogue will help to set up the conflict that will play out over the four acts in our drama. Think of the dialogue as taking place around 1950.

K: I am afraid, Mr. C, that you can give no satisfactory account of persistent, widespread involuntary unemployment, as so many countries experienced during the Great Depression. We Keynesians have an explanation, and moreover, we have a solution.

C: I am afraid, Mr. K, that your explanation raises more questions than it answers. On our side, we believe that an economy has some equilibrating mechanisms--

K: Which don't work, obviously--

C: But you can't just ignore them or assume them away. I am talking about prices as signals and profits as incentives. In the market for any good, when there is a shortage, the price of that good rises. The high price acts as a signal leading existing businesses to expand and new businesses to spring up in order to exploit profit opportunities. Conversely, a surplus causes the price to fall, leading firms to reduce production or exit the industry until balance is restored. In individual markets, we see these mechanisms for restoring balance in supply and demand working all the time.

The system of prices and profits performs the role of an economic planner, albeit in a decentralized way. This economic planner hates to waste scarce resources. After all, the economic problem is that we have unlimited wants but only limited resources. If resources are not being used efficiently, then price signals will show entrepreneurs opportunities to profit by moving resources around, buying cheap and selling dear. If there are resources that are not being used at all, then entrepreneurs will find ways to use them.

K: But reality does not conform to classical theories. Look at that man, sitting over there on the bench. He is involuntarily unemployed.

C: How do you know that? Do you know his reservation wage? That is, do you know the lowest wage that he would accept to go to work? Do you know what his best offer has been?

K: Well, he expects he should get at least \$5 an hour, but he cannot find any offer for anything close to that.

C: So he is not really unemployed. He has withdrawn from the labor force, because he can't find a job

that will pay him what he wants.

K: No, according to the Department of Labor, as long as he is looking for work, he is unemployed. Besides, in his last job, he earned \$6 an hour and what he produced was worth \$7 an hour. But when the economy went into a slump, the demand at his firm fell, and he was laid off. His problem is that there is a lack of effective demand.

C: I'm not sure what 'effective demand' means. Certainly for one firm, demand can fall, resulting in layoffs. But it makes no sense for demand to fall for the entire economy. People are not satiated. When they want less of one good, they want more of something else.

K: Not always. Households do not spend all of their incomes. What they do not spend, they save.

C: Of course. But they save in order to consume in the future. And banks put those savings to work by lending to businesses that undertake investment. Saving is not an impediment to economic activity. On the contrary, in a capitalist economy, saving is one of the keys to industrial development and growth.

K: Nonetheless, there are times when businesses do not want to invest as much as people want to save.

C: In that case, the interest rate should fall. The interest rate is the price that balances investment and saving. When there is an excess of desired investment over desired saving, the interest rate will rise to discourage investment and encourage saving. Conversely, when there is an excess of desired savings over desired investment, the interest rate will fall.

You Keynesians have created a sort of folk economics which says that the economy's driver is consumer spending and that thrift is "bad for the economy." I emphatically reject this. There cannot be an excess of savings. All that is needed to ensure balance between saving and investment is for the interest rate to arrive at the correct level.

K: I do not think that mechanism works. Both saving and investment are governed by psychology. People tend to save a regular proportion of their income, regardless of the interest rate. Businesses invest on the basis of the state of their long-term expectations, regardless of the interest rate.

C: That seems like a peculiar way to think about it. But let us come back to our unemployed fellow. What should he be doing instead of sitting on the bench?

K: He could be digging a ditch for the government.

C: But he'd rather be sitting on the bench. Why should he dig the ditch?

K: The government can pay him to dig the ditch. They can pay him \$5 an hour.

C: If his ditch-digging is worth \$5 an hour, that's fine. The taxpayers should be happy to pay him to dig a ditch if it's a worthwhile use of his time.

K: Actually, the ditch is not worth so much. Let's say his ditch-digging is worth only \$2 an hour. But this way, he's working instead of sitting on a bench, and as taxpayers we benefit from the ditch.

C: No! As taxpayers, we pay \$5 an hour for ditch-digging that is worth only \$2 to us. That makes us worse off.

K: Would you rather pay unemployment benefits of \$3 an hour and get nothing?

C: No....But if we are going to redistribute income to him, why not encourage him to take the best available offer. If it is \$4 an hour, then a \$1-an-hour subsidy would get him the \$5 you say that he expects.

K: Hmmm. Not such a bad idea. But the ditch-digging puts more spending into the economy.

C: No it doesn't. You give \$5 to this man to spend, but that \$5 comes from those of us who pay taxes, and now we have \$5 less to spend. It's just a transfer.

K: But we're not going to raise taxes. We are going to borrow the money to pay him to dig the ditch.

C: In that case, the borrowing is going to use up saving that otherwise would have been used to build homes or expand businesses.

K: No. Households and businesses do not want to spend any more. The savings would have sat idle. We need the government to spend those savings, because no one else will.

C: We need to talk about capital markets. You seem to think that we can have an excess of savings without driving down interest rates. I don't see how that can happen.

K: It has to do with the demand for money. If people save using bonds or stocks, more saving should reduce the interest rate and/or raise stock prices. But if they save using money that they stick under the mattress, the interest rate does not go down.

C: So a recession is driven by a big increase in saving in the form of currency? Do we observe these vast currency hoards during recessions?

K: No, because the desired saving does not translate into actual saving. It only drives down demand and drives down income.

C: Since you brought up money, let's talk about it. We know that money is a unit of account. In thinking about money, I carefully separate nominal magnitudes from real magnitudes.

The prices that matter are relative prices. If I want to consume more hot dogs and fewer haircuts, the question of how many more hot dogs I can get if I give up one haircut is answered by the relative price of hot dogs in terms of haircuts. It matters to me how many hot dogs I have to forego in order to purchase a haircut. However, it does not matter whether hot dogs prices are quoted in dollars, pennies, or yen. The dollar price of a haircut can and will change with the supply of money. Still, the "real" cost of a haircut (meaning the hot dogs that I must forego to obtain one) will stay the same.

When there is an excess supply of money, the proverbial "too much money chasing too few goods," we have general inflation, in which all prices rise. When there is an excess demand for money, then all prices fall. However, to a first approximation, relative prices are not affected by such phenomena.

If people suddenly decide to save in the form of money, then that creates an excess demand for money relative to its supply. That puts downward pressure on prices. It does not cause some sort of general excess demand.

K: I do not think that we observe the sorts of purely neutral inflations and deflations that you think ought to happen in theory. At the aggregate level, it may help to think of prices as fixed. While they are fixed, it is quantities that adjust, not prices. The easiest way to look at it is that quantities are what affect quantities. Investment affects output. Output affects employment. Employment affects income. Income affects saving. If you hold prices fixed, it is clear how this can happen. In the simplest terms, jobs create spending and spending creates jobs.

As for prices, I emphasize feedback between wages and prices. Firms set prices as a markup over labor costs. Meanwhile, workers bargain for wages in attempt to keep up with prices and perhaps get ahead of other workers. Thus, price- and wage-setting are something like an “arms race” in which increases in one lead to increases in the other.

Hence, while your Classical dichotomy is between nominal magnitudes and real magnitudes, my basic dichotomy is between quantities and prices. Prices affect prices, but not quantities; quantities affect quantities, but not prices.

C: Hang on. Are you telling me to *assume* that the price mechanism does not operate, because that is the way you think of things, or are you telling me that you have persuasive *evidence* that the price mechanism does not operate? I keep coming back to basic microeconomics. You say that neither saving nor investment responds to interest rates. In that case, then interest rates should fall dramatically when there is this excess of savings that you say can emerge. Furthermore, if unemployment is high, then wages should fall dramatically.

K: You always talk about what *should* happen. But look at what *did* happen during the Great Depression. We had persistent, high levels of unemployment. If classical economics denies that this can happen, then so much the worse for classical economics. In the real world, perhaps there is something that interferes with the wage-adjustment mechanism; or perhaps any downward movements in wages feed back adversely in other ways, making downward wage adjustment ineffective in reducing unemployment.

The Forgotten Moderation, 1960-1969

On May 25, 1961, President John F. Kennedy appears before a special joint session of Congress, urging the adoption of a goal of safely landing an American on the moon by the end of the decade. This project underscores the high status of science and engineering in the American consciousness. We also are beginning to see the impact of large electronic computers, which help make possible the conquest of space.

Mindful of this zeitgeist, macroeconomists pride themselves on mathematical methods, their ability to forecast and control the economy, and their use of computers to conquer the complexity of the economic system. The first Nobel Prize in economics will be awarded in 1969 jointly to Ragnar Frisch and Jan Tinbergen, who are cited “for having developed and applied dynamic models for the analysis of economic processes.” They were forerunners in the development of macroeconomic models, which rely on computers to estimate macroeconomic relationships and simulate the effects of alternative policies.

In 1970, American Paul Samuelson will be cited by the Nobel committee “for the scientific work through which he has developed static and dynamic economic theory and actively contributed to raising the level of analysis in economic science.” He has done much to establish mathematical methods in professional research and to entrench Keynesian analysis in undergraduate education. It is his paper with Robert M. Solow that named the Phillips Curve, validated it for the United States, and called attention to its implications for stabilization policy.⁵

Indeed, from a Nobel Laureate standpoint, the Forgotten Moderation is a golden age for macroeconomics. Seven of the first seventeen Nobel awards (from 1969 through 1985) will go to economists who contributed to economic ideas that were significant during the Forgotten Moderation: In addition to Tinbergen and Frisch, recipients are John R. Hicks, Tjalling C. Koopmans, Milton Friedman, Lawrence R. Klein, James Tobin, and Franco Modigliani. (Samuelson's Nobel is derived from his work on mathematic methods and international trade theory. Solow also will garner a Nobel, but for his work on long-term economic growth. Friedrich Hayek will earn a Nobel for his macro theories, but they were not part of the 1960s discussion.)

Although macroeconomists whose ideas played a role in the Forgotten Moderation were showered with Nobel prizes, the Nobel committee's ardor for macroeconomists will cool during the subsequent acts in our drama. The macroeconomic research published during the Great Stagflation will yield five awards, shared by a total of nine economists: Robert E. Lucas, Jr., Thomas J. Sargent/Christopher A. Sims, Peter A. Diamond/Dale T. Mortensen/Christopher A. Pissarides, Edmund S. Phelps, and Finn E. Kydland/Edward C. Prescott.

The Nobel committee has yet to recognize any of the macroeconomic ideas that emerged during the 20+ years of the Great Moderation. I see little likelihood that this will change.

Two phrases that describe the political and economic mood of the early 1960s are “Can-do” and “Go-go.” The Kennedy team promises to invigorate economic growth, overcome the Soviet Union's lead in the exploration of outer space, and keep Third World nations from falling under the grip of Communism. For the latter purpose, President Kennedy creates the Peace Corps, and he also builds up

5 Paul A. Samuelson and Robert M. Solow, 1980. “Analytical Aspects of Anti-Inflation Policy,” *American Economic Review* 50:2 (May, 1960), 177-194.

special forces units of the military trained to counter Communist insurgencies.

In contrast with their Eisenhower predecessors, who sought balanced budgets and tolerated recessions, the Kennedy Administration embraces Keynesian deficit spending and hopes to achieve uninterrupted economic growth.

During the Forgotten Moderation, the financial sector is small, simple, and confined by regulation. Banks are not allowed to cross state lines. Many states limit the number of branches that any one bank may have. Interest rates on savings accounts at Federally chartered institutions are controlled by the Federal Reserve under Regulation Q, and checking accounts pay no interest at all. There are no money market funds. There are no mortgage-backed securities. Most mortgage loans are made by savings and loan associations, which retain the loans, funded by deposits. Fannie Mae, created under the New Deal and charged with purchasing loans guaranteed by FHA and VA, is still a government agency, although in 1968 the Johnson Administration will sell Fannie to the private sector in order to get Fannie's debt off the government books. (The Administration wishes to avert an acrimonious debate over the government debt ceiling as the Vietnam War rages.) Freddie Mac will not be chartered until 1970. By that time, the restrictions on interstate banking and on deposit rates are causing a chronic shortage of mortgage funds in California, and the idea is that Freddie Mac, a new government agency, will enable savings and loan associations in California to package mortgages into securities that can be sold nationwide, giving the West Coast thrifts access to more capital.

The 1960s are a period of activist economic policy and good economic performance. The key policy move is a tax cut introduced under President Kennedy. Other policies include wage-price "guideposts," which are informal recommendations to large firms and unions to restrain wage and price increases. In 1968, somewhat later than economists would have preferred, Congress enacts a tax surcharge to try to dampen an economy overheated by President Johnson's simultaneous wars against Communism in Southeast Asia and against poverty at home.

And yet this period of economic tranquility makes little or no lasting impression on the economics profession or on the educated public at large. Today it is largely forgotten. Viewed from 2013, here is a list of possible reasons:

1. At the time, there was much less attention paid to the Federal Reserve. Monetary policy was considered unimportant by the dominant Keynesian economists. For the press, the position of Federal Reserve Board Chairman did not have the oracular status that it holds today. William McChesney Martin was neither a major public figure nor a subject of academic scrutiny. Economists have held conferences and published many papers that attempt to dissect the records of subsequent Fed Chairmen Arthur Burns, Paul Volcker, Alan Greenspan, and Ben Bernanke; there is no comparable body of literature on the Martin era.
2. During the Forgotten Moderation, there were no economic events or policy disputes that dominated the press or left an indelible mark on popular memory. There was no Energy Crisis or Reagan Tax Cut or Internet Bubble or Financial Crisis. Any economic stories were overshadowed by other dramatic events that we have come to associate with the 1960s: the space program; the Kennedy assassination; the Beatles; Civil Rights; Vietnam; student radicalism; Woodstock.
3. The subsequent upheaval erased the memories of the 1960s. In economic research, the paradigm shift that took place, about which I will say more when I discuss the Great Stagflation, effectively discarded an entire generation of leading Keynesian economists. Figures like Walter Heller, Otto

Eckstein, and Lawrence Klein suddenly disappeared, in the intellectual equivalent of a Dinosaur Extinction or Kremlin purge. The macroeconomists of the generation that emerged were engrossed in the Great Stagflation, and they were much less interested in what preceded it.

The New Industrial State and The Money Game

For those interested in what the public was reading on economics during the Forgotten Moderation, I recommend two books that, as far as I can tell, are the only two popular economics books from that decade. *The New Industrial State*, by John Kenneth Galbraith, is the culmination of his broad-brush analysis of the modern economic system. He sees an economy consisting of large, self-perpetuating corporations dominating a society in which entrepreneurialism is nothing but a quaint, politically convenient myth. It is a plausible depiction of the pre-Internet, pre-globalization era of American industrial hegemony. However, Galbraith's portrayal has not held up well. As Deirdre McCloskey pointed out, "Eight years after the first publication of *The New Industrial State*, Bill Gates founded Microsoft."⁶

The other economics best-seller of the Forgotten Moderation is *The Money Game*, written by George J.W. Goodman but marketed under the pen-name 'Adam Smith.' Goodman is both a gifted story-teller and a talented popularizer of difficult financial theories. His chapter "What the Hell is a Random Walk?" introduces Eugene Fama, who will share the Nobel Prize *45 years later* (along with Bob Shiller and Lars Hansen). Explaining Fama's efficient markets hypothesis to lay readers several years before many academic economists are aware of it, Goodman writes, "Prices have no memory, and yesterday has nothing to do with tomorrow."

In fact, if you like to scrounge through stores that sell used books, I also can commend to you two of Goodman's later books, *Supermoney* and *Powers of the Mind*. The latter is a tour through the New Age phenomenon of the 1970s, an intellectual/spiritual/Eastern mysticism movement whose influence on business is still felt, particularly in the field of organizational motivation.

In *Supermoney*, Goodman describes the mood of investors when stock prices recently have been rising at unsustainable rates.

We are all at a wonderful ball where the champagne sparkles in every glass and soft laughter falls upon the summer air. We know, by the rules, that at some moment the Black Horseman will come shattering through the great terrace doors, wreaking vengeance and scattering the survivors. Those who leave early are saved, but the ball is so splendid no one wants to leave while there is still time, so that everyone keeps asking, "What time is it? What time is it?" But none of the clocks have any hands.

One could say that with this paragraph Goodman has anticipated behavioral finance, which Bob Shiller will develop two decades later as a counterpoint to the efficient markets hypothesis.

Milton Friedman's Presidential Address

For our characters Mr. C and Mr. K, it is December of 1967, and Milton Friedman has just delivered his Presidential address to the American Economic Association, which will be published in 1968. Friedman has articulated his view that in the long run, inflation is determined by the money supply, and

⁶ Deirdre N. McCloskey, "Creative Destruction vs. the New Industrial State: Review of McCraw and Galbraith," *Reason*, October 2007. <http://www.deirdremccloskey.com/articles/galbraith.php>

unemployment will tend toward a “natural rate” that depends neither on fiscal policy nor monetary policy, but instead represents

the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is imbedded in them the actual structural characteristics of the labor and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availabilities, the cost of mobility, and so on⁷

In plain English, Friedman is saying that the general tendency in the economy is for the decentralized economic planner of the market to find jobs for those who wish to work. Of course, at any point in time there will be people whose skills are no longer valued and who need new training. There will be potential workers and vacant jobs that have not been matched with one another. Because of such phenomena, the natural rate of unemployment is not zero. However, Friedman argues that Keynesian interventions in the economy are neither necessary for bringing the unemployment rate down to the natural rate nor sufficient to bring unemployment below the natural rate. One of his main points is that the ability to obtain lower unemployment by raising inflation will be much weaker in the long run than in the short run.

Our characters, Mr. K and Mr. C, are walking together, discussing Friedman's speech. Both have long hair, with Mr. C wearing a tie-dyed shirt and Mr. K dressed in a Nehru jacket.

C: Pretty groovy speech, man. Didn't it blow your mind?

K: More like a bad trip. You do realize, of course, that his concept of the Phillips Curve is completely backwards? I teach that when unemployment gets low, that causes inflation to be high. He makes it sound as though it is the high inflation that causes the low unemployment.

C: Right. Think of the natural rate as an equilibrium, which can be disturbed by the behavior of inflation. When you have unexpectedly low inflation, wages will be too high relative to prices. This causes a disequilibrium in the labor market, employers cut back on hiring, and the unemployment rate rises. Over time, however, wage growth slows, until labor market equilibrium is restored and unemployment returns to its natural rate.

Conversely, with unexpectedly high inflation, you can temporarily get unemployment below the natural rate. But eventually the economy will get to the correct real wage rate, and unemployment will be at the natural rate. So you do not need discretionary policy. Policy interventions only cause unemployment to oscillate more widely around the natural rate. And the more you try to buy a lower unemployment rate with higher inflation, the greater will be the cost.

K: He's got it backwards again. Discretionary policies are what have produced such outstanding economic performance under Presidents Kennedy and Johnson. Since we adopted Keynesian policies, the economy has experienced no recessions. Keynesian economists enjoy high prestige. Members of the Council of Economic Advisers in the 1960s are highly influential with the President and widely respected within policy circles. They are renowned within the profession and much more prominent in the press than their predecessors. I'll bet that if you took a poll at this convention, Milton Friedman's economic thinking would be less admired than that of the greats of the 1960s Council--Walter W.

⁷ Milton Friedman 1968. “The role of monetary policy,” *American Economic Review*, 58: 1–17.

Heller, Gardner Ackley, Arthur M. Okun, James Tobin, and Otto Eckstein. Did you know that under President Kennedy, Bob Solow did a stint at the Council as a mere staff economist?

These Keynesian advisers have adapted the phrase “fine tuning.” You know how your television has a “fine tuning” knob? In a typical city, your antenna can pick up four or five channels. You have a channel selector that works by making large, discrete changes in the frequency on which the TV is set to receive signals. The “fine tuning” knob makes smaller changes in the frequency, which can improve reception of the signals in order to increase sound and picture quality. Analogously, we speak of “fine tuning” the economy as making small adjustments to spending and tax policy in order to hone in more precisely on targets for unemployment and inflation.

Thanks to the Keynesians, the disease of unemployment has been conquered. Fiscal policy can be used to dampen booms and to prevent recessions. As long as Congress and the President are willing to adopt good economic advice, the economy can maintain a path of steady growth indefinitely.

As for inflation, Milton Friedman is wrong to be so obsessed with the money supply. You know what Bob Solow says: “Everything reminds Milton Friedman of the money supply. Well, everything reminds me of sex, but at least I keep it out of my papers.”

Inflation is a byproduct of the competition for income shares. Unions bargain for higher wages, pushing up costs, which in turn leads to higher prices. The Phillips Curve gives policy makers a “menu” of choices for inflation and unemployment that is given by the trade-off found by Samuelson and Solow. If successful, wage-price “guideposts” can be used to try to keep wage demands in check and thereby improve the trade-off.

C: I'd be careful about putting too much faith in your inflation theories and policies. At the University of Chicago, where Milton Friedman teaches, they say that inflation is anywhere and everywhere a monetary phenomenon. As for your Phillips Curve, you can't keep fooling workers into accepting lower real wages. At some point, your attempts to bring down unemployment are going to cause you to raise inflation higher and higher, without any benefit. Wait and see.

The Great Stagflation and the Would-Be Macroeconomist

It is the fall of 1971. Follow me into Trotter Hall at Swarthmore College, to my first economics class. In front of the class is Professor Frank Pierson. He is 60-ish, mostly bald, wearing wire-rimmed spectacles. Come to think of it, he looks a lot like I will in 2013, except that he is taller.

In explaining macroeconomics, Pierson is fond of using the terms “injections” and “leakages.” Business investment or government purchases send injections into the spending stream. Household saving or taxes are leakages out of the spending stream.

When new spending is injected into the economy, this puts income into the hands of consumers, who spend a fraction of it and save a fraction of it. Keynes called the fraction that they spend the marginal propensity to consume. What they spend is then re-injected into the spending stream. What they save leaks out of the spending stream.

If the government increases its purchases of goods and services, these purchases are direct injections into the spending stream. If the government provides more transfer payments or cuts personal taxes, these transfers or tax cuts indirectly are injected into the spending stream, as households spend the additional income according to their marginal propensity to consume. In general, actions that increase the government budget deficit provide injections into the spending stream and raise GDP. This is called fiscal policy. (We are assuming that transfers and taxes are of a “lump sum” variety. Taxes and transfers that vary by income are a bit more complicated.)

Although he does not use the term, Pierson teaches the Keynesian dichotomy in which prices have no effect on quantities. Instead, all of the important quantities in macroeconomics, including employment and output, are determined by other quantities. Prices in turn are determined by other prices. Workers are engaged in a fruitless competition with other workers and with business owners over income shares, and this leads to inflation.

When he discusses inflation, Pierson refers to work by Paul Samuelson and Robert Solow. They have documented that in the United States, when unemployment is low inflation tends to be high, and vice-versa. They say that this relationship forces policy makers to make a trade-off between keeping inflation low and reducing unemployment. They call this relationship the Phillips Curve, citing an earlier study of wage inflation and unemployment in the United Kingdom.⁸

The theory of the Phillips Curve is that as unemployment is reduced, the tighter labor market gives unions more bargaining power. By 2013, when manufacturing production workers make up only 6 percent of total employment, private-sector unions will not be seen as playing such a significant role. But in 1971, the unionized manufacturing sector is still a significant part of the economy, with its production workers accounting for close to 20 percent of employment. In 1973, I will join the International Brotherhood of Electrical Workers for a summer job in Missouri factory that manufactures metal speakers for installation in office buildings.

Professor Pierson teaches us about “demand-pull” inflation and “cost-push inflation.” Demand-pull inflation is movement along the Phillips Curve, caused by tighter labor markets. The theory of cost-push inflation is that, even without a low unemployment rate, each labor union tries to give its members a leg up by negotiating higher wages. However, as other workers in the economy do the

⁸ Phillips, A.W. (1958) ‘The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861–1957’, *Economica*, 25: 283–99.

same thing, the net effect is to cause all prices to rise, while leaving relative wages about where they were.

The Wage-Price Freeze

To deal with what they believed was cost-push inflation, economists proposed policies to attenuate the conflict over income shares. In the 1960s, the President's Council of Economic Advisers promulgated "guideposts" to limit wage demands.

In 1970, Congress passed a law giving the President temporary "standby authority" to control wages and prices. Democrats in Congress saw this as a way to embarrass President Nixon, who they presumed would, as a member of the Republican Party nominally dedicated to free markets, never make use of such authority. The message that the Democrats were sending was, "President Nixon could fix the economy. But he won't try." Little did they know what was in store.

I am taking my first macroeconomics course at the point in history when Keynesian economists have the maximum confidence about their ability to fix the economy. With Keynesian stars at the Council of Economic Advisers, the Kennedy and Johnson Administrations were recession-free.

The economy is not the main concern on campus. The Vietnam War, and the student protest response, still loom large. "Tin Soldiers and Nixon's coming," the lyrics written by Neil Young to protest the killing of four student demonstrators at Kent State in May of 1970, capture students' mood of sullen exasperation with their government. It will turn out, however, that the student protest movement has peaked, and it will fade away over the next few years.

For now, there is still plenty of radicalism around. One of the students in my section, Stu Rosenblatt, frequently interrupts with questions and diatribes, trying Professor Pierson's patience. In this era of long hair, Stu's hair is short. His manner is intense, cerebral, and humorless. He belongs to a small, fanatic organization of Marxists called the National Caucus of Labor Committees, headed by Lyn Marcus. Years later, Marcus will change both the ideology of his cult-like group and his name. He will run for President as third-party candidate Lyndon LaRouche, speaking in half-hour television commercials filled with paranoid conspiracy theories.

Swarthmore, founded by Quakers and always in the vanguard of radical politics, lost its president to a heart attack in January of 1969, on the eighth day of a protest by the Swarthmore African-American Student Society. As my freshman class arrives, the college is still trying to recover. The class of '75 appears to have been consciously selected to be less radical and instead inclined toward nonpolitical activities. The tennis and soccer coaches have great recruiting years, and out of a total campus population of fewer than 1200 students, music professor Peter Gram Swing is able to find enough virtuosos for an entire orchestra, requiring just a few townspeople to fill in the missing chairs. Did I tell you how I gained admission? My interview was conducted in a suburb of St. Louis, Missouri, by an alumnus who was the parent of a wrestler I had watched compete in the state championships. During the interview, I commented on that match. My own high school wrestling career was not very distinguished. Entering ninth grade weighing only 85 pounds, I had no difficulty "making weight" at the lowest, 95-pound-limit, weight class, so that on the occasions when other schools could not find anyone who could qualify, I was able to take the forfeit. On the mat, however, I was winless. Nonetheless, when I arrived at Swarthmore, the Dean of Admissions told me that the wrestling coach was looking forward to having me on the team. I never introduced myself to that coach.

Although the economy is not on students' minds, it is very much on the minds of President Richard Nixon and his forceful Treasury Secretary, John Connally. Inflation, now rising above 4 percent, is a political problem domestically. More critically, it is undermining the system of fixed exchange rates established at a famous conference at Bretton Woods, New Hampshire, in 1944. The American dollar is now overvalued in world markets, and as the U.S. government tries to fulfill its obligations to maintain the value of its currency, it is losing gold and foreign currency reserves at an unsustainable rate.

Nixon and Connally know that they will have to abandon the attempt to defend the dollar. They decide to allow the value of the dollar to float, which means completely severing any link to gold. Now, the dollar will depreciate to whatever level the market deems appropriate. This promises to be embarrassing to the Administration, and it may very well exacerbate inflation.

To strengthen their political hand, Nixon and Connally couple the floating exchange rate announcement with another policy move that is even more striking and which dominates the headlines: a wage-price freeze! The policy is announced on November 15, 1971, just a few months after I enter Swarthmore. For the next three months, firms are prohibited from raising wages or prices. During that three-month period, the Administration sets up a wage and price control board, which will set rules for wage and price changes once the freeze is lifted.

Bernard Saffran, a popular young Swarthmore economics professor, is on sabbatical working as a staff economist for the Council of Economic Advisers (long afterward, it will emerge that the Council, headed by Herbert Stein, was skeptical of wage-price controls). He pays a visit to the campus, where a large crowd fills an auditorium to hear him explain the new policies. I am too new to economics to follow his analysis, although I feel the excitement in the room.

In the short run, these policies succeed. Inflation remains under control, a rapid expansion gets underway, and President Nixon's popularity soars. Riding this wave of economic success, and with the "silent majority" of voters tired of radicalism in politics, his campaign for re-election in 1972 results in a landslide victory. For the economy, the good times will soon be over.

The First Oil Shock

In the spring of 1972, I take a course in international politics. The highlight of the course, at least from the professors' point of view, is a role-playing simulation, carried out over three days, in which students act as decision-makers and diplomats from various countries. That year, the professors create as a focal point for the simulation a crisis caused by a group of Middle Eastern oil-producing countries, who decide to blackmail the U.S. and other large oil consumers.

A year later, as an 18-year-old sophomore I take off the semester to work as an unpaid intern in the office of Senator Hubert Humphrey, one-time liberal firebrand, by 1973 a former Democratic Presidential candidate and aging statesman. While I am in Washington, the press begins to unravel the story of a burglary of the Democratic headquarters in the Watergate building the previous year. This story will dominate the news for 1973 and most of 1974.

One of Humphrey's legislative assistants appreciates my work, and as a reward he invites me along when the Senator meets with a group of businessmen in their suite at a local hotel. My one memory of the meeting is when Senator Humphrey gestures dramatically, exclaiming, "The Arabs have got us by the *balls!*" I am shocked by both his crude language and his melodramatic assessment.

Six months after I hear Humphrey's crude remark, and eighteen months after the classroom simulation of Middle East turmoil, Egypt launches a surprise attack on Israel, starting what will become known as the Yom Kippur War. The Nixon Administration supports Israel in the conflict, and in retaliation the Arab oil producers announce a "boycott" of the U.S.

Oil is traded in a world market. Once oil has been pumped out of the ground and sold into that market, it is quite difficult to "boycott" one nation and make sure that the oil is consumed elsewhere. The only way to make certain that the U.S. has less oil to work with is to shut down a significant amount of oil production. This the Organization of Petroleum Exporting Countries (OPEC) proceeds to do.

The Yom Kippur War soon ends. However, OPEC continues to curtail its production. Prices for oil and oil products have more than tripled, not just in the United States, but around the world. OPEC, and Saudi Arabia in particular, have transitioned to a new business model: pump less oil, earn more revenue!

Back in the United States, we face difficult problems. When the price of oil rises, refiners have to re-prioritize. Which products will be cut back the most? Jet fuel? Heating oil? Gasoline?

Ordinarily, the price system would guide refiners to make these decisions. But we still have some residual price controls, and Washington leaders decide, perhaps unwisely, that it will be politically suicidal to allow prices for petroleum products (and oil company profits) to rise to uncontrolled levels. With prices held artificially low, products have to be rationed, and the product that has to be rationed most carefully is gasoline. The price of gasoline is held down, but the true cost of driving goes way up, because gasoline is not always available.

Where a decentralized price system produces order, the government controls create chaos. Gas stations often run out of supply, making car owners more and more anxious to keep their tanks filled. Their behavior in turn exacerbates shortages. Drivers line up at gas stations, and even in line they worry that before they reach the front of the line the stations will have no more fuel. As they wait in line, their tempers become short. The press gives prominent play to the fights that occasionally break out.

The uncertainty created by rationing probably causes more economic damage than had prices been permitted to rise. It leads firms to hoard oil inventories and consumers to hoard gasoline. Concerns with fuel availability causes widespread economic disruption. For example, owners of beach properties suffer huge losses, because people are not sure they will have enough gasoline to drive to the beach. For Thanksgiving vacation in 1974, I share a ride home with three other students. We carry an extra license plate, because some days only cars with odd-numbered license plates are allowed to buy gas.

Squeezed by the energy shortage, the economy plunges into a recession in 1974, and unemployment soars. However, as the regime of price controls unravels and labor unions try to help their members keep up with the rising cost of living, inflation remains high as well.

At this time, the world is hit with "food shocks," as adverse developments in various countries, notably Russia, boost demand for grain and other agricultural products. We notice this at Swarthmore, where the dining hall has a fixed-price contract with the vendor that provides meals. As the vendor's costs increase, the quality of food served deteriorates markedly. At most meals, I pass on the unappetizing main course and instead dip into industrial vats of peanut butter and jelly to make a sandwich. Before coming to Swarthmore, I never ate peanut butter and jelly sandwiches.

By 1974, the proud days of economic advisers presiding over the Little Moderation are forgotten. One of my fellow students, math major Dave Shucker, laughs mockingly, “They thought they could fine tune the economy. Now they can't even find the right channel!”

Intermediate Macroeconomics in the 1970s

In 1973-74, I take an intermediate-level economics seminar taught by Bernie Saffran. We learn the IS-LM-AS model. IS-LM is a formalization of Keynesian theory that goes back to an article by John Hicks.⁹ (Forty years later, many undergraduate macroeconomics courses still teach this model, even though it has many problems, as we will see.) “AS” stands for aggregate supply. In Professor Pierson's class, we only learned about aggregate demand. Because of the oil shocks, economists have added aggregate supply to the textbooks.

For pedagogical purposes, Bernie teaches some special cases of the model. For example, in the Classical Case, we have the dichotomy in which money affects prices but real output is determined by the economy's productive capacity, not by fiscal or monetary policy. In terms of the textbook model, the Classical Case is a vertical AS curve. Otherwise, the AS curve slopes upward.

An extreme Keynesian case is the “vertical IS curve.” This gets back to Keynes' idea that businessmen make investment decisions based on their outlook for the future, so that investment is not sensitive to interest rates. If investment is not sensitive to interest rates, then monetary policy is impotent (at least in the IS-LM world). The Fed can lower the Fed funds rate all it wants, and businesses still do not wish to borrow or invest more.

Another Keynesian special case is the “horizontal LM curve,” also known as the “liquidity trap.” Here, the Fed cannot lower the Fed Funds rate, because households are willing to exchange any amount of bonds for money. This might seem plausible if the interest rate on bonds drops to zero, so that bonds cannot compete with money on the basis of yield. Either the vertical IS curve or the horizontal LM curve would yield what might be termed the crude Keynesian model, in which the budget deficit instrument works but the Fed Funds instrument does not.

On the other hand, there is the crude monetarist model, also known as the “vertical LM curve.” Bernie teaches this as a monetarist hypothesis that the velocity of money is constant and the Fed is fixing a target for the money supply. Decades later, Scott Sumner will describe a vertical LM curve as the Fed aiming for a target for nominal GDP. Sumner calls this special case “monetary offset.”¹⁰ With either constant velocity or monetary offset, the Fed controls GDP, and fiscal policy has no effect on output and employment. In these special cases, fiscal policy only affects the mix of output between government spending, consumption, and investment.

These special cases can be summarized in the following table, which shows whether fiscal and monetary policy affect real output in each case.

9 Hicks, John R. 1937 “Keynes and the 'Classics': A Suggested Interpretation,” *Econometrica* 5:2, 147-159

10 Scott Sumner 2013, “Why the Fiscal Multiplier is Roughly Zero,” Mercatus Center .
http://mercatus.org/sites/default/files/Sumner_FiscalMultiplier_MOP_090313.pdf

Special Case	Fed Funds Rate Effective?	Deficit Spending Effective?
Classical	No	No
Crude Keynesian	No	Yes
Textbook IS-LM-AS	Yes	Yes
Crude Monetarist	Yes	No
Liquidity Trap	No	Yes
Monetary Offset	Yes	No

Since my freshman macroeconomics course with Professor Pierson, pedagogy has changed. Economists now speak of the economy's "aggregate supply," and they describe OPEC's hike in the price of oil as a "supply shock," reducing employment while raising inflation. (They gloss over the issue that an increase in the price of oil ought to cause a one-time increase in the price *level* rather than an ongoing increase in the rate of inflation.) They also have adopted Milton Friedman's view that there is a difference between aggregate supply in the short run and aggregate supply in the long run. That is, aggregate supply is Keynesian (upward-sloping) in the short run but Classical (vertical) in the long run. This is what I now call a Synthesist view, because it combines Keynesian and Classical thinking.

Rational expectations

Bernie's course is taught as a seminar, for which students must write several short papers each semester. One of the papers that I am assigned is on the "cobweb model." It was developed for agricultural markets in the 1920s and 1930s, and its name comes from the fact that when it is plotted on a supply and demand diagram it resembles a cobweb. In this model, there are two seasons a year—a planting season and a harvesting season. Farmers have to decide how much to plant without knowing what will be the price of the harvest. Suppose that farmers use the price of the latest harvest as their estimate of the price of the next harvest. If in 1910 the price of the harvest is low, then farmers will plant relatively little for the harvest in 1911, and the resulting shortage will cause the price to be high. This will lead farmers to plant aggressively for the harvest in 1912, and the resulting abundance will cause the price to be low. Prices will cycle from high to low.

In the cobweb model, farmers are systematically myopic. By planting an amount based on the previous harvest's price, they always do the opposite of what they would have done had they correctly anticipated next year's price.

The cobweb story strikes me as one in which farmers are not behaving rationally. It strikes me that this contradicts the usual assumption in economics, and I scour the economics journals in the library to see how this issue is discussed. I come across a paper written in 1961 by John Muth with the intriguing words "rational expectations" in the title¹¹. However, I cannot decipher the math in the paper. Little do I realize that "rational expectations" and its mathematical representation are in the process of creating a revolution in macroeconomics.

A Macroeconometric Model Jockey

I spend the summer of 1974 in Swarthmore, assisting with projects for the economics department. One

¹¹ John F. Muth. (1961). "Rational Expectations and the Theory of Price Movements", *Econometrica* 29, pp. 315–335.

project is to set up a 25-equation macroeconomic model for classroom use. At that time, the “professional” computer models used about 200 equations. This slimmed-down version is intended to be easier for students to understand.

Swarthmore does not have a computer powerful enough to run this model. Instead, I feed IBM punch cards into a terminal at Swarthmore, which is connected to a large mainframe computer at the University of Pennsylvania.

The professor in charge of the project, Van Doorn Ooms, wants the model to fit historical data better than it does. I am tasked with putting fudge factors into the equations. For example, if the model had forecast consumer spending of \$100 billion in the first quarter of 1968, and the actual value was \$110 billion, I would put in a factor that added \$10 billion to consumption expenditures in that quarter. (It is a bit more complicated than this. Getting the fudge factors right takes some trial and error.)

The equation that needs the most fudging is the Phillips Curve. Starting in about 1969, the equation has begun to under-predict wage inflation. The actual amount of inflation was quite a bit higher than what the equation expected, given the level of unemployment. In late 1971, when the wage-price freeze was imposed, the equation over-predicts wage inflation, because the freeze held down wage growth. But as we move forward in time to when the wage and price controls were gradually lifted, the equation begins to under-predict inflation again.

Swarthmore has a curriculum option, called the Honors Program, in which juniors and seniors take seminars without being graded, and then at the end of their senior year external examiners administer tests of their own design, based on the syllabi as supplied by the Swarthmore professors. After they have been sent the written exams, the examiners come to campus to administer oral exams and to agree on overall evaluations of the students.

My examiner for macroeconomics is William Poole, then of Brown University, later to have a distinguished career in academic and policy circles. One of his questions is, “What would happen if Congress tried to use fiscal policy to maintain unemployment permanently below its natural rate?”

In my answer, I write that trying to push employment above its natural level will cause ever-increasing inflation. During my oral exam, Poole huffs, “I did not go to the University of Chicago for nothing. You cannot have ever-increasing inflation unless the Fed is printing more and more money.”

Chicago is the home of monetarists, and its most famous protagonist, Milton Friedman, has a saying that “inflation is anywhere and everywhere a monetary phenomenon.” Friedman also is responsible for calling the attention of the profession to long-run aggregate supply.

However, Poole's question is actually more awkward for monetarists than he realizes. The profession really has not grappled with the new theory of aggregate supply well enough to have a firm grip on how it affects other propositions in macroeconomics. It will turn out that in a “rational expectations” setting, my answer is more defensible than Poole credits¹². Of course, since the situation is hypothetical, no one will ever know what answer is truly correct.

In June of 1975, I graduate. I take a job as a research assistant with a newly-created agency, the Congressional Budget Office. The Democratic majority in Congress had been frustrated that the

12 See Thomas J. Sargent and Neil Wallace (1981). “Some Unpleasant Monetarist Arithmetic,” Federal Reserve Bank of Minneapolis Quarterly Review, fall 1981. http://www.minneapolisfed.org/publications_papers/pub_display.cfm?id=151

President's Office of Management and Budget, serving a Republican, set the terms of the Budget debate by providing all of the quantitative estimates. The CBO is supposed to enable Congress to address fiscal issues with the President on an equal analytical footing.

The CBO is located in a temporary headquarters, in a building not far from the Capitol, at 3rd and D streets, SW. My position is in the Fiscal Analysis section, headed by soft-spoken Frank de Leeuw, a well-respected macroeconometrician, whose job is to provide estimates of the effects of tax and spending policy on the economy. Under de Leeuw is Alan Blinder, a highly-regarded young assistant professor, on leave for just the summer from Princeton University.

Blinder's task is called the “multipliers project,” which means obtaining estimates of the impact of a standard set of alternative policies from the major macroeconomic models at the time: Chase Econometrics, headed by Michael Evans; Data Resources, Incorporated (DRI), head by Otto Eckstein; Wharton Economic Forecasting Associates (WEFA), headed by Gerald Adams; and the MIT-Penn-Social Science Research Council (MPS) model, built under the guidance of Albert Ando of Penn and Franco Modigliani of MIT, maintained and funded by the Federal Reserve Board. These are all men who used to enjoy great respect in the economics profession, which welcomed them at prestigious conferences to present analysis based on their models. However, in the academic world, regard for the models is waning.

Of all the research assistants, I am the most fluent in FORTRAN, the programming language in which the MPS model was coded for the computer. To obtain a computer tape copy of the MPS model, I visit the Special Studies Section of the Fed, a unit that is located in the Watergate building, made infamous by the 1972 break-in perpetrated on behalf of President Nixon (I come through the basement entrance where security guard Frank Wills first discovered tape on the door, arousing his suspicion.) I am given the task of adapting the MPS model to run on the House Administration Committee's mainframe computer—the CBO is no more able than Swarthmore to afford the multimillion dollar machine needed to run such a model in 1975.

(In June of 2013, when I visited CBO to lead an informal lunch discussion, it was still located in the same building at 3rd and D streets that served as its “temporary” headquarters in 1975. And a CBO staffer told me that they still program in FORTRAN, although today it is spelled Fortran and the models run on personal computers.)

Blinder wants the MPS model modified to incorporate alternative paths for fuel prices, which at the time policy makers believe they can control. The idea is that by holding down the price of domestically-produced oil, policy makers can reduce the “oil tax” and thereby boost consumer spending. In order to adapt the MPS model to handle this adjustment, I have to dig into the guts of the computer code, including the vital and aptly-named subroutine, URLOST.

I had assumed that, unlike the 25-equation teaching model that I had set up at Swarthmore in the summer of 1974, these large “professional” models would fit historical data well. This turns out not to be the case. The MPS model is way off, and it needs fudge factors just as badly as the teaching model. However, the MPS model is the one that Blinder trusts the most to have state-of-the-art thinking embedded in its equations.

DRI, Chase, and WEFA all supply their own fudge factors, called add factors, as part of their forecasting services, which are very expensive and highly profitable. The research assistants tasked with working on the multipliers project are stunned by the size and importance of these add factors. It

becomes apparent that, as far as forecasting is concerned, DRI, Chase, and WEFA are providing us with the judgments of Eckstein, Evans, and Adams, as embedded in the add factors, and these judgments are more important to most of their customers than are the models themselves.

During one of our conversations, Tom Wurster, a business school student with a dry sense of humor and a cynical outlook, muses, "It's like the wizard of Oz. The computer model is the machine that emits all the smoke and frightening noises, and then you pull back the curtain and there's Otto, speaking into a megaphone." Meaning Otto Eckstein, of DRI.

When Blinder returns to Princeton, some of my excitement at working for CBO leaves with him. Having spent a lot of time talking with research assistants at the Fed as I struggled to set up the MPS model, I inquire about positions there and I am offered one. I am assigned to the economic forecasting group, known as the National Income section.

My supervisors in the National Income section include Dave Wyss and Stephen Roach. Wyss works long hours with keen intensity. When his temper fails him, telephones and computer modems bear the brunt of his wrath, and his colleagues are used to hearing plastic loudly smacked onto a desk. He will soon join DRI and remain there for decades, eventually taking over the lead forecasting role. Roach, too, will soon depart, in his case for the Wall Street firm Morgan Stanley, where he will become famous as an often-bearish macroeconomic guru.

It turns out that the MPS model plays no role in forecasting at the Fed. Although the staff economic forecast is tabulated on a mainframe computer, the program, named Ruth (for a former research assistant), amounts to what we would now think of as a gigantic spreadsheet. All of the key numbers in Ruth are entered by hand, based on the judgments of the staff involved. Ruth then makes sure that all of the accounting relationships are satisfied. For example, if you enter figures for consumer expenditure, investment, government spending, exports, and imports, then Ruth will add these up to arrive at GNP. Inside the Fed, the staff forecast is known as the Ruth forecast.

The Ruth forecast is prepared just prior to each meeting of the Federal Open Market Committee (FOMC), the Fed's key decision-making body. Ruth is included in the Greenbook, a background memorandum that has a green cover. The Greenbook also includes a summary of economic indicators released since the previous FOMC meeting, with an analysis of what the staff believes those indicators suggest about the economic outlook.

In preparing the Ruth forecast and the Greenbook, the staff consults with members of the Federal Reserve Board, and especially with the Chairman, who at that time is Arthur Burns. Within the Fed, the Greenbook is a politically sensitive document. The staff is not free to come up with whatever forecast it thinks is most probable. Instead, the Greenbook must support the policy direction favored by the Chairman.

In between FOMC meetings, the Board of Governors in Washington meets every Monday morning for a briefing on the latest economic indicators. Economists of the National Income section often provide this briefing. A mid-month briefing might cover the release of retail sales figures as well as wholesale and consumer prices. The briefings are carefully staged. When a Federal Reserve Board member asks a question, the briefer's goal is to answer it in a way that both flatters the Board member and sounds authoritative. From this perspective, stupid questions are the most difficult to answer.

We arrive at 1976, an election year. Gerald Ford is President, with Nixon having finally been driven

from office in August of 1974 by the Watergate scandal. President Ford faces a combination of high inflation and high unemployment, and he tries Keynesian solutions for each. To fight unemployment, he has Congress enact a tax rebate, giving consumers a temporary income boost in the hope that it will encourage them to spend. Still acting on the “cost-push” theory of inflation, he tries moral suasion against price increases. His Administration hands out buttons that say “WIN,” which stands for “Whip Inflation Now.”

Both the tax rebate and the WIN button will be remembered as exercises in futility and fecklessness. The “WIN” button only serves as fodder for comedians. In November, Ford will lose to a surprising newcomer to national politics, Jimmy Carter.

An MIT Graduate Student

By this time, I am in graduate school in economics, at MIT. I have entered in September of 1976, hopeful that my experience with the MPS model will give me a leg up on other students. That turns out not to be the case.

In fact, one of the courses in the required macroeconomic sequence is taught by Yale's Ray Fair, entirely based on his large macroeconomic model. The course consists of Professor Fair taking us through his model equation by equation. The students measure Fair's work against the theories and statistical methods they are learning in other courses, and they find it wanting.

What most infuriates students is Fair's ubiquitous use of lagged dependent variables. If you are trying to predict consumer spending in this quarter, it seems reasonable to use as predictive variables the level of disposable income, the value of stock market wealth, and other factors that might affect consumer spending. Using the lagged dependent variable means also including last quarter's consumer spending as a predictor. But the equation is supposed to represent causal relationships. Why should spending more last quarter *cause* me to spend more this quarter?

To Ray Fair, the lagged dependent variable represents “adaptive expectations.” This is a very loose concept. Suppose that households chose the level of consumer spending today based on expectations for income in the future. Presumably, one quarter ago, they chose consumption based on their then-current expectations for income. In that case, their choice for consumption one period ago tells you something about what their expectations were at that time. Assuming that expectations only slowly “adapt,” you can treat last quarter's value of consumption as a proxy for those expectations.

The problem is that last quarter's value of consumption could represent many other phenomena as well. It could capture the effects of measurement error or specification error, both of which are almost certain to be present in this context. The use of the lagged dependent variables in most equations appears to be a sneaky way to get equations to fit the data.

The overall impression that the students get of Fair's model is that it does not represent macroeconomic research that is either rigorous or reliable. Sometimes, as when he uses lagged dependent variables, he is committed to trying to get a good fit with the historical data, regardless of the cost in terms of statistical bias or departure from theory. At other times, he is committed to having the model display particular theoretical properties, regardless of what the data seem to say. In the end, what his model represents is Ray Fair's particular interpretation of how macroeconomic data have behaved. He has so little credibility with the class that by the time the quarter is up, students are openly laughing.

The use of macroeconomic models to evaluate policy has recently been challenged in a very fundamental way, by Robert E. Lucas, Jr., of the University of Chicago. The “Lucas critique”¹³ has put macroeconomic model-builders like Ray Fair very much on the defensive.

The issue gets back to “adaptive expectations.” In the past five years the Phillips Curve has morphed into the “expectations-augmented Phillips Curve.” The original Phillips Curve simply said that you could predict the inflation rate based on the unemployment rate. In fact, if in the 1960s one had simply used the equation

$$\text{Inflation rate} = 7.2 \% - \text{unemployment rate}$$

one would have done reasonably well. However, in the 1970s, inflation has ratcheted up, even though unemployment has been on the high side. To capture this ratchet effect, the “expectations-augmented” Phillips Curve says that, other things equal, higher past inflation leads to higher future inflation. The rationale is that as workers observe the inflation rate, they demand cost-of-living raises, which drives up costs to firms, leading to higher prices.

In macroeconomic models, such as Ray Fair's, the key variable is the rate of wage inflation. Prices are then a simple markup over wages. The Phillips Curve behavior comes from the fact that the unemployment rate affects the rate of wage inflation. As macroeconomists augmented the Phillips Curve in this wage equation, they used as a proxy for expectations past values of inflation. To evaluate Friedman's hypothesis of “no permanent trade-off,” they examined whether their equations had the property that in the long run wages catch up to prices. This they found to be the case.

However, there is a problem with using past values of a variable as a proxy for expectations of that variable. If households and businesses are using only past values, they will be making systematic errors. This is the problem that I recognized in my undergraduate seminar paper on the cobweb model, where I encountered Muth's paper on rational expectations.

The Lucas Critique

In the early 1970s, Robert E. Lucas applies “rational expectations” to the expectations-augmented Phillips Curve, and he shows that this has two important implications. One implication is that even in the short run, policy makers could not hit an employment target. That is because the labor market will have anticipated policy actions and taken steps to neutralize them. In particular, to the extent that workers know that the Fed is trying to engineer inflation, workers will demand higher wage increases in order to avoid declines in real wages. With real wages unchanged, employment will be unchanged, also.

A second implication is that macroeconomic models were bound to break down if policy makers tried to use them to hit an employment target. The adaptive-expectations models presume that workers form expectations in a stable way, regardless of how poorly they do at keeping wages aligned with the cost of living. However, with rational expectations, workers will change the way that they form expectations if they find that their past methods have resulted in errors. As workers change the way that they form expectations, the macroeconomist will find that their existing wage equation, that embodies the old expectations-formation formula, goes off track.

13 Lucas, Robert E., Jr. 1976. “Econometric Policy Evaluation: A Critique.” Carnegie-Rochester Conference Series on Public Policy 1(1): 19#46.

The Friedman (or Friedman-Phelps) natural rate hypothesis and the Lucas critique have arrived at a time when Keynesian economics and macroeconomic models are extremely vulnerable. The models failed to predict the combination of high inflation and high unemployment that has plagued the economy from 1970-1976. A number of Keynesian-inspired policies, including wage-price controls, the 1975 income tax rebate, and of course the “WIN” button, have been ineffective.

Academic economists are attracted by the mathematical elegance of Lucas' work. Moreover, economists who employ adaptive expectations have to suffer from cognitive dissonance with what otherwise is their view that households and firms try to optimize.

The term “microfoundations,” coined by Edmund Phelps, becomes the buzzword in academic macroeconomics (it is ignored by the press and by policy makers). It refers to the attempt to bridge the gap between classical economics and macroeconomics. Classical economics relies on the laws of supply and demand, regulated by the price system. Macroeconomics, as developed by Keynes and Hicks, ignores prices, implicitly leaving them fixed. The Phillips Curve seems tacked on as an afterthought. The Lucas critique is taken as a warning that macroeconomic models that lack microfoundations will break down. The Keynesian macroeconomic models have broken down, so economists take the Lucas critique to heart.

In September of 1976, when I begin my graduate studies, MIT's economics department remains the most highly regarded in the country. Harvard is still coming back from a self-inflicted decline in the 1940s, when anti-semitism caused it to lose some of the best economists to MIT and elsewhere.

MIT's big rival is the University of Chicago. In fact, it is Chicago, thanks to Lucas, that has the excitement and momentum. Chicago's leading figure, Milton Friedman, seems to have been vindicated in several respects. Since the 1950s, Friedman has argued that consumers will not be so myopic as to spend a large percentage of a temporary income windfall, and this “permanent income hypothesis” anticipated the failure of President Ford's tax rebate. He has argued against the view that there is a durable trade-off between inflation and unemployment, and the 1970s stagflation is winning other economists over to his view. Finally, his view that inflation is a monetary phenomenon has not yet been accepted in policy circles, but it is making its way into the classroom.

Even at MIT. Macroeconomics there is dominated by two young professors well acquainted with Chicago-school monetary theory: Rudiger Dornbusch and Stanley Fischer. They will be the dissertation advisers for every important MIT macroeconomics Ph.D student of that era: Ben Bernanke, Olivier Blanchard, Ken Rogoff, Maury Obstfeld, Jeff Frankel, Greg Mankiw, Christina Romer, and others.

The late 1970s are marked by intense arguments between the “freshwater school” of economics, centered at the University of Chicago and the University of Minnesota, and the “saltwater school,” centered at Harvard, MIT, Yale, Berkeley, and Stanford. As a graduate student, I am passionately loyal to the saltwater school, which is Keynesian in outlook. Our opponents in the freshwater school embrace the views of Milton Friedman (inflation is a monetary phenomenon, there is no permanent inflation-unemployment trade-off). They add Lucas' analysis of rational expectations to arrive at the hypothesis that there is not even a short-run ability for fiscal or monetary policy to systematically affect unemployment.

My second year at MIT, Lucas is invited to give a three-day series of lectures. This is an opportunity for the faculty and graduate students to confront the enemy in person. My fellow student Robert

McDonald, noting Lucas' chain smoking, chiseled face, and unpopular (at MIT) views, remarks that Lucas looks as if he had stepped out of an Ayn Rand novel.

Scorn For Fischer Black

McDonald and another friend among my classmates, Alan Marcus, choose to do dissertations in finance, which is housed in the business school. Leading professors there include Robert Merton and Fischer Black. Merton will win a Nobel Prize for his work on option pricing, a prize that Black will be unable to share because of his untimely death two years prior to the award.

Black gives an odd but memorable paper at the Money Workshop, run by Franco Modigliani. In the paper, Black looks at the entire economy through the lens of the capital-asset pricing model. People invest in human and physical capital, and everybody holds a well-diversified portfolio. The only risk that remains is non-diversifiable market risk. When the economy receives a bad draw from the urn of possibilities, a recession results. Capital and labor are less productive in an adverse state, and some unemployment results.

Black's ideas are a creative application of the theory of finance to the economy as a whole. However, it comes across as bizarre in the context of macroeconomics, and it will not be well received. He tries to tie his paper into the rational-expectations literature. He says that he describes an economy in which all agents understand how it operates. I type up and circulate a one-page comment that ends, "That there are agents in the economy who fail to understand its operations is evidenced by the paper under discussion."

Black will soon depart MIT in particular and academic life in general, frustrated by the lack of respect given to his macroeconomic theory. He will join Goldman Sachs in 1984 and enjoy a lucrative and productive career there.

One other anecdote about Fischer Black. In one of his finance lectures, a student suggests that it must be possible to earn a higher return if you are willing to bear idiosyncratic risk. Black turns around, goes to the blackboard, and writes in enormous capital letters, "NO." The whole point of the capital-asset pricing model is that there is no reward for taking anything other than market risk. Idiosyncratic risk, which can be reduced via diversification, is not rewarded.

Under the capital-asset pricing model, households own diversified portfolios. This means that an individual household is relatively insulated from narrow risks that affect only one part of the economy. The dominant risk that remains is market risk, which every household must bear to some extent. Black, viewing the economy through this lens, sees a general downturn as an instance in which the market portfolio has suffered from a bad draw among the possible outcomes.

Another paper that is delivered to the Money Workshop and greeted with skepticism comes from Robert Hall. Hall argues that if consumers are forward-looking and optimizing, then consumer spending ought to behave like a random walk. He tests this hypothesis, and finds that it cannot be rejected (among other issues, his testing procedure violates the classical statistics approach of putting the interesting hypothesis in the position of challenger rather than champion). The paper is treated as if it were a joke (it will be published in a leading journal¹⁴), but it will become the foundation for a "rational-expectations" theory of consumer spending and also an indicator of the difficulty of

¹⁴ Robert E. Hall (1978), "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence," *Journal of Political Economy* 86:6, p. 971-987

extracting meaningful information from economic time series.

Samuelson and Solow

MIT had been, along with Yale, a bastion of Keynesian economics. Paul Samuelson, who is 61 years old when I arrive, and Robert Solow, 52, are famous Keynesian evangelists. Samuelson, the first American Nobel Laureate in economics, has been a dominant figure. His *Foundations of Economic Analysis*, based on his Ph.D dissertation, established the primary research method in economics as comparison of equilibrium conditions using formal mathematics. His popular textbook imparted Keynesian economics to hundreds of thousands of undergraduates over three decades, starting with the first edition in 1948.

If Samuelson is greatly admired, then Solow is widely loved. Other professors love him for his wit. Students love him because of his warmth and empathy and for his clarity of teaching. However, he has, underneath the wit and charm, become a bitter antagonist of contemporary developments. Even while older colleagues actively pursue research, he has quasi-retired, spending time on his sailboat and serving on committees dealing with economic education or the study of productivity. He is no longer active in producing research papers, although he remains visible in the profession through correspondence and lighter writing.

Solow's widely-circulated 1987 quip, "We see computers everywhere but in the productivity statistics," will soon be overtaken by events, as computers start to enhance productivity dramatically. However, he will refuse to use a personal computer and instead will have his correspondence typed by a secretary. He will not use the Internet or obtain an email address. Paul Romer, who begins graduate study at MIT two years after I do, will analyze economic growth in a way that many economists think of as following in Solow's footsteps. Solow will disparage Romer's work.

Although he remains a well-recognized figure, Solow is so scornful of prevailing trends in the research mainstream that he has effectively marginalized himself within the field of macroeconomics. I will choose him as my dissertation adviser.

Solow teaches a one-quarter required course in the macro sequence, and he focuses on a book by Edmond Malinvaud, called *The Theory of Unemployment Reconsidered*. In it, Malinvaud argues that if prices as well as wages are sticky, then there will be feedback effects between product and labor markets. For example, if a high price level creates an excess demand for money and the demand for goods and services is inadequate, this will reduce the demand for labor. If wages are also sticky, this will cause unemployment. If workers are unemployed, their demand for goods and services will be low, etc. It is the Keynesian dichotomy and multiplier story, justified as resulting from "general disequilibrium," meaning that there are many markets in which the price mechanism fails to balance supply and demand.

To me as a student, this looks like a way to answer the classical objections to Keynesian economics. In Malinvaud's framework, idle resources emerge because prices do not adjust downward to balance supply and demand in goods and services or in the market for labor. As usual, however, there is a classical objection to such a narrative: what is it that stops prices from dropping in order to clear markets, particularly for goods and services?

What I suggest in my dissertation is that price cuts require an information flow in order to be effective. I describe a business as having regular customers and potential customers. Suppose that I own such a

firm. If I raise my price, my regular customers notice right away, and they will check around with other firms to see if they offering better deals. So I am cautious about raising prices. However, if I cut my price, potential customers are unlikely to notice, so that I do not see much of an increase in business. In order to reach potential customers with my new low price, I have to advertise. This cost deters me from cutting my price. If I am cautious about raising my price and I am deterred from cutting my price, then the result will be sticky prices.

Dornbusch and Fischer

The idea of sticky prices and general disequilibrium seems promising to me at the time. However, the University of Chicago, including disciples like Dornbusch and Fischer, will give the profession a different focus. The main concern will be dealing with the mathematical challenges posed by the rational expectations hypothesis. With the floating-exchange rate regime not even five years old, Dornbusch, adapting rational expectations, has developed the dominant theory of exchange-rate behavior¹⁵. Fischer is one of the first to point out that if labor contract negotiations are “staggered,” meaning that they take place at different times of the year, wages will be sticky even if expectations are rational.¹⁶

The mathematical challenge is that a model with rational expectations requires “dynamic optimization.” At each point in time, a household has to look ahead far into the future and choose the optimal path for all of its economic decisions. Then, as new information arrives, the household must re-solve its dynamic optimization problem. The equations required to describe dynamic optimization are quite difficult.

Fischer is brilliant at manipulating these equations so that they can be presented in two-dimensional phase diagrams. Meanwhile, Dornbusch is “the master of the logarithmic derivative,” as Rogoff confides to me. However, sophisticated treatment of expectations comes at a cost. These models are very sparse in other respects—there is just one consumer, one type of output, one type of worker, and so on.

Unlike many of my fellow students, I am not inspired by Dornbusch and Fischer. I do not see the benefit of writing down equations to solve long-term optimization problems as a way of understanding macroeconomics. To me, too much economic relevance is being sacrificed to the altars of mathematical rigor and rational-expectations dogma. That assessment puts me hopelessly out of step with where academic macroeconomics is headed. It binds me to Solow.

In January of 1979, a revolution breaks out in Iran. Iran's oil exports plummet, and another “energy shock” ensues. Inflation soars to new heights, and it will reach double-digit levels, meaning more than 10 percent at an annual rate. Stock prices are at their lowest inflation-adjusted levels since the Great Depression. Unemployment, which has been at best 2 percentage points higher than it was in the 1960s, will soon start climbing again.

A think tank known as the Club of Rome had published a volume in 1972 called *The Limits to Growth*, in which they argued that the earth's finite resources would put a ceiling on economic prosperity. The Club of Rome is scorned by academic economists, but this think tank is given great credence by the

15 Rudiger Dornbusch (1976). "Expectations and Exchange Rate Dynamics". *Journal of Political Economy* 84 (6): 1161–1176

16 Fischer, S. (1977). "Long-Term Contracts, Rational Expectations, and the Optimal Money Supply Rule". *Journal of Political Economy* 85 (1): 191–205

press and the public. (Although Solow is no congenital optimist, he has taken the public lead among economists in arguing that the price system and technological innovation will avert the doomsday scenario. He will be proven correct.)

By 1980, when my dissertation is completed and I am on the job market, the economic outlook is the worst of my lifetime. My own situation is not promising. There are few academic openings available, my dissertation does not have “rational expectations” in the title, and I do not have Dornbusch or Fischer plugging for me on the job market. I get a few nibbles from schools in Texas, but I turn down the opportunity to interview when my fiance says, “I’ll *write* to you in Texas if that’s where you take a job.”

An Economist with the Fed

Fortunately, my name is still good at the Fed, and I obtain a job offer to return there, now with the title of economist. The Fed has a new Chairman, the imposing 6-foot, 8-inch figure of Paul Volcker. He does not have much use for the Fed’s forecasting staff. Volcker’s focus is on beating inflation, and he works closely with key staff official Stephen Axilrod on a system to reduce the rate of money creation by focusing on an indicator called nonborrowed reserves. These are reserves held by banks in the form of balances at the Fed, other than those that are borrowed through the Fed’s discount window. Arguably, the nonborrowed reserves target is just hocus-pocus to keep the press, Wall Street, and politicians off Volcker’s back while the economy endures back-to-back recessions that cause the unemployment rate to spike to 10.4 percent, the highest rate of the post-war period.

The first recession is a brief one in 1980, caused by the imposition of controls on credit card usage. As Volcker later reminisced,

[Early in 1980, President] Carter was obviously under pressure, so he triggered a provision of law that permitted the Federal Reserve to put on credit controls... We said, “Okay, you’re going to have a reserve requirement on credit cards—if credit cards exceed past peaks, you would have a reserve requirement.” We did that knowing, we’re now in March, the peak in credit card use comes in November and December. We were way below it so there was no possibility that this was going to become a factor for some time... The economy at that point fell like a rock. People were cutting up credit cards, sending in the pieces to the President as their patriotic duty. Mobile home and automobile sales dropped within the space of a week or so. The money supply, we didn’t know why the money supply was dropping, but all of the sudden the money supply was down 3 percent in a week or something... Well, it was a recession alright, the economy went down, but it was an artificial recession. As soon as we took off the credit controls in June, the economy began expanding again¹⁷

When Ronald Reagan defeats Carter in the 1980 election, his main economic proposal is a deep tax cut. Because he wants to increase spending on defense, the result is a big increase in the short-term deficit. Keynesians predict that this will cause aggregate demand and inflation to soar. The opposite happens.

President Reagan lifts that last controls over energy markets. Instead of an increase in fuel prices, the country enjoys a dramatic drop in the price of oil.

President Reagan also encourages Volcker to renew his inflation-fighting efforts, and another, much

17 Martin Feldstein (2013), “An Interview with Paul Volcker,” *Journal of Economic Perspectives* 27:4, p. 105-120.

deeper recession, ensues. Unemployment briefly rises over 10 percent. However, by late 1983, the harsh measures have succeeded, and both inflation and unemployment are headed in the right direction—down. Reagan will win re-election in 1984 in a landslide.

After about a year at the Fed, I rejoin the National Income section where I had worked as a research assistant. Peter K. Clark, an economist who I met in my CBO days, has been brought in from academia to be section chief. He and I get along well, and I spend some time as forecast co-ordinator. It is a sought-after position, with a lot of pressure and visibility with senior staff, but the work is more clerical than substantive. The real economic judgments are made at higher levels. The overall forecasting process is much as it was when I left four years earlier, although the Ruth program is being phased out and replaced by a successor. The MPS econometric model still plays no role, except that the economists in the Special Studies Section give comments to the forecasters.

In the background, there is some organizational politics going on—what today I would refer to as corporate soap opera, since it seems to take place in every large enterprise. In this case, the soap opera involves the two sections that work most closely on the forecast—the Wages, Prices and Productivity section and the National Income Section. A year after I (re-) join National Income, the former WPP section chief has moved up to an Officer position (very high prestige for Fed staff) and Peter K. Clark has not, which Clark takes as a signal to return to academia. WPP staff will continue to advance, to the disadvantage of National Income staff. In another year, WPP will absorb National Income, and my days as forecast coordinator are done. I spend some time in the International Division before returning to a section called Financial Studies, which is where I began in 1980.

In my 6+ years at the Fed, I have many periods where I am not tasked with projects, so that I have time to read widely and to try to publish papers. For example, I have time to read *Marcia Stigum's Money Market*, a book that explains the inner workings of bond trading. It is from that book, rather than from any professor or any Fed staffer, that I learn how the Fed really works on a day-to-day basis.

Contrary to what the textbooks say, the Fed's open market operations do not consist of buying and selling bonds outright. Instead, the Fed operates in the repo loan market. Government securities dealers, like Goldman Sachs or Morgan Stanley, maintain inventories of bonds to sell to customers, just as a grocer will have inventories of fruits and vegetables. Just as a retailer will finance inventories using bank loans, the dealers finance their inventories of bonds with very short-term borrowing, for periods of one day to one week. They do this by using repurchase agreements. If I as a dealer have a ten-year bond that I want to carry for 7 days, then I sell it to you as a money manager with an agreement to repurchase it at a slightly higher price 7 days from now. For those seven days, I have cash, and you have the bond. At the end of the seven days, you get your cash back and I get my bond back (unless, as often happens, we renew the agreement for another week). Because I buy the bond back at a higher price (as promised), you earn interest on your cash. I pay interest, but when I get my bond back its value has gone up because it has moved one week closer to the date on which it will make its first interest payment. (However, depending on market conditions, my bond might gain more in value or even lose in value. That is the risk I take as a dealer for keeping the bond in inventory.)

The interest you earn by lending me cash as part of the repurchase agreement is known as the repo loan rate. The Fed operates in that market. When it wants to bring down the Fed Funds rate, it makes repo loans. When it wants to drive up the Fed Funds rate, it cuts back on its repo loans or even engages in “reverse repo,” meaning that it borrows cash in the repo loan market rather than lending cash.

My reading also includes important literature in the field of finance. I work through the notes from

Robert Merton's finance class, which some of my classmates had taken at MIT. I read articles by Fischer Black and Eugene Fama on applying the efficient markets hypothesis to banking.

I learn that financial economists think in terms of substitutability and equivalence. It is easy to substitute one financial asset for another, and often you can replicate one security using a combination of other securities.

For example, with mortgage interest rates sky high but house prices still rising along with overall inflation, some mortgage lenders propose a shared-appreciation mortgage, in which the borrower agrees to give the lender a share of the price appreciation on the home in exchange for a lower interest rate and monthly payment. After a period of ten years, the borrower pays the lender the latter's share of appreciation, based on an appraisal. My first published paper is one that points out that the main goal of the shared-appreciation mortgage is to lower the initial monthly payment for the borrower. I point out that an equivalent approach would be to schedule a deferred payment for ten years after the mortgage is originated. The shared-appreciation mortgage just adds an element of uncertainty to the amount of the deferred payment.

The finance-theory view of financial markets differs from the macroeconomic view. In macroeconomics, the Fed affects interest rates by changing the relative supplies of different types of asset claims—exchanging money for bonds, for example. In the finance-theory view, a financial claim is priced on the basis of the underlying investment projects that it represents. If a firm's investments consist of fruit trees, then the stocks and bonds issued by the firm will be priced on the basis of the risks and returns embedded in fruit trees. Relative supplies of different financial claims are irrelevant. This is called the Modigliani-Miller Theorem. Fama and Black apply Modigliani-Miller and other hypotheses developed by financial economists to suggest that financial market participants are capable of insulating markets from Federal Reserve actions. They describe a world of banking without money, and they suggest that this is a reasonable approximation to the way things operate in the real world, in which financial markets have grown by much more than the growth rate in the liabilities of the Federal Reserve.¹⁸

The Troubles with Macroeconometrics

Another topic about which I read a great deal has to do with the statistical properties of macroeconomic data. A number of key papers are written in the 1980s suggesting that macroeconomic data is not stationary, which invalidates many of the techniques used in macroeconomic models, especially the use of lagged dependent variables.¹⁹

The literature on nonstationarity puts the macroeconometrician in a bind. If you analyze data in levels, nonstationarity creates spurious correlation. That is, when an economic aggregate, such as consumer spending, is much higher than it was a decade earlier, it will automatically be correlated with any other variable that is also higher than it was a decade earlier, regardless of whether those two variables truly affect one another.

18 In September of 2013, consultant Peter Stella pointed out that between 1951 and 2006, commercial bank reserves at the Fed actually fell slightly, while total financial claims in the U.S. economy increased by 10,000 percent. Peter Stella (2013), "Exit-path Implications for Collateral Chains." <http://www.voxeu.org/article/exit-path-implications-collateral-chains>

19 Charles R. Nelson and Charles I. Plosser, September, 1982. "Trends and Random Walks in Macroeconomic Time Series: Some Evidence and Implications," *Journal of Monetary Economics*, 10(2), pp. 139–162

One treatment for nonstationarity is to look only at differences in data. Thus, you would look at how the *change* in consumption from one quarter to the next relates to the *change* in income from one quarter to the next. The problem with differenced data is that it has a large component of noise. Special events, such as strikes, tax rebates, and automobile sales incentives programs can exert a dominant influence. It is very difficult to detect any interesting causal relationships in differenced data.

A separate issue with econometric methods is raised in an iconoclastic book by Edward Leamer, called *Specification Searches*.²⁰ Leamer points out that statistical *theory* assumes that the investigator engages in a single confrontation with the data. However, econometricians *in practice* try and fit many different specifications to the data, until the investigator is happy with both the quality of the fit of the equation to the data and also with the consistency of the findings with the investigator's prior views. This process of searching for specifications makes results unreliable and lacking in objectivity. Leamer's methodological attack will lead to a revolution in statistical practice by economists in virtually every sub-field *except* for macroeconomics. That is, economists will no longer put their trust in multiple regression. Instead, they will look for "natural experiments," in which specification searching is not a determinant of results. The problem for macroeconomics is that we have only one economy, and as such it is not amenable to natural experiments.

A Minsky Moment

Early in my career at the Fed, I attend a lecture by a professor from Washington University. I feel a loyalty to that school, because of my own father's long-time association there in the political science department. Only a handful of Fed economists, none of whom are from any sections that work on monetary policy, join me in a Fed conference room to hear the speaker. His name suggests a shriveled old tailor, but he turns out to be a bulbous-nosed bear of a man. He is energetic and unkempt, with an untucked shirt-tail flapping as he stalks back and forth in front of the blackboard. He is Hyman Minsky.

I find Minsky's talk to be an odd mix of potential insight and blatant error. The potential insight is that corporate finance is cyclical, in his view. In the wake of a recession, firms do not borrow, because borrowers and lenders are conservative. Any investment that takes place is financed solely with cash flow from profits. Gradually, as a recovery gets under way, firms become willing to borrow, but only against marketable assets. As a recovery extends and turns to euphoria, firms borrow speculatively against future earnings.

The blatant error is to insist that there is an exact relationship between government deficits and corporate profits. It is true that national income accounts are constructed so that

$$\text{personal saving} + \text{corporate profits} = \text{government deficit} + \text{investment} + \text{net exports}$$

In effect, Minsky is saying that personal saving, investment, and net exports are to be held constant, so that an increase in the government deficit necessarily flows into profits. However, he does not acknowledge these strong implicit assumptions, and this I find troubling.

By late 1986, I am about to switch careers, getting away from macroeconomics altogether. At this time, my biases are still in favor of Keynesian economics. I am now out of step with mainstream economists in several respects:

20 Edward E. Leamer 1978. *Specification Searches: Ad Hoc Inference with Nonexperimental Data*. John Wiley & Sons

1. Mainstream economists now put rational expectations at the center of every model. My instinct is that this puts too much emphasis on expectations about inflation and money growth as determinants of behavior. I still prefer the “general disequilibrium” approach taught by Solow, which the academic community has not embraced.

2. Mainstream economists have discarded the traditional Keynesian consumption function, in which consumers reflexively spend a given share of their income. They have replaced it with a dynamic optimization problem, in which consumers shift their consumption in response to changes in interest rates. I find this approach sterile. Moreover, it seems to me to lead to predictions that are counterintuitive and not well supported by data.

3. Mainstream economists reject macroeconomic models because of the “Lucas critique,” but they are developing methods for analyzing macroeconomic data that are robust with respect to that critique. I am not persuaded that these methods are helpful, given the other problems with macroeconomic data. I am more concerned with nonstationarity and sensitivity to specification. In some sense, each quarterly observation of macroeconomic aggregates is unique. There is not any statistical technique that can convert these observations into quasi-experimental data suitable for scientific analysis.

4. Mainstream economists are inclined to simplify their models in many respects in order to keep them mathematically tractable under the key assumption of rational expectations. For example, they reduce an economy to a single consumer/producer/entrepreneur. I see this as imposing arbitrary straitjackets that keep theory disconnected from reality. To me, the macroeconomics papers that appear in journals have all of the relevance of scholastic debates over how many angels can dance on the head of a pin.

It is worth repeating that in physics, researchers manipulate equations that are subject to empirical verification. I have come to doubt the possibility of verifying equations in macroeconomics, and that in turn makes the manipulation of equations a less well-grounded exercise. I forget who first coined the phrase “mathematical masturbation,” but I think it is very fitting.

I leave the Fed in December of 1986 to join an agency called Freddie Mac, which at the time is a part of the Federal Home Loan Bank System. After several stimulating years there, I will quit suddenly in April of 1994 to start a business using a new technology called the World Wide Web. After a difficult year, I will partner with entrepreneurs with better business experience than mine, and our web site will attract increasing numbers of visitors and earn a modest profit. Then the Internet will generate a stock bubble, and we will be able to sell our business in 1999, near the peak of the bubble, to one of the companies that went public in that era. We receive a combination of stock, which ends up worthless, and cash, which retains its value. After the sale, I watch from the sidelines as Freddie Mac enjoys rapid growth. However, this too, turns out to be part of a bubble. Thus, I will have managed to participate in two situations that ultimately crashed while personally coming out ahead.

Before leaving this chapter, let us bring back our classical and Keynesian economists for a dialogue that will summarize the developments that took place in the 1970s.

C: Well, things aren't looking so good for you Keynesians now, are they? What went wrong?

K: Oil shocks, for one thing. Also, it looks as though we did not clamp down on inflation soon enough. We probably should have noticed that the natural rate of unemployment, or what we call the Non-Accelerating Inflation Rate of Unemployment (NAIRU) was rising and that we should not

have kept trying to force unemployment below 5-1/2 percent. The money supply got out of control there for a while.

C: So now you admit that there is a natural rate of unemployment. And you admit that inflation is a monetary phenomenon. Back in 1970 you denied both of those. And you need to talk about supply, not just “effective demand.” And wage-price controls don't work. And the Phillips Curve broke down completely.

K: All true. But don't go too far. The old Phillips Curve may have broken down, but the expectations-augmented Phillips Curve works fine.

C: No, your macroeconomic project is finished. Don't you understand the Lucas critique? Your statistical models capture transitory relationships, not the true behavior of the economy. To know how policy will really work, you need a model based on microfoundations.

K: A lot of our graduate students are working on Keynesian models with microfoundations.

C: I think what they will find is that recessions come from errors in predicting inflation. The best policy is to make inflation predictable. Keep inflation predictable, and the natural system of prices and incentives will keep the economy close to full employment. And the best way to keep inflation predictable is with stable money growth.

K: But what is your definition of money? There is a narrow definition, called the monetary base, which is easy for the Fed to control but not highly correlated with inflation. There are broader definitions, such as M3, which are correlated with inflation but not directly under the Fed's control.

C: Well, what do you suggest?

K: We think in terms of targets, instruments, and indicators.²¹ The target variables are the unemployment rate and the inflation rate. The Fed's instrument is the Fed Funds rate. Indicators are other variables that might give information to the Fed sooner than the unemployment rate and the inflation rate. The various measures of the money supply might be indicators, although we do not think that they actually have much value as indicators, because velocity is so unstable.

C: That is how you and I came to agree on the Taylor rule. It specifies a response of the Fed Funds rate to the inflation rate and the unemployment rate. For example, we might say that for every 1 percentage point that inflation rises above its target, you want to increase the Fed Funds rate by 1.5 percent, and for every 1 percentage point that the unemployment rate is above target, you want to decrease the Fed Funds rate by 1 percentage point. And we believe strongly that rules are the key. As long as the Fed follows a predictable rule, households and businesses will be able to make accurate forecasts of inflation. And if they can make accurate forecasts, the economy will perform well. Unemployment arises when they make forecasting errors.

K: That's what you say. But I still have a hard time thinking of the Great Depression as some sort of prediction error.

C: Where does your upward-sloping aggregate supply curve come from, then? In microeconomics,

²¹ This terminology comes from Friedman, Benjamin M. 1975. “Targets, Instruments and Indicators of Monetary Policy,” *Journal of Monetary Economics* 1: 443-473

the law of supply refers to relative price changes. If the price of hamburgers goes up relative to the price of hot dogs, butchers will want to supply more hamburgers. However, in macroeconomics, when we say that the price level goes up, we are saying that the prices of all goods and services go up. There is no relative price change. Accordingly, why should there be any response in terms of supply?

K: One approach is to suggest that nominal wages are sticky. Workers are reluctant to accept wage cuts in a downturn. Unemployed workers are willing to work at the existing wage or slightly lower, but wages do not adjust downward to reduce this excess supply in the labor market. This results in a positive relationship between prices and output. When prices are low relative to nominal wages, output and employment are low. If aggregate demand policies increase prices, this will raise employment and output.

C: So workers appear to be unwilling to accept wage cuts in nominal terms. However, if the wage cuts come in the form of higher prices, they are more willing to accept them. This is known as money illusion. We Classicals do not believe in money illusion.

K: Studies of wage behavior tend to confirm stickiness, particularly with respect to wage cuts. Surveys of wage changes in the economy show a large concentration at zero (meaning no change), with a fair number of increases, and very few decreases.

C: Nonetheless, the hypothesis of money illusion is a bit difficult to swallow. When prices are rising, workers tend to demand cost-of-living increases, which suggests that they care about real wages, not just nominal wages. As with any form of irrational behavior, it is easier to believe that money illusion is small and short-lived than to believe that it is large and persistent. How plausible is it that during the decade of the Great Depression wages were not able to adjust relative to prices?

One clear implication of the money-illusion hypothesis for aggregate supply is that real wages should be countercyclical. When we observe high employment, we should observe low real wages, and vice-versa. In fact, there does not appear to be any consistent relationship, either positive or negative, between real wages and employment.

K: Some Keynesians suggest that prices, too, are sticky. This would explain the cases in which real wages do not behave countercyclically. The challenge is to come up with a persuasive explanation for nominal price stickiness.

In any case, both your models and ours suggest that the best outcomes are when inflation aligns with expectations. We can agree for now that inflation surprises are a bad thing.

C: Speaking of inflation, I don't think you ever really dealt with it properly. Take the IS-LM model, for example, in which there is only one interest rate. But the interest rate that you use to balance supply and demand in the money market is a short-term nominal rate, while the interest rate that affects investment is the long-term real interest rate.

K: What we say is that all interest rates move together.

C: But that is not necessarily so. The "rational-expectations" model of interest rates would suggest that the long-term rate is based on the expected future path of short-term rates. In theory, short-term moves should have been anticipated by the market.

K: But investors can be surprised.

C: Sure they can. But they will be trying to figure out what a surprise means about the rule, not just automatically reducing long-term rates whenever the Fed cuts short-term rates.

K: I think we can call a truce on policy disputes, where we agree on the Taylor rule. But I think we still disagree about whether markets behave rationally. That debate is going to simmer for a while.

The Great Moderation, 1985-2007

From 1985 through 1994, while I am at Freddie Mac, the annual unemployment rate stays within the range of 5.3 percent to 7.5 percent, while inflation averages about 3 percent. From 1995 through 2007, when I have my Internet business and then retire to teach and write, macroeconomic performance is even better, as the U.S. goes recession-free with the annual unemployment rate staying within the range of 4.0 to 6.0 percent, while inflation averages just 2-1/2 percent.

The 1985-2007 period sees the White House occupied by Ronald Reagan, George H.W. Bush, William Clinton, and George W. Bush. However, the economic policy figure who dominates the stage is Alan Greenspan, Chairman of the Federal Reserve from 1987 to 2006.

Greenspan is known for having been in the 1950s and 1960s an acolyte of Ayn Rand, the doctrinaire libertarian writer-philosopher. However, he has been sufficiently flexible to serve effectively as an economic policy official both under President Ford in the mid-1970s and under President Reagan in the 1980s.

The Federal Reserve Board staff perceive Greenspan as a detail-oriented data junkie. He appreciates staff economists' tracking of economic statistics and sends them scurrying around like research assistants to investigate further minutia. However, as far as putting together the big picture is concerned, he tends to trust his own instincts.

Greenspan guides the economic ship through some stormy financial weather. On October 19, 1987, the stock market plummets 20 percent in a single day, by far the biggest crash of the post-war period. This crash stunned observers. At any given moment, there are always analysts who argue that the market is overvalued and at the same time there are those who argue that it is undervalued. However, no reputable analyst was suggesting prior to October 19 that shares were overvalued by 20 percent, much less that it was likely that the correction would take place on a single day.

There was little in the way of news to precipitate the crash. Subsequent analysis suggested that the crash was in many respects a self-reinforcing event, perhaps driven by "portfolio insurance" strategies that called for selling as prices fell in order to limit losses. Problems with computer systems and liquidity provision mechanisms also have been cited.²²

Before markets open the following morning, Greenspan's Fed takes steps to ensure that credit markets will not freeze up. The Fed buys securities on the open market, reducing the Fed funds rate. It announces that it is prepared to provide liquidity to financial institutions on an emergency basis if needed.

For the economy as a whole, the crash turns out to be a non-event. While it will take several months for share prices to return to pre-crash levels, GDP growth never falters and the economy does not experience even a minor recession.

By 1996, the question of whether the stock market has gotten carried away is being raised. Shortly after listening to a briefing by Yale economist Robert Shiller, Greenspan gives a talk at the American Enterprise Institute on December 5, 1996, in which he asks,

²² See Mark Carlson, 2007. "A Brief History of the 1987 Stock Market Crash with a Discussion of the Federal Reserve Response," Federal Reserve Board *Finance and Economics Discussion Series* paper 2007-13.
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=982615

how do we know when irrational exuberance has unduly escalated asset values, which then become subject to unexpected and prolonged contractions as they have in Japan over the past decade?²³

The financial press quickly picks up on the provocative phrase “irrational exuberance,” and there is a brief correction in the stock market as investors react to Greenspan's expression of concern. However, the market soon turns around and resumes its upward rise, led by shares in Yahoo! and other darlings of the Dot-com era.

In July of 1997, Thailand experiences a run on its currency, and soon other Asian economies are hit with similar panics. This Asian debt crisis is largely handled with loans and policy recommendations from the International Monetary Fund. (Stanley Fischer is a major player as the IMF's deputy managing director. Joseph Stiglitz will later write a book excoriating Fischer's performance.²⁴) During the two to three years that it takes to resolve the crisis, there are fears that the U.S. economy could be driven into recession. However, those fears are not realized.

In 1998, a large hedge fund, Long Term Capital Management, which had become famous for its high-flying success and the membership on its board of Nobel laureates Myron Scholes and Robert Merton, incurs such large trading losses that it no longer has the confidence of its creditors. Fearing that financial markets would be disrupted if LTCM were forced into bankruptcy, in September Greenspan arranges for about a dozen other firms to provide assistance to LTCM to allow time for its orderly liquidation. Once again, notwithstanding the tension that gripped financial markets, the U.S. economy keeps plowing ahead.

Finally, in March of 2000, one of the Dot-com stars, a firm called MicroStrategy, announces that it will need to restate its earnings to correct some accounting irregularities. This proves to be the pinprick that pops the dot-com bubble. Soon, all of the major Internet stocks are reeling, as are the shares of the rest of the NASDAQ market as well as the New York Stock Exchange. Over the next 18 months, about \$5 trillion in market value is erased by the stock market collapse.

This time, Greenspan is unable to completely avoid economic trouble, as the economy dips into a recession, albeit a brief one, starting in March of 2001 and lasting until November of that year. To try to limit the damage, Greenspan has acted quickly to lower the Fed funds rate, and he keeps it low through what observers complain is a “jobless recovery.” That is, in spite of the turnaround in GDP growth that prompts the National Bureau of Economic Research recession-dating committee to declare that a recovery begins by the end of 2001, unemployment will remain somewhat elevated through 2004.

Overall, the Greenspan era can be summarized as one of remarkable economic stability, particularly given the various episodes of financial market turmoil. Not even the September 11, 2001 terrorist attacks, which directly impaired several important financial firms and thereby required more extraordinary actions by the Fed, hold back the economy.

The lesson that one is tempted to draw is that regardless of the nature of follies and bubbles that grip

23 Alan Greenspan, 1996. “The Challenge of Central Banking in a Democratic Society,”

<http://www.federalreserve.gov/boarddocs/speeches/1996/19961205.htm>

24 The book, *Globalization and Its Discontents*, was published in 2002. Ken Rogoff took strong exception to Stiglitz's attack. Rogoff rose to Fischer's defense in an open letter (<http://www.imf.org/external/np/vc/2002/070202.HTM>).

the financial markets, the Fed can always contain any economic damage by taking steps to soothe markets when necessary and by providing sufficient stimulus with lower interest rates. In 2005, Janet Yellen, then head of the San Francisco Federal Reserve Bank, in a speech about the possibility that the U.S. is experiencing a housing bubble, says,

In my view, it makes sense to organize one's thinking around three consecutive questions—three hurdles to jump before pulling the monetary policy trigger. First, if the bubble were to deflate on its own, would the effect on the economy be exceedingly large? Second, is it unlikely that the Fed could mitigate the consequences? Third, is monetary policy the best tool to use to deflate a house-price bubble?

My answers to these questions in the shortest possible form are, “no,” “no,” and “no.”

Her views represent the consensus among macroeconomists, which is that it would be a bad idea to tighten monetary policy in order to cool the housing market. They believe that monetary policy should focus on overall economic activity. They see no reason to react to rising house prices by cooling the economy. As Yellen implies, if the housing bubble were to deflate, the central bank expects to be able to stabilize the economy with ordinary measures to reduce the Fed Funds rate. This consensus assessment will turn out to have been far too sanguine.

The Era of the DSGE Model

During the Great Moderation, while Alan Greenspan apparently is conducting the economy so harmoniously that he is dubbed “the maestro,” the academic discipline of macroeconomics shrinks and turns inward. The undergraduate textbooks continue to teach the IS-LM-AS model from the 1970s. Meanwhile, graduate courses teach something totally different: the mathematical modeling technique known as Dynamic Stochastic General Equilibrium, or DSGE for short.

In a DSGE model, a representative individual, who acts as the economy's only worker, consumer, and producer (and yet behaves competitively), makes an optimal plan for work, leisure, consumption, saving, and investment for the indefinite future. It turns out that if one introduces random shocks, to productivity for example, the mathematics of this problem are quite intricate. If graduate students are able to master the techniques, they enjoy a sense of having been initiated into an exclusive fraternity.

The dialogue in Act III is an imaginary argument over mathematical modeling and DSGE. The characters are A Simple Kid (ASK) and Olympian Blueblood (OB).

ASK: Why should I bother with DSGE?

OB: Because it has passed the market test. Everyone uses it.

ASK: To me, the market looks more like a cartel which produces a lousy product.

OB: One reason that the DSGE model is popular is that it addresses the Lucas Critique. Lucas pointed out that macroeconomics in the Keynesian tradition implicitly assumed that individuals were not optimizing, particularly in the way that they formed expectations. Therefore, the older tradition lacked firm microfoundations, and because of this it was not reliable. Because the core of the DSGE model is its optimizing representative agent, its microfoundations presumably are robust.

Another reason that the DSGE model is popular is that nothing else is being taught at the leading economics departments. Every new Ph.D is trained in this model, and the new Ph.D's quickly take over the responsibility for teaching graduate macro.

ASK: Indeed. Stanley Fischer has turned into the Genghis Khan of the macroeconomics profession. Just as geneticists have been able to estimate that millions of people alive today can trace their ancestry to Genghis Khan, a striking number of macroeconomicists can trace their doctoral degrees to Fischer.

As Fischer's horde overran the macroeconomics field in the academy, uniformity set in. They add minor wrinkles to DSGE models, in which various “frictions” or imperfections are imposed on the optimizing consumer/worker/producer, so that unemployment can occur. However, the results of these mathematical exercises are nearly always the same. It turns out that in these New Keynesian DSGE models, macroeconomic stability is likely to be achieved as long as the monetary authorities act in a predictable way. There is widespread agreement that a simple monetary rule, such as the Taylor rule that has the Fed adapt the Fed Funds rate to changes in inflation and unemployment, will stabilize the economy.

OB: You would prefer to go back to doing macroeconomics without microfoundations?

ASK: I do not agree that we can equate solving a stylized dynamic optimization problem with having microfoundations. Putting a dynamic optimization equation in the midst of what is otherwise an ad hoc model and calling it microfounded is like putting a Rolls Royce engine in a rusted-out hulk with no wheels and calling it a luxury car.

OB: Are you saying that the way to turn it into a luxury car is to get rid of the Rolls Royce engine?

ASK: I am saying that we should drop the pretense that we are doing physics and instead admit that we are dealing in narrative. Put it this way. Suppose I give you a choice between betting \$1000 on two groups trying to achieve a goal. One group consists of rocket scientists trying to land a spacecraft on the moon. The other group consists of economists enacting monetary and fiscal policy to try to hit an employment target one year from now. Which group would you bet on?

OB: I admit that I would bet on the rocket scientists.

ASK: Right. No matter how much economists try to dress up as rocket scientists, macroeconomics is not rocket science. Why is that? Many laymen would say, “Because macroeconomics deals with human beings, not with physical objects.”

OB: But that does not mean that you should not use mathematics. It just means that the math can turn out to be more complex.

ASK: But when a rocket scientist works with equations, those are equations that have been verified and tested in the real world. The equations in DSGE models are arbitrary conventions. They have not been evaluated to see whether they really apply.

OB: We use microeconomic models that assume rational agents along with other assumptions, and those models work. Is it not logical to use the same assumption in macroeconomics?

ASK: When we study individual markets, we look for situations in which we can isolate only one

factor that changes at a time. We call these “natural experiments.” In macroeconomics, we cannot perform natural experiments. We have only one economy.

OB: But we can observe different policies conducted in different time periods.

ASK: But each time period is different! There are secular trends, such as the decline in the share of jobs in manufacturing and an increase in employment in health care, or the increase in the labor force participation of women and the decline among men. There are unique events, such as the Arab oil embargo or Nixon's wage-price freeze or the Dot-com bubble.

OB: But we do have data. What do you suggest that we do with it?

ASK: I think we ought to treat the historical data the way that historians treat, say, wars or revolutions. Historians understand that it is possible for disparate theories to be tenable given the facts. The same is true in macroeconomics: the same set of historical facts can be interpreted in light of very different theories.

OB: That may be. Still, macroeconomics deals with quantitative measures, such as GDP and inflation. This calls for the language of mathematics. Plain verbal narratives invite ambiguity and outright error.

ASK: Ambiguity and error are not good. But mathematical expression of an idea is no guarantee of its validity.

OB: But why not at least enforce the discipline that mathematical models provide?

ASK: Because that discipline seems to lead to a “lamp-post effect.” You know the story of the drunk who loses his watch? He's looking for it under a lamp post. Somebody asks him, “Where did you lose it?”

OB: Yes, I know the story. He points down the street and says, “I lost it over there.” But when he is asked why he is looking under the lamp post, he says, “Because there is light here.”

ASK: Right, and I think that macroeconomists gravitate toward explanations that they can put into mathematical form because that is their lamp post. They do not necessarily look for the explanation that might be most appropriate for the events that take place. They cannot handle the complexity of the economy. They oversimplify.

OB: Of course models simplify. That is why they are models. But that is also why we need models. They give us insights. Those rocket scientists that you admire use models.

ASK: Yes, but their models are based on physical phenomena that are unchanging and well understood. The mass of the earth does not change. The mass of the moon does not change. Gravity does not change. The chemical properties of fuels do not change. The law of gravity does not change. The laws of motion do not change. And we have learned about all of these things from thorough testing and replication. When rocket scientists write down a set of equations to describe the path of the spacecraft, they know all of the factors that affect that path and they have relatively precise knowledge of the values of the various forces, which they can quantify. In macroeconomics, our measurements are not as precise—who knows whether the adjustments for quality in the consumer price index are correct? A rocket scientist can pin down which factors matter and which factors do not matter. Macroeconomists

cannot do that. Are the details of the financial sector important or are they irrelevant? We don't know. Does computerized inventory management fundamentally change the way the economy reacts to shocks? We don't know. Mathematical models are ahistorical. They make it appear as if there is no context to economic performance, as if any given configuration of unemployment and inflation can appear at any time. In fact, macroeconomic performance is highly context-dependent. We cannot separate macroeconomic outcomes from the characteristics of the economy during which they are observed.

Like history, macroeconomics deals with phenomena that have what James Manzi terms “causal density.”²⁵ That is, there are many factors that act on, say, consumer spending, and consumer spending in turn has many effects on other variables. Physicists typically are able to isolate the factors that affect, say, the speed and direction of a solid ball flying through the air.

OB: So what do you suggest we do instead of modeling?

ASK: I think we have to be fairly humble, for starters. Instead of ruling out causal factors, by focusing on what we can fit into a system of equations, I think we should take a broader view. Historians looking at the outbreak of the first World War can list possible causes. They can give reasons for paying attention to some factors more than others, perhaps based on analysis of other historical events. However, nobody would propose that a system of equations is the best way to summarize the factors that might have caused the war to break out. I think we ought to review and discuss historical events the way that historians review and discuss wars and revolutions. We need to take note of the various changes that take place in each decade that affect the way that the economy performs and the way that it responds to shocks and to policy interventions.

[they exit, still arguing]

Summarizing the macroeconomic research of Act III, Olivier Blanchard writes²⁶

after the explosion (in both the positive and negative meaning of the word) of the field in the 1970s, there has been enormous progress and substantial convergence. For a while—too long a while—the field looked like a battlefield. Researchers split in different directions, mostly ignoring each other, or else engaging in bitter fights and controversies. Over time however, largely because facts have a way of not going away, a largely shared vision both of fluctuations and of methodology has emerged. Not everything is fine. Like all revolutions, this one has come with the destruction of some knowledge, and it suffers from extremism, herding, and fashion. But none of this is deadly. The state of macro is good.

This essay first appears as a working paper in August of 2008. The next act is about to begin, and it will challenge the essay's smug conclusion.

25 James Manzi, *Uncontrolled: The Surprising Payoff of Trial-and-Error for Business, Politics, and Society*. NY, NY: Basic Books, 2012.

26 Olivier Blanchard, 2009. "The State of Macro," *Annual Review of Economics*, *Annual Reviews*, vol. 1(1), pages 209-228, 05.

The Financial Crisis Aftermath, 2008-2013

Because I had worked both at Freddie Mac and at the Fed, I had a personal perspective on the financial crisis. This was a time when I was blogging regularly at a site called Econlog.econlib.org. Therefore, it is easy to reconstruct my thoughts at the time and to offer a real-time diary of the crisis as it unfolded. Here I will devote considerable space to this diary, and then I will return to the larger macroeconomic questions.

My Diary of the Financial Crisis

In 2003, Richard Syron replaced Leland Brendsel as CEO of Freddie Mac. I could make a case that this led to the financial crisis. Brendsel, who was CEO when I worked at Freddie, had long resisted pressures from mortgage lenders and various housing-related interest groups to reduce mortgage loan underwriting standards. In 1990, at a time when a race to the bottom in underwriting standards was threatening to break out, Leland obtained Fannie Mae's agreement to continue to require borrowers to supply documents verifying their income, assets, and employment status. This agreement put a stop to an industry experiment with "low-doc" lending that was not going well.

By the time that Syron took over, the pressure to relax documentation standards was again intense. Also, the standard Freddie/Fannie requirement of a reasonable down payment (20 percent, or 10 percent with mortgage insurance) was being undercut by nontraditional lenders who were bypassing the agencies to sell loans packaged into privately-issued mortgage-backed securities underwritten by Wall Street investment bankers.

Syron quickly caved in on lending standards. Both Freddie Mac and Fannie Mae soon began guaranteeing mortgage loans with little or no down payment and with little or no documentation to verify income, assets, or employment.

One of the few people at Freddie Mac with whom I still kept in contact was David Andrukonis, the company's chief risk officer when Syron joined the firm. A few times a year, Dave and I had lunch together, and on one such occasion he grumbled that Syron seemed to want to turn Freddie Mac into a non-profit. Dave complained that in his own view the so-called "under-served" segment of home buyers was actually over-served. Otherwise, he offered no details, so I had no idea what was going on behind the scenes. Not long afterward, Dave resigned. Later, it emerged that he had been fired as a consequence of sending Syron a memo criticizing the reduced documentation standards.²⁷

Dave's resignation was not the only clue to the coming mortgage meltdown that I received. Another came at a social occasion when another former Freddie Mac employee told me that he had sold short stock in New Century Mortgage, one of the leading subprime mortgage lenders. Working for a private mortgage insurance firm, this friend had seen enough of the flaws in New Century's lending policies to become convinced that the firm was headed for trouble. New Century's bankruptcy in April of 2007 was one of the first major events of what was then known as the subprime crisis.

I ignored such clues. I was among the economists who were least concerned by house prices. House prices should be tied fundamentally to rents, interest rates, and expected house price appreciation. As a first approximation, the ratio of rent to price should be the same as the real interest rate. For example,

²⁷ Charles Duhigg (2008), "At Freddie Mac, Chief Discarded Warning Signs," *New York Times*, August 5, 2008. http://www.nytimes.com/2008/08/05/business/05freddie.html?pagewanted=1&_r=1&th&emc=th

if the mortgage interest rate is .08 (8 percent) and inflation is .03 (3 percent), then the real interest rate is the difference between the two, or .05. The ratio of rent to price should be about the same. If the ratio of rent to price should be .05, then the ratio of price to rent should be 20.

Historically, price-to-rent ratios have been lower than 20. The average seems to be about 10 or 11.²⁸ Factors that hold down this ratio might include other costs of ownership (such as physical depreciation of properties), risks of ownership, and transaction costs in buying and selling.

The price-rent ratio reached unprecedented levels, climbing well above 15 at its peak early in 2006. To me, it seemed that low mortgage rates were behind the rise. Mortgage rates for thirty-year fixed-rate loans were below 6.5 percent from July of 2002 through March of 2006, and for most of that time the rate was below 6 percent. If one assumes inflation of 2.5 percent, with house prices rising with inflation, that means a real interest rate at or below 4 percent. If the real interest rate is .04, then the price-rent ratio could be 25. So 15 did not seem unsustainable to me.

My view at the time was that real interest rates were unlikely to remain so depressed. A big increase in interest rates could dampen price-rent ratios. Otherwise, I was not worried.

In hindsight, I should have done more to connect the decline in lending standards to the rise in price-rent ratios. In addition, it would have helped had I known just how much of the mortgage lending was going to speculators, rather than to owner-occupants. One study showed that the proportion of mortgage loans to non-owner-occupants tripled, from a normal rate of 5 percent, to 15 percent in 2005 and 2006.²⁹ Subsequent studies suggest that in addition to the high rate of reported non-owner occupied mortgage loans, there was also rampant ownership fraud, meaning that speculators falsely told lenders that they planned to occupy the homes.³⁰ Loans to speculators are much riskier than loans to owner-occupants, who tend to be more conservative and more reliable as borrowers.

Now it seems clear that speculative home purchases and lax mortgage underwriting by both traditional and nontraditional lenders served to inflate a housing bubble. However, even as the subprime mortgage crisis emerged in 2007, many economists, including Federal Reserve Chairman Ben Bernanke and me, thought that the crisis would be contained. I still believed that the risk management practices at Freddie Mac and Fannie Mae, as well as regulatory measures to ensure adequate capital at those institutions and at leading banks, were certain to limit the crisis to the nontraditional mortgage lending sector. Only later did I realize that risk-based capital regulations, rather than preventing the crisis, helped to foster it.³¹

In December of 2007, the Fed took its first extraordinary step to deal with the subprime crisis. On December 11, the Fed announced a “term auction facility,” by which it made available short-term loans to banks offering “a wide variety of collateral.” The idea was to keep banks from being caught in a liquidity squeeze.

Many experts were advocating some form of mortgage forbearance to aid borrowers. I was always

28 See for example, Stan Humphries (2010), “A Better Price-Rent Ratio,” <http://www.zillow.com/blog/research/2010/09/21/a-better-price-rent-ratio/>

29 Robert B. Avery, Kenneth P. Brevoort, and Glenn B. Canner (2007), “The 2006 HMDA data,” *Federal Reserve Bulletin*. <http://www.federalreserve.gov/pubs/bulletin/2007/pdf/hmda06final.pdf>

30 For example, see a Fitch report (2007) archived by Huffingtonpost. <http://big.assets.huffingtonpost.com/FraudReport8Nov07Fitch.pdf>

31 Arnold Kling (2009), “Not What They Had in Mind: A History of Policies that Produced the Financial Crisis of 2008,” http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1474430

strongly opposed to this, primarily because so many borrowers had so little equity to start with. On December 4th, I posted on the blog EconLog,

My instinct is to tell the markets to just suck it up and deal with the losses. With that approach, I hope that the worst will be behind us by 2009.

To me, the main problem is to get back to equilibrium in terms of house prices. My fear is that the interest-rate freeze and other bailouts will serve merely to drag the problem out for years.

The sooner we put the foreclosures behind us and get to a market equilibrium in house prices, the sooner the mortgage market will be liquid again. At least, that's my way of looking at it. Obviously, I am in the minority.

The next day, I initiated a sequence of posts under the heading "subprime daily briefing."³² That day, I wrote,

Bank capital standards may be counterproductive at this point. I worry about this scenario: Every bank has to mark down some of its securities, and this means that they need more capital. So they all start selling securities, which means that the prices go down, which means more markdowns, more need to raise capital, etc. I'm not sure that such a vicious cycle truly can occur, but it seems like a possibility worth worrying about. The way to stop it, of course, is to loosen up the capital regs for a bit, under the assumption that the banks really are solvent if the market is given time to recover in an orderly fashion.

My thinking would continue along these lines. I thought that of all the ways to try to avoid a liquidity squeeze, forbearance on bank capital requirements was the least bad alternative.

For the first three months of 2008, my father's terminal illness occupied most of my concern. While my blogging was sometimes prolific, I was not focused on the financial crisis.

During this period, the major development in the financial crisis was the rescue in late March of Bear Stearns, the major investment bank, with the bank J.P. Morgan taking over the firm, aided by the Federal Reserve taking on a large amount of assets that were then of questionable value. At the time, I wrote

I believe that both J.P. Morgan and the taxpayers are going to make a profit at Bear Stearns' expense. I don't see this as creating moral hazard.³³

At the time, some critics argued that this transaction did create moral hazard. In retrospect, their view has gained credibility, but only a minority of economists believe that the bailout was a bad decision.

For the next two months, no major institutions crumbled. However, in June, Countrywide Financial, for many years one of the leading mortgage lenders, had to be absorbed by Bank of America.

In July, Freddie Mac and Fannie Mae came under pressure, as private investors lost confidence in the firms, creating a sizable wedge between the rates the agencies paid on debt and the risk-free rate on

³² These posts make fascinating reading today, in my humble opinion. You can find them by going to this page (<http://econlog.econlib.org/archives7.html>), and scrolling down to the December posts.

³³ http://econlog.econlib.org/archives/2008/03/financial_comme.html

comparable U.S. Treasury securities. On July 13, the Federal Reserve announced that it was prepared to begin lending to Freddie and Fannie. However, I already had concluded that the two agencies were doomed. On July 10, I wrote

I have to figure that a meltdown is possible. The capital that Freddie and Fannie report assumes that they can continue to borrow at cheap rates. If they can't, then all bets are off, so to speak. Even if their assets were transparent (which they're not), they would have a tough time selling them at a decent price. Liquidation is not an option.

Have a nice day.³⁴

On July 14, Paul Krugman wrote,

they didn't do any subprime lending, because they can't: the definition of a subprime loan is precisely a loan that doesn't meet the requirement, imposed by law, that Fannie and Freddie buy only mortgages issued to borrowers who made substantial down payments and carefully documented their income.³⁵

I knew otherwise. In an essay for an online media outlet, I wrote

the GSEs have recently suffered large credit losses on loans that were not of investment quality. These low-down-payment loans were similar to the subprime mortgage loans that fueled the boom and bust cycle in housing. It is not clear why the GSEs chose to purchase these loans, since they are outside of the GSE charters. One story has it that they were afraid of losing market share. Another story I have heard is that the GSEs were under pressure from Congress to do more to provide funds for "affordable housing," and the GSEs interpreted this as requiring more high-risk lending.³⁶

As the government took over Freddie and Fannie on September 7, 2008, I wrote

Five years from now, we could find ourselves with no exit strategy. My guess is that we'll be pretty much out of Iraq by then. But it would not surprise me to see Freddie and Fannie still in limbo.³⁷

As of early 2014, Freddie and Fannie were indeed still in limbo.

On the financial winners and losers from the government takeover, I commented

what is going to happen is that Fannie Mae's debt-holders are going to receive a windfall. They charged Fannie a risk premium, meaning an interest rate a little bit above the Treasury rate, to factor in the possibility that [they might not be bailed out]. So now they are getting U.S. government guarantees on debt that pays a higher rate than Treasuries.

34 http://econlog.econlib.org/archives/2008/07/fannie_freddie.html

35 Paul Krugman (2008), "Fannie, Freddie, and You," New York Times, July 14
<http://www.nytimes.com/2008/07/14/opinion/14krugman.html?hp>

36 Arnold Kling (2008), "Bailing Out Fannie and Freddie," Pjmedia July 15 <http://pjmedia.com/blog/bailing-out-fannie-and-freddie/?singlepage=true>

37 http://econlog.econlib.org/archives/2008/09/freddie_fannie_1.html

If the world were completely fair, then the debt-holders would not make out quite so well. In practice, you can't make the world completely fair.

In practice, the folks at Treasury figure that by doing this now, rather than waiting, at least they stop Fannie and Freddie from issuing debt that pays a risk premium when the Treasury knows that it's the taxpayers who will end up paying that risk premium. So the existing debtholders' profits are grandfathered in, but the hope is that you're not going to keep handing out money to the buyers of new GSE debt.

In fact, much of the government's actions during the financial crisis involved *ad hoc* allocations of gains and losses among different investors. In each instance, the goal of policy makers was to try to minimize the extent to which financial institutions were forced to liquidate risky, long-term assets. Still, it was hard to know when intervention was justified and when it was not. On September 12, when a bailout of Lehman Brothers appeared imminent, I wrote,

Government officials try bailouts for two defensible reasons. First, they believe that the firms' assets are more valuable than they will appear to be if they have to be sold quickly. Thus, the government may lose little or nothing if it arranges to hold those assets for a while. Second, the officials are hoping to avoid a domino effect in which the failure of shaky firms causes good firms to fall also.

However, government officials also have a "not on my watch" attitude. That means, it always makes sense to engage in short run behavior that props up the system, even if in the long run it makes the system more fragile. In the long run, it might be better to [let a firm fail]. In the short run, it is unthinkable.³⁸

On September 14, the venerable brokerage firm of Merrill Lynch was taken over by Bank of America. On September 15, however, Lehman Brothers filed for bankruptcy. In retrospect, many questions have been raised about the wisdom of bailing out Bear Stearns but not bailing out Lehman. It would seem that at least one of those decisions has to be wrong.

At the time, however, regulators thought that major financial institutions had used the period after the bailout of Bear Stearns to solidify their positions and to reduce their exposure to wobbly counterparties. This assumption was almost immediately proven false.

The oldest money market fund, Reserve Primary, had invested heavily in short-term securities issued by Lehman. In my view, this exposure provides evidence in favor of those who saw the Bear Stearns bailout as creating moral hazard. On September 16, the Lehman bankruptcy caused Reserve Primary to "break the buck," meaning that its money market shares fell below one dollar in value. Officials at the Fed and elsewhere feared that this would spark a run on money market funds, which would have been a total disaster. This was the day on which the financial crisis appeared to be spinning out of control.

Also on September 16, the Fed authorized lending to AIG insurance. Perhaps more than anything else, the intervention in AIG illustrates the bizarre nature of the crisis and the *ad hoc* character of the interventions.

From 2003 through 2005, AIG played a key role in the process by which Wall Street firms issued

38 http://econlog.econlib.org/archives/2008/09/the_financial_i.html

mortgage-backed securities. These securities were carved up into “tranches,” with the objective being to obtain the maximum amount of AAA-rated securities backed by subprime mortgage loans. Some of the tranches could not obtain AAA ratings, even though most financial modelers considered these tranches to be safe. This created an opportunity for AIG to engage in what looked like arbitrage. AIG itself was rated AAA, and when its Financial Products Division guaranteed the tranches against default, these tranches became AAA. AIG's guarantees were known as credit default swaps (CDS), and AIG issued them in large amounts, earning fees for what its financial engineers calculated to be essentially zero risk. However, by the end of 2005, AIG's senior management became concerned about this exposure, and they stopped the Financial Products Division from issuing any more CDS on mortgage-backed securities. It was at this time that Freddie and Fannie stepped up their purchases of subprime mortgages—otherwise the subprime lending boom would have come to a halt at that point.

As of September of 2008, AIG still had not incurred any losses on its CDS. However, the chances were increasing that some of the tranches on which AIG had written CDS would go bad, in which case AIG would have to fulfill its guarantee. Because this possibility was closer than it had been before (in option terminology, the options that AIG had written were now not so far out of the money), major counterparties of AIG, including Goldman Sachs and several other domestic and international financial institutions, exercised their contractual rights to have AIG put up more short-term liquid securities as collateral. These “collateral calls” meant that the counterparties wanted more than AIG's AAA rating standing behind its guarantee. They wanted short-term Treasury securities that they could hold for the remainder of the life of the mortgage tranches.

It was these “collateral calls” that sent AIG reeling. To obtain enough short-term securities, AIG would have had to sell major assets of its insurance business, and on short notice such sales would have resulted in big losses. To forestall this, AIG accepted loans from the government. However, the terms of those loans were onerous, and AIG subsequently had to sell parts of its business in order to repay the loans.

The net effect of the AIG intervention was to funnel billions of dollars of short-term assets to Goldman Sachs, Deutsche Bank AG, and other counterparties of its CDS³⁹. This improved the short-term liquidity of those firms. However, the actual losses on the tranches guaranteed by AIG ultimately were far less. AIG shareholders took a major hit as a result.

Instead of making its poison-pill loan to AIG and helping Goldman and the other counterparties, the government could have told those firms to suspend their collateral calls until actual defaults occurred on the underlying mortgage-backed securities. I saw the government's actions as rewarding the firms that were causing the liquidity squeeze, and I advocated the opposite.

I think that the people who insist on Treasuries as collateral should have to pay a financial penalty, just as someone who has a CD at a bank can be assessed a penalty for early withdrawal. By punishing liquidity preference, we could stop the liquidity squeeze.⁴⁰

By now, my initial sympathy with policy makers had turned to disenchantment. My outlook was particularly darkened when On September 17 I read an op-ed by Nicholas F. Brady, Eugene A. Ludwig, and Paul A. Volcker, three venerable former financial officials. They wrote,

We should move decisively to create a new, temporary resolution mechanism. There are

39 See “Top U.S., European Banks Got \$50 Billion in AIG Aid,” *Wall Street Journal*, March 7, 2009.

40 http://econlog.econlib.org/archives/2008/11/should_we_penal.html

precedents -- such as the Resolution Trust Corporation of the late 1980s and early 1990s, as well as the Home Owners Loan Corporation of the 1930s. This new governmental body would be able to buy up the troubled paper at fair market values, where possible keeping people in their homes and businesses operating. Like the RTC, this mechanism should have a limited life and be run by nonpartisan professional management.⁴¹

I sensed that this idea would appeal to policy makers. But I believed that it was not well thought out. I wrote,

The RTC was bounded. It only had to deal with failed depository institutions. The problem today is not limited to any particular type of institution.

The RTC was passive. It received the assets after the S&L's failed. What Brady-Ludwig-Volcker are proposing is an active agency, that would "buy paper." Buy at what price? Using what guidelines?⁴²

However, within days, it was rumored that this is the sort of plan that policy makers were considering. Treasury Secretary Henry Paulson soon latched onto the idea of a government agency to buy up "toxic assets." By September 21, he had proposed the Troubled Asset Relief Program (TARP), a three-page piece of legislation authorizing up to \$800 billion in asset purchases.

On September 22, I once again advocated a solution based on capital forbearance.

My alternative is to encourage new lending by lowering capital requirements at the margin. Tell banks that loans issued after September 1, 2008, require half the capital of similar loans issued before September 1. Some banks are in such bad shape that even with those lower capital standards they will not be able to make new loans. Fine. You don't want those banks to grow. But other banks have room to grow, and you want them to grow more than they would under the existing regulations.⁴³

On September 23, I watched this exchange on the PBS News Hour, between interviewer Jeffrey Brown and Eugene Ludwig.

JEFFREY BROWN: Let me ask you, stay with you. One of the issues that we heard raised in the hearing was the question of whether anybody can fairly value the bad assets out there, how this would work mechanically. What do you think? How should that work?

EUGENE LUDWIG: The plumbing can clearly be taken care of. This is not the first time we've dealt with these kinds of mechanisms or crises.

Hearing this, I exploded with anger.

I am sure that Henry Paulson, Ben Bernanke, and Eugene Ludwig know more than I do about the current health of the banking system, the state of credit markets, and the potential risks to the economy...

41 Nicholas F. Brady, Eugene A. Ludwig, and Paul A. Volcker, "Resurrect the Resolution Trust Corp.," *Wall Street Journal*, September 17, 2008. <http://online.wsj.com/news/articles/SB122161086005145779>

42 http://econlog.econlib.org/archives/2008/09/morning_comment.html

43 http://econlog.econlib.org/archives/2008/09/a_simpler_solut.html

But an issue about which they know less than I do is mortgage credit risk. To them, the problem of pricing mortgage assets is a detail to be worked out later, as when Ludwig sniffs that he is sure that "the plumbing can be taken care of." Well, I'm a plumber, and I don't think so. Based on my knowledge of pricing mortgage credit risk, I believe that the bailout proposal is far riskier than other alternatives.

How did we get into this mess in the first place? We got here because financial executives took on mortgage credit risk without understanding what they were doing. Some of them were new to the business, like the high-flying Wall Street firms who entered the industry during the boom. Some of them thought they were insulated from risk, because of new derivative hedging instruments. Some of the executives never belonged in the business in the first place, including Dick Syron at Freddie Mac, who in 2003 took over a firm where there was lots of knowledge of mortgage credit risk and proceeded to flout the warnings of experienced middle managers and the Chief Risk Officer about the firm's plunge into subprime lending. Congressional and Administration meddling in support of "affordable housing" played a role, and those folks are still around working on the latest legislation.

...I have to warn that nobody involved in the bailout proposal has sufficient knowledge of mortgage credit risk. They are like Dick Syron--in over their heads without realizing it. The last thing we need in the mortgage market is another large, inexperienced player.

You can say that after the bill is enacted, the big boys will hire technical economists to deal with the plumbing. But that will be too late. Technical economists will not be able to fix a concept that has such poor risk-reward trade-offs built into it.⁴⁴

I began to speak of a "suits vs. geeks" divide. The "suits" were high-level executives and policy makers who did not understand the intricacies of modeling mortgage credit risk. Geeks were those who, like myself, had experience with modeling credit risk. Suits thought that buying up toxic assets would be easy. Geeks thought it would be nearly impossible.

In the middle of the debate over the TARP proposal, I paused to question the underlying macroeconomic theory.

What macroeconomic theory says that we run the risk of a Depression if we don't have a bailout? Try to come up with an argument that is either already in a textbook or that you would put in a textbook. If macro is a genuine discipline, it has to consist of something more rigorous than "If Bernanke is worried, then so am I."

In layman's terms, we are trying to answer the question of how Wall Street relates to Main Street. How do you explain why we need to help Wall Street to help Main Street?

The IS curve, for example, represents a feedback mechanism from Wall Street to Main Street. When credit markets tighten, interest rates rise, and investment declines.

...The textbook analysis says that when interest rates rise, the Fed can supply more money to bring them back down. Why can't that work today? Any macro theorists want to answer?

44 http://econlog.econlib.org/archives/2008/09/the_ignorance_b.html

Bueller?

As far as I can tell, the theory that is implicitly being employed today is something like the following.

The Fed is constrained by a "bank capital trap." ... the binding constraint at banks is capital requirements, not reserve requirements. Adding more reserves has no effect. If the Paulson plan is turned down, then this theory says that the binding capital constraint will lead to higher interest rates for borrowers, a slowdown in economic activity, more loan defaults, more erosion of bank capital, and a downward spiral.

I have not seen the "capital trap" theory in any macro textbook. How can we be undertaking one of the most extreme policy measures in economic history based on a theory that no one has ever studied?⁴⁵

Even after TARP legislation finally passed on October 3 (it lost on its initial vote), I complained about it.

There is an important difference between the financial sector today and the financial sector of the early 1930s. Back then, our financial services were underdeveloped. There was no deposit insurance. When banks failed, there was no safe place for households to put savings, other than under a mattress. There was no place for them to go for mortgages.

Today, if anything, we have an overdeveloped financial sector. Harvard economics professor Kenneth Rogoff, former chief economist at the International Monetary Fund, believes that the financial sector in the United States is bloated and needs to shrink. The ongoing consolidation in finance has even further to go, in his view. While this is unpleasant for those who work in the field, it is necessary to achieve better balance in our overall economy. We could see a large reduction in the number of firms and the number of people employed in financial services without impairing households' ability to invest safely or obtain credit that they can use prudently.⁴⁶

On October 6, the Federal Reserve began a new policy of paying interest on reserves. From this point on, the Fed could purchase assets and fund them with reserves but without stimulating bank lending. That way, it could contribute to bank soundness and strengthen the market for some securities, including longer-term Treasuries and mortgage-backed securities, without increasing the money supply. One can argue that the Fed was thereby elevating bank soundness to a higher priority than stimulating the rest of the economy.

When it came to implementing TARP, it turned out that Eugene Ludwig and the other "suits" were wrong. The Treasury could not quickly come up with a way to buy troubled assets. Instead, on October 14, they announced a plan to inject capital into major banks. In the end, TARP funds were put to a wide variety of uses, including a bailout of General Motors. The original idea of buying up "toxic assets" was forgotten.

Looking back now, I would say that the macroeconomic effects of TARP and the other extraordinary measures are difficult to assess. It is easier to identify winners and losers among investors and

45 http://econlog.econlib.org/archives/2008/09/where_are_the_m_1.html

46 <http://www.american.com/archive/2008/october-10-08/main-street-vs-wall-street>

creditors. For example, AIG's creditors did well, at the expense of its shareholders. GM's employees did better than they would have under bankruptcy, at the expense of its bondholders. Some banks, such as Citigroup, that appeared to be very shaky in September of 2008, were probably saved by the capital injections and interest-bearing reserves.

Up until this point, my two main concerns with policy in this period were:

1. The ignorance of policy makers about mortgage credit risk and the nature of contemporary financial markets.
2. The complete disconnect between macroeconomic theory and the policies that were followed.

Perhaps, in spite of their ignorance, the policy makers stumbled their way successfully through the crisis. However, with no possibility of conducting a controlled experiment, we can only guess at the counterfactual of what would have happened had they done things differently.

One thing they might have done differently was adhere more closely to the previously-prevailing theory, which would have said that policy makers can tolerate the failures of financial institutions, because monetary expansion could offset any decline in demand that might result. That hardly anyone believes this to be the case is an indication of the need to rebuild macroeconomic theory so that it can justify the actions that policy makers undertook.

However, if one is going to completely rebuild macroeconomic theory, one need not necessarily end up supporting the policy actions. In fact, my views on macroeconomic theory eventually went in a different direction.

On December 18, George Mason University economist Tyler Cowen wrote a blog post that began,

Is the financial crisis — which is rapidly becoming the "real economy" crisis — somehow the "dual" of the socialist calculation problem?⁴⁷

Influenced by this idea, three weeks later I wrote,

I view a recession as a special case of an information problem. A recession arises because individuals, investors, and entrepreneurs realize that they have committed resources to unprofitable projects. Currently in the United States, too many resources were committed to housing and mortgage securitization. Perhaps this information error was caused in part by monetary policy. Perhaps it was caused in part by other government distortions. Perhaps it was mostly a naturally-occurring information failure caused by speculative fever and poor judgment. It does not matter to me whether the cause was government or the market. There was an information failure, and now the economy needs to make a sudden, sharp adjustment. We have unnecessary resources in the construction and finance sectors.

The problem is to figure out where the resources should go. Which other sectors have the greatest marginal use for these resources? This problem eventually will be solved by the market. However, in the short run, the problem is so severe that the market is overwhelmed. Many of the adjustments that are taking place, rather than absorbing unemployed resources, are

⁴⁷ <http://marginalrevolution.com/marginalrevolution/2008/12/a-simple-model.html>

generating reductions in economic activity in other sectors...

it is misleading to suppose that a government transfer from savers to spenders necessarily puts the economy on a better path. Instead, such a transfer may keep resources from getting to where they need to go in the long run.

If the spenders make decisions that are compatible with the long-run path for the economy, then this fiscal stimulus will be helpful. However, if the spenders cause resources to be committed to projects that ultimately are unsustainable, then any relief is only temporary.⁴⁸

In August of 2009, I took up this idea again.

The "socialist calculation debate" ...concerns the mistakes that a planner is likely to make in the absence of the information provided by markets. However,... markets do not insulate the economy from planning mistakes. Entrepreneurs can make mistakes. Builders can construct houses and shopping malls that turn out to be unwanted. Individuals can obtain educational degrees that turn out to be in fields for which there is insufficient demand. Workers can develop experience in firms and industries that subsequently fail, leaving the workers with skills that have greatly diminished market value.

...Fischer Black had exactly the story of planning errors that I talked about, but he grafted onto it the theory of the Capital Asset Pricing Model, which says that people diversify away all idiosyncratic risk. Thus, everyone either does well together or does poorly together. Some people (think of government workers) choose "low-beta" assets, and so their economic circumstances change relatively little over the cycle, while others (think of people who buy stock index funds on margin) choose "high-beta" assets and get tossed around in whatever economic storms that blow in.

I don't think that the CAPM is even a decent approximation for the distribution of risk. That is, I think people take a lot of idiosyncratic risk, particularly in terms of their human capital, which is for most people their biggest asset.

I think that in the last 18 months, an unusually high number of people have had their plans go awry. They wish they had made different choices in terms of their education and occupations. Digging out from these mistakes is going to take a long time. A lot of recalculation needs to get done, and the problem is really daunting.⁴⁹

I believe that this the first time that I referred to a recession as a "recalculation problem." That idea in turn evolved into my outlook as of 2014. But let us step back and examine the broader issues involved in addressing the macroeconomic analysis of the financial crisis and its aftermath.

The Economics of the Financial Crisis

Prior to 2008, there actually were many macroeconomists who saw the possibility of a crisis. However, the potential crisis that concerned us was not the crisis that we got.

From about 2005 to 2007, what worried macroeconomists were the so-called international savings

48 http://econlog.econlib.org/archives/2009/01/lectures_on_mac_11.html

49 http://econlog.econlib.org/archives/2009/08/an_alternative_1.html

imbalances. In some countries, notably China, domestic saving far exceeded domestic investment. In other countries, notably the United States, domestic investment far exceeded domestic saving. The counterpart to these domestic imbalances were trade surpluses (in the high-saving countries) and trade deficits (in the low-saving countries). The fear that macroeconomists raised was of a sudden decline in investor's willingness to hold ever-increasing amounts of dollar-denominated assets. Such a shift would cause a sudden drop in the value of the dollar, leading to inflation and excess demand for goods in the U.S. and a severe decline in demand elsewhere. But this was not the way that the actual crisis played out.

Economists had not thought in terms of a liquidity squeeze in financial markets, nor had they thought about the macroeconomic implications of such a squeeze. Instead, during the Great Moderation, mainstream economics thought of the economy as a car negotiating a hilly road, with monetary policy as the gas pedal. The Fed could maintain the speed of the car by pressing or letting up on the gas pedal, as needed.

In the previous chapter, I quoted Janet Yellen, arguing in 2005 that the housing bubble should not be of concern for monetary policy. Part of her reasoning was the prevalent view that the Fed's gas pedal would be sufficient to maintain the car's steady pace even should the housing bubble suddenly deflate.

By 2009, Yellen's views, like those of most economists, had changed. At this time, she said,

the hand we have been dealt today doesn't look anything like the textbook ideal that I just described. Instead, we are experiencing pervasive financial market failures with devastating macroeconomic effects. The normal monetary transmission mechanism has been hobbled by dysfunctional money and credit markets. Risk spreads have ballooned on supposedly safe assets like agency debt and mortgage-backed securities (MBS). What does optimal monetary policy look like in this situation? How do we gauge the effectiveness of policy actions, and how can we implement and communicate systematic policy responses under these conditions?⁵⁰

To continue the metaphor, it seems that in 2009, the car had a flat tire. The gas pedal was no longer a sufficient tool for maintaining speed.

I propose the gas pedal as a metaphor for continuity. The flat tire is a metaphor for discontinuity. If the economy is characterized by continuity, then in any given month it behaves similarly to the way that it behaved in previous months. The economy does not suddenly “jump” from one state to a very different state. Typically, macroeconomic models embody continuity, in that they do not allow for sudden jumps. In order to describe an economy that can shift suddenly, a model must incorporate multiple equilibria, or what I would prefer to call discontinuity. With discontinuity, a relatively small deviation in behavior can lead to a large change in outcome.

In the wake of the financial crisis, the economy seemed to have jumped to a very different state. There was at least one discontinuity, perhaps two. The first discontinuity was the financial crisis itself. The deterioration in the condition of major financial institutions was sudden, not gradual. The candidate for the second discontinuity is the sharp drop in employment that took place in late 2008 and early 2009, with hardly any recovery four years later. (If we attribute the dismal labor market performance entirely to the financial crisis, then perhaps we should think in terms of only one discontinuity.)

⁵⁰ Janet Yellen (2009). “Financial Markets and Monetary Policy,” Panel discussion for the Federal Reserve Board/*Journal of Money, Credit, and Banking* (JMCB) conference. <http://www.frbsf.org/our-district/press/presidents-speeches/yellen-speeches/2009/june/yellen-financial-markets-monetary-policy-closing-panel/>

An example of a discontinuity is a bank run. Even if the real situation in the economy changes slowly, perceptions can shift quickly and cause a bank run. Prior to a bank run, investors perceive the bank as sound. During and after the run, they suspect that the bank may not be able to meet its obligations. Even if reality is changing slowly, the change in perception can take place relatively quickly, and its effects can be dramatic.

The financial crisis of 2008 has been characterized by some economists as a bank run that took place in the institutional lending market, also referred to as the shadow banking system. This raises the issue more generally about perception and reality in the financial crisis and its aftermath.

With respect to perception and reality (or liquidity and solvency), a firm might be in one of three states:

- 1) insolvent under all circumstances. Investors with funds at risk with the firm are going to experience losses, whether they realize it or not.
- 2) solvent under all circumstances. Even if investors were to lose confidence in the firm, it would be able to meet its obligations to them.
- 3) solvency contingent on investor perceptions. If investors maintain confidence, so that the cost of short-term funding is low, the firm's net worth is positive. However, if investors lose confidence and the cost of short-term funding rises, the firm's net worth would become negative.

It is state (3), contingent solvency, that opens up a path for discontinuity. If investors' perceptions shift, one or more banks can suddenly change state.

In fact, it may be the norm for financial institutions to be in this state of contingent solvency. They are solvent if their investors remain confident, but they are insolvent otherwise.

For example, prior to the crisis, Freddie Mac and Fannie Mae were generally able to borrow at interest rates less than one quarter of one percent above the interest rate on comparable Treasury securities. With this low funding cost, they were able to hold mortgage securities in their portfolios at spreads that were profitable. Had these spreads been maintained, these two government-sponsored enterprises (GSEs) might have been able to maintain their franchises, even with the losses that they incurred on mortgage defaults as a result of the drop in house prices. What made it urgent for the government to take them into "conservatorship" in September of 2008 was the fact that investor perceptions were shifting, and the GSEs were paying more than one percent above Treasury rates, which eliminated their profit margins.

If banks are normally in a state of contingent solvency, then there is always the possibility of discontinuity in the financial sector. A relatively modest adverse shift in perceptions, by causing a run, can lead to a large decline in both liquidity and solvency among affected banks. This can cause a sudden drop in financial intermediation.

How did this financial crisis affect the economy? There are a number of different stories, which are not mutually exclusive. I will briefly lay them out here, and then I will discuss them at greater length. The first two stories primarily attribute the economic distress, including the decline in employment, to the financial crisis. The remaining stories emphasize other factors.

1. New conventional wisdom. The new conventional wisdom is that the financial crisis was a severe blow to aggregate demand. This blow was cushioned in part by preventing major bank failures and in part by fiscal and monetary stimulus that made up for some of the weakness in aggregate demand.
2. Minsky Moment. According to this view, financial cycles are normal. In 2008, we reached the phase in which extraordinary optimism is replaced by extreme pessimism. This produces a shortfall in aggregate demand.
3. Market monetarism. The old conventional wisdom did not posit an independent role for financial crises. Market monetarism sticks to this old conventional wisdom. It says that what happened in 2008 was contractionary monetary policy. This monetary contraction in turn caused both the financial crisis and the economic slump. The financial crisis was a symptom, rather than the cause, of this monetary contraction.
4. Wealth channel. Household wealth plummeted in 2008 and 2009, because home prices declined. This affected the middle class, where housing is typically the largest asset. The drop in aggregate demand is not due to the disruption in financial markets. It is due to the popping of the housing bubble and the effect of lower house prices on middle-class wealth and consumption.
5. Liquidity trap. According to this view, the main problem caused by the crisis was that it necessitated a drop in interest rates beyond what was possible. Achieving balance between saving and investment required a negative real interest rate. With inflation at 2 percent or less, that may require a nominal interest rate below zero, which is not possible in an economy where money can be used as a store of value.
6. Structural adjustment. This view says that the the first two decades of the 21st century find the economy in a transition toward greater use of information technology in the production and distribution process. In the United States, we have seen many 20th century jobs disappear, due to offshoring and technology substitution. The economy is far from the point where 21st century jobs have been discovered. The financial crisis greatly accelerated the effort of firms to shed unproductive workers, but such adjustment would have taken place eventually even without the crisis.

Each of these stories has strengths and weaknesses. My own preference is for the structural adjustment story. I also think that the Minsky Moment idea deserves consideration as an explanation for the low rate of business investment and job creation.

This reflects my disenchantment with conventional macroeconomics. The standard models are ones in which workers lose their jobs because of some shock, and then they get their jobs back either when the shock wears off or it is offset by fiscal and monetary stimulus. I think that most of the jobs that have been lost since 2008 are not coming back. New jobs will be created. The interesting issue is how those jobs are created, and how quickly they are created. I do not think that mainstream macroeconomic theories have much to say about how this process plays out.

Let me return to the new conventional wisdom. The policy makers who took steps to shore up (or bail out) banks were acting as if adversity in the financial sector matters more than adversity in other industries. How does an adverse development in the banking industry affect the economy any differently than an adverse development in another sector, such as automobiles or the market for legal services?

Economists believe intuitively that a reduction in financial intermediation is adverse for the economy. During the financial crisis, Treasury Secretary Henry Paulson and others used a plumbing metaphor. They described the financial system as “clogged” with toxic assets, creating serious problems for the entire economy. Another metaphor economists might use is that of a power failure, which has consequences that go well beyond the electricity market. However, the intuition in such metaphors is not embedded in either the theoretical or empirical models that macroeconomists employ. Also, the metaphor of a power failure would suggest that the financial crisis was a supply shock, disrupting production. The conventional wisdom is that it was a demand shock, disrupting spending.

The Role of Financial Intermediaries

I think that we need to start by describing the function of financial intermediaries. I would emphasize the role that intermediaries play in turning risky undertakings into low-risk assets.

Credit-seeking households and firms tend to generate long-term risky liabilities, such as mortgages and corporate debt. Wealthy households and institutions with funds to invest tend to prefer short-term risk-free assets, such as bank deposits or shares in money market funds. In short, the *nonfinancial* sector as a whole would like a balance sheet that consists of short-term, low-risk assets and long-term, high-risk liabilities. The financial sector accommodates this by having the opposite: a balance sheet with short-term, low-risk liabilities and long-term, high-risk assets.

Of course, the same public that makes up the nonfinancial sector also owns the firms in the financial sector. Those of us who own shares in banks, insurance companies, mutual funds, and other financial intermediaries, and those of us who as taxpayers pay for bailouts of such firms when such bailouts are provided, are the ones who bear the ultimate risk associated with financial intermediation, such as mortgage lending and the financing of business ventures.

The executives who run financial institutions use various tools to manage risk. One tool is diversification. If not every depositor is going to ask to withdraw funds at the same time, then the bank can get away with backing short-term deposits with illiquid assets. If not every loan is going to go bad at once, the bank can get away with backing low-risk deposits with assets that are (individually) high in risk.

Another tool is selection. As an individual, I do not have the knowledge to distinguish sound loans from unsound loans. I would rather participate in risky projects as a depositor and/or shareholder in a bank that has expertise in this area.

Still another tool is monitoring. Suppose that, as an individual, I were to make a commercial loan. If the borrower stopped making payments on schedule, I would not know whether to renegotiate the loan, take the borrower to court, or write the loan off completely. The bank does that for me.⁵¹

Even using all of these tools, the bank may get in trouble. It could make poor decisions, resulting in more loan losses than it has allowed for. However, it will be difficult even for management to know precisely the state of the bank. It is always possible that depositors will not seek an early withdrawal of funds, and the bank may recover. It is always possible that some of the seemingly bad loans will turn out to be sound. Managers cannot be sure, and they are likely to err on the side of optimism. It will be harder still for outsiders, including regulators and depositors, to make an assessment.

⁵¹ See Douglas Diamond (1984), “Financial Intermediation and Delegated Monitoring,” *Review of Economic Studies* 51, pp. 393–414.

Unless deposits are insured, depositors will have to guess the condition of the bank. If they are confident that the bank is sound, then they will keep their funds on deposit. If they are less confident, then it may be prudent to withdraw funds. If many depositors lose confidence at the same time, a run ensues. If the bank is only contingently solvent, then the run will ruin the bank.

As Gary Gorton and others have pointed out, in the United States, many financial institutions use short-term funding instruments that are not insured deposits. This “shadow banking system” is subject to runs.⁵²

Starting in late 2007, and reaching a crescendo in September of 2008, perceptions of the soundness of financial institutions changed dramatically for the worse. Neither investors nor regulators could ascertain the true status of financial institutions, but the reluctance to renew short-term loans had the effect of a bank run. As a result, the financial sector lost some of its ability to accommodate the desire of the nonfinancial sector to issue risky long-term liabilities and hold riskless short-term assets. Financial intermediation contracted dramatically, and many observers believe that the contraction would have been even worse without the extraordinary measures taken by the government to rescue financial institutions.⁵³

The conventional wisdom is that keeping the banks from going under was necessary in order to prevent a recurrence of the Great Depression. Inevitably, this raises the issue of what caused the Great Depression, a question that continues to perplex economists and to elude consensus.

Monetarists' understanding of the bank failures of the 1930s, when about one-quarter of all banks ultimately had to close, is that it caused a large decline in the money supply. In Milton Friedman's view, it was the monetary contraction that caused the Great Depression, and the bank failures were a major factor in the monetary contraction.

Ben Bernanke, in his research in the early 1980s, suggested that in addition there was a “credit channel,” in which a decline in financial intermediation by itself curtails economic activity, regardless of its effect on the quantity of money.⁵⁴ A particular bank has invested in relationships with particular borrowers, and if the bank fails, then those borrowers have to incur high fixed costs in establishing relationships with a different bank. Bank failures impose a cost by disrupting existing credit relationships. It was Bernanke, of course, who was Federal Reserve Chairman when the financial crisis of 2008 broke, and he generally sought to preserve large financial institutions in order to avoid disrupting the “credit channel.”

My own view continues to be that in the years leading up to the crisis we had *too much* financial intermediation. This meant that real economic activity included too many enterprises with high risks

52 Gary B. Gorton and Andrew Metrick (2010), “Securitized Lending and the Run on Repo, Yale ICF Working Paper 09-14 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1440752

53 The Booth Business School at the University of Chicago conducts occasional polls of roughly 40 economists representing a range of view points. One such poll asked the respondents to agree or disagree with the statement, “Taking into account all of the economic consequences — including the incentives of banks to ensure their own liquidity and solvency in the future — the benefits of bailing out U.S. banks in 2008 will end up exceeding the costs.” At the time that the poll was taken, the majority agreed. Comments by the economists indicated that the benefits had to do with preventing worse economic performance. http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV_0qeKwxLWkDyiwjX

54 Bernanke, Ben S. (1983). “Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression,” *American Economic Review*, vol. 73 (June), pp. 257-76.

and low returns. Obviously, there was too much housing construction. But in addition, many firms were trying to hold onto market segments or expand into market segments that did not yield sustainable profits. If financial intermediation had been less aggressive, then employment might have been lower in these cyclically sensitive areas of the economy and higher elsewhere.

To draw out the contrast between my view and the other views mentioned, imagine that we had a television interview or talk show featuring these various interpretations of the financial crisis.

The Crisis Discussed in Talk-show Format by Mainstream Economists

Moderator: We are here to talk about the economy. We have three main questions. First, was the housing bubble a macroeconomic event, meaning that it was caused by macroeconomic policies? Second, did the financial crisis cause the subsequent recession and poor recovery? Finally, how effective were the policies that dealt with the economy in the wake of the financial crisis, and what might have worked better?

We have two panels with us today. Our first panel has two mainstream economists, one a liberal and one a conservative. The other panel has four economists from outside the mainstream. Let's start with our conservative mainstream economist. What do you blame for the housing bubble?

Conservative: Back when Paul Samuelson was a columnist, during a recession he would write “If you turn this recession upside down, it will say, 'Made in Washington.’” Today, I would say that if you turn the housing bubble upside down, it would say “Made in Washington.” First of all, housing policies imposed lending quotas on banks and on Freddie Mac and Fannie Mae that forced them to go after unqualified borrowers. Second, the Fed kept interest rates too low for too long, especially in 2004.

Moderator: Just to remind you, the Chairman of the Fed at the time was Alan Greenspan, and the President was George W. Bush. Does our liberal mainstream economist agree that they are to blame for the housing bubble?

Liberal: Yes, but not for the reasons that my conservative friend just gave. The bad loans were made by companies chasing after profits. Freddie, Fannie, and the regulated banks did not even make the worst loans. The worst loans were made by unregulated lenders and put into private securities. I think that the problem was the deregulation of the financial sector, and some of the blame for that actually goes back to the Clinton Administration, and even earlier. Greenspan and the other regulators just had too much confidence in free markets.

Also, I do not believe that we should blame the Fed for low interest rates. I agree with what Ben Bernanke said in a speech when he was one of the governors of the Federal Reserve Board, but before he became its chairman.⁵⁵ He noted that the United States was experiencing a large capital inflow, which can be thought of as an excess of savings in foreign countries. Foreign investors were heavy purchasers of U.S. assets, including mortgage securities. This may have fueled the housing bubble.

However, what economists were most worried about was the fact that the dollar was at unsustainably high levels. That is what Bernanke's speech was about. If you think that the dollar may be too high, then you do not want to raise interest rates, because that would raise the value of the dollar even more.

55 Ben Bernanke, “The Global Saving Glut and the U.S. Current Account Deficit,” March 10, 2005.
<http://www.federalreserve.gov/boarddocs/speeches/2005/200503102/>

Also, look at what was happening to long-term rates at the time. From the second quarter of 2004 to the second quarter of 2005, the Fed Funds rate went up, 1.0 percent to almost 3 percent. During that same time period, the ten-year Treasury rate actually declined, from 4.6 percent to 4.2 percent. So you can see why Bernanke talks about a savings glut. The Fed is trying to tighten, and the bond market is going in the other direction.

Moderator: When the bubble started to pop, Bernanke and the other regulators thought that the problem would be contained. So did the two of you, I believe. I think everyone was surprised at how fragile and interconnected our big financial institutions had become. There was a time around August and September of 2008 when every week it seemed as if another financial giant was about to go under.

The TED spread, which is the difference between the three-month eurodollar interest rate (which pertains to interbank lending) and the three-month Treasury bill rate, was considered an indicator of financial uncertainty during the crisis. It is considered elevated when it is higher than 100 basis points. On a monthly-average basis, it rose above that threshold in July of 2007. It remained above 100 basis points through January of 2009, except for a brief dip to 80 in May of 2008, following the rescue of Bear Stearns. From August through November of 2008 it was over 200 basis points, with a peak monthly average of 315 basis points in September.

Meanwhile, coincidentally, Ken Rogoff and Carmen Reinhart were wrapping up the research on *This Time is Different*, their history of financial crises. What they found was that financial crises are often followed by big recessions and slow recoveries. Does that explain what we are seeing today, and how does it fit in with your mainstream models? Am I correct that mainstream models, which you call DSGE, do not even include a banking system or any financial sector at all?

Conservative: Well, yes, a DSGE model typically does not include an explicit financial sector. However, macroeconomists have always been interested in the financial sector. Incidentally, I think people sometimes overstate the conclusions of Reinhart and Rogoff. Not every financial crisis results in a prolonged slump. For example, Michael Bordo and Joseph Haubrich found that in the U.S., financial crises often have been followed by rapid recoveries.⁵⁶

Liberal: Yes, there is a lively debate concerning the role of financial phenomena in macro. Ben Bernanke's research in the 1980s appeared to show that bank closures helped deepen the Great Depression, but not everyone agrees. To people living in the 1930s, it seemed that the stock market caused the Great Depression, but economists think more in terms of problems with the gold standard.

We need to work more on modeling the way that the financial sector affects the economy. For now, we have a number of channels. For example, there is Tobin's q . James Tobin proposed that the ratio of the market value of capital (stock prices) to the replacement cost of capital would influence investment. A high value of q (greater than 1) is a signal to invest more, and a low value is a signal to invest less.

Moderator: But if that were the main driving force in the economy, we should have had deeper recessions during other stock market declines, such as that of 2000-2001.

Liberal: Right. So we need to look at other channels. We need to look at credit markets. Did they stop functioning well, and did this freeze out borrowers?

⁵⁶ Michael D. Bordo and Joseph G. Haubrich (2012), "Deep Recessions, Fast Recoveries, and Financial Crises: Evidence from the American Record," Federal Reserve Bank of Cleveland Working Paper 12-14.

Moderator: Interest rates remained pretty low, although the spread between privately-issued debt and government debt widened a bit. Was there really that much of a credit crunch?

Liberal: So you never know whether a drop in loan volume is due to demand factors, supply factors, or both. The question is not so much whether interest rates rose as it is whether certain borrowers were rationed out of the market entirely because banks no longer had an appetite for risk. That clearly was true in the mortgage market, but it's not as obvious in other credit markets.

Conservative: I have to say that by the usual indicators, such as the TED spread that you mentioned, the financial crisis was over by the middle of 2009, if not earlier. Yet the civilian employment to population ratio was still depressed four years later. We might want to look at other factors to explain the prolonged slump in hiring.

Liberal: I agree. For example, even if credit markets are back to normal, household balance sheets still took an enormous hit. According to Edward Wolff, the drop in house prices caused the median household's wealth to decline by 47 percent between 2007 and 2010.⁵⁷

Conservative: Steven Gjerstad and Vernon L. Smith also argue that the deterioration in household balance sheets was important.⁵⁸

Moderator: But if balance sheets are the driver, and it was the drop in house prices that damaged balance sheets, then wouldn't it have been better to bail out homeowners than to bail out banks? Why was the bank bailout so crucial?

Most economists think that the bank bailout was necessary, or at least cost-effective. In November of 2012, the University of Chicago Business School asked a panel of 40 economists to agree or disagree with this statement⁵⁹

Taking into account all of the economic consequences — including the incentives of banks to ensure their own liquidity and solvency in the future — the benefits of bailing out U.S. banks in 2008 will end up exceeding the costs.

Of the panel, 10 percent said “strongly agree,” 49 percent said “agree,” 13 percent said “uncertain,” 13 percent said “disagree,” and none said “strongly disagree.” (15 percent of the panel did not answer the question.) Thus, of those who chose to respond to the survey, more than two-thirds thought that the bank bailout was cost-effective.⁵⁹

Liberal: I think that the main reason for that is that economists have the sense that without the bailout, things would have been worse. Some of the banks would not have been able to borrow enough in capital markets to keep operating. The result would have been complex restructuring, and while you were doing that you would have other banks' funds tied up and you could have a total meltdown.

Conservative: I am not so sure about that. I think that there might have been other procedures used

57 Edward N. Wolff (2012) “The Asset Price Meltdown and the Wealth of the Middle Class”

<https://appam.confex.com/appam/2012/webprogram/Paper2134.html>

58 Steven Gjerstad and Vernon L. Smith (2013), "Balance Sheet Crises: Causes, Consequences, and Responses," *Cato Journal* 33:3, p. 437-470

59 IGM forum (2012). http://www.igmchicago.org/igm-economic-experts-panel/poll-results?SurveyID=SV_0qeKwxLWkDyiwjX

that would have produced an orderly resolution without using taxpayer funds to protect all the bank shareholders and creditors. But I agree that doing a bailout was better than letting the situation descend into chaos.

Moderator: We know that the recession began late in 2007, which was before the big problems at Bear Stearns, Freddie and Fannie, and so on. But what I am hearing is that you both believe that the financial crisis is what made the recession so deep, even though right now we don't have the models that might connect the financial crisis to economic performance. Also, if all of these institutions had been left to fail and sort out bankruptcy, the problem would have been worse. So the bailouts, while they may not have been perfect, helped keep us from having a deeper recession, at least if the two of you are correct.

Let's move on to the other policy responses, like the \$800 billion American Reconstruction and Recovery Act, common, which was a fiscal stimulus, as well as the Fed's purchases of long-term bonds and mortgage securities. I think most of the public looks around and says that those stimulus measures were ineffective. Let's take the fiscal stimulus first. The models used by the Congressional Budget Office and others showed that the fiscal stimulus helped--

Conservative: But unemployment wound up higher with the stimulus than the models were forecasting without the stimulus.

Liberal: That just shows that the economy was in an even deeper hole than we thought it was. Without the stimulus, unemployment would have been higher still.

Conservative: You realize that those model estimates take into account nothing that actually happened. The models are constructed to conform to Keynesian theory, or dogma if you will. When the proprietors simulate the models with and without the stimulus, they know that they will get a result that shows higher GDP and more employment with a stimulus. But they are just giving their opinion in the guise of "The computer said so."

Liberal: But it's not just the computer models, which I agree most economists do not think are reliable. Almost any theoretical model says that when interest rates are low, fiscal stimulus is effective.

Conservative: Maybe it *should be* effective. But in this case, the spending was so poorly targeted that it did not work. Where are the green jobs? How many state governments saved the money they got instead of spending it?

Liberal: I agree that the stimulus could have been better designed. I think that President Obama made too many compromises with Republicans. There should have been more spending and fewer tax cuts. Also, I think that the stimulus should have been much bigger. Conservatives always raise fears about government spending "crowding out" private investment. But where is the evidence for crowding out?

Conservative: Look at investment. It seems to go down whenever government spending goes up.

Liberal: But crowding out is supposed to come from high interest rates. Interest rates remained low. In my opinion, when you look at low interest rates, you have to say that those who raise fears about government spending are just wrong.

Moderator: So the two of you disagree about fiscal policy. What about monetary policy? The term

Quantitative Easing, or QE, means that the Fed does not simply intervene in the Fed Funds market. In addition, it buys other assets, such as long-term Treasury bonds and mortgage-backed securities. Was this good policy?

Liberal: Yes. With the Fed funds rate at zero, the Fed was “out of ammunition” at the short end. The economy needed more stimulus, and the Fed provided it.

Conservative: I do not agree. What the Fed did with QE was create uncertainty. It now has a much larger balance sheet than before. Investors do not know how this will be resolved. Will the central bank be able to unwind its purchases without causing disruption? Will there be much higher inflation down the road? People are wary, and when people are wary they do not make long-term investments.

Moderator: Could you take a step back and explain how QE is supposed to work?

Liberal: Sure. The basic idea is that the public wants a certain “portfolio balance,” meaning that they want to hold a mix of short-term assets and long-term assets. This mix depends on the relative interest rates of the two types of assets. When the Fed swaps short-term assets (bank reserves that now earn a low interest rate) for long-term bonds, the public finds itself with too few long-term assets, and it bids up the prices of those assets. For long-term bonds, a higher price means a lower interest rate.

Conservative: You realize, of course, that the Treasury could do the same thing. That is, it could issue more short-term debt and less long-term debt. This would have the exact same effect as QE on the relative supplies of the two instruments.

Liberal: Yes, but this way the Treasury locks in low long-term interest rates and has a more diversified liability structure.

Conservative: Not if the Fed does the reverse! Think of the combined balance sheets of the Fed and the Treasury. When you combine them, the government is being funded almost entirely with short-term debt.

Moderator: So what I hear you saying is that QE could be done by the Treasury. In that case it would be called debt-management policy. But when it is done by the Fed, it is called monetary policy. Interesting. But the bottom line is, does it work?

Liberal: I believe it does. I think that the housing market, for example, would still be in dire straits if mortgage rates were not as low as they have been.

Conservative: I go back to the issue of uncertainty. I think that business investment is being held back because of the uncertainty created by the Fed's bigger balance sheet. The Fed is now financing an unusually large share of the deficit. People are uncertain when it will stop and what the consequences will be when it does stop.

Liberal: I have not seen any measures of uncertainty that show that it is correlated with QE.

Conservative: But look at the civilian employment-population ratio, which as of the end of 2013 was still below what it was even at its worst in 2009. I think that shows that President Obama's policies have not worked.

Liberal: I think it shows that there wasn't enough stimulus.

Moderator: I want to ask a different question. How happy are you with the state of economic modeling in the wake of this crisis?

Liberal: On the one hand, I think this crisis has made us fall back on more ad hoc models, not quite all the way back to IS-LM-AS, but close. It's hard to adapt DSGE to the situation, although it does give us the insight that forward guidance by the Fed can help. That is, the Fed does not just have open market operations in its toolbox. By saying that it intends to keep interest rates low for a long time, it can provide additional stimulus.

Conservative: That has not been proven yet, of course. I think that markets need predictability, and what they are getting instead are predictions, which are not the same thing. I'm pretty doubtful about the "talking cure."

Moderator: Back to economic theory and methods. Given that the financial crisis and its aftermath were not what mainstream economists anticipated, do we need any fundamental changes in how macroeconomists approach the subject.?

Conservative: No, not really. I think we knew all along that policies that distort the market get you into trouble.

Liberal: That's too glib. I think we knew all along that markets can fail. I think that the basic framework of aggregate demand and aggregate supply is right. But I think we need to work on models that spell out the connection between distress in financial markets and the behavior of the overall economy.

Moderator: What about sub-groups in the labor market? I'm thinking of the high rate of long-term unemployment and also the fact that young people seem to be having a particularly difficult time finding jobs. I think both of those phenomena raise questions about the undergraduate textbook story of aggregate supply. How can long-term unemployment be reconciled with the sticky-nominal-wage model? If somebody loses a job in, say, 2009, then shouldn't their real wage have adjusted by 2013? And shouldn't young people with no job experience be immune from sticky nominal wages?

Liberal: I think that all you are seeing are the signs of weak aggregate demand. When the economy is weak, you will have a lot of long-term unemployment. And young people always have unemployment rates that are high relative to the average.

Conservative: You also had a big increase in the minimum wage just as the recession was starting. That makes it harder for young people to find jobs.

The Financial Crisis Discussed in Talk-show Format by Non-mainstream Economists

Moderator: But I was asking about the sticky-wage story. Real wages have fallen, and yet we've had five years now of disappointing jobs numbers. I'm asking whether you have any new theoretical ideas about aggregate supply that might account for some of the patterns we've seen since the Financial Crisis. . . . I am not hearing anything. So, that sounds like a cue to bring our next panel. I believe that each of you departs from the mainstream consensus, but in different ways--

Market Monetarism: Actually, my views are what I took to be the mainstream consensus before the financial crisis. The way I look at it, many of my fellow economists, like the Liberal and Conservative that you interviewed, have abandoned the views that held sway for two decades and gave us the Great Moderation. All of the trouble that we are in now can be blamed on bad monetary policy. The problem is not that monetary policy was too loose before the crisis, as the mainstream Conservative and the Austrians would say. The problem is that monetary policy became too tight during the summer and fall of 2008.

Moderator: Let's let our other guests introduce themselves.

New Liquidity Trap: I believe that the economy is stuck in an equilibrium in which the nominal interest rate is zero and expected inflation is low, so that the real interest rate is too high. We need to overcome political opposition to massive stimulus.

Minsky Moment: My main point is that stability breeds instability. Stability ultimately gives way to financial euphoria, and euphoria ends in a crash, which is what we had in 2008.

Schumpeterian Adjustment: I believe that what we have experienced over the past decade or more is rapid change in the structure of the economy, with new technologies and new international trading patterns. This creative destruction has caused dislocation for many Americans, and that is the main problem that we face.

Moderator: That brings me back to my three questions. Was the financial crisis a macroeconomic event? Did the financial crisis cause the economic downturn? And were the policies appropriate? Let's start with *Market Monetarism*.

Market Monetarism: The financial crisis was a macroeconomic event in that the markets recognized that we were in a tight-money episode. This caused a drop in the value of financial assets, and that in turns put banks in precarious positions.

Moderator: But the Fed lowered interest rates and expanded its balance sheet during the crisis. Doesn't that show that monetary policy was expansionary?

Market Monetarism: Not at all. Interest rates are a price, determined by supply and demand factors. You cannot know that interest rates are falling because the Fed is supplying more money or because market expectations for economic growth are declining. In 2008, it was clearly the latter. As for the Fed balance sheet, the Fed accompanied its new asset purchase programs with a policy of paying interest on reserves. Thus, it encouraged banks to hold reserves idle, rather than lend them out. So the net effect on the money supply was ambiguous at best. In any elementary model of the money market, raising the interest rate paid on reserves is contractionary.

The best indicator of monetary policy is the level of nominal GDP, or NGDP for short. Of course, since monetary policy affects the economy with a lag, you want the Fed to focus on future NGDP. Ideally, we would have a market forecast, based on an NGDP futures contract. The name "market monetarism" comes from this idea that you would use a market indicator of future NGDP to fix monetary policy. Unfortunately, there is no NGDP futures contract, but there are plenty of indicators out there that would allow you to get a pretty good idea of the market estimate of NGDP growth over the next two years. And in September of 2008 those indicators would have told you that we were suffering from a monetary contraction.

Moderator: Are you seriously arguing that it was a monetary contraction that caused the problems at Freddie, Fannie, Lehman....?

Market Monetarism: Not necessarily. But the failure of those three companies was not enough to wreck the economy. Even the failure of another large bank would not have been enough, as long as the Fed supplied enough money to keep NGDP growing at a normal rate of 5 percent per year or so, which is consistent with normal inflation of 2 percent plus normal real growth of 3 percent. Look at this table, which shows the percent growth of NGDP from four quarters ago.

Quarter	Percent change in Nominal GDP from four quarters earlier
2007-Q3	4.8
2007-Q4	4.4
2008-Q1	3.1
2008-Q2	2.7
2008-Q3	1.9
2008-Q4	-1
2009-Q1	-2
2009-Q2	-3.2
2009-Q3	-3.1
2009-Q4	0.1

So in the second half of 2007, the economy is doing ok, although it is far from overheated. But the first half of 2008 is already well below the 5 percent range.

Moderator: And the Fed is lowering the Fed funds rate, from 5-1/4 percent in the first half of 2007 to just over 3 percent in the first quarter of 2008 and down to 2 percent in the second quarter.

Market Monetarism: But that's obviously not enough, as you can tell from how NGDP is performing. Moreover, the Fed funds rate stays at 2 percent in the third quarter of 2008, even though you have all of these indicators saying that the economy is in trouble: the elevated TED spread, and the general atmosphere of panic, including TARP.

Moderator: The \$800 billion Troubled Asset Relief Program enacted in October. But then the Fed drops the interest rate essentially to zero by the end of the year. At that point, wasn't the Fed pretty much out of ammunition?

Market Monetarism: Not at all. Remember that they had started paying interest on reserves. That in itself is contractionary, since it encourages banks to hold excess reserves rather than lend to households and businesses. The Fed should have stopped paying interest on reserves, or never started paying interest to begin with. They could even have charged a penalty on excess reserves.

They were already buying mortgage-backed securities and other assets, and they could have bought more securities, or foreign currencies. My point is that they didn't lack the tools to raise nominal GDP

growth. They lacked the will. And so, if you go back to the table, by the latter half of 2009 nominal GDP is actually down 3 percent from a year ago. When it should be 5 percent higher than a year ago. If you think in terms of levels, the cumulative shortfall is actually greater—NGDP was more than 10 percent below what it should have been.

Moderator: In our earlier panel, both the mainstream liberal and the mainstream conservative economists said that they thought that the financial crisis caused the recession. I gather that you do not agree.

Market Monetarism. Correct. It was contractionary Fed policy that caused the recession.

Moderator: So let's come to my third question, about policy. I can tell that you think monetary policy was not expansionary enough. Did the fiscal stimulus help?

Market Monetarism: No, I am pretty sure it did not help. The point to understand here is monetary offset. That is, when the Fed has an NGDP target, fiscal policy can change the composition of output, but it cannot change the total. Whenever the Fed targets nominal GDP, the fiscal multiplier must be zero. Now in this case, we cannot be sure that the Fed had a target for nominal GDP. Obviously, if they did, it was much lower than what my target would have been. But ask yourself what the Fed would have done if there had been no fiscal stimulus. Without stimulus, everyone's forecast for unemployment would have been higher, with lower inflation. Using any sort of Taylor-rule type reaction function, the Fed would have been more expansionary with less fiscal stimulus. And with any Taylor-rule sort of policy, the expansion would have offset the foregone stimulus.

Moderator: And I'm getting the sense that you don't think that macroeconomists need new ways of thinking about the economy.

Market Monetarism: No, I'm happy with the way we were thinking about it for many years before the financial crisis. I think if you picture aggregate supply as coming from sticky nominal wages and aggregate demand as NGDP you've pretty much got it.

Moderator: But back during the Great Moderation, we did not hear about NGDP targeting. Instead we had the Taylor rule, which says that the Fed should adjust interest rates to unemployment and inflation.

Market Monetarism: The Taylor rule is not bad. One problem is that it is backward-looking. Remember that I say we should target the NGDP forecast rather than wait for NGDP and then react. Another problem is that the Taylor rule does not give guidance about what to do when the Fed funds rate is zero. You can say that at that point you need QE, but how much? I say, you watch the market forecasts for NGDP, and when it's back to the level you want, you have enough monetary expansion.

Moderator: On our earlier panel, our conservative economist said that loose monetary policy caused the financial crisis, and it seemed to me that the conservative thought that monetary policy is too loose today. I believe he was thinking in terms of the Taylor rule.

Market Monetarism: I have to disagree. You could, maybe, maybe, say that there was a small overshoot of NGDP in 2006 when the four-quarter change got to 6 percent. But that is nothing major. The real problem is that we had this horrific undershoot starting in 2008 and throughout 2009, with no attempt to get back to trend.

If you are targeting the forecast, then a Taylor rule and an NGDP rule are pretty similar. Let's take the labor force as fixed. In that case, the growth rate in NGDP is the growth rate in employment plus the growth rate in productivity plus the growth rate of inflation. The Taylor rule would look at employment and inflation. So if you had a positive shock to productivity, the Taylor rule would give you looser monetary policy than an NGDP rule, and conversely. On the other hand, I worry about mis-measuring the inflation rate. If you overstate inflation under a Taylor rule, then your monetary policy will be too tight, and conversely. I think inflation is really hard to measure correctly, so I would rather insulate monetary policy from inflation measurement.

In terms of the Financial Crisis Aftermath, I don't think the difference between the Taylor rule and NGDP targeting is the issue. From a Taylor-rule perspective, we have missed the unemployment-rate target by a lot without overshooting the inflation target. If the Fed had missed its GDP target because it hit its Taylor-rule targets, then we could worry about the difference between NGDP and the Taylor rule. But any way you look at it, monetary policy has been too tight.

Moderator: Let me ask you the same question I asked the mainstream economists. How can we reconcile the sticky-nominal-wage model with these facts: real wages have fallen; long-term unemployment is a significant component of unemployment; and young people are doing particularly poorly in the job market?

Market Monetarism: I go back to the point that I do not trust measures of inflation. In order to measure real wages, you have to take measure nominal compensation rates and adjust for inflation. That make the real wage measure suspect.

Moderator: But if real wages have increased faster than the official data would suggest, then that means that inflation has been lower than the official data would say. But that in turn would mean that productivity is higher than the official estimates. From a labor demand standpoint, that is a wash. One statistic we can look at is the labor share of GDP. That should move countercyclically according to the textbook model, and you can see some slight upward blips in previous recessions. But this time it has moved down.

Market Monetarism: Perhaps even nominal GDP is hard to measure, in which case labor's share is distorted. Sometimes I think that targeting total labor compensation is the best way of assuring stability for employment. You know, if we use labor compensation as our indicator of monetary policy, money has been even tighter than if we use NGDP as the indicator.

Moderator: I see. New Liquidity Trap, do you agree that all of our problems are due to tight money?

New Liquidity Trap: The problem for monetary policy is that Fed liabilities and T-bills have become essentially perfect substitutes. Since the financial crisis, banks have wanted to hold liquid assets. The demand for T-bills is so high that the interest rate is close to zero. It can't go any lower. Economists call this the Zero Lower Bound, or ZLB.

At the ZLB, ordinary monetary policy becomes ineffective. Banks are indifferent between holding T-bills and holding reserves at their account at the Fed, so open market operations are meaningless.

Conversely fiscal policy becomes very effective. The government can raise spending without having any impact on interest rates. It is the perfect time to repair our infrastructure, for example.

Moderator: But you just heard Market Monetarism say that the fiscal multiplier is zero!

New Liquidity Trap: That can't be true if interest rates are fixed.

Market Monetarism: It's true as long as the Fed targets NGDP.

New Liquidity Trap: But the Fed can't target nominal GDP, because open market operations do nothing.

Market Monetarism: No, the Fed can target nominal GDP as long as it can find something to buy. If the Fed bought goods and services--

New Liquidity Trap: Then it would be conducting fiscal policy.

Market Monetarism: It can buy long-term bonds.

New Liquidity Trap: That is debt management. The Treasury can do that.

Market Monetarism: It can buy foreign currency.

New Liquidity Trap: That would work, if other countries allowed their currencies to appreciate. Then our exports would be more competitive and the cost of imported goods would rise, which would dampen imports. But I don't think other countries would allow that, especially since their economies are weak, also.

Market Monetarism: In that case, foreign countries would have to expand their money supplies. The result would be an increase in inflation, which would increase the demand for goods and move along aggregate supply curve.

New Liquidity Trap: I agree that the OECD economies could use more inflation right now. But most of all, they need more aggregate demand. And fiscal expansion has a big role to play.

Market Monetarism: Aggregate demand is NGDP. The Fed controls NGDP. That is why the fiscal multiplier is zero, and what we need is more monetary expansion.

New Liquidity Trap: But conservatives won't let the Fed pursue more expansion. They want the Fed to go in the other direction.

Market Monetarism: I'm a conservative, and I agree with you that conservatives in general are a big part of the problem. But that is not a liquidity trap. That is lack-of-will trap. The Fed, in part because it fears conservatives, lacks the will to implement expansionary policy. It does not lack the means to do so.

New Liquidity Trap: What I care about is getting the economy back to full employment. That means I am going to advocate for both fiscal expansion and monetary expansion.

Moderator: But what is your theoretical argument against Market Monetarist?

New Liquidity Trap: In a model with forward-looking agents, there is an equilibrium where people's

inflation expectations get stuck at a low level, and central bank open market operations cannot change that.

Market Monetarism: But the central bank is not limited to ordinary open market operations.

New Liquidity Trap: The reality is that the central bank is boxed in politically. Unfortunately, Congress is boxed in, too. We need more stimulus, however we can get it.

Moderator: Let's turn to Minsky Moment. First, was the financial crisis a macroeconomic event?

Minsky Moment: Indeed, it was a classic macroeconomic event. I view finance as highly cyclical. First, we have the phase that I call hedge finance, in which businesses try to avoid borrowing. Instead, they fund projects out of earnings. We are seeing that now, with corporations having strong balance sheets and still not investing. Eventually, we get to the speculative finance phase, where businesses are willing to borrow against future earnings in order to fund projects. Finally, this turns into the Ponzi finance phase, in which businesses are borrowing so much that their only hope to repay loans is out of future borrowing. Then we get a crash, and we go back to hedge finance. That is what happened in 2008.

Moderator: But didn't we have Minsky moments before that? We had the 1987 stock market crash, Long Term Capital Management, the Dot-com crash—those were all Minsky moments, weren't they? But the economy sailed past them.

Minsky Moment: Ah, but you see, that is exactly the problem. Sailing past a crisis just sets you up for a worse crisis. Imagine a busboy that has just cleared a table and is carrying a tray of dishes back to the kitchen. All of a sudden, he stumbles! But he manages to catch his balance without losing any plates. When the waiters see that he is ok, they put more dishes on his tray. Then he slips again! But once again, nothing falls, and he rights himself. So more dishes go on his tray. Then, finally, he trips and cannot recover, and there is a horrific crash.

Moderator: But this crisis happened in housing. Does that fit your model?

Minsky Moment: Certainly. The housing bubble was a classic pyramid scheme that depended on ever-increasing amounts of mortgage credit to finance ever-increasing house prices. That is classic Ponzi finance. Once it began to stall, lenders realized that they had created a Ponzi scheme, and they had no choice but to unwind it. Now, we are back to hedge finance in the housing market. Nobody is betting on price increases any more.

Moderator: And I gather that you would say that the financial crisis caused the economic downturn.

Minsky Moment: Of course. When you go from the Ponzi finance phase to the hedge finance phase, investment collapses and you have a deep slump.

Moderator: What about the policy response?

Minsky Moment: I think we need more aggressive fiscal policy. You need to make up for the collapse of investment.

Moderator: Let's turn to our fourth and last panelist. Our first question is whether you think that the

financial crisis was a macroeconomic event.

Schumpeterian Adjustment: I do not think in terms of macroeconomic events, in the sense of changes in aggregate demand. Instead, I focus on structural change that takes place in the economy over the medium to long run.

Moderator: I gather that you are more of Classical than a Keynesian. How does Schumpeterian adjustment relate to the Real Business Cycle model of Kydland and Prescott?⁶⁰

Schumpeterian Adjustment: I think of the real business cycle model as one of an adverse productivity shock that affects the whole economy. The Schumpeterian story is one in which there is a favorable productivity development in one sector that causes distress because it requires labor to shift to another sector. It is part of the process of creative destruction.

Since 1990 the U.S. economy has been experiencing rapid change in technology and in the pattern of international trade. It could be that the financial crisis has something to do with this. If the pace of change were slow, one might expect the financial environment to be relatively placid.

Minsky Moment: That's interesting. You know, Charles Kindleberger points out that many of the great bubbles of the history began with what he calls "displacement," meaning a sudden shift in economic fortunes.⁶¹ The favored country is where the mania starts to build.

Schumpeterian Adjustment: I have some sympathy for the Minsky-Kindleberger view. However, I think of manias and crashes as interesting symptoms, not primary drivers. The economy needs to get from point A to point B, regardless of financial conditions. Perhaps the mania slows down the process of contracting an obsolete industry and the crash then speeds up that process. According to Richard N. Langlois, Schumpeter thought that during the process of creative destruction, sometimes the firms dependent on outmoded technology were slow to catch on. Using an illustration of computers making carbon paper obsolete, Langlois explains,

They do not stop making carbon paper right away. So there is an economic boom that starts as the new technology spreads. It creates what Schumpeter calls a secondary boom that is artificial. Because what should be happening is that resources should be being withdrawn from carbon paper at the same time they are being put into computers. But that does not happen. The carbon paper is still there because those signals have not yet reached those who finance carbon paper. Yet there is a boom in computers. The whole process is not sustainable.⁶²

Think of the economy as having two sectors. In one sector, productivity is growing faster than demand, and so that sector is shrinking, at least in terms of the amount of labor employed. In another sector, demand is growing faster than productivity, and so that sector is growing in terms of labor employed. The challenge for the economy is to shift labor from the shrinking sector into the growing sector. This challenge can prove difficult.

60 Finn E. Kydland and Prescott, Edward C. (1982). "Time to Build and Aggregate Fluctuations". *Econometrica* 50 (6): 1345–1370

61 Charles P. Kindleberger and Robert Z. Aliber (2005). *Manias, Panics, and Crashes: A History of Financial Crises*. Wiley Investment Classics.

62 Richard N. Langlois (2013), "Insights from Joseph Schumpeter," in G. Page West III and Robert H. Whaples (eds.), *The Economic Crisis in Retrospect*. Edward Elgar Publishing Limited, p. 125.

Moderator: Why is that? I thought that relative prices were supposed to provide the signals in a capitalist economy to get resources to the right place.

Schumpeterian Adjustment: There can be a skills mismatch, for one thing. If the economy has too many construction workers and too few home health care aids, it will take a while for the price signals to do their job.

Moderator: So is this the Diamond-Mortensen-Pissarides job-matching model that won recently won the Nobel Prize?

Schumpeterian Adjustment: I do not think that job matching is the whole story. In job-matching models, the jobs are given, and the problem is to find matches of people with jobs. I think that the more serious problem is that the jobs are not just sitting there waiting to be filled. They have to be discovered. A lot of the jobs that the economy ultimately will have are jobs that do not exist today. It takes time to organize new businesses, and it takes time for the labor force to adapt to the nature of new businesses.

We used to talk about the “socialist calculation problem,” which reflects the difficulty that a central planner would have in trying to organize production in the absence of market prices as a source of information. In a capitalist economy, the central planner is replaced by entrepreneurs. They, too, face a “calculation problem,” in that they do not have all of the necessary information available. Instead, they solve the resource allocation problem through a process of trial and error.

For example, consider the Great Depression. If you look at the economy in 1929 and the economy in 1949, you see fairly low unemployment in both years. But it is not the same people working the same jobs. The labor force in 1949 is much more white-collar, with a much higher proportion of high-school graduates. The demand for agricultural laborers has plummeted, because of tractors and other machinery. The entire food production and distribution system has been reconfigured by long-haul trucking, refrigeration, and prepared foods. In manufacturing, many occupations, such as cigar rollers or light-bulb glass blowers, have been replaced by machines. Alexander J. Field has argued that productivity increased faster in the 1930s than in any other decade.⁶³

Moderator: Shouldn't that have caused a boom rather than a bust? Why would firms not hire more workers if productivity is increasing?

Schumpeterian Adjustment: In the cigar factory or the light-bulb factory, average productivity is way up. But the marginal value of another worker is low. Remember, demand did not grow as fast as productivity.

Moderator: So then some workers have to move to other industries. What stops that from happening?

Schumpeterian Adjustment: In the 1930s, entrepreneurs have to figure out what to do with all these displaced workers, many of whom have 8th-grade education levels, or less. You have to invent new products and services that can employ these men. Nobody actually came up with a solution, unless you count the Second World War. By 1950, a lot of these men had aged out of the labor force, and we had a younger generation that was better educated and more adaptable to white-collar work.

63 Alexander J. Field (2012), *A Great Leap Forward: 1930s Depression and U.S. Economic Growth*. Yale University Press

What we are seeing today is something similar. Look at people in terms of where they fall in the normal distribution of cognitive ability. Let's set aside the top 10 percent, who generally can find productive work, and let's set aside the bottom 10 percent, who generally will end up in low-paid work supplemented by public assistance. Focus on the middle 80 percent. Some people in that group have generally had a comparative advantage doing work that is physically demanding, hazardous, or unpleasant. Men tend to be in this category more than women. Other people have a comparative advantage doing work that requires conscientiousness and "people skills." Women tend to be in this category more than men. So let's refer to male jobs and female jobs, even though there are many women who are suited to doing what we are calling male jobs and many men who are suited to doing what we are calling female jobs.

In the sectors that provide male jobs, productivity is growing faster than demand. Machines are substitutes. Foreign workers are substitutes, through imports or outsourcing.

In the sectors that provide female jobs, demand is growing faster than productivity. Health care and education are examples.

One hundred years ago, when both homes and workplaces needed mostly manual labor, the comparative advantage of females was in doing manual labor in the home. But with labor-saving inventions, such as automatic dishwashers, permanent-press clothes, and no-wax floors, as well as the increase in jobs in the sectors that provide female jobs, women have poured into the labor market.

However, for males, it has been the reverse. We see a long-term trend in which male labor-force participation has declined.

If this had continued to take place gradually, we probably would have been fine. However, the trend accelerated with the rise of the Internet and with China becoming a participant in the process of world trade and manufacturing. The result is that a lot of American workers have been released from manufacturing, low-end clerical work, and parts of the service sector where demand has fallen (selling books and records, for example). Entrepreneurs do not know what to do with all of these workers. It has to be something new. The displaced workers are not going back to their old jobs, no matter what.

The story of aggregate supply and aggregate demand is one in which the job structure of the economy is stationary. When demand goes down, people get laid off from jobs. They get recalled to those same jobs when demand comes back.

In the Schumpeterian story, jobs are always being created and destroyed. Sometimes, though, new opportunities appear before old firms realize that they are in trouble. Lots of people try to come up with new ways to deliver news on the Internet, but old-fashioned newspapers are slow to close down. That is Schumpeter's model of a boom.

Eventually, the obsolete firms get the memo. Perhaps they get it during a financial crisis, when it becomes clear that they are no longer viable. As a result, a lot of workers are let go at the same time.

Now the entrepreneurs have to figure out what to do with these unemployed workers. The challenge is that these are likely to be the workers whose skills have the least value in the contemporary workplace. They are not likely to be computer programmers, or effective project managers, or persuasive salespeople.

Moderator: But in today's economy, the people that seem to be having the hardest time finding a job are younger workers. You would think that if technological obsolescence is the problem, it should be the older workers having problems, and young people should be doing okay.

Schumpeterian Adjustment: One factor at work is that a lot of older people work in occupations that are protected in one way or another. In government, they are not going to fire a 50-year-old in order to hire a 25-year-old, even if the younger worker has better computer skills and requires lower compensation.

Something like one-third of the labor force is working in occupations that require licenses, and one thing that people in those fields can do is make it harder to get a license. They require a new entrant to obtain a doctorate (this happened several years ago in Maryland in physical therapy), but existing practitioners are grandfathered in.

However, I think that the biggest reason that young people tend to have lower rates of employment than older workers is that young people have not been able to settle on their comparative advantage. Young people today do not go to trade school. Most of them get general degrees, and they have very little experience in actual work environments, so they do not know the best way to use their talents. Neither do employers.

We are seeing an economy with fewer well-defined jobs. If it's well-defined, it can be automated. Instead, businesses have projects to try to create new capabilities or solve problems. It is harder to fit inexperienced workers into that framework. You cannot just give them a couple days of training and have them be productive. They need to learn the business and understand its problems in order to be helpful at solving them. Overall, the up-front cost of bringing on a new worker has been going up, particularly for young people with no work experience.

Moderator: Shouldn't the wage rate take care of that? Young workers will have to accept lower wages.

Schumpeterian Adjustment: In fact, what we are seeing is a different path for young workers into the workplace. Consider the phenomenon of internships, many of which are unpaid. I think that internships are a response to the high fixed cost associated with hiring a new worker. You have to put so much effort into training and acclimating a new hire before the person becomes productive that it does not work just to pay a low wage or to hire people that you will have to fire later. Instead, the internship works as a sort of trial period. By creating an internship path into the business, the firm cuts down on its up-front hiring costs. The intern bears more of those costs.

Moderator: What do you think of the policies that were enacted to try to deal with the financial crisis and the recession?

Schumpeterian Adjustment: I do not think that either the bailouts or the fiscal and monetary stimulus get at the underlying structural problems. Imagine that we have a planned economy, except that instead of central planning we have market prices and entrepreneurial trial and error. It gets back to the calculation problem. The economy's decentralized planning function needs to arrive at patterns of specialization and trade that make use of available resources. But look at how difficult that problem has become! It used to be that you needed over half your workers in agriculture. Now in the United States, it is less than 2 percent. In 1950, we had maybe 20 percent of the work force in manufacturing production jobs. Now it's only about 5 percent. And yet we produce more food and manufactured goods than ever. If you were a central planner today, trying to find the comparative advantage of every

worker, how would you do it? The variety of jobs is so bewildering! Again, we have the market doing the job of the central planner, but the market is bewildered, also.

So you try, say, a fiscal stimulus. Is the government discovering new patterns of comparative advantage? Or is it just raising the demand for skills that already are in high demand? The Keynesian theory is that you don't have to think about that issue. Just spend the money, and it does not matter where. In my view, unless you are creating patterns of sustainable specialization and trade, you are not really adding to economic activity. If your government-subsidized solar energy company goes bust, there is no permanent job creation.

Monetary stimulus is based on the theory that you have some sticky price somewhere, usually the nominal wage. What I am suggesting is that the challenge is to figure out the pattern of comparative advantage. Monetary policy does nothing about that.

Moderator: What if monetary policy targets nominal GDP?

Schumpeterian Adjustment: That might not be so easy to do. Our financial markets are very big, and when the Federal Reserve swaps one type of asset for another, the financial markets can absorb that without causing a change in nominal GDP. Fischer Black, who came to economics via finance, gave a talk in which he said the following:

I believe that monetary policy is almost completely passive in a country like the U.S. Money goes up when prices go up or when incomes go up because demand for money goes up at those times. I have been unable to construct an equilibrium model in which changes in money cause changes in prices or income, but I have no trouble constructing an equilibrium model in which changes in prices or income cause changes in money...

I think that the price level and the rate of inflation are literally indeterminate. They are whatever people think they will be. They are determined by expectations, but expectations follow no rational rules.⁶⁴

Moderator: So you don't believe traditional monetary theory, where if you double the money supply you double the price level?

Schumpeterian Adjustment: What does it mean to double the money supply? Suppose that people use \$20 bills as a medium of exchange and they use \$100 bills to store wealth. We measure the money supply as the amount of \$20 bills in circulation, and we measure velocity as the ratio of GDP to the volume of \$20 bills in circulation. Next, suppose that the Fed exchanges \$100 bills for \$20 bills, pulling \$20 bills out of circulation. According to traditional monetary theory, that should cause a proportional contraction in nominal GDP. But what will happen in practice is that people will write more checks, use credit cards more often, and so on, in order to make the same purchases without using \$20 bills. There will be some minor loss of convenience in the short run, but you will not see anything like a proportional contraction in nominal GDP.

What I am suggesting is that from the perspective of payments and transaction processing, exchanging Treasury securities for currency or bank reserves is the equivalent of exchanging \$100 bills for \$20 bills. I do not think it will affect the ability of people to make transactions. What you will observe

64 Fischer Black (1986), "Noise," *Journal of Finance* 41:3, p. 529-543

when the Fed changes the amount of money is nearly an equal and opposite shift in velocity, as people adapt by using different transaction media.

Moderator: What about the effect through interest rates?

Schumpeterian Adjustment: As you pointed out earlier, a lot of theory and empirical work shows that most interest rates are determined in financial markets. The Fed is a relatively small player in those markets. Open market operations by the central bank are like somebody dipping a cup to pour water into or out of the sea. Close to where they are dipping, when they act you can see movement in the water, just as you can see the Fed Funds rate move when the Fed intervenes in securities markets. However, as far as the whole sea is concerned, not much happens, particularly compared with the effect of other storms and tides. That is, the other interest rates in the economy are much less affected.

Moderator: But surely the Fed can affect nominal variables. What if it just printed endless amounts of money?

Schumpeterian Adjustment: Yes, by making extreme moves, the Fed could change the way people form expectations about prices and generate hyperinflation. However, short of that, it may not be able to fine-tune an inflation rate. It could be that any policy that does not result in a complete debasement of the currency allows for multiple equilibria in inflation. I suspect that prices are highly path-dependent. People expect the configuration of prices tomorrow to look like the configuration of prices today. However, if for mysterious reasons prices rise consistently by, say, 5 percent per year, then expectations of inflation that high will become embedded in people's behavior.

Moderator: Most economists would not say “mysterious reasons.” They would say “faster money growth.”

Schumpeterian Adjustment: They would say that. But Fischer Black suggests that we do not know how inflation expectations are formed or how they change. Perhaps the original theory of the Phillips Curve, in which labor market conditions affect nominal wage changes, is correct.

Moderator: How do you explain what happened in the 1970s? Why did inflation go up and then come down when Paul Volcker changed monetary policy?

Schumpeterian Adjustment: I might argue that it was not Volcker who made the difference. Instead, I would say that the economy was not able to cope with double-digit inflation. The stock market became very undervalued, perhaps because of confusion about real and nominal interest rates⁶⁵. Housing demand also was curtailed. As inflation goes up, the 30-year amortizing mortgage becomes more “front-loaded” in that the initial payments are higher relative to income than when interest rates and inflation are lower. Also, as of 1980, interest-rate regulations created a scarcity of mortgage credit, because savings and loans could not raise deposit rates to compete with money-market funds. What I am suggesting is that the high inflation of the late 1970s may have been self-correcting. It resulted in weakness in the stock market and in housing, which then created severe recessions—remember, the unemployment rate climbed over 10 percent in the second half of 1982. Yes, most economists say that was due to monetary tightening, but I am suggesting that it was due to financial dynamics that were playing out regardless of what the Fed was doing.

65 Franco Modigliani and Richard Cohn (1979), "Inflation, Rational Valuation, and the Market," *Financial Analysts Journal* 35(3), 24-44

Moderator: Well, let me try pressing you one more time. What about foreign currency intervention? If the central bank buys foreign currencies, doesn't that lead to inflation?

Schumpeterian Adjustment: So let's make sure that we are not talking about a sterilized intervention, where the central bank buys foreign currency and sells securities to try to keep the domestic money supply constant. The last time I looked, the consensus in the literature was that sterilized intervention did not produce durable changes in currency values. So instead, let's talk about buying yen with dollars, with no offsetting sale of securities. I would admit that if you do enough of that, you should raise the value of the yen and lower the value of the dollar. But how much is enough? The foreign currency markets are very deep.

My views on the impotence of monetary policy can be summarized as follows. First, in the realm of payments and transaction processing, there are enough substitutes for currency that the actual quantity of money is not a controlling factor. Second, in the realm of financial markets, the central bank is not a large enough player.

Over the last several decades, the effect of the Fed on financial intermediation almost certainly has declined. One can argue that reserve requirements are no longer binding, due to innovations like sweep accounts. The ratio of required reserves to deposits declined to less than one-half of one percent in 2007.⁶⁶ In addition, we have had the growth of “shadow banking,” or financial intermediation that takes place outside of the traditional banking sector.

The sheer size of credit markets is daunting. Deirdre McCloskey pointed out that in 1999, the U.S. monetary base rose by \$40 billion, while she estimated the total volume of world assets (real and financial) at \$280 trillion. She argues that this made unlikely that the Fed could affect interest rates.⁶⁷

Finally, even if these arguments about Fed impotence are wrong, and the Fed can fine-tune nominal GDP, I would suggest that real GDP is determined by the ability of the market to discover patterns of sustainable specialization and trade. So what you would get at higher nominal GDP would be almost entirely higher inflation, rather than more real GDP and employment.

Moderator: Well, we certainly do have some challenges to conventional wisdom on this panel. That will have to wrap it up for now.

The Aftermath of the Financial Crisis: Labor Market Behavior

Nonfarm payroll employment reached a peak of 138.1 million in January of 2008. It subsequently fell to a low of 129.3 million in February of 2010, and in October of 2011 it was still only 132.1 million, six million below the peak. Over the next two years, hiring improved, bringing nonfarm payroll employment to 136.6 million in October 2013, still below its previous peak. Meanwhile, from January of 2008 to October of 2013, population growth had increased the number of working-age Americans by over 10 million.

⁶⁶ See Hasan Comert (2013), *Central Banks And Financial Markets: The Declining Power of US Monetary Policy*, Cheltenham, UK: Edward Elgar Publishing, p. 47.

⁶⁷ McCloskey, Deirdre (2000), “Other Things Equal: Alan Greenspan Doesn't Influence Interest Rates,” *Eastern Economic Journal* 26:1, p. 99-101. Cited in Jeffrey Rogers Hummel (2013), “The Myth of Federal Reserve Control Over Interest Rates,” *Library of Economics and Liberty*, <http://www.econlib.org/library/Columns/y2013/Hummelinterestrates.html> . Note, however, that Hummel takes it as given that the price level is determined by the money supply.

The decline in employment was unusually widespread across industries.⁶⁸ Manufacturing jobs fell by 2 million, and employment in business services declined by 1.6 million. Overall, service-producing industries accounted for half of the total decline in employment, which was a much larger share than in earlier post-war recessions. Most previous recessions had been concentrated in goods-producing industries and construction.

The share of long-term unemployment, defined as workers unable to find jobs for more than half a year, peaked at 45 percent, which was far higher than in any other post-war recession. Even in 1983, when the overall unemployment rate was slightly higher, long-term unemployment made up only 25 percent of unemployment.⁶⁹ Note that if a recovery is slow to materialize, one can expect that the share of long-term unemployment will rise and remain high.

There has been a pronounced secular trend in the labor share of income, particularly over the past decade.⁷⁰ This secular trend seems more significant than any cyclical movement in the labor share. This is significant, because a simple sticky-nominal-wage theory of employment fluctuations would predict pronounced cyclical movements in the labor share, with the share increasing during recessions as the real wage rises above its market-clearing level.

To summarize, the recessions that took place between 1946 and 1983, the declines in employment were dominated by short-term layoffs in goods-producing industries. The Financial Crisis Aftermath differs in that about half the jobs were lost in service-producing industries and much of the unemployment has been of longer duration. Finally, we have seen an acceleration in the decline in labor's share of income.

All of this suggests to me that one might wish to view recent labor market conditions in the context of a long-term shift that includes substitution of capital for labor and substitution of overseas labor for domestic labor. My hypothesis is that prior to the financial crisis, firms were holding onto labor that was “possibly productive,” meaning that they were not sure that these workers were a source of profit.

Keep in mind that most workers do not directly provide measurable output. Instead, they provide capabilities to firms. Think of the business service sector, which experienced a particularly large decline. Business services provide firms with training, information services, and other “soft” benefits. My thinking is that the financial crisis led firms to focus on maintaining earnings and avoiding the need to tap credit markets. They cut back on “soft” services.

What is perhaps even more important is that new business formation slowed in the wake of the financial crisis. Perhaps this reflects a decline in the willingness of banks and private investors to support new businesses under conditions of financial uncertainty. Perhaps it reflects pessimism on the part of would-be entrepreneurs. Regardless of the cause, the slowdown in business formation is a problem, because existing firms are very unlikely to be the source of major employment gains. Instead, research shows that fast-growing young firms provide the bulk of new jobs.

My Interpretation of the Financial Crisis Aftermath

68 See Christopher J. Goodman and Stephen M. Mance (2011), “Employment loss and the 2007–09 recession: an overview,” Bureau of Labor Statistics *Monthly Labor Review*, April, p. 3-12
<http://www.bls.gov/opub/mlr/2011/04/art1full.pdf>

69 See Josh Mitchell (2013), “Who are the Long-term Unemployed?” Urban Institute.
<http://www.urban.org/UploadedPDF/412885-who-are-the-long-term-unemployed.pdf>

70 See Michael W. L. Elsby, Bart Hobijn, Ayşegül Şahin (2013), “The Decline of the U.S. Labor Share,” draft prepared for Brookings Panel on Economic Activity. <http://www.brookings.edu/~media/Projects/BPEA/Fall%202013/2013b%20elsby%20labor%20share.pdf>

My view is that in order to increase the proportion of working-age people with jobs, the economy needs to find new patterns of comparative advantage. This is the task of entrepreneurs undertaking trial-and-error efforts to develop new products and services. Right now, entrepreneurs do not know enough about how to profitably utilize unemployed resources. At the same time, I believe that policy makers and politicians know even less.

It could be that monetary expansion and fiscal stimulus would somehow make it easier for entrepreneurs to discover the patterns of sustainable specialization and trade that would restore full employment. However, I do not think that we should assume that this is the case. In particular, I do not think that we should assume that there is a simple diagnosis for the condition of the labor market, such as too little spending or too little price inflation.

I believe that major economic fluctuations reflect the tension between the Schumpeterian forces of creation (new businesses forming and growing) and destruction (incumbent businesses declining and disappearing). In a dynamic economy, when these forces are balanced, we get growth without major recessions. But such balance is not always present. Consider the following table of possibilities.

	Low Levels of New Business Growth	High Levels of New Business Growth
Low Levels of Incumbent Business Decline	Corporatist Stagnation	Schumpeterian Boom
High Levels of Incumbent Business Decline	Minsky Slump	Dynamic Growth

When a modern economy has low rates of both creation and destruction, then it is stagnant. Corporatist economic management will tend in this direction. Incumbent businesses will enjoy government protection and continue to operate, even if they have become outdated and inefficient. I would argue that many European economies suffer from corporatist stagnation, and that Japan fell into this state in the 1990s.

When exciting innovations appear, sometimes new firms rush to take advantage while incumbent firms hang on. For example, while Amazon was growing its retail business, many traditional retailers continued to operate. This is consistent with Schumpeter's model of a boom.

The opposite situation is when the enthusiasm to launch high-growth enterprises wanes at the same time that incumbent businesses focus on cutting costs to maintain profits. I call this a Minsky slump, because I think it is likely that this combination is brought on or exacerbated by a financial crisis. A sudden decline in the willingness of savers to trust financial intermediaries to take risks means that incumbent businesses trim their operations in order to solidify profits. At the same time, the reduced tolerance for risk also results in fewer high-growth start-ups.

When both creation and destruction take place at high rates, an economy experiences dynamic growth. The “Asian tigers” of the 1970s and 1980s, as well as China in recent decades, fall into this category.

Inflation Regimes

Mainstream models treat inflation as a variable characterized by continuity. In the old-fashioned Phillips Curve, the inflation rate is determined by the unemployment rate. In more recent textbook macroeconomic models, inflation is determined by the rate of money growth.

My view is that inflation is a variable that is subject to discontinuity. In particular, I believe that there are three regimes for inflation:

1. Hyperinflation takes place when the government cannot obtain enough revenue through borrowing or taxing to fund its spending. The government proceeds to print money at an ever-accelerating rate. The rapid rate of depreciation of money leads households and businesses to try to spend money as quickly as possible, so that the velocity of money rises sharply.
2. Anchored inflation expectations. Most of the time, inflation is expected to be low, about 3 percent or less in the United States. These expectations are self-fulfilling. A typical change in the rate of money growth will not affect how households and businesses behave. The result will be that velocity growth will move in the opposite direction as money growth, offsetting fluctuations in money growth.
3. High and variable inflation. This was what the United States experienced during the Great Stagflation. The public becomes aware of inflation, and it starts to affect household and business decisions. Long-term contracts include cost-of-living escalator clauses. Financial innovations emerge that permit easy substitution toward interest-bearing assets and away from non-interest-bearing money. These responses to high inflation tend to increase the velocity of money, tending to make inflation higher and more variable.

The regime of high and variable inflation is difficult both to enter and to exit. From 1969-1975, it took a combination of high money growth, currency depreciation, wage-price controls, and the oil and food “shocks” to replace anchored expectations of inflation with consciousness of high inflation. From 1980 to 1985, it took a combination of high market interest rates (long-term rates as well as the Fed funds rate), an appreciating currency, and a collapse of oil prices to escape the regime of high and variable inflation and return to a regime in which inflation expectations were anchored.

If this view of inflation regimes is correct, then it suggests that monetary policy cannot do much to alleviate a recession. Assuming that we are in a regime with anchored expectations, small changes in money growth will be offset by changes in velocity. Perhaps a large increase in money growth can eventually un-anchor inflation expectations and cause the economy to shift to the regime of high and variable inflation. However, this is by no means a superior regime from the standpoint of unemployment.

This paragraph, from Fischer Black's “Noise,” is worth quoting again.⁷¹

I believe that monetary policy is almost completely passive in a country like the U.S. Money goes up when prices go up or when incomes go up because demand for money goes up at those times. I have been unable to construct an equilibrium model in which changes in money cause changes in prices or income, but I have no trouble constructing an equilibrium model in which changes in prices or income cause changes in money.

I sometimes call this the “MIT view of money” or the “finance view of money.” The money supply is

⁷¹ Fischer Black (1986), “Noise,” *Journal of Finance* 41, p.529-543.

determined by the needs of households and businesses to undertake transactions. If the central bank does not supply enough money, the market will innovate in ways that allow people to increase the velocity of money. If there is more than enough money, then its velocity will slow.

Black's view on inflation is one that I have come around to believe:

I think that the price level and the rate of inflation are literally indeterminate. They are whatever people think they will be. They are determined by expectations, but expectations follow no rational rules.

In his AFA address, Black also described a view of economic fluctuations that has nothing to do with aggregate spending or aggregate prices. Instead, he said that investment in human and physical capital involves risk. This risk is not entirely diversifiable. When investments work out poorly, a slump results.

I do not share Black's model of real fluctuations. Instead, I prefer the Schumpeterian story, given earlier, in which the forces of creation and destruction are not always synchronized.

The most-often quoted sentence from Black's address was this:

we might define an efficient market as one in which price is within a factor of 2 of value

Black proposed this shockingly loose interpretation of market efficiency because he believed that the exact true value of a long-term security is impossible to calculate. He went on to say,

Because value is not observable, it is possible for events that have no information content to affect price.

I keep this phrase in mind whenever the stock market responds to announcements by the Federal Reserve. I believe that most investors, most of the time, are trading on the basis of noise. However, I also share Black's view that, in the long run, prices move in the direction of fundamental value.

Fischer Black summarized his macroeconomic thinking in a book called *Exploring General Equilibrium*.⁷² There, he emphasizes the importance of capital that is not measured in conventional national income accounts, including human capital. However, in contrast with the strict capital-asset pricing model, he acknowledges that households must take idiosyncratic risk, in part because human capital is not readily traded. For example, it is not practical for me to sell shares representing 98 percent of my human capital, because this would create moral hazard insofar as I have little incentive to utilize my human capital when my own stake in it is small.

When one thinks about Black's thesis, it is evident that conventional economic statistics vastly understate the role of capital in the economy. If you look at the national income accounts, about 2/3 of national income is attributed to labor. In reality, however, most labor income represents a return on human capital.

Similarly, the national income accounts indicate that about 70 percent of national output is allocated to consumption. However, most of the goods and services that are traded in the market are not used in

72 Fischer S. Black (2010) with foreword by Edward Glaeser, *Exploring General Equilibrium*. MIT press

final consumption. Few of us have jobs that involve producing goods and services for direct consumption. Instead, most of us work on providing capabilities to firms—producing organizational capital, in other words.

Standard economics uses the production function, in which output can be produced instantaneously, using available inputs. In contrast, Black emphasizes that production takes place in stages. When you commit to undertaking an early stage in the process you are taking a risk that years later the demand for final-stage output may have disappeared, because of changes in tastes and technology that take place during the interim. Black points out that these sorts of mistaken commitments are a very plausible source of economic slumps. To me, this suggests replacing the production function with a more realistic description of production as taking place along paths.

Production Paths in Lieu of the Production Function

There are two ways we can produce automobiles. We can build them in Detroit or we can grow them in Iowa. Everyone knows how we build automobiles. To grow automobiles, we begin by growing the raw material from which they are made--wheat. We put the wheat on ships and send the ships out into the Pacific. They come back with Hondas on them.

--David D. Friedman⁷³

30 years from now, instead of growing a tree, cutting down the tree and building this wooden table, we would be able to just place some DNA in some living cells, and grow the table, because they self-organize. They know where to grow and how to change their production depending on where they are. This is going to be a key to this new industrial infrastructure of biomaterials—a little bit of computation inside each cell, and self-organization.

--Rodney Brooks⁷⁴

In the passages quoted above, the authors sketch out alternatives to the standard path for producing goods, both of which involve “growing” the desired product. Suppose that we take this idea to an extreme. Assume that as consumers what we want is to feel various sensations. The economic term for the value that we assign to these sensations is utility.

There are many recipes for creating utility. There are an enormous number of paths that ultimately lead to consumers enjoying utility.

Suppose that we talk about arriving at utility not by a production function but by taking these long, complicated paths, starting from human and material resources and leading to utility. One way to think about these utility-production paths is as a generalization of the concept of capital. A layman thinks of capital as money (“It takes capital to start a business.”) In macroeconomics and national income accounting, capital is typically defined as goods that are long-lived and used in the production of other goods rather than being themselves consumed.

73 David D. Friedman (1986), *Price Theory: An Intermediate Text*, chapter 6.

http://www.daviddfriedman.com/Academic/Price_Theory/PThy_Chapter_6/PThy_Chapter_6.html

74 Rodney Brooks (2002), “Beyond Computation,” <http://www.edge.org/conversation/beyond-computation>

However, economists have become quite promiscuous in their use of the term “capital.” We speak of human capital, social capital, cultural capital, and intangible capital. When users are familiar with the process for using a smart phone, the producing that smart phone has consumer capital. Coke has brand-name capital. Facebook has network capital.

We talk about these other forms of capital because without them we cannot explain the earnings differentials among workers, value differentials among firms, productivity differentials among countries, or economic growth over time. However, when we introduce new varieties of capital, we usually start with a simple production function, $Y = f(K,L)$, which we then modify to capture one or two capital variations at a time. If we were to consider all of the varieties of capital at once, the production function would become too complex to be useful as a modeling construct.

If the varieties of capital make production too complex to model, then we might as well switch to a looser, more descriptive approach. We might abandon the simplification of the production function and forget about the notion of adding up the value of machines purchased by businesses to arrive at “capital.” Instead, how might we describe production in a realistic way?

Consider a thought-experiment. Imagine that you have been sent on a mission to a planet that is physically identical to Earth, but with a human population consisting solely of people in the hunter-gatherer stage of development. Your assignment is to empower this population with the ability to produce a modern automobile. Not a primitive model from 100 years ago, but a car like the one we recently bought, equipped with seat-warmers, satellite radio, Bluetooth for talking on a phone, a rear camera to make it easier to drive in reverse gear, lane-changing sensors, and so on.

In order to complete this mission, you would need much more than the engineering specifications for the car. The car uses many components that in turn have to be described and built. To be usable, the car needs a road network as well as other infrastructure. The satellite radio will not work with communication satellites.

In order to teach the hunter-gatherers how to build the car, you will need to acquaint them with science, engineering, and practical knowledge. In order to do this, you will have to bring their linguistic capabilities to modern levels. Language is one general-purpose technology (GPT) among many that they will need. Others include writing, printing, common schools, electric motors, and computers.

In fact, you as an individual could not possibly complete such a mission. As Leonard Read famously pointed out, nobody knows how to make a pencil,⁷⁵ much less a modern car. What I am calling the production path for creating a pencil or a car is too complex for any single individual to master.

I use the term “path” to suggest a process that takes place in time and space. If you were to follow the path for making a pencil, this would involve going around the world, gathering raw materials for the pencil, stopping to have them fabricated in various intermediate steps, and then bringing them together to the manufacturing facility that assembles and finishes the end product. Another way to imagine a production path is to think of the Silk Road used by Marco Polo on his trading expeditions.

We could represent paths graphically as lines passing through nodes. Each node represents a basic,

⁷⁵ Leonard Read (1958) “I, Pencil” <http://www.econlib.org/library/Essays/rdPnc11.html>. For other descriptions of the complexity of the production process see Pietra Rivoli (2005), *The Travels of a T-Shirt in the Global Economy: An Economist Examines the Markets, Power, and Politics of World Trade*, Wiley. Also Thomas Thwaites (2011), “How I built a toaster from scratch” http://www.ted.com/talks/thomas_thwaites_how_i_built_a_toaster_from_scratch.html

familiar process. Each line represents a forward link from one node to the next.

Imagine using this method to represent the process of baking bread. We might start with three nodes: measure out two ounces of yeast; measure out 1/3 cup sugar; measure out 6 cups of water. We draw a line from each of these nodes to the next node which is “combine ingredients.” Then we draw a line to another node, which is “heat the ingredients to 100 degree temperature.” Off to the side, we have a node to measure out 8 cups of flour, and we draw a line that connects this node to a line extended from the “combine ingredients” node to a node that says “fold in flour.” And so on.

As David Friedman points out, there is a path to creating cars that gathers components for final assembly in Detroit. However, there is another path that involves growing wheat, putting it on ships to Japan, and having those ships return with cars. In fact, these are highly simplified descriptions of complex paths. As different as these paths are, they invoke a number of common nodes, including nodes representing banking transactions, legal contracts, and the invocation of various business norms and procedures.

As a production process, bread-baking in a modern home also depends on banking transactions, legal contracts, and business norms and procedures. In fact, the actual bread recipe is only a small, simple part of a deeply complex process. Again, consider the thought-experiment of training a population of hunter-gatherers to be able to provide you with yeast, sugar, flour, water, utensils, a kitchen, and an oven in the forms which you are accustomed to using. There would be millions of steps in this process.

Next, think about what happens when a complex process is interrupted in the middle. In the process for “growing” an automobile, we could have a problem with the wheat harvest or a dockworkers' strike. This would mean a sudden, perhaps temporary, decline in the usefulness of other nodes dedicated to this process.

Around the year 2035 or so, we are going to be able to evaluate Rodney Brooks' prediction about being able to grow a table using fine control over DNA. If he was wrong, then venture capitalists who are investing in biotechnology in the hope of achieving such a capability around that time will be disappointed. Their investments will not yield good returns. Conversely, if Brooks was right, then the lumber and furniture manufacturing industries that are continuing to invest in productive capacity will be disappointed. Their investments will not yield good returns.

Thus, sometimes attempts to lay down new paths to produce utility will end in failure, just as the many attempts in the first half of the 19th century to find a Northwest Passage across the United States were not successful. At other times, new paths will make previously-important nodes obsolete, just as some railroad junctions became ghost towns once trucking had become economical.

Within this framework, we can think of human workers as general-purpose, programmable machines, which can become either more or less valuable, depending on the evolution of utility-production paths. The value of a human worker can decline suddenly and temporarily if the production process for which that human has been tuned suffers from an interruption. For example, if there is a housing market crash, then until the market recovers we do not need as many construction workers.

The value of a human worker can change permanently if the production process for which that human has been tuned becomes obsolete. With the advent of the internal combustion engine, we needed fewer blacksmiths to make horseshoes.

Before 1925, there were many ways to use workers who had less than a high-school education. They could work as all-around farm laborers, cigar rollers, or glass-blowers making light bulbs. However, those occupations soon were replaced by machines. Most workers had only an 8th-grade education, because choosing to drop out around the 8th grade may not have seemed like an unreasonable decision prior to 1930. However, by 1950, the usefulness of such workers had declined markedly. Some of the dislocation of the Great Depression may have been due to the failure of young men to foresee the adverse consequences of failing to complete high school.

More recently, we have seen a job market that has been very unwelcoming to young workers and workers without college degrees. For the latter, the problem could be stiffer competition from overseas workers and from “robots,” meaning machines with much more dexterity than those of earlier vintages. For young workers, the problem could be that employers are increasingly reluctant to incur the up-front costs of carrying workers who must undergo months of training and acculturation before they can contribute to the capabilities of the firm. For anyone seeking employment at firms where health insurance is an automatic benefit, the fact that health insurance costs have nearly tripled over the past fifteen years gives firms less room to offer attractive take-home pay to workers.

Production paths are constantly re-arranged, because of innovation and changes in tastes. Old patterns of specialization and trade become unprofitable. Sometimes, this results in sudden drops in the values of various forms of capital, including human capital. People whose value to firms has dropped sharply then become unemployed.

Fundamental Flaws with Mainstream Macroeconomics

In my view, there are two fundamental flaws with mainstream macroeconomics. By mainstream macroeconomics, I mean to include the Keynesian tradition of aggregate demand and aggregate supply as well as the Dynamic Stochastic General Equilibrium models, including New Keynesian variants, developed over the past thirty years.

The first fundamental flaw is to treat the production process as instantaneous. You have your capital and labor sitting there, and all you have to do is put them together to produce output. In my view, Fischer Black's emphasis that production takes time is very important. It means that plans made months or years ago have to be reconciled with current conditions. As tastes and technologies evolve, some plans turn out to be brilliant, while others turn out to have been misguided.

The problem of reconciling past plans with current conditions is more complicated than is portrayed in standard Austrian economics. The Austrian story is relatively simple. When interest rates are low, entrepreneurs choose more roundabout production processes, and when interest rates are high they choose shorter production processes. As I interpret Fischer Black, and as I see it, there are many more issues involved than just the single dimension of the length of the production process. The specific nodes in the production path all have to be selected. The entrepreneur needs to anticipate all sorts of conditions that will affect the competitive environment in the future, and any major mistake can cause a plan to fail.

The second flaw in mainstream macroeconomics is to ignore the time that it takes to discover successful production processes. There is a trial-and-error process at work as enterprises are launched. The fortunate few will expand, but most new firms will fail. Starting from a situation such as one that prevailed in 2009, with many previously-viable patterns of production no longer sustainable and consequently high unemployment, it takes a lot of time and effort to discover the new patterns of

specialization and trade that will reveal everyone's comparative advantage and restore full employment.

The importance of this laborious discovery process is what I think is missing from Fischer Black's account of macroeconomics. He insists on using the term "general equilibrium," while I believe that it is important to recognize that the economy is never in an equilibrium state. Moreover, the adjustment to changes in tastes, technology, and shocks (such as a surge in oil prices) can be long and painful.

Both theoretical and statistical models in mainstream macroeconomics embody these two flaws. Consequently, I think that we are better off not using them. From my perspective, the conventional structure of aggregate demand and aggregate supply offers nothing but a set of just-so stories. These stories are misleading and possibly dangerous. The framework of aggregate supply and aggregate demand could turn out to be the equivalent of the ancient Greek theory of medicine which holds that health is governed by the four humors of black bile, yellow bile, phlegm, and blood.

What I Believe: a Summary

So, to summarize my views:

1. Financial markets are loosely efficient, in Black's sense.
2. Financial intermediaries hold opaque portfolios of long-term, risky assets, and they issue short-term, riskless liabilities. Financial intermediaries tend to be only contingently solvent, meaning that a loss of confidence can suddenly raise the risk premium charged to them on their short-term funding, making them insolvent.
3. Financial intermediation is subject to Minsky-Kindleberger cycles. Right after a crash, financial intermediaries do not enjoy public confidence. They can no longer freely issue riskless short-term liabilities backed by risky long-term assets. The post-crisis collapse in the issuance of mortgage-backed securities without explicit government backing is an example. Over time, financial intermediaries regain public confidence. Increasingly, the public accepts short-term liabilities issued by financial intermediaries even though these are backed by risky long-term assets.
4. Production paths are long and complex. Paths change as people make new discoveries.
5. Jobs are jeopardized when existing patterns of specialization and trade become unprofitable. However, the timing of job cuts can vary. Firms can choose to retain non-essential workers for a while.
6. Jobs are created by a trial-and-error process. Entrepreneurs attempt to identify and exploit new sources of comparative advantage. Many businesses fail for each one that succeeds. There are times when entrepreneurs are cautious, and there may be times when the businesses they start are not sufficiently successful to increase overall employment. If unemployment is high because of permanent shifts in tastes and technology (as opposed to a temporary overstock of some durable goods), then it will take a long time for the market to discover new patterns of sustainable specialization and trade.
7. Both job creation and job destruction may be affected by the Minsky-Kindleberger cycle. When there is low trust in financial intermediaries, incumbent firms may feel pressed to improve profitability by cutting non-essential workers. Also, entrepreneurs may face difficulty in raising funds to launch and expand new firms.

8. Net gains or losses in employment depend on the relative strength of the job creation and job destruction processes. Most of the time, these processes are approximately equal in strength, and there is little net gain or loss. However, there can be periods in which one process is stronger than the other for several months, leading to large cumulative net gains or losses in employment.

9. Inflation is driven by expectations. Usually, expectations are anchored at low rates of inflation. At sufficiently high rates of inflation, households and businesses start to pay close attention to inflation, and their anticipation of high inflation leads them to take actions that tend to boost inflation further. Breaking this cycle is difficult.

10. Money is not a control variable. Households and businesses are able to alter their behavior and, if necessary, employ financial innovations in order to neutralize changes in the balance sheet of the central bank.

11. Aggregate demand, as measured by total spending, is a symptom, not a cause. The underlying drivers are the forces of creation and destruction. As entrepreneurs discover patterns of sustainable specialization and trade, people engage in more market activity. As a result, measures of spending in the economy go up. When job creation falls short of job destruction, leisure and involuntary idleness increase. People engage in less market activity, and measures of spending decline.

12. I do not believe that it is possible to decide between various viewpoints based on macroeconomic data alone. There are no controlled experiments in macroeconomics. Those who believe that the government has policy instruments that can influence the level of economic activity by regulating aggregate demand cannot be refuted, because there are so many degrees of freedom for manipulating and re-interpreting data. However, unless one approaches the historical record with a strong belief in the efficacy of fiscal and monetary policy, it is difficult to discern evidence for such efficacy.

Advice to a young, would-be macroeconomist

If I came across a young Arnold Kling, interested in macroeconomics, what would be my advice? Here are some thoughts.

1. Your goal should be to have an interesting life. An entire career spent in the academy will not necessarily satisfy that.

2. Focus on economic history and financial institutions. Macroeconomists may be able to learn more from economic history. They certainly need to know more about financial institutions. In Charlie Kindleberger's economic history course, I wrote a paper on the origins of insurance. I argued that insurance contracts were developed not to deal with risk aversion but instead to strengthen the collateral behind loans. For example, marine insurance protected those who lent to finance trans-oceanic trade. Life insurance protected those who lent money to individuals (the market for life insurance was started in order to serve creditors). If I could go back and tweak my career, I would do more with economic history and financial institutions.

3. Stay away from the following: "microfoundations of macro;" regression analysis of time series data; monetary theory. At best, each of these topics is a "well-squeezed orange," to use a Kindleberger expression. At worst, they are a waste of mental energy.

4. The "macro wars" also are a waste of mental energy, at least if you choose sides. If I had been a less

partisan Keynesian when I was in graduate school at MIT, I might have appreciated Fischer Black's ideas sooner than I did. Rather than believe that there is a right side and a wrong side, it is better to consider that there may be merit in a number of points of view. I find myself mixing very disparate ideas, such as Fischer Black's views on inflation with Hyman Minsky's views on financial cycles.

5. Examine business dynamics and labor force adaptation. Why do firms not see a profit opportunity in exploiting unemployed workers? How much job creation and job destruction takes place among young firms? How does this compare to the rate among older firms? When labor with certain skills becomes abundant enough to lead to unemployment, how do firms adapt to absorb this labor? How do workers go about changing occupations? How does the labor market as a whole go about correcting skill imbalances, and what role do new cohorts of workers play in this process? Pertinent to these questions, there are some data sets available today that were not around when I was in graduate school.

6. You can have a good life without doing macro. If I could trade places with any economist in the world, my first choice would be Hal Varian, who joined Google in 2002 and has been the chief economist there. What I like about his career is that it includes a mix of academic work and business experience. He has been able to interact with bright academics and bright non-academics. His work has had a discernible impact.

Varian earned his Ph.D seven years before I did, and his first niche was applied microeconomics. He was an assistant professor at MIT when I was there, and he taught the only modern course in our micro sequence. I was terrified by the math, but fortunately for me he gave a very intuitive final exam. He had a distinguished career—I am not saying that I could ever have matched his research work.

When I was first looking into starting an Internet business, I came across some papers that he had done on the economics of the Internet, and we re-connected. He recommended “The Economy of Ideas,” an article written by someone who was decidedly not a credentialed economist, John Perry Barlow.⁷⁶ Thus, Varian did not become an academic snob.

In 1998, Varian co-authored, with Carl Shapiro, *Information Rules*, about solutions to the problem of obtaining revenue for digitized content where distribution and reproduction take place at essentially zero cost. Once Varian joined up with Google, he helped them address the issue of revenue with the use of auctions for advertising. He also became an early exponent of what is now called “the big data revolution.”

I dwell on this, because when you are choosing a direction for your career, you want to ask yourself what kind of life would be good for you. So let us think about other people who have had interesting lives.

Among macroeconomists, I would say that Ben Bernanke, Ken Rogoff, and Larry Summers have had interesting lives. All three have spent time in Washington in high-level policy positions. They did not put most of their energy into any of the “poison” topics, and as a result I think that their academic work will have a longer shelf life than that of most macroeconomists of my generation. Bernanke is known for his work on banks and the Great Depression. Rogoff is known for his work with Carmen Reinhart on the history of financial crises. Summers is known for the breadth of his research contributions.

Still, it takes a lot of luck as well as skill to get to where Bernanke, Rogoff, and Summers got. The

⁷⁶ John Perry Barlow (1993), “The Economy of Ideas,” *Wired* 2.03
http://www.wired.com/wired/archive/2.03/economy.ideas_pr.html

overwhelming majority of macroeconomists have lives that I am glad to have avoided. You do not want to commit to a specialty in which only a handful of people end up leading lives that you would find interesting.

7. The combination of business experience and academic experience is perhaps most naturally arrived at via business school. If someone had convinced me in 1976 to go into management information systems in business school, that would not have worked out too badly.

But how many people knew at that time what Moore's Law was going to do to the computer industry and in turn what the personal computer/Internet revolution was going to do to make business strategy more complex and intellectually challenging? Furthermore, how many people at the time knew that macroeconomics would sink so deeply into the morass of microfoundations, time series econometrics, and monetary theory?

In the mid-1980s, the parting of the ways between me and macroeconomics was mutual. My life became interesting again when I joined Freddie Mac and in the following decade when I started my Internet business. I am happy with the choices that I made that cut short my career as a would-be macroeconomist. I am particularly happy that I did not stick with macroeconomics, given that I believe that the leading academics in macro took their profession down what seems to me to be a narrow road ending in a cul de sac.