

06 How Macroeconomics Lost Complexity

Maybe there is in human nature a deep-seated perverse pleasure in adopting and defending a wholly counterintuitive doctrine that leaves the uninitiated peasant wondering what planet he or she is on.

Robert Solow

Last chapter we told the story of how economics lost complexity. That story wasn't complete because it was restricted to one branch of economics—microeconomics. There is another branch of economics—macroeconomics, and in this chapter we tell the story of how macroeconomics developed as a separate field in an attempt to add aspects of complexity to the standard model with the aim of improving policy advice, but how those aspects of complexity were quickly lost it again. Instead of dealing with the macro economy as a complex system, macroeconomists focused on dotting i's and crossing t's. Going back to the opening metaphor of the book, what had started as an attempt to scale the complexity peak ended back on the lower mountain.

Before proceeding with that story we should clarify the difference between macroeconomics and microeconomics. Microeconomics is what we considered last chapter. It builds a theory up from the individual elements—from the micro level to the macro level. It starts from assumptions of rational individuals and then analyzes how they would coordinate their actions, and what role the state should play in that coordination. Its domain includes both small issues and large issues, so in principle it includes both micro and macro. It was not until the 1930s and 40s when J. M. Keynes's work was integrated into formal models that macroeconomics as a separate branch of economics developed. So since the 1940s, there has been both a microeconomic and a macroeconomic branch of economics, with microeconomics covering all economic issues, and macroeconomics focusing on a subset of issues having to do with fluctuations in output and unemployment and inflation.

Classical Roots

Although Classical economists had some rules of thumb about macroeconomic policy, they didn't claim to know much about macroeconomics—and it was not part of what they taught. Laurie Tarshis, a Canadian economist and the author of the first Keynesian style textbook¹, told the story of his introductory economics class on Black Friday, 1929. The teacher walked in and began the class by stating, “The events of this day are likely to be the most significant economic events of the century.” The professor then proceeded to go through the textbook material, not mentioning the crisis again for the entire course.

This story is telling because it illustrates the economics profession's treatment of macroeconomic fluctuations up until the 1940s. The study of macroeconomic fluctuations wasn't part of the core of economics at the time. Business cycles happened, but there wasn't much that we could do about them. Their policy advice was to learn to live with them. This approach was understandable—the data didn't exist; the statistical techniques for studying that data and pulling out information didn't exist. Moreover, an effective government that could implement policies to do much about such a fluctuation didn't exist. Still they dealt with it, just not in a scientific way. Mostly, they focused on financial crises. Other than that they didn't have much advice. They definitely didn't support running deficits, or government stimulus packages. Instead they favored sound finance—balancing budgets to prevent profligate governments from bankrupting the nation.

Keynes and Keynesianism Are not the Same

That all changed in the 1940s and 1950s when a course called macroeconomics developed and became a part of the principles of economics. Macroeconomics began as a revolution in economic thinking—one that would bring complexity aspects to the fore and move discussions of economic policy beyond the simplifying assumptions of the Walrasian approach. Although the term itself was not known at the time, early macroeconomists were setting their sights again on Complexity Mountain.

The reason the Classical approach to macro had ended was clear enough; the Depression. In the 1930's the social situation in the United States was dire, as the economy had gone into a sudden and unforeseen tailspin—aggregate output had fallen 25%, and unemployment was everywhere. People and politicians wanted answers, and policies to deal with it, and Classical economists had none. “Just wait” doesn't sell well to the unemployed. Students no longer accepted that the most important issues of the day would not be the subject of their studies. They demanded more, and a brilliant economist by the name of John Maynard Keynes obliged, with a book entitled *The General Theory*.

Previously, Keynes had come to fame with his *Economic Consequences of the Peace*, in which he argued that the reparations imposed on Germany after the war were impossible to pay and would cause serious problems. The book was much discussed and made him well known. He was near or at the top of both the policy and theoretical economics profession. His success wasn't surprising since he was the son of a famous economist, part of the Bloomsbury literary scene, and editor of the *Economic Journal*, as well as a top advisor to politicians. Keynes is best understood as a classical economist with vision and an activist policy leaning. He was not tied to any model, and would develop new models and new policy solutions at the tip of the hat. A quip by Winston Churchill captures this aspect of Keynes²: “If you put *two* economists in a room, you get *two* opinions, *unless* one of them is Lord *Keynes*, in which case you get *three* opinions.”

As we stated above, before the 1930's, the macroeconomic policy recommendation of economists was “Just wait—the economy will adjust; you just have to be patient; in the long run the economy will come out of it.” To support that view, economists of the time could point to history—fluctuations occurred with regularity, but then the economy rebounded. That seemed to be happening this time as well. True, unemployment was high, but it was declining, and in fact, from 1932 to 1937 the US economy was growing at a rate of 5-6%. If that rate of growth had lasted for another five years, the worst of the depression would have been over; the long run would have brought the economy back to full employment. The only difference between the 1930s depression and earlier ones was that the 1930s depression was thought to be a bit bigger and a bit longer.

Then came 1937. After the government put in a tax increase to help reduce the deficit, the economy tanked. Instead of growing, as it was supposed to do with high unemployment, output fell. This experience was a challenge to the Classical story about business cycles and to their “just wait” policy solution. This time it just didn't seem to be working, so there must have been something more deeply wrong. The field of macroeconomics was born with the decline in output in 1937.

Soon after the start of the depression, Keynes became convinced that the standard Classical model of the aggregate economy had missed an important insight into the way the aggregate economy worked. In our interpretation of his work, he had what would today be seen as a complexity vision of the aggregate economy, in which there was not a single equilibrium, but many. In such a multiple-equilibrium world macro results were determined by dynamic turbulence and interactions of the individuals, not by people's rational decisions. In modeling this turbulence, reductionism would not suffice, and there could be macro laws that were not grounded in micro relationships, and that

could exist independently of the microeconomic reality. To understand this turbulence, one needed a separate field of study; macroeconomics was to be that separate field.

Macroeconomics was initially called macro dynamics; it was the study of dynamic laws that operate at an aggregate level, but not necessarily on a micro level. Keynes's macroeconomic laws described emergent effects that had no foundation in microeconomics. Keynes argued that under certain circumstances, differences between savings and investment could lead to a systemic breakdown and sustained unemployment and significant deviations from hypothetical long run equilibrium. He outlined a heuristic model that captured how an economy with those emergent effects would operate. This Keynesian model provided a quite different vision about the economy and about policy than the Classical vision.

To see the importance of this Keynesian model for policy, think of controlling an economy with emergent laws and many different equilibria. The "wait and see" policy approach of Classical economists was rooted in the idea that the economy had deviated temporarily from its ideal single equilibrium, but would eventually find its way back there – much like a marble rolling in a bowl that inevitably settles at the bottom after being cast around. Keynes argued that these dynamic emergent fluctuations could prevent the economy from moving to a long-run equilibrium within a reasonable period of time. Thus, he felt that this more complex dynamic needed to be integrated into the broader Classical cannon of thinking about aggregate fluctuations, and that once integrated these insights would revolutionize Classical thinking. Given this belief, Keynes turned his attention to writing the *General Theory*, which he saw as a true general theory of the aggregate economy. He wrote to his friend George Bernard Shaw: "You have to know that I believe myself to be writing a book on economic theory which will largely revolutionize - not, I suppose, at once but in the course of the next ten years - the way the world thinks about economic problems."

Keynes' work focused primarily on the short run coordination problems that could exist in a macro economy. Instead of trying to formally analyze the dynamics of the economy, he eliminated all the dynamics from his basic model. In its place he heuristically outlined a much simpler framework that only looked at how an aggregate economy subject to exogenous shocks would move from one short-run equilibrium to another. This framework became known as the "Keynesian model" and a version of it is still taught in many principles of economics textbooks. It is based on a simple set of behavioral assumptions that were not grounded in formal microeconomic reasoning, but instead were grounded in general observations and proclivities. Given these behavioral assumptions, Keynes argued that the economy could get stuck in a rut, and provide less than full employment for a long time.

In many ways Keynes's theoretical contribution was the insight that the aggregate economy might well be a complex system that could have different laws that were not reducible to the micro level. While those laws would have their origin in the dynamic interconnections of individuals, they would not reflect their conscious decisions or desires, and the collective result of the aggregate of individual micro decisions could be quite different than what the micro decision makers wanted.

In our interpretation of Keynes's work, Keynes intuitively understood the complex nature of macroeconomics, but since complexity science did not develop as a discipline until half a century later, he did not have the math to deal with this. He could only capture it heuristically. One of the key ways in which he captured it was through his discussion of uncertainty and animal spirits, driving people's expectations that in turn drove the economy. As we will discuss in later chapters, in complexity science all this makes sense; given this uncertainty, expectations and people's actions that were based on those expectations, the economy could go through phase transitions—changing suddenly in ways that could drive it to an undesirable new basin of attraction. In complexity

language, today this would be described as becoming locked-in. But Keynes didn't have complexity science available to him, and those few economists who could work on the math were not understood—their models were beyond the technical understanding of most economists of the time.

While Keynes didn't have a formal complexity model, he had an intuitive understanding, and he recognized that this understanding undermined the classical story of long run equilibrium being arrived at in a reasonable period of time. Keynes never dealt with the question of whether, over a sufficiently long time period, the economy would move back to the full employment equilibrium. He avoided this question with the quip that in the long run we are all dead. By this he meant that for policy purposes an equilibrium that would be achieved in a longer time period than the political system would allow was irrelevant.

Keynes had great hopes for his book; as we said he saw it as revolutionary—he recognized that by assuming complex dynamics, the macro economy would have multiple equilibria, and might not return to full employment in the short run. But what did it mean for policy? What it meant was that some type of government policy, or a different institutional structure, might well be needed to overcome the lock-in and ensure that the aggregate economy arrived at a more desirable basin of attraction. The depression called for government involvement in the economy to get it out of this locked in position.

Initially Keynes' hopes for his book were not satisfied. It was not especially well received by older economists, particularly those who had specialized in macro issues. It was seen by most top economists as an interesting, but flawed, attempt to deal with the problems facing the economy. Reviews pointed out that Keynes' analysis was ambiguous on many issues, and was difficult to comprehend. For many cutting-edge macro economists of the time, Keynes' analysis was too simple. It made too many simplifying assumptions. Keynes had not unraveled the Gordian knot of the macro economy that others were struggling with, but had instead cut it, by simply not dealing with the formal analysis of how adjustments happen. Still, because of Keynes' stature, and his expository brilliance, the book attracted a fair amount of attention.

The Stillborn Keynesian Theoretical Revolution

While Keynes's theory is best understood as an early attempt to envision the aggregate economy as a complex system, subject to multiple equilibria, where expectations matter, with lock-ins and emergent macro behavior, that was not the way it was interpreted by the majority of the economics profession. Instead it was what might be called—neo-classicalized, by which we mean that it was shoe-horned into a formal micro Walrasian grounded model that assumed all those aspects of complexity away. The anti-reductionist element of Keynesian economics, which provided a justification for having a separate macroeconomics from microeconomics, was removed. This is a big change, which is at the heart of the difference between what is and isn't a complex system. We've loosely referred to this as the whole being more than the sum of the parts, which means that you can't "calculate" the whole directly from the parts. In a complex system having a separate theory for the whole and another for the parts, makes pragmatic sense.

Seeing the economic system as complex was consistent with the Classical economists who had seen the economy at the macro level as far too complicated for formal modeling. But in thinking about the long run, Classical economists had made a crucial mistake. They assumed the long run could be analyzed separately from the short run and that we could assume that all turbulence would disappear in the long run. Keynes' theory questioned that assumption. He argued that there was not a single equilibrium to which the aggregate economy would gravitate within a reasonable amount of time. He saw the dynamics of the interactions among individuals as being far too complicated to

necessarily lead to a single equilibrium. This meant that it was possible to get stuck in a high unemployment rut, from which it would not recover in the short run. He didn't explore what would happen in the long run, but felt it was unimportant because if something were not done, he believed society would give up on the market economy. Thus he saw himself as saving Classical laissez-faire capitalism, not as undermining it.

Unfortunately, that complexity vision of the macro economy that underlay his theory was soon lost, although initially those referred to as Keynesian economists didn't recognize that they had lost it. Essentially, what happened was that when others took Keynes' ideas and built a formal macro theory, they implicitly grounded in a comparative static micro theory that assumed away all complex dynamic interactions that could cause macroeconomic turbulence. In doing so they lost its complexity essence. How did this happen? As we discussed in the last chapter, in the 1930's there was a movement from the more narrative approach of Marshall in microeconomics, to Walras' approach, finding its inspiration in the formal models of classical physics. The basic ambition became to extend microeconomic reasoning that Marshall had made as the basic building block of economics, to the entire economy. Young cutting edge economists of the time were working on that extension.

Why didn't Keynes object? The answer is that soon after the publication of the *General Theory*, Keynes was pulled into government service, and struggling with practical and political issues of war finance and the reconstruction of the international monetary system. He didn't have time to follow the theoretical discussion in detail, and was supportive of all his followers. Soon after the war, he died; he never returned to doing theory. So, it was left to his followers to develop macro theory. Quite naturally, they fit the Keynesian ideas into a formal general equilibrium system which was the cutting edge theory of the time. The problem was that in doing so, they were forced to give up its foundations in turbulence and dynamics; the math was just too difficult. Instead, they developed a simpler model that came to be known as the Walrasian general equilibrium model. The model they came up with was called a *neo-Keynesian model* by specialists, in order to distinguish it from Keynes's vague model. That led to a lot of confusion in the policy arena, because naturally most people assume that neo-Keynesianism is somehow building on Keynes' ideas. In one way it was, but in other important ways—specifically in its complexity foundations, it was totally deviating from it.

Crucially, whereas Keynes' model could be seen as having complexity foundations, the neo-Keynesian model could not. It was essentially a general equilibrium Walrasian model with fixed wages and a single equilibrium. The multiple equilibria and dynamic aspects of Keynes' insights—the complexity insights—were lost. So with the development the neo-Keynesian model, economists shifted back to the lower mountain, in which the entire aggregate economy could be described by functional relationships with simple linear dynamics. Non-linear issues, the role of expectations, institutions, and dynamic interdependencies among various firms and individuals, were pushed aside, thereby eliminating the complexity aspects of Keynesian thought.

The reason for doing this was that the resulting model fit an optimal control model that paralleled the standard control model in micro. This required making similarly drastic assumptions in macroeconomics and as in microeconomics, which for Keynes would be throwing the baby out with the bathwater. But it made modeling the Keynesian system easy; it simply required the assumption of some different laws and fixed wages, which prevented the economy from moving back into balance on its own. That fixed wage assumption carved out the role for government intervention within the model: Government monetary and fiscal policy were the tools that moved the economy back to full employment. In this model government policy was effective because of the drastic assumptions in the model itself. If there were flexible wages and prices, it wouldn't be necessary. This formal "neo-

Keynesian” model assumed that the economy would arrive at the Walrasian equilibrium of full employment if there had been flexible wages and prices.

With this modification the dynamic foundations and the hints of non-linearities and complexities found in Keynes’s *General Theory* just disappeared. What had been called Keynesian economics was no longer the more general theory; it was simply a linearized and unnuanced Walrasian model with fixed wages. It came to the policy conclusions that Keynesians supported—activist monetary and fiscal policy, but other than that it was simply a sleight of hand, which had the unfortunate effect of snuffing out a complex system view of the economy that Keynes had.

Most advocates of Keynesian economics in the 1950s and 1960s were not too concerned about this loss of dynamic foundations of the Keynesian model, because their primary interest was in policy, and the neo-Keynesian model arrived at the policy results they believed were needed—the need for the government to undertake activist monetary and fiscal policy to counter fluctuations in aggregate output. Since it was obvious that prices and wages were fixed, or at least slow to adjust, they felt that the neo-Keynesian model was close enough, and they turned their focus to developing methods to implement the policy and keep the economy at full employment.

Abba Lerner’s Functional Finance, and the Macroeconomics of Control

The textbook model for this neo-Keynesian model was developed by a number of economists at the time, one of whom was the same Abba Lerner whom we met in the last chapter. As we discussed there Lerner was a brilliant but unnuanced economist who had a knack of intuiting out the essence of theories, and relating them to policy, thereby providing simple textbook models. Lerner’s primary interest was in microeconomics, but while attending the London School of Economics (LSE) he had heard that some new ideas by Keynes were floating around in Cambridge about explanations for the Depression.

Using that same brilliant analytical mind that he brought to micro, Lerner knew that these ideas had to be crazy, since the economic theory that he knew excluded the possibility of a depression. Keynes must have had made a logical mistake. To resolve the issues, he and several other LSE students arranged a meeting with some Cambridge students at a pub, half way between Cambridge and London. One of the Cambridge students who came down was Joan Robinson, a brilliant and hard as nails arguer, who was as sure of herself as was Lerner. They had it out, and at the end, Lerner was intrigued, but unconvinced. Lerner’s own description of the meeting gives a sense of disconnect between their ways of viewing the world, but also of Lerner’s tenacity in getting to the bottom of an argument, he says “The weekend meeting had not been too successful; we still couldn't understand each other - at least we couldn't understand them. They were confident that we were either just very stupid or backward - and we thought they were crazy, obviously doing something that didn't make any sense, but we couldn't quite put our finger on what was wrong.”³

He was however sufficiently intrigued to decide to go up to Cambridge and straighten them out. He could do so because he had just won the Tooke scholarship at LSE which allowed him to go to another university to study for a year. His advisors had decided that it would be best for him to go to Manchester to study some statistical and empirical methods. They hoped that study would add a bit of nuance to Lerner’s worldview. Lerner agreed to go, but decided that on the way he would stop at Cambridge to clear up Keynes’s faulty reasoning. He never made it to Manchester.

Cambridge was a far more gentlemanly place than LSE. It was organized around polite interchange and proper Cambridge etiquette. Lerner would have none of that, and had little patience with English sensibilities. He would go down to high tea in the sandals which he always wore, and

bring gefilte fish which he preferred to eat, rather than the fine crackers they served at high tea. It was not only in demeanor that he didn't fit the Cambridge mold. He was anything but gentlemanly in his argumentation, and he made it clear that he was up there to correct their faulty understanding of the macro economy.

But a strange thing happened. Instead of converting the Keynesian economists at Cambridge to the standard Classical model, Lerner was converted to the Keynesian view of the aggregate economy. He became convinced that macroeconomics could have a different set of laws than the laws that operated on a micro scale, and thus could be different from those in microeconomics. But he was also convinced that once the government understood those macro laws, it could use that knowledge to control the macro economy, just as it could control the micro economy once it knew the micro laws. This interpretation of Keynesian economics perfectly complemented his control model based on micro principles, and thus, Lerner's economics of control approach had both a microeconomic set of laws, and a macroeconomic set of laws. Lerner devoted the entire second part of his *Economics of Control* book to macroeconomics, and developed the concept of "functional finance" which became the textbook understanding of Keynesian policy.

Because of their starkness and simplicity, it was Lerner's functional finance that in large part set the textbook policy framework in macroeconomics. Lerner's functional finance⁴ consisted of the following three rules:

1. The government shall maintain a reasonable level of demand at all times. If there is too little spending and, thus, excessive unemployment, the government shall reduce taxes or increase its own spending. If there is too much spending, the government shall prevent inflation by reducing its own expenditures or by increasing taxes.
2. By borrowing money when it wishes to raise the rate of interest, and by lending money or repaying debt when it wishes to lower the rate of interest, the government shall maintain that rate of interest that induces the optimum amount of investment.
3. If either of the first two rules conflicts with the principles of "sound finance", balancing the budget, or limiting the national debt, so much the worse for these principles. The government press shall print any money that may be needed to carry out rules 1 and 2.

There are a number of things to notice about these rules of functional finance. First, they assume that the government has the ability in practice to raise and lower taxes and spending to achieve fiscal policy ends. There is no discussion of what the spending is for, or what types of taxes are to be levied. Second the laws assume that the level of the debt does not matter, and specifically rule out worrying about balancing the budget or the level of national debt. Deficits are not a problem of governments that have the ability to finance their deficits by printing money. Third, they assume macroeconomic relationships that have no connections to microeconomics. This is a striking contradiction, given that the idea had been that the whole economy could be captured in a single general equilibrium view. The consequence of this rule though, is that these functional finance rules cannot be connected to the rules given to managers who live and operate in the micro world. Lerner didn't deal with why the micro and macro rules are different, but at the time, he didn't have to do so. People were willing to accept that macro and micro could be unrelated.

To help popularize his functional finance policy Lerner created a steering wheel metaphor that contrasted his "economics of control" approach to macro policy with the then prevailing "laissez-faire" policy. He argued that the laissez-faire approach was similar to driving a car without a steering

wheel, the natural result of which was that the economy continually crashed, veering off the road first in one direction, then in another. It was time, he argued, for the government to adopt a Keynesian “economics of control” approach in which the government used an explicit steering wheel--functional finance--to keep the economy running smoothly.

Lerner contrasted the Classical laissez-faire policy of sound finance with the economics of control policy of functional finance. He argued that sound finance involved a set of rules—always balance the budget except in wartime, and do not increase the money supply at a rate greater than the growth rate of the economy. The problem, for Lerner, was that these rules of sound finance were not analyzed; they were simply accepted as being right.⁵ Lerner argued that, when governments understood how the macro economy actually operated, they would adopt his alternative “functional finance” set of rules. Under the rules of functional finance, decisions about the deficit and the money supply would be made in regard to their functionality—their effect on the economy—and not in regard to some abstract moralistic premise that deficits, debt, and expansionary monetary policy are inherently bad.

Lerner’s stark presentation of these rules of functional finance caused much stir in the 1940s and 1950s when most Keynesians, including Keynes himself, were politically more circumspect. It is only later, from the 1960’s, that what came to be known as Keynesian ideas for government fiscal policy, were more wholeheartedly embraced⁶. Lerner’s rules specifically ruled out worry about the size of the deficit, or the size debt a country might have. Lerner argued for functional finance at a Federal Reserve Seminar where Keynes was presenting a paper. At the seminar, Keynes severely chastised him, saying that the rules of functional finance were not something that he would support. This led MIT professor, Evsey Domar, to lean over and facetiously ask Lerner whether he thought Keynes had read Keynes’ book, *The General Theory*.⁷

Despite Keynes’ hesitancy to accept it, in the 1950s and 1960s, Lerner’s functional finance rules became the basis of most textbook presentations of Keynesian theory and policy. Functional finance became what was generally considered Keynesian policy. The government would use countercyclical monetary and fiscal policy to steer the economy. The guiding principle was that the government would run deficits and increase the money supply if the economy seemed to be going into a recession, and run surpluses and decrease the money supply if the economy had inflation. Functional finance is what Keynesian policy meant to most people. Thus, when “Keynesian policy” was attacked in the late 1960s and early 1970s, it was primarily the idea of Lerner’s policy of functional finance that most people were attacking. Neo-Keynesianism had completed its take-over of Keynesianism, including its name – Keynesianism and neo- Keynesianism had become synonymous.

The Market Fundamentalist Reaction to Functional Finance

Not everyone signed on to the functional finance policy program, and many Classical economists who saw the macro economy as too complex to control with either government spending or monetary policy, were strongly against it, except as a one-time measure during a depression. Milton Friedman, to whom you were introduced in the last chapter, saw functional finance as another encroachment of government on the market. This intensified his belief that the market had to be defended at all costs.

The policy discussions in the 1950s became heated and personal, and were tied into McCarthyism and fear of a communist takeover of the US economy. All who called themselves Keynesians were opening themselves up to charges of aiding and abetting communism. Individual economists who supported Keynesian economic policy were singled out by market fundamentalist groups who tried to get them fired. Such an environment was not conducive to discussing nuances of

theory—economic policies, and the economic theories upon which they were based, became entwined with ideological fights and politics. It was a time when one could tell an economist’s policy advice by where they came from. If they came from Chicago—they would favor market fundamentalism and oppose Keynesian economics. If they came from Yale, Harvard, or other similar schools, they would favor government interventional and support Keynesian economics.

That vitriolic fighting eventually blew over, and by the 1960s the Keynesian policy norm was accepted by the majority of policy makers. It became the new normal. In 1971 even the Republican president Richard Nixon stated “We are all Keynesians now.”

Political acceptance of Keynesian economics did not mean that all economists accepted it. As described above, the theoretical foundations of Keynesian policies were weak, as was its empirical evidence. In the real world of politics, it was impossible to change spending or taxing quickly, and it was difficult to even define the money supply, let alone control it. Indeed politicians and the decision-making dynamics were not part of the model. Economists with Classical concerns about the increasing size of government and the accompanying restriction in individual freedom and rights were also generally opposed to functional finance. Eventually, the opposition to what was called Keynesian economics coalesced under the heading of monetarists, and the two-part market fundamentalist/pro government control division of economists that we saw in microeconomics last chapter, had a parallel Keynesian/monetarist division in macroeconomics.

The monetarist arguments against the Keynesian policy consensus involved both political and economic issues. The political issue was that the government would have a predilection toward spending and running deficits, and that allowing governments to run deficits would create more big government since there would be an asymmetry in response. For political reasons government would be much more likely to increase spending to expand the economy than it would be to slow it down. Although monetarists agreed that monetary policy could be effective in controlling inflation, they did not see it as effective in controlling the level of spending in the economy, since it only operated with a long and variable lag.

Whereas Lerner had argued for functional finance with the analogy that not using it was like riding in a car with no steering wheel, monetarists used an analogy of the driver with only a gas pedal, and no brakes, and the steering linkages so loose that when government turned the steering wheel, the car would take ten minutes to respond, making driving practically impossible. Essentially, the monetarist’s argument against functional finance was that governments could not be trusted, and that the control linkages were far too complicated to rely on for control. That was the state of macroeconomics up through the mid 1970s, which was the beginning of the end of neo-Keynesian economic theory.

The Death of Keynesian Economics

The neo-Keynesian and monetarist models were reasonable rough guides to policy, but neither had solid theoretical foundations. The neo-Keynesian models assumed that macro laws existed that could be exploited by government action without actually providing models that proved that could happen, or empirical evidence that showed that it did. They certainly weren’t science, in the sense of having a solid foundation to them, but they were useful in guiding policy, as long as they were not taken too seriously. Unfortunately, they were taken very seriously—they were presented as science, and when macro economists started to develop the micro-foundations, they could show that the micro-foundations of those models were inconsistent with the Walrasian assumptions of rationality upon which the model was based.

The models used to show this inconsistency were quite different from the neo-Keynesian models discussed above. These new models were highly formal Walrasian general equilibrium models with precise assumptions, which, among other things, ruled out non-linear dynamics and dynamic agent interaction. In short they were models that ruled out all complex system issues. Nonetheless, they were mathematically impressive to non-mathematicians, and they gave the sense of providing a solid theoretical grounding for the new macroeconomics that developed and replaced the neo-Keynesian macroeconomics. Supporters argued for these “microeconomic foundation models” as being better theoretically than neo-Keynesian models because they used the same foundations as micro. Within these new macro models because of the assumptions they made, there was no role for government in controlling the economy. In fact, in these model, government attempts to control the economy would make the problems worse. For example, if people expected the government to run expansionary fiscal policy in response to a downturn in output, they would no longer see a need to lower prices—after all the government would increase demand, and the result would be an inflationary bias in the economy that would lead to accelerating inflation should the government attempt to boost demand.

When inflation occurred in the 1970s, the economists who had been arguing for these micro-foundation models were seen as correct, and the neo-Keynesian model was seen as incorrect. In response the economics profession abandoned those neo-Keynesian models and the Keynesian label. Keynesian theory was dead. They adopted a new model called the dynamic stochastic general equilibrium (DSGE) model that to non-mathematicians looked imposing and highly scientific – although, as we’ll describe when we discuss complexity economics in Chapter 8, to physicists the DSGE model looked like a vintage Cuban car, lovingly maintained, but with hopelessly out of date technology. The problem was that in order to make the DSGE model tractable, they had to assume away almost all elements of complexity.⁸ Having done so, their model led them to the market fundamentalist conclusion—there was no role for government policy in the macro economy. Not only was Keynesian theory dead, so too was Keynesian policy.

While it was correct that the neo-Keynesian models were not up to the job of guiding the macro economy, neither were the new micro-foundations models. They assumed away all complexity features. They assumed simple linear dynamics, no inter-agent emergent effects, and a rationality that was far beyond what humans could aspire to. In short, on common sense grounds the micro-foundations of these new models were so far from reality that they could not reasonably serve as a guide for policy.

It was at that point that Dave and others started arguing for a “Post Walrasian” macroeconomics that was based on complexity, giving the two-mountain analogy as an explanation. They called for a return to the complexity foundations of macroeconomics and argued that macro theorists needed to start seeing the macro-economy as an evolving complex system that was quite separate from micro. They argued that the foundations of macro theory in the mathematics of dynamic non-linear turbulence, not in the static linear Walrasian model. Their calls were not heeded. All macroeconomic theory was required to be done within a DSGE framework that essentially ruled out any serious problems with the macro-economy, unless the government had caused them. The influence of government had been exorcised out of the model.

The Financial Crisis Leads Back to Complexity Mountain

The financial crisis of 2008, and the severe recession that followed led people to start questioning the standard macroeconomic theory and the policy advice that followed from it. They started picking up on Dave’s and other’s criticisms, which led to the *Economist* article that we quoted

in the opening chapter. A special session of the venerable Dahlem conference was undertaken to discuss the role of mathematics in the social sciences, where a group of top social scientists, mathematicians, natural scientists and a few humanists met in 2008. Dave was the leader of the group exploring the role of mathematical models in finance and at the end of the conference; this group then wrote a report entitled, “The Financial Crisis and the Systemic Failure of Academic Economics”⁹.

The report went viral on the web and it quickly became a topic of discussion in the blogosphere—with critics of economics using it to argue that there was too much mathematics in economics, and that there was a need to return to Keynesian style macroeconomic policies. But a closer reading of the report will show that neither of these conclusions followed from it. The use of mathematics in models wasn’t the problem; the problem was in the interpretation and use of the models for policy. If anything the mathematics macroeconomists were using was far too simple, not too complicated. Similarly, with policy—it wasn’t only the new micro-foundations models that were too simple; it was also the microfoundations of the neo-Keynesian models that was too simple. None captured the complexity elements of the economy. The problem was that both sides thought they had scientific foundations for their policy, when in fact, neither side did.

The reasonable discussion of macro policy was being undermined by economist’s attempts to capture policy debates in models that were far too simple. In doing so they diverted the discussion from the real issues. When that happens ideological difference become entwined with the scientific debates and reasonable discussion stalls. The distinction between what we know in a general sense, but that we don’t know in a scientific sense, is lost. As a consequence the belief took root that the polar narratives in the standard frame were firmly rooted in scientific models and theory. They are not.

Emergent Polarization

In many ways the complexity research program is the same research program that Keynes, and Classical economists before Keynes, were struggling with. The neo-Keynesian theoretical revolution was a revolution that attempted to deal with the macro puzzle with the available mathematical tools. Unfortunately, the tools were not up to the task. The novel insights of Keynes were in his vision. That vision was to be found in his prose, not in the formal models. The Keynesian revolution failed not because its vision was wrong, but because the tools were inadequate to the task at hand. Given the tools available, reverting to the Walrasian general equilibrium approach—which is the approach the economics profession followed-- narrowed the puzzle down to one that was analytically manageable, but in the process lost the essence of the problem by assuming away its complexity features.

The story of macroeconomics, like the story of microeconomics given in the previous chapter, is one of enlightened good intentions and insights, necessarily rudimentary and far from complete, but which then are gradually hijacked into a tractable but more sterile frame. This in turn led directly to the ferocious polarization that is reflected in policymaking and dominates the public debate today. We believe it is important to analyze and describe how these things happened and acknowledge that it is not through bad intention, nor through ignorance. On the contrary, many of the players are both brilliant and passionate about developing an understanding of how our macro economy work. Nevertheless the sum of those talents and good intentions has led directly to a counter productive and polarized frame for policy.

The emergence of complexity science, through both the tools and thought patterns it has provided, is gradually leading to a reconsideration of the assumptions that brought the current

polarization of the debate. As we will discuss in Chapter 8, economics is laying the groundwork to rediscover complexity. That, at least, is our hope.

Chapter 6

1 Tarshis 1947

2 Keynes, responding to criticisms that he changed his position is reported to have shut the critic up by saying “When the facts change, I change my mind. What do you do, sir?”

3 D. C. Colander and H.Landreth, *The Coming of Keynesianism to America: Conversation With the Founders of Keynesian Economics* (Edward Elgar Publishing Ltd, 1996), page 89.

4 Lerner, 1941

5 Lerner 1944, 1951

6 D. C. Colander and H.Landreth, *The Coming of Keynesianism to America: Conversation With the Founders of Keynesian Economics* (Edward Elgar Publishing Ltd, 1996).

7 This episode is explored in D. C. Colander, Was Keynes a Keynesian or a Lernerian?, *Journal of Economic Literature*, Vol. 22, No. 4. Dec. 1984, pp. 1572-1575.

8 This model took into account forward looking agents, who would react to government policy—something the neo-Keynesian models would not do. This was clearly an advance. The problem was that in order to make the model tractable, these new macroeconomists had to assume away aggregate fluctuations caused by agent interactions, the existence of uncertainty as to what the true model was, and a variety of other elements that were highly likely to be relevant to understanding the economy. DSGE modelers recognized these limitations, and many of them developed a keen intuition for economic dynamics that goes well beyond what is captured in their models. But that intuition wasn't conveyed to others, or subject to debate, because it was not part of the formal model.

9 The report had multiple authors. Besides Dave, there was Hans-Follmer, Humboldt University, Armin Haas, Potsdam Institution for Climate Impact Research, Michael Goldberg, University of New Hampshire, Katarina Juselius, U. of Copenhagen, Alan Kirman, GREQAM, University of Aid-Marseille, Thomas Lux, University of Kiel, and Brigitte Sloth, University of Southern Denmark. The full report can be found on the web at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1355882 .