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Have Macroeconomic Models Lost Their Connection with Economic Reality?

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Have Microeconomic Models Lost Their Connection with Economic Reality?

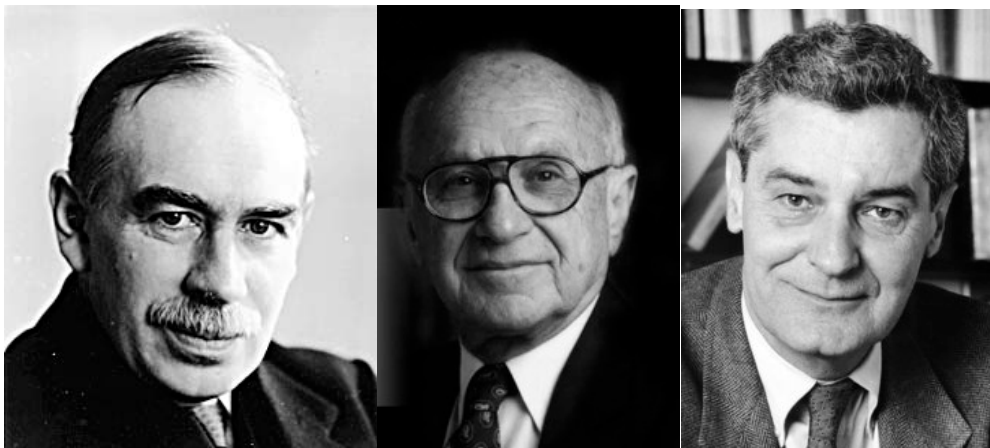
Abstract

Macroeconomic theory has developed into increasingly sophisticated mathematical models. In the words of Mankiw, macroeconomics has developed from engineering into science. The Global Financial Crisis (GFC) revealed that the empirical relevance and the usefulness of these models is debatable. Why has this occurred? Who have been the key players in this development? What have been the policy implications of this development? This paper addresses these points by providing an overview of the development of macroeconomic theory over the past 40 years. The focus is on the main lines of thinking and the story behind the models more so than on the mathematical details of these models. I argue that crises have been the main driver of changes in macroeconomic theory and that the current debates after the GFC will be the start of a more plural approach to macroeconomics, in which engineers will regain their place.

JEL-Codes: B220, E120, E600.

Keywords: macroeconomic theory, Keynes, Friedman, Lucas.

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1. Preliminary remarks.

This paper is based on the Joan Muysken lecture that was delivered at Maastricht University, October 2019. The lecture is named after prof. Joan Muysken, the first professor of economics at the School of Business and Economics of Maastricht University, and is a co-operation between the department of economics (MILE) and Studium Generale of Maastricht University. The idea of the lecture is to discuss economic topics for a broad, non-specialized audience. Previous lecturers in these series were Paul DeGrauwe, John Kay, William Mitchell and Caroline Hoxby. The topic of this lecture is the development of macroeconomic theory and in particular the relation between this development and economic reality.

2. On the evolution of macroeconomics

In my view, the relation between theoretical developments and the match with empirics is key for the progress of macroeconomics. And it is precisely this relation that has been discussed over the past decades and in particular after the recent Global Financial Crisis.

For example, there is this interesting “joke” about the influence of economics and economists

Q: How many economists are needed to run a country?

A: It doesn't matter, because nobody listens to them.

Actually, this “joke” might be close to the truth. In an interesting article in *De Economist* (2006), Bruno Frey gives a nice evidence-based reflection on the influence of economics for policy making. He argues that although many economists work as policy advisors, this does not imply that they have an impact on policy. Economists influence the input side of policy-making but the effect they have on the output side of policy-making and thus whether their advice really has an impact on society, is unclear. Why can this be? Is this due to the models that economists use?

Have macroeconomic models lost their connection with economic reality? That is a big question, I admit. But the question has been asked before. Just like after previous crises, the Global Financial Crisis of 2008 (GFC) has triggered a debate (in fact: many debates) about the value of macroeconomic models and about the development of macroeconomic theories.

Why have these models not led to better predictions of the crisis? Or led to better awareness of the signals of an upcoming crisis? Why have the macroeconomic models not signalled the risks in the global economy? Have these models and the policy implications “caused” the financial crisis? Have macroeconomic models lost their connection with economic reality? These types of questions are being asked to economists and in particular to macroeconomists.

In this paper, I address these points by providing an overview of the development of macroeconomic theory over the past 40 years. I will focus on the main lines of thinking and I cannot and will not go into much detail. Second, for this contribution the story behind the models is more important than

the mathematical details of these models. I will therefore not discuss any model in mathematical terms and details.

I will conclude that “mainstream” macroeconomic theory has indeed lost connection with economic reality and that the dominance of the “mainstream” model has not been a blessing for the development of the relation between macroeconomic theory and economic reality. But there is hope. After the Global Financial Crisis, attention for alternative theories has increased and with the help of new techniques to disclose large amounts of data, macroeconomists can and should benefit much more from the existing diversity in the field.

2.1 *Macroeconomics: the start*

Macroeconomics is a discipline within economics that analyses economic development, output, employment, inflation and interest rates. Macroeconomics focuses in particular on the relation between these variables, such as the relation between the demand for output and employment and the relation between inflation and unemployment.

John Maynard Keynes (1883-1946) can be seen as the father of modern macroeconomic analysis as the analysis of relations between these key variables and the markets that “produce” these variables. For example, he introduced the idea that a decrease in wages might lead to an *increase* in unemployment because of the negative effects of a wage decrease on aggregate demand. This was new, or even revolutionary, because before Keynes the idea was that unemployment signals too high wages and that a decrease in wages *decreases* unemployment. Before Keynes, the focus in economics was much more on individual markets and the incentives of the various market participants. Second, contrary to his predecessors, Keynes focused on disequilibrium macroeconomics. And in disequilibrium, spillover effects between markets are the transmission mechanisms in the economy. Hence, Keynes’ focus on the relation between key macroeconomic variables.

In particular, the connection between wages or income, the demand for goods and the consequences for employment in an unemployment economy was the addition that Keynes brought into economics. Keynes was an inspiring economist because in all his works Keynes was very much inspired by real economic problems that needed to be addressed. His *General Theory of Employment, Interest and Money* was written in 1935 and was largely inspired by and based on the economic environment that he observed when the world faced a huge depression in the 1930s. Contrary to what was expected, the markets were unable to solve the problems related to unemployment and low production. To address these problems, economic theory needed a new and different approach. If you want to understand Keynesian theory, you need to take this into account. Also keep in mind that an economic crisis coincided with or even “caused” a major change in macroeconomic thinking.

NOTE 1: *A crisis enforced re-thinking of existing theories*

Keynes tried to tackle the problem of how to get idle machines and unemployed people back to work because firms want to use their machines and unemployed want a job. However, in the big depression no party had an incentive to start the process of moving the economy forward. Both firms and laborers were caught in a trap: firms could not sell enough products because people had

not enough income to buy these products. People had not enough income because they had no job, because the firms did not sell enough products. Why would firms invest if there is a lack of purchasing power because of unemployment? Why would people buy houses or new clothes when there is no prospect of getting a job?

This brings us to an interesting point that Keynes brought forward. *Economies can suffer from coordination problems, coordination failures.* In any economy, billions of “agents” (consumers, producers, savers, investors) take many decisions every day, every hour, every minute. The interesting thing is that they do not know the decisions from each other. For example, for investments, savings are necessary. How do firms that want to invest know how much consumers want to save? How do firms know how many of their products are in demand and thus how many products they must produce? Alternatively: who or what coordinates economic decisions?

In a market economy, prices coordinate these decisions. Prices inform producers and consumers about scarcity. For example, if some product is very cheap, there will be a lot of demand for this good. Even more demand than the number of goods that have been produced or can be produced against these prices. This results in sold-out and long waiting times. The producers of the goods receive signals that their goods are in big demand and they will produce more of these goods and increase the prices. Then the demand will decrease and the supply will increase such that demand will be equal to the production of the firms. More precisely: the adjustments end when the demand plans from the consumers match the production plans from the producers¹. (Coordination) Problem solved. Note that in this model we implicitly assume that prices are flexible. Second, we assume that agents react on price signals by changing demand and supply if prices change. But this is not necessarily true and not a fixed and natural law.

Take for example the coordination between savings and investments. Suppose that consumers do not want to consume but start to increase their savings. This part of their income is tied up at the bank. The banks want to invest the money, but what if there are no investors out there? If you believe in the price mechanism of the market, then the interest rate would decrease and coordinate the decisions of savers and investors. A decrease in the interest rate makes savings less attractive and investments more attractive. But what if savers and investors do not react on the price? Because the firms do not expect that they can make profitable investments because people save too much? Or because savers are so uncertain about the future that they will not change the amount of savings even at very low interest rates? And what if the firms that demand labor, do not react on a decrease in the price of labor (the wage rate) because they expect that they cannot sell more products? Will a wage decrease then lead to an increase in employment?

In the 1930s, Keynes observed low flexibility of prices and if any, a lack of reaction to from consumers and producers to price changes. From his observations in the 1930s, Keynes concluded that the price mechanism as a coordination mechanism did not work in a depression economy. The economy was stuck in an unemployment situation. The match of consumers’ and producers’ plans did not generate enough production and employment. The question that bothered Keynes was: how can we solve this situation? How can we solve unemployment problems if the markets fail to generate enough employment?

¹ Note that Keynes made clear that equilibrium is about ex-ante variables. Ex-post there is always equality of supply and demand, but this is not necessarily an equilibrium.

Keynes came with the now obvious solution: let the government coordinate and start the process by stimulating demand for output and build for example new schools and railroads. This will start a process of increased demand for labor, increasing wages, increasing income and production and so on and so forth. This is all well-known and well-settled first-year textbook economics nowadays. We call this type of policy “fiscal policy”. Alternatively, the Central Bank could lower the interest rate to stimulate investments and consumer demand to get more people at a job². We call this “monetary policy”. Fiscal and monetary policy are also labelled “stabilization policy” or “demand management”.

Why is stabilization policy necessary? Because in Keynes’ view, uncertainty about the future causes a market economy to be inherently unstable, and there would always be periods of unemployment and idle capacity (“the new normal” according to Keynes)³. The classical idea of equilibrium on markets, matching of plans of agents, is an exception according to Keynes. Keynes gave politicians an argument to spend, to create, to motivate and to defend budget deficits and gave them the idea that an economy could be “steered”. In bad times, the government must create budget deficits, in good times the government must create a surplus on their budget⁴. No more business cycles, no more crises. The economy has come under control. In an interesting article that was published in 2006, Gregory Mankiw, calls this a period where macroeconomists developed as “engineers”. The aim of macroeconomics and macroeconomists was to fix problems. This idea of macroeconomists who saw themselves as engineers was widely spread. The focus in economic theory of these days (1950-1970) was on economic policy to cope with the instabilities of a market economy, which caused unemployment and low production.

Not only Keynes, but also many of his followers were actively involved in offering policy advice (for example US-Keynesian economists such as Robert Solow and James Tobin worked for the Council of Economic Advisors). Coincidentally, a recent volume of *De Economist* is dedicated to Jan Tinbergen who received the first Nobel Prize in economics in 1969⁵. Heijdra and ter Weel (2019) name their contribution “Jan Tinbergen: Engineering a Better World”. Indeed, Jan Tinbergen saw himself as an economic engineer with his mantra *‘Let’s make economics useful to mankind’*. The Keynesian recipes worked quite well. Actually so well that at one point in time economists were all Keynesians!

The theoretical insights of Keynes led to two developments in economic theory. First, and much to Keynes disapproval, his models inspired a number of economists to develop formal macro-economic models and techniques to empirically test Keynes’ theories. Keynes himself was not so fond of this development, as evidenced by his at times unfriendly, debates with Jan Tinbergen, one of the fathers of the development of econometrics (Keynes, 1939). The second development and the one on which I will elaborate, revolves around the question whether a government can and need to coordinate economic decisions and how effective fiscal and monetary policies are to stabilize the economy.

² Note that since Keynes doubted about the sensitivity of savers and investors for changes in the interest rates, he was much more in favor of fiscal policy.

³ In Keynesian theory, uncertainty is key. Skildelsky (2009) extensively discusses the relevance of uncertainty in Keynesian theories. See also Kay (2015) on this point and on the relevance of the difference between risk and uncertainty for financial market and financial products.

⁴ Hence, deficits would not cause long-term debt problems.

⁵ Tinbergen received this prize together with the Norwegian economist Ragnar Frisch for their development of econometrics.

2.2 *The attack on Keynesian economics*

Ideas that promote government interference in an economy and that promote stabilization policy will always find opposition from economists who claim or who are convinced that government interference in an economy is inefficient and not good for a market economy. A government that helps markets on track is too good to be true. In the 1960s, the attacks on Keynesian thinking came from the US, in particular from Chicago. Amongst the most influential attacks was the one by Milton Friedman.

Friedman's critique revealed an important problem in Keynesian thinking. Keynes was never explicit on the question whether and how people would react to changing economic conditions and outcomes. Keynesian thinking argues that unemployment is due to a lack of demand for goods and services. Thus to increase employment, demand needs to increase. The government can increase this demand in case the private sector does not realize enough demand to reach full employment. Since people are unemployed and like to have a job against the going wages, the firms can hire employees without having to pay higher wages. But even if the firms pay higher wages, the only consequence would be a one-time increase in inflation. The discovery of a (stable) trade-off between inflation and unemployment by A.W. Phillips supported this view. Hence, the government can "buy" employment at the cost of inflation. Does society want this? This depends on their preferences for inflation and unemployment, as revealed in the voting behavior.

Friedman attacked this point in Keynesian thinking. Friedman argued that governments can only buy employment at the cost of an ever increasing inflation! According to Friedman, Keynes only discussed a first effect and has neglected the reactions of employers and employees on government policy.

Friedman argued that if inflation increases, wages will increase, inflation increases further and so on. Thus, such Keynesian policy results in the famous wage-price spiral. Conclusion: a one-shot increase in inflation will not do to decrease unemployment. Wages (and thus prices) need to increase continuously in order to increase/buy employment. Moreover, and contrary to Keynes, Friedman concluded that stabilization policy to reach full-employment could only temporarily be effective but would in the end only lead to increasing inflation. And, this end would be reached before full-employment was realized.

Conclusion: governments should not engage in active stabilization policies. Instead, to fight unemployment the government must focus on the creation of better functioning labor markets. Second, the monetary authorities should follow a money-growth rule, since they can only influence the money supply. The Central Bank just needs to clearly communicate their intentions to the market. Such a rule is the preferred policy in Friedman's view. Rely on the markets instead of on the government is his mantra.

Friedman's attack was published in a brilliant article in the American Economic Review in 1968 and the 1970s appeared to show that he had a good point. In the 1970s we noticed two oil crises that resulted in an increase in both inflation and unemployment. This was not what Keynesian theory predicted. In this economic world, Friedman's monetarist ideas gained in influence. Friedman's

article triggered and started the development of new macroeconomic theories, based on expectations, micro-foundations and rules⁶.

NOTE 2: *Again, an economic crisis has “caused” a major change in economic thinking!*

For this major change, one must realize that the relevance of Friedman’s contribution is the re-focus on expectations and on the ineffectiveness of stabilization policies. Second, he stressed again that the role of the government is to take away any barriers that hamper the markets to function properly⁷. This all fitted in the political neo-liberalist way of thinking that re-occurred in the early 1980s.

Let me at this point shortly summarize

1. After the crisis of the 1930s and after the Second World War, the world faced years of high growth, high employment and moderate inflation. This period gave economists and politicians the idea that an economy could be “steered” and managed. This Golden Period ended in the early 1970s.
2. The 1970-1983 decade experienced two oil crises, high inflation rates, high interest rates and increasing unemployment. Stagflation ruled the world. Old recipes did not seem to work anymore. What could economists contribute to solving these problems? What economic policy could “best” bring us back to a normal economic development?
3. In the 1980s, after the stagflation, the focus of macroeconomics shifted towards the need to decrease government involvement in the economy, to give more “breath” to the markets and to the question of how to strengthen the role of the markets.

In the 1980s, discussions about economic policy shifted from the idea of the government as an active player in the economy to the government as the guardian of free markets. The focus shifted from the demand side to the supply side of the economy. Implicitly, the idea was that high unemployment and high inflation in the late 1970s/early 1980s have shown the failure of Keynesian thinking and Keynesian policy recipes. This new focus and new thinking is well-known as New-Classical economics. In political terms this focus is known as Neo-liberalism and is very much connected to economic policies of people such as Margaret Thatcher (UK) and Ronald Reagan (USA).

Alternatively, the discussions shifted from disequilibrium economics to equilibrium economics and from government intervention to accepting the market outcomes. Consequently a broad range of macroeconomic topics that had been extensively discussed in the Keynesian era, such as business cycle theory (Schumpeter, Kalecki, Goodwin, Kuznets, Kondratieff), income distribution (Kaldor, Tinbergen, Capital debate/Cambridge-Cambridge debate (Robinson, Samuelson, Sraffa)) disappeared from the macroeconomic research agenda. Typically, these topics were all based on societal problems that needed to be “fixed”.

⁶ The relevance of Friedman’s article is confirmed by the Winter 2018 volume of the Journal of Economic Perspectives, which contains articles from Mankiw and Reis, Blanchard and Hall and Sargent to “commemorate” this article. See “A symposium on Friedman’s natural rate hypothesis after 50 years”.

⁷ As usual, Friedman built on earlier theories and theorists, in particular Fisher (1922, relation between the money supply and inflation) and Muth (1961, expectations). After Friedman, the rules versus discretion debate gained a lot of interest in economics. Kydland and Prescott (1977) is the seminal article for this debate.

In the remaining part of this paper, I will focus on two points that are related to the development of macroeconomic theories into the mainstream macroeconomics of today.

- 1) New-classical economics has changed the field of macroeconomics dramatically. This coincided with development of macroeconomics from “engineering” into “science”.
- 2) Lack of discussions between macroeconomists has led to monism in research and teaching where pluralism is much needed.

And I will conclude that

As in the 1940s and in the 1980s, we are again in a period of transformation in economic thinking which will change the field of macroeconomics.

2.3 Main building blocks of mainstream macroeconomics since the 1980s

Keynesian models that had been developed in the 1960s, the 1970s and in the 1980s suffered from a lack of analytical rigor. This point has inspired many economists to “repair” this in the late 1980s and in the 1990s. Two major topics that have been key in this process and in the development of macroeconomic models since the 1980s and hence have shaped macroeconomic models:

- 1) the role of expectations in macroeconomic analyses
- 2) the so-called micro-foundations

I will shortly go into these theoretical developments and then discuss how these changes have influenced thinking about economic policy in macroeconomic models.

Expectations

One relevant point of Friedman is his focus and his explicit incorporation of expectations in economic theory⁸ to attack Keynesian thinking. The idea of expectation is that today's behavior and decisions are determined by how people see the future. Keynes was aware of the importance of expectations and also paid attention to expectations but did not incorporate these comprehensively in his theory of output and employment. These were just part of the “animal spirits”, which were left unexplained in his theory.

Friedman's focus on expectations has been extremely influential in the development of macroeconomic theories since the 1970s and triggered a lot of theoretical and empirical research into the role of expectations in economics.

⁸ As Sijben (1979) argues, expectations have long been part of economic thinking. Already Marshall, Fisher and Keynes have discussed expectations as part of economic behaviour in the first half of the 20th century. However, in Marshall and Keynes, expectations are implicitly incorporated or declared to be “not to be explained” as in Keynes' famous animal spirits. Friedman builds on Fisher who developed the idea of adaptive expectations.

The question for researchers is: how do agents form expectations? And, how precisely do expectations feed into economic decisions about consumption, investment, supply of labor? Friedman claimed that people form expectations based on past evidence and adjust if their expectation was not correct. This seems all quite logical and does make sense. Still, in this set-up it is possible that agents continuously make mistakes and have wrong expectations because they continuously lag behind reality. Second, in this set-up people do not react on events that given the current information, may happen in the future. For example, an increase in energy prices because of expected climate change measures would not be taken into account. That is not what a rational individual does.

In other words, people will not always and will not only base their expectations on realized past outcomes. But if so, what is the alternative? The answer was given by John Muth, a Chicago-born economist. In 1961, Muth wrote an article about expectations and price movements. For expectations, his hypothesis was *“that expectations are the same as the predictions of the relevant economic theory”*.

Apart from a minor question on what economic theory is the *relevant* economic theory, what could it mean? The idea that Muth developed was that the expectations that individuals formulate are as good as the predictions that follow from the appropriate model of the economy. That is a big claim. It implies that if anyone on the streets would be asked what level of inflation (s)he expects in 2020, the answer would be based on the most appropriate economic model or on any information that would predict as good as such a model.

It also implies that people have full access to all relevant information and can combine all this information into a prediction of the relevant variable, the inflation in 2020. The idea behind this formulation is that in a well-functioning market economy, no information is wasted. Hence, Muth called these expectations *“rational expectations”*. The Chicago economist Robert Lucas popularized this idea further in a series of influential papers that he wrote in the 1970s.

These are the two *“flavors”* for expectations that macroeconomists use. One the one hand expectations that are based on the difference between past expectations and past realizations (we call these *“adaptive expectations”*). These are easy to make and to understand, but run the risk of continuous wrong values for the expectations. On the other hand, rational expectations, which are always correct but are based on an enormous effort and knowledge of the individual and on a correct model of the economy. Many macroeconomic models only model one type of expectations and rational expectations have become the standard.

Does it matter much what type of expectations is being used in economic models? Yes, it matters a lot and much of the development of macro-economic theory in the 1970s, the 1980s and the 1990s was dedicated to the role of expectations for policy-making. Why does it matter which type of expectations have been modelled?

The key point is that economic policy measures to increase demand and employment in an economy can be *temporarily* effective in case people have adaptive expectations. If they have rational expectations however, they foresee all consequences of economic policy and pro-actively react accordingly. Then economic policy measures to increase demand and employment will *not* have any

effect and will only lead to inflation⁹. The debates concentrated most on monetary policy: the change in the money supply or in the interest rate to influence demand in the economy. Let me give an example of the thinking.

Suppose that the economy is in a recession, with a low output level and a high level of unemployment. Assume that the increase in the wage rate and inflation was 0% last year. For this year, the unions have succeeded to negotiate an increase in purchasing power for their members and negotiated a wage increase of 1%. Next, the Central Bank lowers the interest rate to increase spending, output and employment. In reaction, inflation starts to increase as a reaction to an increase in employment and the 1% increase in wages. Assume that during the year, inflation increases by 1% as well.

If unions and employees only look back and base their behavior on an inflation rate of 0%, employees perceive the 1% increase in money wages as an increase in purchasing power because the increase in current inflation is not taken into account. The 1% wage increase is negotiated by the unions under the assumption that the inflation is 0% as it was last year. Hence, people will increase consumption and increase the supply of labor.

However, if people have rational expectations, they foresee the change in inflation and take this into account to notice that despite the increase in money wages, the purchasing power has not changed this year. Thus, they will not spend more and will not supply more labor. This kind of monetary policy only results in inflation and has no consequences on output and employment. We call this neutrality of money and we conclude that the quicker expectations adjust and change, the less effective is economic policy. For the Phillips curve, this implies non-stability and in case of rational expectations, a vertical Phillips curve: there is no trade-off between inflation and unemployment.

Thus, the way expectations are modelled determines the effectiveness of stabilization policy and determines answers to questions such as: must a government spend more to address unemployment? Must the Central Bank increase the money supply to increase output (and inflation)?

Neutrality of money was (and still is) a heavily debated topic in macroeconomics¹⁰. In theoretical debates, the way people form and adjust expectations is the key of the different views. In this debate, another challenge in Keynesian thinking came to the surface: the behavior of individual agents (consumers, firms) and the relation between this behavior and macroeconomic outcomes (output, employment). Can it be that individuals that behave rational (aim to maximize profits and utility and have rational expectations) create an economy with unemployment and low output? If not, how can we explain an unemployment economy from individual behavior? This brings us to the second heavily debated topic in macroeconomics over the past decades: the micro-foundations debate.

⁹ An implicit assumption here is price flexibility.

¹⁰ This debate started of course also in the early 1900s in influential papers by Irving Fisher and Knut Wicksell.

Micro-foundations

In macroeconomics we analyse the result of economic decisions of many individuals (firms, consumers). But what individual behavior is behind this result? What is the relation between individual behavior of the many agents and the economic outcome for say a country? This is not so straightforward. The savings paradox is one famous example. If in a country, all consumers individually decide to save more, total consumption and total output decrease. It is then perfectly possible that total income decreases to such an extent that total savings decrease, despite the fact that individuals save a larger part of their income. Thus, more savings from all individuals does not necessarily lead to higher total savings.

The question is: (how) can we develop a model for an economy (for example at the level of a country) that consists of many agents, starting from individual behavior. What is the relation between individual consumption and savings behavior and total production in a country? Is total production just the sum of the separate decisions of individuals, taken in isolation? This might seem so but it is a bit more complicated. Why? People interact, may have different ways to form expectations. Your consumption might depend on the consumption of other people, your expectations might depend on the expectations of other people and so on. Your consumption might depend on your wage rate, which depends on the wage that the union negotiates which depends on employment, which depends on the consumption of other people as well.

Your consumption may also depend on the interest rate which depends on the savings and investment behavior of consumers and firms. The results in an economy at an aggregate level are the results of the many decisions of the many individuals (consumers, firms, the government, agents in foreign countries) that interact and base their decisions on a variety of expectations. In economics we call this the aggregation problem¹¹. This makes macroeconomics a complex field. And this makes the micro-foundations a difficult topic. How can you model all these individuals and their interactions without one-to-one replicating the full economy?

This relation between individual behavior and output, employment and inflation in an economy was neglected by Keynes. To put it in economic terminology: Keynes did not base his macroeconomic theory on microeconomic behavior, where microeconomic behavior is defined as the behavior of an individual economic agent. The so-called micro-foundations debate is a complex topic in economics¹². How can you represent the behavior of many individuals, the many interactions and thus discuss total (or aggregate) consumption, total investment and so on in a simple, tractable model? Can we just “multiply” the behavior of one individual by 17 million to get the results for the Netherlands? But then you lose the interactions. Second, what behavior must be multiplied?

One way to tackle this issue is to assume that all individuals are alike. And they are all alike Mr. and Mrs. RARE. Mrs RARE is fully rational, is gifted with rational expectations and continuously maximizes her objectives and she is quite or at time extremely sensitive to financial incentives. Mr. RARE owns a firm and as a producer, he shares the same characteristics as Mrs. RARE: A Rational Agent with Rational Expectations. And by the way, both Mr and Mrs RARE are also looking at the

¹¹ Note that Joan Muysken wrote his PhD thesis on this problem, see Muysken (1979).

¹² The theoretical debate started in the 1970s, see for example the works of Clower and Leijonhufvud.

consequences of their current decisions for their grandchildren and even their great grandchildren and their grandchildren as Mr and Mrs RARE have an infinite horizon that spans many generations. In economics, we call this “forward looking behavior” in an “overlapping generation model”.

Finally, Mrs and Mr RARE live in a risky world, but not in a world of uncertainty. Thus they are aware of all kinds of events that will influence their economic position (such as BREXIT) and more importantly, they can assess possibilities that these events lead to certain outcomes. In economics terms: they can make probability distributions for all contingencies that can occur. So, following the BREXIT Mrs and Mr RARE can assess that, for example, with 10% chance, Dutch output will decrease by say 1% and so on. Rational as they are, they incorporate these outcomes in their current decisions. This makes Mr and Mrs RARE really whiz-kids.

Thus one way to solve the micro-foundations problem is to consider the say Dutch economy as consisting of 17 million Mrs and Mr RARES. We just inflate the behavior of Mrs and MR RARE. Strange? Yes, indeed, but this is exactly how “mainstream” macroeconomics has “solved” the problem of the relation between individual behavior and collective, aggregate outcomes. Multiply extremely rational individual behavior to reach aggregate outcomes. Does it make much sense to model this kind of behavior while beforehand you know that nobody fulfills the characteristics of Mrs and Mr RARE behavior? Does this make much sense to explain economic reality? I doubt and to me, this is still an unsolved problem in macroeconomics. I am even wondering whether we need a micro-foundation if we cannot define a proper one.

From an economics point of view, the idea that an economy consists of Mrs and Mr RARES is debatable. But from a modelling or mathematical point of view this is a very convenient idea and indeed, this idea and this behavior has since been built in a large number of macroeconomic policy models which are consequently characterized by more or less complicated mathematical derivations and techniques, also often borrowed from physics, like optimal control techniques. The American economist Robert Lucas has played a key role in this development.

It is as if the economic system is comparable to a system in physics¹³. Even the wording seems to be borrowed from physics: in an economy there are a number of “natural” convergence points (equilibria). Nowadays, even macroeconomists talk about “experiments” and “treatments” when they simply mean an increase in government spending (wording of the old days). According to Mankiw, with these models macroeconomics started to develop as “science”. Instead of the fixing of problems, the models aimed to show how an economy can be modelled consistently on the basis of basic economic principles for individual behavior. These models are elegant and internally consistent because they start from individual behavior. The heavy use of mathematics in these models suggest a kind of preciseness. But unfortunately, these models do not match well with the data.

¹³ The resemblance between economic systems and natural systems has been an old debate in economics. Economists that claim that an economic system can be modelled as a natural system claim that an economic system that is based on markets is inherently stable, see the work of Lucas. On the other hand, there are economists who claim that economic systems or social systems in general, are much too complex to be modelled as a natural system and the conclusions of these models must be used very carefully, see the Austrian school and Hayek’s Nobel Prize lecture (von Hayek, 1989).

These models gained a lot of attractive power among economists who aim to model the economy as a system in physics. And there are many! These type of models then developed into the mainstream models in the 1990s and the 2000s and have been the basic models for policy advice, all over the Western World. In this mainstream model, full of RARE agents, the economy will always converge to a “natural equilibrium” with a “natural rate of output” and a “natural rate of unemployment”, a “natural interest rate” (Wicksell) and I guess with natural rates for inflation and wages as well. These natural rates are determined by the characteristics of the economic system, in particular the characteristics of the markets in an economy (competition, flexibility).

But do these models really start from individual *economic* behavior? They start from extremely rational individual behavior where rationality is defined in a specific way: use of all information and have well-defined and planned behavior. Can it not be that consumption is the result of opportunistic behavior? Just like investment? Can it not be that considerations of fairness and equality play a role in economic behavior? For example, in wage setting? Can it not be that narratives influence consumption and investments? Yes of course it can, but not in these models. These models lack real economic behavior and insights from other social sciences such as sociology and psychology. As Haldane and Turrell (2018) put it: the mainstream model has isolated macroeconomics from other disciplines and led to a methodological mono-culture in macroeconomics. Mainstream macroeconomics and macroeconomists have been trapped in a tunnel-vision.

3. Have theoretical developments been influential in engineering?

Why would we bother so much about the theoretical development of macroeconomics into the mainstream model? The point here is that this model has strong recommendations for economic policy and one can argue that, despite the complaints of many politicians about macroeconomic models, economic policy has been influenced by this type of thinking, in particular in the 1990s and the 2000s. So, I do not completely agree with the analysis of Frey (2006). Let me give 4 examples.

1. Monetary Policy

In his 1968 article Friedman claimed that monetary policy is not effective to increase output and decrease unemployment. Lucas made the point even stronger in the 1980s. Consequently, “Do not play around with the monetary target”, hence the best policy is a policy based on a fixed rule. That can be a rule for the growth of the money supply, for the interest rate or for inflation. As long as the policy is well-communicated and credible so that whatever it takes, the policy rule will be followed. This idea triggered a lot of research about rules based versus discretionary based monetary policy and in the mainstream model, the rules based policy has won. Thus, in the EMU, the ECB targets an inflation rate and whatever it takes, the rule must be followed.

2. Fiscal Policy

The mainstream macroeconomic model cherishes the undistorted functioning of markets and stresses the budget constraint for the governments. Taxes distort the functioning of markets since they undesirably influence the decisions of consumers and producers. They are enforced payments by the government and thus not the result of free choice. The idea is that the private sector always outperforms the public sector. The public sector must only provide goods that cannot be provided by the private sector such as defense and dikes. In addition, governments cannot use fiscal policy to solve unemployment problems. For fiscal policy, this implies low taxes, low government deficits and debts and hence low government expenditures.

3. *Unemployment*

In the mainstream macroeconomic model there is a “natural rate of unemployment”. Keynesian stabilization policy is not effective to decrease this rate as this policy will only cause increasing inflation. But what if we think that this unemployment rate is too high? Then we must improve the functioning of the labor market, in particular the supply side. How? Decrease union power, decrease the minimum wage and the unemployment benefits, make it easier for firms to fire employees and so on.

4. *Focus on/confidence in markets: deregulation*

We can summarize the policy prescriptions of the mainstream macro-economic model as having low confidence in government involvement in the economy and having an unlimited confidence in markets. Deregulation! Thus the 1980s and the 1990s were characterized by strong de-regulation in particular of the financial markets. In addition, many public services have been privatized (electricity, health care, telecommunication to mention a few examples).

In comparison to the models of the 1970s, the mainstream macroeconomic models are quite boring for the engineers as there is nothing to steer on the demand side of the market. The mantra is: if there is a problem (too high unemployment, too low output) see to it that the markets (labor market, goods markets) do a better job.

Thus increase competition, decrease regulation on the markets, increase the “flexibility” of the markets. Markets can solve any problem, if you do not distort their functioning. This is the neo-liberal agenda that many governments have been following since the mid-1980s. Not only the governments, also the IMF and the World Bank embraced these models and prescribed the policy recommendations to all countries in the world who run into economic problems or faced economic challenges. These recommendations have become famous as the “Washington Consensus”. Second, the mainstream model has made discussions about the origins of the business cycle and about income distribution obsolete. We have to accept the market result in the economy. But in comparison to the models of the 1970s, the mainstream macroeconomic models have been quite interesting for the scientists. Numerous papers have been dedicated to varieties of the mainstream model, to more complex mathematics and to more sophisticated analyses. Without ending into different conclusions for economic policy.

But ever since the early days of Mrs and Mr RARE, the mainstream models have always been pursued by the question: how realistic can models that consists of Mr and Mrs RARE be? For we all

know that Mrs and Mr RARE simply do not exist¹⁴. In terms of Mankiw: have the scientists separated too far from the engineers?

In the 1990s and the 2000s, comments on the mainstream model were not taken very seriously and discussions took place “in the margin”. The economic environment seemed to support the policies that followed from the mainstream model: the 1990s and the 2000s are the years of the Great Moderation. Sound economic growth, stable macro-economic environment.

4. Discussions and new directions

Everything developed fine until “Reality started to misbehave” (Niall Ferguson, *The Ascent of Money*, Part 6, Chimerica)¹⁵. Reality started to misbehave in 2008.

NOTE 3 ***Again, we needed a crisis to start a serious debate on macroeconomic theory. This crisis started in 2008.***

The Global Financial Crisis (GFC) was a reality shock for mainstream macroeconomics. What was the state of mainstream economics at the start of the crisis? Two examples illustrate the state of the macroeconomics art at and during the GFC

Paul Ormerod, a British economist reports about a visit of Queen Elizabeth to the London School of Economics in November 2008. Talking about the crisis to Faculty she just asked: “Why did nobody notice it”? Where-after the director of research replied: “At every stage, somebody was relying on somebody else and everyone thought they were doing the right thing”

“When the crisis came, the serious limitations of existing economic and financial models immediately became apparent. [...] market participants were gripped by panic. Macro models failed to predict the crisis and seemed incapable of explaining what was happening to the economy in a convincing manner. As a policy-maker during the crisis, I found the available models of limited help. In fact, I would go further: in the face of the crisis, we felt abandoned by conventional tools.”

Reflections on the nature of monetary policy non-standard measures and finance theory
Speech by Jean-Claude Trichet, President of the ECB, Opening address at the ECB Central Banking Conference Frankfurt, 18 November 2010

In my view, the biggest problem in mainstream macroeconomics is, apart from the micro-foundations, that it has lost the key characteristic of a macroeconomic analysis, which is the

¹⁴ Friedman (1953) also raised the question whether it matters that the assumptions of a model have an empirical basis. In his instrumentalist vision, a model is good as long as it can make accurate predictions. In the extreme, the model itself can even be a “black box”.

¹⁵ This fascinating episode is available on YouTube. The 48 minutes version is the full version, see .
<https://www.youtube.com/watch?v=QM-WRNMDtp0>

connection, the spill-over effects between markets. For example, mainstream macroeconomic models hardly enable a risk-analysis of increasing asset prices, increasing debt and increasing leverage. The lack of a financial sector in many of these models prevented a Minskyan behavior analysis of banks.

The lack of a financial sector in many of these models still is a problem in my view¹⁶. For example, one interesting problem that appeared after the GFC is, is it possible that increasing financialization/deregulation on the (financial) markets has changed income distribution such that excess savings and low interest rates are the “new normal”?

And related to this, what are the macroeconomic effects of very low interest rates? What are the effects for economic policy, for income distribution, for institutional arrangements (pensions, insurance), for risk assessment?

The future of macroeconomics

Again we needed a crisis to critically reflect on the existing theory. The GFC triggered a large number of debates about the future of macroeconomics. Not only among economists, but also between politicians and economists as evidenced by the Hearing of the committee on Science and Technology of the US House of Representatives (July 2010), where they explored the limits of modern macroeconomic theory and discussed with Robert Solow, Sidney Winter, Scott Page, V.V. Chari and David Colander the question why the economics profession cannot provide better policy guidance. The discussions focused on the mainstream economics model. Except for Chari, the economists concluded that the mainstream models have lost their connection with economic reality.

How must we proceed? There is hope and let me point at three interesting developments.

First, amongst others, Paul de Grauwe has written a number of interesting articles about “behavioral macroeconomics”. He has convincingly shown that the mainstream model consisting of Mrs and Mr RARE does not comply with economic data. A small change in the model (not only Mrs and Mr RARE but also Mrs and Mr ROT (Rule of Thumb) are part of the economy) makes the model perform much better in matching the data. The key point is that some individuals have rational expectations, while other individuals follow rules of thumb for their expectations. So, de Grauwe introduces the idea that individuals differ in an economy and that they do not all behave rational in the sense of the mainstream model. I think that this is a fruitful start to introduce more behavior in macroeconomics just like the profession did in microeconomics over the past decade.

¹⁶ Many mainstream models have a banking sector. However, these banks only shift savings to investors and their behavior is neutral in the sense that their behavior has no influence on the real part of the economy, such as output and employment. But what I mean is the modelling of a financial sector with their own goals and choices which can lead to destabilizing behavior (see Minsky (1992) and Koo (2009))

Second, thanks to technological developments, economists have access to an enormous amount of data. With the help of new techniques to analyze big numbers of data, we can much more than before discover patterns in data. We can also analyze interactions between individuals much better now and with the help of new types of models such as network models, agent-based models and computational economics, we are able to build models that better reflect economic behavior of and interaction between groups of different types of individuals.

Third, there is more than mainstream economics in macroeconomics. In my view, the most important alternative is Post-Keynesian economics, which builds very much on traditional Keynesian theory. Unfortunately, the relevance of Post-Keynesian theories among academics, in academic journals and in policy advice has decreased dramatically over the years, but they regain in importance. For example, in the 1980s Hyman Minsky already claimed that capitalistic systems are inherently unstable because of speculation resulting in unwarranted debt relations on the financial markets and in financial crises. This theory was developed in the 1980s, but was not taken very seriously in the 1990s and in the 2000s. May be because Minsky did not construct a mathematical model but just verbally described the behavior of individuals and bankers? Minsky told the narrative. Since 2008 Minsky's theory has become more popular and more referred to, also in the serious academic journals. The same holds for Post-Keynesian monetary theories. Post-Keynesians have always stressed the importance of the financial sector and in particular banks, in an economy. They have always stressed the important role of money and credit in the economy and they have always stressed the implication of uncertainty in economics. The revival of post-Keynesian monetary theory, Modern Monetary Theory, gains more and more influence in particular in political circles in the USA. The new attention for Keynesian and Post-Keynesian theories is best expressed in the title of the book by Robert Skidelsky (published in 2009): Keynes, The Return of the Master.

But may be the most important conclusion that I take away from the many debates is the broad consensus that pluralism in economics is much desired. Which is something! We haven't discovered yet the model that fits all countries in all times, be it in normal times or in times in which we live now, with extremely low interest rates. It is also clear from the discussions that we need a better narrative to back the models that we use in macroeconomics. Many economists agree that we need different types of models for different purposes and for different times. Alternatively, we need to handle macroeconomic models with much more care than we have been doing !!!

We need pluralism in economic teaching, but also in economic research. In addition to the sophisticated highly mathematical models, we must accept models that approach economics from a different and often real multidisciplinary angle. In these models the narrative plays a larger role than the mathematics and that is exactly the problem. Although it is all about economics, it seems that mainstream economists and non-mainstream economists speak a different language. Not just a different language, but a very different language!

To illustrate this latter point, see the following quotes from the Post-Keynesian economist Joan Robinson and New-Classical economist Robert Lucas

At a time when economic theory has become highly mathematical, she (i.e. Joan Robinson) refuses to use equations. *"I don't know math," she quips, "so I am obliged to think."* (The New York Times, March 23, 1976, Page 29)

"Progress in economic thinking means getting better and better abstract analogue economic models not better verbal observations about the world" (Robert Lucas in Chari, JEP 1998, p. 185)

Even if we take the difference between the state of the art of economics in 1976 and in 1998 into account and even if we take into account that many Post-Keynesian models use equations, the difference in their view on economics is striking and still relevant in the current debates between Post-Keynesians and New-Classical economists.

In my view, there is nothing wrong with multidisciplinary models that are less sophisticated in terms of mathematics. Of course, these models might be less precise but wasn't it Keynes who said: "it is better to be roughly right than precisely wrong".

"[Economists] are often in error but never in doubt" according to Paul Ormerod. In my view, the way to move forward in macroeconomics is to be more in doubt to be less in error. For this, engineers and scientists have to work more closely together. An alternative metaphor is that in macroeconomics we have architects (scientists) and firemen (engineers) (Timbeau, 2012). Firemen can only do their work if they are familiar with the architecture of the building. Architects can only develop safe buildings if they are familiar with the needs of firemen.

5. Conclusions

1. **Have macroeconomic models lost their connection with economic reality? This was the question that I wanted to address in this contribution. The answer is not simply yes or no.**

It is true that mainstream macroeconomics did not signal the dangers of deregulation, in particular on financial markets and the following increasing debt positions in the world.

It is true that the assumptions of economic behavior in the mainstream macroeconomic model are far beside real economic behavior. But this does not imply that the model cannot predict economic developments.

To me it seems true too that mainstream macroeconomic models are based primarily on being internally consistent more than on giving an adequate analytical description of reality.

It is true that whereas in reality problems are interdisciplinary, macroeconomic models have become more mono-disciplinary.

So this leads to the conclusion that mainstream macroeconomic models have indeed lost connection to reality.

However,

It is not true that mainstream macroeconomic models have not been adjusted. But in my view, all these adjustments are varieties on a similar theme: a market economy is inherently stable and can be modelled as a physical system with more or less precise outcomes.

For me, the question remains: can one be precisely right in a world of uncertainty? No, but one can be precisely wrong. With big consequences.

2. **We need more pluralism and debates in macroeconomics classes.**

There is this funny joke about economists:

An economist's left leg is on fire and his right leg is frozen... . He is asked: how do you feel?

The economist says "on average I'm perfectly fine".

It seems true that mainstream macroeconomists have behaved too much according to the economist in this joke: they focused too much on the average. There must be more attention for the fires and the frozen legs in economics.

For attention for and for fixing the fires and the frozen legs we need a pluralist approach to economics. We need to acknowledge that there is no one-and-for-all- economic model. Pluralism includes mainstream economics but also Post-Keynesian economics, feminist economics, health

economics and so on. We need pluralism in the approach to economic problems and pluralism in methodology.

Economics is a very rich and vivid science with many connections to other social disciplines and with a rich tradition in analyzing real world problems in their context. Let us go back to these traditions in research and teaching. Microeconomic theories have been enriched with many insights from other social sciences and this has resulted in behavioral economics¹⁷. It is now time for macroeconomics to follow.

¹⁷ In itself, behavioral economics is a strange term as economics is a behavioral science.

References

- Akerlof, G. (2007), The Missing Motivation in Macroeconomics, *American Economic Review*, 97, 1, pp. 5-30.
- Akerlof, G. and R. Shiller (2009), *Animal Spirits*, Princeton University Press.
- Baumol, W.J. (2000), What Marshall *Didn't* Know: On the Twentieth Century's Contributions to Economics, *The Quarterly Journal of Economics*, CXV, (1), pp. 1-44.
- Blanchard, O. (1997), Is There a Core of Usable Macroeconomics? *American Economic Review*, 87, 2, May, pp. 244-246.
- Blanchard, O. and L. Summers (2017), *Rethinking Stabilization Policy. Back to the Future*, Paper prepared for the Rethinking Macro Policy conference, Peterson Institute of International Economics, October 2017.
- Blanchard, O. (2018), On the future of Macroeconomic Models, *Oxford Review of Economic Policy*, 34, 1-2, pp. 43-54.
- Blanchard, O. (2018), Should we reject the Natural Rate Hypothesis? A symposium on Friedman's Natural Rate Hypothesis after 50 years, *Journal of Economic Perspectives*, 32, 1, pp. 97-120.
- Blinder, A. (1997), Is There a Core of Practical Macroeconomics that we should all believe? *American Economic Review*, 87, 2, May, pp. 240-243.
- Branson, W.H. (1972), *Macroeconomic Theory and Policy*, Harper and Row.
- Carlin, W., R. Gordon and R. Solow (2012), Round table discussion: where is macro going?, in R. Solow and J-P. Touffut (eds), *What's Right with Macroeconomics*, The Cournot Centre Series, Edward Elgar, pp. 195-228.
- Chari, V V. 1998. Nobel Laureate Robert E. Lucas, Jr.: Architect of Modern Macroeconomics, *Journal of Economic Perspectives*, 12 (1), pp. 171-186.
- Chari, V.V. and P. Kehoe (2006), Modern Macroeconomics in Practice: How Theory is Shaping Policy, *Journal of Economic Perspectives*, 20, 4, pp. 3-28.
- Clower, R. W. (1979), The Keynesian Counterrevolution: A Theoretical Appraisal, in Korliras, P. and M. Thorn (1979), *Modern Macroeconomics*, Harper and Row, pp. 289-304.
- Colander, D., M. Goldberg, A. Haas, K. Juselius, A. Kirman, T. Lux and B. Sloth (2009), The financial crisis and the systemic failure of the economics profession, *Critical Review*, 21, 2-3, pp. 249-267.
- DeGrauwe, P. (2012), *Lectures on Behavioral Macroeconomics*, Princeton university Press.
- Driehuis, W., M. Fase and H. den Hartog (1988), *Challenges for Macroeconomic Modelling*, North Holland.
- Fisher, I. (1922), *The Purchasing Power of Money, its Determination and Relation to Credit, Interest and Crises*, MacMillan.
- Ferguson, N. (2009), *The Ascent of Money, A Financial History of the World*, Penguin Books.

- Frey, B. (2006), How influential is economics? *De Economist*, 154, 2, pp. 295-311.
- Friedman, M. (1968), The Role of Monetary Policy, *American Economic Review*, 58, pp. 1-17.
- Friedman, M. (1953), *Essays in Positive Economics*, Chicago: University of Chicago Press
- Haldane, A. and A. Turrell (2018), An interdisciplinary model for macroeconomics, *Oxford Review of Economic Policy*, 34, 1-2, pp. 219-251.
- Hall, R.E. and T. Sargent (2018), Short-run and long-run effects of Milton Friedman's presidential address, A symposium on Friedman's Natural Rate Hypothesis after 50 years *Journal of Economic Perspectives*, 32, 1, pp. 121-134.
- Hayek, F. von (1989), The Pretence of Knowledge, *American Economic Review*, 79 (6), pp. 3-7.
- Heijdra, B. and B. ter Weel (2019), Jan Tinbergen: Engineering a Better World, *De Economist*, 167 (3), pp. 215-219.
- Kay, J. (2015), *Other People's Money*, Profile Books.
- Keynes, J. (1935), *The General Theory of Employment, Interest and Money*, MacMillan.
- Keynes, J. (1939), Professor Tinbergen's Method, *Economic Journal*, 49, pp. 558-568.
- King, J. (2005), *Heterodox Macroeconomics: What, exactly, are we against?* Paper presented at the conference of Heterodox Economists, University of New South Wales, Sydney, 12-13 December.
- King, J. (2013), A Case of Pluralism in Economics, *The Economic and Labour Relations Review*, 24 (1), pp. 17-31.
- Kirman, A. (1992), Whom or What does the representative individual represent? *Journal of Economic Perspectives*, 6, 2, pp. 117-16.
- Koo, R. (2009), *The Holy Grail of Macroeconomics*, John Wiley and Sons.
- Korliras, P. and M. Thorn (1979), *Modern Macroeconomics*, Harper and Row.
- Korteweg, S. en F. Keesing (1979), *Het moderne Geldwezen, deel III: de Geldtheorie*, North Holland.
- Kuipers, S. en B. Wilpstra (1983), *Conjunctuur- en Groeitheorie: visies op de werking van een marketeconomie*, Stenfert Kroese.
- Kydland, F. and E. Prescott (1977), Rules rather than discretion: The inconsistency of optimal plans, *Journal of Political Economy*, 85, 473-490.
- Leonhufvud, A. (1967), Keynes and the Keynesians: A Suggested Interpretation, *American Economic Review*, 57, pp. 401-410
- Lucas, R. (1972), Expectations and the Neutrality of Money, *Journal of Economic Theory*. 4 (2): 103-24.
- Lucas, R. (1996), Nobel Lecture: Monetary Neutrality, *Journal of Political Economy*, 104, 4, pp. 661-682.
- Mankiw, N. (2006), The Macroeconomist as Scientist and Engineer, *Journal of Economic Perspectives*, 20, (4), pp. 29-46.

- Mankiw, N and R. Reis (2018), Friedman's Presidential address in the evolution of macroeconomic thought, A symposium on Friedman's Natural Rate Hypothesis after 50 years *Journal of Economic Perspectives*, 32, 1, 81-96.
- Minsky, H. (1992), *The Financial Instability Hypothesis*, Working Paper 74, The Levy Economics Institute, Bard College.
- Muth, J. (1961), Rational Expectations and the Theory of Price Movements, *Econometrica* 29, pp. 315–335.
- Muysken, J. (1979), *Aggregation of putty-clay production functions*, PhD thesis Rijksuniversiteit Groningen, April.
- Ormerod, P. (1997), *The Death of Economics*, Wiley.
- Phillips, A.W. (1958), The Relation Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861–1957, *Economica*, 100, 25, pp. 283-299.
- Sims, C.A. (2010), But Economics is not an Experimental Science, *Journal of Economic Perspectives*, 24, 2, pp. 59-68.
- Skidelsky, R. (2009), *Keynes: The Return of the Master*, Allen Lane.
- Snowdon, B. and H. Vane (2005), *Modern Macroeconomics*, Edward Elgar
- Solow, R. (1997), Is There a Core of Usable Macroeconomics We should all believe in? *American Economic Review*, 87, 2, May, pp. 230-232.
- Solow, R. (2008), The State of Macroeconomics, *The Journal of Economic Perspectives*, 22, 1, pp. 243-246.
- Solow, R. and J-P. Touffut (2012), Introduction: passing the smell test, in R. Solow and J-P. Touffut (eds), *What's Right with Macroeconomics*, The Cournot Centre Series, Edward Elgar, pp. 1-7.
- Sijben, J. (1979), *Rationele verwachtingen en de monetaire politiek*, Stenfert Kroese.
- Taylor, J., (1997), A Core of Practical Macroeconomics, *American Economic Review*, 87, 2, May, pp. 233-235.
- Teigen, R. (1978), *Readings in Money, National Income and Stabilization Policy*, R.D. Irwin.
- Timbeau, X. (2012), The fireman and the architect, in R. Solow and J-P. Touffut (eds), *What's Right with Macroeconomics*, The Cournot Centre Series, Edward Elgar, pp. 8-32.
- U.S. Government Printing Office (2010), *Building a Science of Economics for the Real World*, Hearing before the subcommittee on investigations and oversight of the Committee on Science and Technology, House of Representatives, July 20, Serial No 111-106.
- Walsh, C. (1999), Changes in the Business Cycle, *FRBSF Economic Letter*, 1999-16, May 1999, Federal Reserve Bank of San Francisco.
- Wren-Lewis, S. (2018), Ending the micro-foundations hegemony, *Oxford Review of Economic Policy*, 34, 1-2, pp. 55-69.