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UNCERTAINTY IN CREATING MACROECONOMIC POLICY: KNOWLEDGE, SKILLS AND (UN)PREDICTABILITY

Abstract

“If economists could manage to get themselves thought of as humble, competent people on a level with dentists, that would be splendid.” (Keynes, 1931). Then macroeconomics would transform into a useful and routine type of engineering, which will prevent the emerging of recessions. However, the appearance of stagnation and enormous financial crises started to change the economy postulates. Even though it poses significant findings, macroeconomics is not an exact science which has the ability to completely and accurately presuppose the actions of the economic entities and employ one general solution in every situation. The unpredictability of their conduct designates the dynamics of the science of macroeconomics and the need to adjust it to the contemporary economic status. The ongoing crisis undoubtedly proves that.

Key words: macroeconomics, science, economic entities, postulates, adjustment

Introduction

"Macroeconomists can be scholars (scientists) or problem solvers (engineers)" (9). Some of them are just predictors of economic performance. Few and a relatively small number of them are forecasting specialists. For the others, the forecasting is only a small part of what they do. One reason for this is that macroeconomists are not very good at predicting. It is difficult not because of the imperfection of understanding the way the economy works, but more because it is not possible to take into account all factors (economic and non-economic) that may affect future economic trends.

(Un-) Realized predictions about expected performance of the global economy and the individual national economies in the last 3-4 years (period of the world economic crisis) unambiguously confirmed the poor predictions of the economists. Macroeconomist's forecast for the performance in 2008 was not achieved, because few of them foresaw the dramatic rise in oil prices, and agricultural products in the first half and the financial crisis in the second half of the year. The same results were with the prediction of economic performance in 2012. In striving to project the economy in 2012, economists - predictors needed to answer some important questions such as: "What will be the price of oil in 2012?"; "How will the crisis in the euro zone influence the world and individual national economies?"; "Will there be war in Iran?"; "Will there be a big flood or drought in agricultural regions with opposite effects on quantities and prices of food?"; "What are the expectations of economic agents and how they relate to newly created economic conditions?".

Because the answers to these questions are quite uncertain, few macroeconomic predictors offer specific forecasts. Instead, they are usually combined with "optimistic" and "pessimistic" alternative scenarios. Evolution of such forecasts for the expected growth of the economy of the Republic of Macedonia in 2012 (from optimistic rate of 4.5 percent, to pessimistic negative growth rate), is another confirmation of the present uncertainty, and thus the inaccuracy of macroeconomic forecasts.

Thus, the uncertainties make forecasting of economic agents very difficult. Perhaps that is why instead of anticipating what will happen, "most macroeconomists are concerned with analyzing and interpreting events that occur (doing macroeconomic analysis) or seek to understand the structure of the economy (doing macroeconomic research)" (1). On the other hand, emerging problems require solutions from the macroeconomists - engineers.

Such problems that the macroeconomic science is nowadays facing, are analyzed in this paper. Using descriptive, historical, statistical, deductive, inductive and experiential methods, the paper should answer the following questions: "Why are the results of macroeconomic analysis an unreliable indicator of the achievements and developments in the economy?"; "What is the impact of uncertainties in predicting economic performance?"; "Should macroeconomics be a pure science that will only analyze the situation or it should it be more than that -

engineering that will address macroeconomic problems?". In preparation of this paper the analysis and proposals from several macroeconomic theorists and analysts are used, as well as subjective analysis and views of the authors of the text.

1. What is Macroeconomics? Science or Engineering?

According to Gregory N. Mankiw (9), "there are two types of macroeconomists: those who would like macroeconomics to be a science and those who understand macroeconomics as a kind of engineering. The goal of scientists is to understand how the world works. Engineers are always problem solvers."

Such division of the macroeconomists derived from the two dominant schools of economics: Classical and Keynesian. The first marked the development of macroeconomic during the middle Ages until the appearance of the grandiose work of John Maynard Keynes "General Theory of Employment, Interest and Money" in 1936. The second school has marked the development of macroeconomics from the appearance of Keynes until today. Meanwhile, both schools were present in economic science, but with appropriate modifications (changes and adjustments) in their views, which were caused by significant changes that have taken place in the world economy (12).

In the XVIII and XIX century and early XX century the theory of English classical political economy dominated. Its founders were British economists Adam Smith and David Ricardo. On the economic plan, classical political economy strongly emphasized the role of the individual, his/hers private property and initiative and the "invisible hand" of the market as the most effective regulator of economic life. In such conditions, there is no room for state intervention in the economy. Classical political economy accepts the teachings of the physiocrats of the "natural order", except that it considers that the "natural order" can be provided only by the capitalist system, not by the feudalism in agriculture as dominant economic activity. The basic positions they advocate this economic school were:

- The market has the power of self-regulation, leading to the rational use of available resources;
- In capitalism there is no compulsory unemployment;
- Supply automatically generates its consumption (it is called "Say" law). Therefore, there is no danger of significant difference between the aggregate supply and aggregate demand and the emergence of economic crises.

Obviously, classicists were more focused on economics as a science, i.e. analysis of how the system works.

The first weakness of the claims of the classical school of economics began to show in the late XIX and early XX century. It was the period of transformation of the liberal monopoly capitalism. On the market, large companies with monopolistic power (there was no competition) began to dominate and to direct economic policy

according to their goals, needs and interests. Soon after The World War I, reorientation of the economy from peacetime to wartime was required. In such circumstances the state could not remain on the side as it happened until then. Private capitalist initiative and freedom were temporarily sacrificed in the interest of general security.

Ten years after the war, the Great recession occurred (from 1929 to 1933). It caused terrible decline in investment, output and employment, further threatening the survival of the capitalist system. It dramatically denied the prevailing attitudes and assertions of classical economic thought on how to run macroeconomic policy.

Indeed, their dominance in economic science ended with the appearance of the Keynes's grandiose book in 1936. In it, Keynes advocated contrary views and opinions from those of the classical school of economics. That book, like all Keynes's work, played a revolutionary role in guiding macroeconomics in solving economic problems worldwide.

Keynes was under strong impression of the consequences of the great global economic crisis, particularly the fall in investment, production and employment. That forced him to radically oppose the views and claims of classical economic thought, imposing a new world claim according to which:

- Unemployment is a regular occurrence;
- Supply can not automatically create sufficient demand, but in case of discrepancy, the equilibrium can be established at a new, even lower level;
- Although theoretically their balance is desirable, investments and savings often diverge in practice, which leads to crises in the system and to unemployment.

Such learning leads to the appearance of macroeconomics. First, macroeconomists (9) were engineers who were trying to solve practical problems, like the Great Recession. Most of them (Modigliani, Samuelson, Solow, Tobin ...) in their autobiographies confirm that the Great Recession was the main (key) motivator in their careers. Keynes and the creators of his model had the perspective of engineers. They were motivated by problems in the real world and after they developed their theories they waited to apply them in practice.

However, the problems that later emerged in the development of macroeconomics, especially the emergence of stagflation in the early 1970s of the XX century, caused macroeconomists to be more interested in developing analytic tools and establishing theoretical principles. The Keynesian school was replaced by new ideas of classical economic thought. The monetarism first appeared with its most important representative Milton Friedman. His rule for stable growth of monetary aggregates has become legendary in determining the cause of the outbreak. Also, he offered possibilities for the economy to get out of recession that hit the world in 1929/1933 and the early 1970s of the XX century. The next wave of new classical economics was the revolution of rational

expectations. Lucas and others argued that Keynesian models are useless for the analysis of macroeconomic policy because they do not take seriously the expectations of the economic subjects.

The third wave of new classical economics had theories about the real business cycles (Kydland, Prescott, Plosser and others). They were built on the assumption that prices adjust to clean up the market, which is quite different from Keynesian theory.

As a result of the three waves of new classical economics, the field of macroeconomics has become more rigorous and significantly associated with the instruments of macroeconomics. In other words, macroeconomics again turns to the analysis of how the system works (science).

Current world economic crisis has again questioned the Keynesian economics. Encouraged by the errors of liberalism that dominated the last decade of the XX and much of the first decade in XXI century, Keynesians were back by offering their theories as a solution to the crisis. Again, Keynesian theory dominated with its statements: unemployment increases because labor demand is too low to provide full employment at existing wages, labor demand is low because firms cannot sell everything at current prices; demand for manufacturing firms is inadequate because many consumers are unemployed, etc.

Recessions and depressions are the result of the magical circle of low demand, so the stimulation of demand can have multiple effects. Measures taken by the financial authorities in the U.S. and EU will undoubtedly confirm the Keynesian thesis. World output requires solutions for the crisis.

In this confrontation of the two schools of economics today, in a time of great challenges, uncertainties and challenges imposed by the global economic crisis, the question is: "What should we do?"; "To conclude or to solve problems (to act engineers)?". More likely answer is that in times of crisis and after it we require solvers of problems! Basically, as Mankiw says, "God brought macroeconomists to the world not to propose and test elegant theories but to solve practical problems". (9)

However, can engineers find solutions without adequate scientific basis? And at the same time, how good can scientific tenets be in terms of uncertainties and unresolved major problems facing the world economy? "As the world generally needs scientists and engineers, it also needs the two types of macroeconomists. They simply have to play both roles. I believe that discipline would prosper more if the macroeconomists always bear in mind that they have a dual role ". (9) The main problem that both types will face is contained in the title of the next chapter.

2. How to Act in Conditions of Uncertainty?

The economists that offer forecasts are trying to present various scenarios that could occur at different choices of the basic elements of macroeconomic policy. Their prediction is usually comprised of three main parts that are used depending on the predictions from its sources. These parts are available data, models for analysis and evaluation of results. (11)

Data is a historical category. If the series are higher or longer, the value of the data and analyzes are more reliable. Also, the permanency (continuity) of data is very important. However, due to various reasons (statistical, methodological, political, economic and social events, etc.) often, the data presented in broken or incomplete series immediately sets the dilemma of their accuracy and emphasizes the uncertainty of their quality.

There are many uncertainties in the past data. Thus, a short series of data on economic conditions and developments in the Republic of Macedonia (from 1992 onward), their non-compliance due to the frequent changes in their methodologies for determining and presenting, distortions due to various shock effects on the economy (disintegration of the Yugoslav market, the UN sanctions against Yugoslavia and the Greek embargo against the Republic of Macedonia, Kosovo refugees in the Republic of Macedonia in 1999, "war" waged on the territory of the Republic of Macedonia in 2001, etc.) confirm the uncertainty of the data on which macroeconomic analysis the Republic of Macedonia are made. It is obvious that "uncertainty about the past is an important component of our uncertainty in the future." (6)

Models for determination of the past and expected economic achievements are based on these data and the experiences in the past. However, "despite the useful lessons that history gives us, it is arguable that none of the past experiences appears in exactly the same way. Simultaneously, the economy will inevitably change and evolve in ways that cannot be covered precisely by any mathematical model".(11) For example, no econometric model could take into account the emergence of stagflation in the 70s of the XX century. The same happened in the last few years with the emergence of the global economic crisis and deflation which was much greater than inflation. These factors were not taken into account nor can be taken in the future by any econometric model before and after the crisis.

Because of these reasons, the available data and corresponding model should accommodate the third and perhaps most important economic part of economic forecasting - providing assessments of current and future economic conditions and trends. "The assessment (evaluation) the balance between strength and power of history to current events is critical for the forecasting process, because ignoring any of them can easily lead to bad projections". (11)

Forecasting is a difficult job even under normal conditions. In times of great economic crisis like the current, it becomes more difficult and challenging work. Indeed, in times of uncertainty, the role of assessment of the forecasters becomes very important. If the macroeconomists in the world applied this unwritten rule and

seriously accepted warnings in 2006/2007 from the Professor at Columbia University in the U.S. Nouriel Roubini for the upcoming threats to the global economy and the expected global economic crisis, maybe the crisis would not have happened or it would have happened to a lesser extent than realized.

Let's recall the events of the development of the crisis. The initial phase of the recession in 2008 was modest. In the second quarter of the year the world economy began to recover and show signs of growth. According to economic models, it should be a sign that economic recovery begins. Indeed, the average recession in some countries took less than three months. However, during the summer of 2008 worrying information from the financial markets were presented.

It indicated unsustainable recovery of the economy. In September 2008, the financial crisis deepened with the bankruptcy of Lehman Brothers. Evaluations of forecasters for the upcoming performances of the economy began to dramatically change and had declining and even negative sizes.

Such developments indicated that economic models have become less useful, and that opinions of Roubini and few after him, become the most important. It has become increasingly clear that economic models cannot adequately address the financial intermediation that got more complicated modern forms than before, nor how it affects the real economy. Economic models were not prepared to accept any response of the authorities of some countries in response to the crisis. Approving loans with interest rates near zero (as the FED did) and the implementation of the policy of quantitative monetary easing were totally unexpected and unsuited for economic models.

Accordingly, "because econometric models usually cannot (or insufficiently can) align and adjust the specific factors or structural changes (breaks), final analysis of results must rely on the assessment of experts. Their assessment of the current economic environment forms the basis for final evaluation of the results that are based on ongoing model projections". (8) For these reasons economists had to monitor current events closely and continuously perform assessment of the process of forecasting.

3. Practice Changes the Rules

Such an approach is especially needed today. According to many indicators, analyses and assessments, the world is in the worst economic crisis since that of 1929/1933, and perhaps bigger. According to the existing models, the larger the economic crisis is, the faster the recovery is. In the present case, it would mean that the economic cycle moves in the form of the Latin letter V - recession and fall to the bottom and then immediately move on the expansive path of that cycle.

However, many analysts say that if we follow and analyze developments in the global economy over the past 2-3 years, we will find that the output from this crisis will be slow and that the global economic cycle moves in the form of a letter U or at worst, in the form of letter W, that would mean the emergence of double bottom in the economic cycle. There are at least two reasons (11) for slow growth and quick exit from the crisis. The first is the effect of prolonged unemployment and the second is the caution of consumers and businesses.

a) Millions of people lost their jobs due to recession. Their number was much higher compared to other recessions. Average unemployment rate of 5.5 percent in the U.S. rose to about 10 percent late in 2010, and in 2011 began to slowly decrease and reached about 8.2 percent. In EU countries, the average unemployment rate of around 7 percent increased to about 10 percent, with insignificant trends for its reduction (except for the Republic of Germany). In some EU countries (Spain, Greece) this rate was above 20 percent. The total number of unemployed in the European Union at the end of 2011 reached a record number of 24 million people.

"Usually, in times of recession, with GDP falling by 1 percentage point the unemployment rate increases by seven tenths of 1 percentage points. In this recession, GDP fell by 4 percent, which would mean an increase in the unemployment rate for less than 3 percentage points. Unfortunately, it has more than 5 percentage points."(11)

This time the length of time when people are jobless is critical. As never before, almost half of those who lost their jobs could not find work again in the next 6 months. Practice confirms that, the longer someone is unemployed, the harder it is to find work. The analyses also confirmed that during the extended period of unemployment, workers lose their job skills; some jobs simply are not recoverable. Thus, workers who will fail to find work may start to work in places that are unknown to them. That, of course, will have a direct impact on reducing their productivity.

b) The crisis caused caution among economic agents as a result of the uncertainty about where a "new normal" or baseline could be. Many today seek "financial security". It forced them to delay significant purchases until conditions become clearer. Sales of real estate, cars and other goods significantly reduced. Businessmen are also careful. They usually make many decisions that are based on forecasts. However, they encounter numerous uncertainties in forecasts / projections for future economic conditions and trends. They do not consider new employments until it becomes clearer how the economic recovery and departure path along the prosperous economic cycle will be. Their caution stems from uncertainty regarding energy supply, the amount of taxes (in some EU countries they are raised) and environment (uncertainty about the future of the euro and thus the euro zone, political and possibly military resolution of the crisis in Iran, continuing crisis in some North African countries, the outcome of the presidential elections in the U.S., etc). Such caution means restraint, followed by modest employment, modest purchases of equipment, modest amounts of new buildings, etc.

Besides those two, another important reason for the expected slow exit from the crisis could be indicated. Among economists and governments of individual countries, there is no consensus on how the economy could easily get out of the crisis. Their views are diametrically opposite. In the U.S. the prevailing view is that increasing the money supply in the economy with very low interest rates (so-called quantitative easing), despite the high budget deficit facing the U.S. economy, will stimulate growth and employment and return the U.S. economy on the prosperous path. On the other hand, the big debt crisis in the European Monetary Union has led many economists and politicians to propose and impose hard budget constraints and savings in the economy as an opportunity to painlessly recover debts and prevent the creation and accumulation of new debts. In such confrontation measures taken by the two most developed economic zones the danger of further stagnation of the economic crisis is hidden. Indeed, most forecasts indicate that the world economy, especially the EU economy in 2012, will have stagnant or even negative rates of growth.

Thus, the standard rules of the science cannot find adequate equal application in the world economy attempts to resolve the crisis. On the other hand, economists - engineers have equal access to solving this problem. Because of their opposing historical data, econometric models have poor value. In their exchange, more often, estimates (forecasts) are made about future economic performance which, however, because of the array of uncertainties is subject to dynamic changes in very short periods. History affirms that "projections were the least reliable when times were uncertain". (10)

Indeed, "all forecasts are enveloped in an endless loop of uncertainty. Risks of forecasting are assessed by calculating scenarios for economic development in different external macroeconomic conditions in relation to the initial. A typical scenario involves alternative assumptions about future developments in oil prices, exchange rates or economic growth in important economic regions, such as in the U.S. and the EU. The scenario includes not only the calculation of direct effects, for example, the level of oil prices on national economy, but also the indirect effects that could occur through changes in demand and prices in other Member States in the Euro zone". (2) Such approach is applied by the National Bank of the Republic of Macedonia-NBRM. According to the statements by NBRM's governor, "NBRM also has alternative scenarios, if negative forecasts about the future of the euro are realized." (7)

Thus, forecasts are needed for policy making. However, because today they are made in conditions of instability and uncertain predictability, another important factor should be taken into consideration: behavior and beliefs of the economic agents.

4. Macroeconomics in Conditions of Instability and the Role of Behavior and Beliefs of Economic Agents

Klain, one of the first who used the word "macroeconomics" (1946) claims (9): "More of the newly created mathematical models of the economic systems, especially theories of business cycles, are poorly linked to

the behavior of the individual households or businesses, which must be the basis of all theories of economic behavior "!

A key difference between economics and natural sciences is that in economics the key roles are played by the active decision-makers: households and businesses (economic entities). The economic results are determined by the way economic agents think and behave in conditions of uncertainty and their beliefs about the past, present and future. Their behavior is determined by the perception of uncertainty. If many people are insecure about their future job prospects, they save more due caution. Because such behavior reduces consumption, it may force firms to reduce the number of jobs to compensate the lost profit.

Beliefs and expectations of the economic agents adjust over time in response to changes in the environment and, in turn, affect how the economic systems behave. Occasional sharp changes in expectations could result in adverse effects. Exactly what happened in autumn 2008 is at first, the financial crisis, and then the recession in the real sector. It drastically reduced the beliefs of subjects in most of the world. In economics, there are two approaches (6) in the modeling of decision making under conditions of uncertainty: (a) standard, "rational" approach of "homo economicus" which assumes that beliefs are based on an efficient processing of available information, and (b) "behavioral" approach, which derives from the literature on psychology that emphasizes the psychological lines that violate the assumptions emphasizing "rational" views.

There is strong experimental evidence that people are subject to bias when collecting and processing information in terms of uncertainty and that such processing appears only occasionally (with interruptions). For example, enhanced information on the growing debt crisis forces the economic entities to refrain from intensive and riskier investments in the anticipation of better future information.

However, the aspects of the behavioral approach are:

- The practice confirms that there is no rule according to which perceptions of risk are under the dominant influence on recent or personal experiences. Such an effect explains why the fear of the financial crisis decreases over time as the memories of the last crisis fade;
- People tend to follow the actions of others. It can be an effective strategy. This type of behavior reflects the fact that economic agents are willing to experiment with the possible risks using strategies that are different from normal (usual). The penalty for such an error can be less if others made the same mistake. Indeed, such was the case with several banks that originally, almost went bankrupt and later with the help of financial interventions by the governments and central banks of individual countries got out of the crisis.

These observations for decision making under conditions of uncertainty in the economy have implications for macroeconomic policy in three dimensions (6):

First, the decision which is made under conditions of uncertainty affects the dynamics of the economy. Ignoring how people react under conditions of uncertainty, together with the presence of feedback between behavioral performance and beliefs, we highlight some of the difficulties and disadvantages in making economic policy;

Second, recognizing that beliefs and attitudes play an important role in the dynamics of the system affects the actions of policy are considered acceptable. For example, in the midst of the greatest intensity of the global economic crisis (mid 2009), the Prime Minister of the Republic of Macedonia stayed calm and even eliminated the distrust of depositors in banks with a statement that, if the collapse of the banks happens, the Government will reimburse all amounts to, eventually, lost assets;

Third, communication between economic agents is part of the response of macroeconomic policy for the uncertainty. Because people's beliefs about future policy actions affect their behavior today, the strategy to control the economic system should include not only a plan for establishing such instruments (ex. increase in bank interest rates if it expects increase of the inflation), but also a plan to determine beliefs about how decision makers will act in the future.

So, predictability involves the communication of the economic policy makers with the public. Communication strategy involves deciding how much information to communicate and in what form. Any information is used and it costs. The optimal communication strategy makes balance between the advantages and costs.

Let us consider first the advantages. The available information can improve the quality of the decisions of economic agents. Many government agencies have valuable information that ordinary citizens cannot easily access. For example, the NBRM has information about the shocks that hit the economy and how policy intends them to respond. If people get information, they can reduce their errors in forecasting and making decisions based on more information.

Communication could help in coordinating beliefs, so that would replace bad with good behavior. Suppose that private investors are starting to question the soundness of a bank for which the Central bank knows that it is solvent. A signal from the Central bank that this particular bank is solvent can change the beliefs of economic agents and thereby can ensure continued liquidity and solvency of the bank. For example, when in mid-autumn in 2011, the debt crisis culminated in the EMU and threatened of the euro, the Governor of NBRM through several releases and statements presented satisfactory solvency of the Macedonian banks and said that there is no danger to the safety of savings deposits of citizens. He also presented the soundness of the Macedonian denar. In an eventual collapse of the euro, any savings in Euros would convert into denars without any loss. At that moment, it eliminated the concerns of citizens and they did not withdraw their savings from banks, and it also increased their volume, especially in domestic currency.

Despite the advantages, communication, sometimes, may contribute to worsening the mistakes of the market. For example, if the government announced that because of the budget deficit tax rates will increase on economic subjects in near future, that will be a signal to the economic subjects to reduce activity or to find ways to avoid or reduce the additional tax burden. Lesser transparency could mitigate this problem.

Conclusion

The basic dilemma that arises from this analysis is whether macroeconomics is a science or engineering? Or, have the uncertainties of today turned macroeconomics into a science of prediction?

If you treat it just like a science, it should answer the question how the world economy works. However, although the basic elements of macroeconomics as a science are known, it gives a partial answer to the question why the world entered a new major economic crisis and how easily it could be pulled out. Conspirators of the classical political economy consider that the output of the current economic crisis should be sought in the growth of the national output and most importantly the budgetary savings and establishment of a financial discipline. This approach is already established within the EU, but without significant visible results. Estimates of the opposite side are that the austerity measures of the crisis will further deepen.

On the other hand are the Keynesians, who pose as a problem solver. They offer enhanced fiscal spending in order to stimulate growth and to pull the economy out of recession. However, their approach, which in the past 2-3 years was applied in the U.S., does not give the expected positive results.

In both cases, experience and data are used, as well as known econometric models that should determine the direction of the economy in the future. However, incompleteness and uncertainty of the data, and a range of uncertainties hanging over the global economy, devalue the values of the results of econometric models. Of course, this does not mean that standard macroeconomic models have no impact on the conduct of macroeconomic policy. The economic crisis that began in 2008 did not annul the economic analyses made before the crisis, although they have proved irrelevant in trying to discover the causes and finding appropriate solutions for the financial crisis. These models showed significant deficiencies because the behavior of consumers and economic operators who are leading drivers of the economy, were largely unpredictable.

That is the reason why nowadays the future of the economy is determined on assessment of past, present and future, taking into account the uncertainties which are increasing daily, in number and intensity. Moreover, of particular importance is the ability to understand and assess these uncertainties, and how they are transferred to the public. An additional problem is that practitioners face the challenge of unpredictability. Predicting the precise time and dynamics of instability in all these developments is very difficult, although it is possible to determine the factors that contribute to such instability.

Accordingly, macroeconomics may or may not be science or engineering, but it certainly has problems when trying to predict the future. Determining the probabilities is particularly difficult for rare, high influence precedents such as the current global economic crisis.

Because of such contradictions in the modern way of practicing macroeconomics, the main conclusion of this paper is contained in the following questions and answers of the perhaps the biggest macroeconomist in the world at this moment, Gregory Mankiw (9): "Can engineers find adequate output solutions without adequate scientific basis? And at the same time, how good can scientific tenets be in terms of uncertainties and unresolved major problems facing the world economy? So, as the world generally needs scientists and engineers, it also needs macroeconomists of those two. They simply have to play both roles". Then, dealing with the shocks in the economy would be easier.

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