# POSSIBLE ELEMENTARY MODEL FOR EARLY DETECTION OF MACROECONOMIC IMBALANCES IN MACEDONIA

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**ABSTRACT**

Predicting the economic crises or existence of macroeconomic imbalances is very useful for national economies. There are many academic and institutional efforts to make it more efficient. One of it is the EU Commission model based on Alert Mechanism Report which aims to identify and address imbalances that hinder the smooth functioning of the economies of EU. Based on it and some other academic experiences and researches made, the Macedonian elementary model for early detection of macroeconomic imbalances is developed using 15 macroeconomic, fiscal, monetary, finance and external economy indicators grouped in 4 main indicators which are the base for calculation of index as an aggregate (basic) indicator for detecting macroeconomic imbalances based on weighted values. The model is constructed using the very characteristics of Macedonian economy and could be used to lunch activities to prevent further and deeply imbalances or possible recession in the economy.

***Key words:*** macroeconomic imbalances, indicators, model, Macedonia

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## 1. INTRODUCTION

We are living in the era of New Keynesianism. Probably it's true. Some of its basic economic answers become valid in the last decade after the crisis of the world economy emerged in 2007/2008. In a long period of some 3-4 decades before it there has been a strong and global trend toward neoliberalism, "according to a composite index that measures the extent to which countries introduced competition in various spheres of economic activity to foster economic growth." (*J. D. Ostry, P. Loungani, and D. Furceri , 2016:38*). The neoliberal agenda mainly rests on two planks. First one is increased competition achieved by deregulation and the opening of domestic markets, including financial markets, to global competition. Second is the decreased role of the state, achieved by privatization and limitations on the capability of governments to create substantial fiscal deficits and accumulate debt. Some aspects of the neoliberal agenda have not delivered as expected.

An assessment of these two specific policies "reaches three disquieting conclusions:

1. the benefits in terms of increased growth seem fairly difficult to establish when looking at a broad group of countries;

2. the costs in terms of increased inequality are prominent. Such costs epitomize the trade-off between the growth and equity effects of some aspects of the neoliberal agenda;

3. Increased inequality in turn hurts the level and sustainability of growth." (*J. D. Ostry, P. Loungani, and D. Furceri,2016*). Because of such and many other reasons crisis became inevitable but was not predicted.

In her review of some of the latest books criticizing economics and its inability to predict the economic cycles and crisis, including the last one of 2008, prof. D. Coyle ask if "the entire subject of economics is fundamentally flawed: "If economists couldn't predict the biggest financial crisis in decades, what are they good for?" (*D. Coyle, 2017*). It is well known and of higher importance that if economic cycles and possible imbalances could be detected earlier or even predicted, the action could be overtaken so the negative impact would be avoided or downsized to

a minimum. Academicians, institutions and governments are always in search for such a models and instruments.

As the crises influences every single economy in the world in some or many ways (recession, unemployment and drop of savings and investment rates, decrease of export, deficits, public debt and hysteresis effects) the actions were taken. Many set new mechanisms or improve the existing ones to forecast economic activities. Macroeconomic models which was in wide use before the 2008 crisis mainly excluded financial institutions and relied on the traditional indicators as "representative agents." This starts changing rapidly, although efforts remain full of foggy and normative terminology, such as "optimal" outcomes.

After the consequences of the devastating financial crisis of 2008 and economic recession in 2009 the European Commission established the so called Alert Mechanism Report (AMR) in 2012 as the "starting point of the annual cycle of the macroeconomic imbalance procedure (MIP), which aims to identify and address imbalances that hinder the smooth functioning of the economies of Member States or the economy of the EU and may jeopardize the proper functioning of the economic and monetary union." (*European Commission, 2016*). Than established mechanism that overview the possible macroeconomic imbalances is still existing and uses a scoreboard of selected indicators, plus a wider set of auxiliary indicators, to screen potential economic imbalances in need of policy action. The number of possible categories currently is defined into four: no imbalances; imbalances; excessive imbalances and excessive imbalances with corrective action. The alert mechanism report builds on an economic reading of the scoreboard of indicators. "The scoreboard includes a range of indicators and reference thresholds regarding a number of areas, including external positions, competitiveness, private debt, housing markets, the banking sector, employment. It relies on ex-post data to ensure data stability and cross-country consistency." (*European Commission, 2016*).

## 2. LITERATURE REVIW AND METHODOLOGY USED

### 2.1 Literature review

There are a number of empirical and theoretical literatures on different models of predicting the economic cycles and detecting the possible macroeconomic imbalances. Unfortunately most of them are not giving results and future economic prospects seldom are unknown. Some reasons for that arise from the fact that models mostly reduces individual humans to nothing more than maximizers of utility or profit, but it is probably not a case. Further, institutions are very important but economists still think of institutions too abstractly, mainly as a black box rather than a social reality.

In his latest book Prof. Bookstaber (2017) point out that much macroeconomic modeling ignores the fact that economic time series are non-ergodic, namely their characteristic behavior can be completely different in different contexts or periods which made modeling very intensive. His opinion goes on to charge that economics has ignored behavioral psychology and behavioral economics is one of the most popular areas of the discipline now, among academics.

Bookstaber also claims that economists mainly ignore the reality of complexity theory, network theory, and agent-based modeling. Although these areas are not main stream, and many established researchers have never learned the research techniques needed to apply these concepts, they, became increasingly popular. "Economic theory asserts a level of consistency and rationality that not only leaves the cascades propagation over the course of a crisis unexplained but also asserts that they are unexplainable." (*R. Bookstaber,2017*). This makes modeling and detection of imbalances even more difficult.

The concept elaborated in the book Adaptive Markets (Lo, 2017) is a synthesis of the traditional, rationality-based models approach and new approaches based on noneconomic thought as psychology and neuroscience, evolutionary theory or techniques such as computer simulations and artificial intelligence. One of the most effective points made by advocates of Efficient Markets Hypothesis is that it "is in fact difficult to beat the market; profit-making opportunities are swiftly arbitraged away." *(D. Coyle /2017/, op. cit.)*. Lo argues that when financial markets are stable

enough for longer period, the rationality-based model is appropriate. But in the moment when there is any instability, human fear, greed, culture, behavioral norms, storytelling, and even imagination starts to increase the instability further which means that the environment determines the way market participants behave. "The Adaptive Markets Hypothesis is based on the insight that investors and financial markets behave more likely biology than physics … It implies that market prices need not always reflect all available information, but can deviate from rational pricing relations from time to time because of strong emotional reactions like fear and greed. … This isn't to say that rational economics is of no value; on the contrary" (*A. W. Lo,2017*).

Eugen Fama, Nobel Prize winner in economics 2013, noted that in an efficient market "prices fully reflect all available information." But the question is if all needed information is available? Thus markets often misbehave and investors can't reach its optimum value, so the crises can happened.

Onkal-Atay, Thomson and Pollock (2004) using their Judgmental forecasting method wrote that "the central tenet of judgmental forecasting is enhancing *predictive performance* via effectively incorporating non-model-based information into the forecasting process" (*D. Onkal-Atay, M. E. Thomson and A. C. Pollock, 2004*). Their combination is valuable precisely only when different sources are used, while leading to potentially poor results if all the forecasts are based on the same information set.

## 2.2 **Methodology used**

The process of economic forecasting and early detection of possible macroeconomic imbalances is very complex and seldom is not giving very useful information because of unpredictable behavior of markets and economies as a whole. Yet, a need for it still exists and possible losses of values and decreasing generation of additional values push economists to make efforts to find further solutions.

In order to explore the way how to make early detection of possible macroeconomic imbalances in Macedonia, an elementary model is constructed using statistical methods based on calculation of index

($X$) as an aggregate (basic) indicator based on weighted values. Some 15 sub indicators grouped in 4 main indicators are statistically followed and calculated their relative changes in latest quarter compared with an average relative value of the previous three quarters or previous years. Each sub indicator participates in the main indicator ($Mi$) relative to its given importance as participating coefficient ($Pcii$) and the main 4 indicators participate in the same way in the aggregate indicator named as index $X$. The principal for a main indicator ($Mi$) calculation is following:

$$Mi_1 = (Pc_{11} \cdot I_{11}) + (Pc_{12} \cdot I_{12}) + (Pc_{13} \cdot I_{13}) + \ldots$$
$$Mi_2 = (Pc_{21} \cdot I_{21}) + (Pc_{22} \cdot I_{22}) + (Pc_{23} \cdot I_{23}) + \ldots$$
$$Mi_3 = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots$$
$$Mi_4 = \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots$$

Where Iii is index calculated on an average relative change of value of such an indicator in the last three quarters or previous years.

Aggregate (basic) indicator ($X$) is calculated as follows:

$$X = (Pc_a \cdot Mi_1) + (Pc_b \cdot Mi_2) + (Pc_c \cdot Mi_3) + (Pc_d \cdot Mi_4)$$

Where $Pc_{a\text{-}d}$ is the value of the given participating coefficient of a main indicator ($Mi$) in the aggregate (basic) indicator ($X$).

Based on the previous the $X$ in the developed model is:

$$X = \{ Pc_a \cdot [(Pc_{11} \cdot I_{11}) + (Pc_{12} \cdot I_{12}) + (Pc_{13} \cdot I_{13}) + \ldots] + Pc_b \cdot [(Pc_{21} \cdot I_{21}) + (Pc_{22} \cdot I_{22}) + (Pc_{23} \cdot I_{23}) + \ldots Pc_c \cdot [ \ldots \ldots \ldots ] + Pc_d \cdot [ \ldots \ldots \ldots ]\}$$

If the value of $X$ is more than 100, economy is moving in the good direction, and opposite.

## 3. ELEMENTARY MODEL FOR EARLY DETECTION OF MACROECONOMIC IMBALANCES MACEDONIA

The model which produce aggregate indicator (index *X*) for early detection of macroeconomic imbalances should rely on calculation of main and sub indicators important for a high middle-income, small and open economy with high unemployment, traditional external deficits and rudimentary financial markets as Macedonian economy is.

The EU members, for example, are using the Eurostat methodology with Scoreboard which "consists of fourteen indicators relevant for the early detection of existing or emerging macroeconomic imbalances at Member State level." (*Eurostat, 2016*). Indicators are grouped in 3 groups: (Eurostat,2016, op. cit.).

I. External imbalances and competitiveness (5)

1. Current account balance - % of GDP (3 year average);
2. Net international investment position (% of GDP);
3. Real effective exchange rate - 42 trading partners (3 year % change);
4. Export market share - % of world exports (5 year % change);
5. Nominal unit labor cost index (2010=100) (3 year % change).

II. Internal imbalances (6)

1. House price index (2010=100), deflated (1 year % change);
2. Private sector credit flow, consolidated (% of GDP);
3. Private sector debt, consolidated (% of GDP);
4. General government gross debt (% of GDP);
5. Unemployment rate (3 year average);
6. Total financial sector liabilities, non-consolidated (1 year % change).

III. Employment indicators (3)

1. Activity rate - % of total population aged 15-64 (3 year change in pp);
2. Long-term unemployment rate - % of active population aged 15-74 (3y change pp);
3. Youth unemployment rate - % of active population aged 15-24 (3y change in pp).

The methodology in Macedonian case will be determined of official data regularly available from the state institutions and specific economic problems of the country mentioned above. Therefore the four main indicators (*Mi*) are selected as follows:

1. $Mi_{macro}$ which compose of a four basic macroeconomic indicators:
a) GDP quarterly growth (*source: SSO; source: National (Central) bank; source: Ministry of Finance; source: Macedonian Stock Exchange*) (*Igdp*) with its relative importance as participating coefficient in $Mi_{macro}$ with value of *0,40*;

b) Unemployment rate* changes measured quarterly (*Iunempl*), inverse value calculated, with its relative importance as participating coefficient in $Mi_{macro}$ with value of *0,30*;

c) Inflation rate* changes measured quarterly (*Iinfl*), inverse value calculated, with its relative importance as participating coefficient in $Mi_{macro}$ with value of *0,20*; and

d) Labor productivity* growth measured quarterly (*Ilabpr*) with its relative importance as participating coefficient in $Mi_{macro}$ with value of *0,10*.

Overall importance of $Mi_{macro}$ as participating coefficient in *X* is *0,35*.

2. $Mi_{external}$ which compose of a four basic indicators for the external position of the economy:

a) Current account deficit/surpluses** (*Icuracc*) relative changes measured quarterly with its relative importance as participating coefficient in $Mi_{external}$ with value of *0,30*;

b) Foreign direct investments** (*Ifdi*) relative changes measured quarterly with its relative importance as participating coefficient in $Mi_{external}$ with value of *0,20*;

c) Gross foreign debt as percentage of GDP** (*Ifordebt*) measured quarterly with its relative importance as participating coefficient in $Mi_{external}$ with value of *0,20*; and

d) Foreign reserves level** (*Ifxres*) relative changes measured quarterly

with its relative importance as participating coefficient in $Mi_{external}$ with value of *0,30*.

Overall importance of $Mi_{external}$ as participating coefficient in *X* is *0,25*.

3. $Mi_{fiscal}$ which compose of a three basic indicators for the fiscal position of the economy:

a) General government balance*** (*Iggdef*) relative changes measured quarterly with its relative importance as participating coefficient in $Mi_{fiscal}$ with value of *0,40*;

b) General government debt*** as percent of GDP (*Iggdebt*) measured quarterly with its relative importance as participating coefficient in $Mi_{fiscal}$ with value of *0,40*; and

c) Percentage of the wage bill paments of all expenditure in the Central budget*** (*Iwbcb*), inverse calculated, measured quarterly with its relative importance as participating coefficient in $Mi_{fiscal}$ with value of *0,20*.

Overall importance of $Mi_{fiscal}$ as participating coefficient in *X* is *0,18*.

4. $Mi_{finmon}$ which compose of a four indicators of monetary policy, financial and others indicators:

a) Relative changes of the basic interest rate of the Central bank** (*Iintrest*) measured quarterly with its relative importance as participating coefficient in $Mi_{finmon}$ with value of *0,25*;

b) Relative changes of the level of credits to private sector** (*Icrdits*) measured quarterly with its relative importance as participating coefficient in $Mi_{finmon}$ with value of *0,25*;

c) Changes in the relative value of the stock exchange index MBI-10**** ($Imbi_{10}$) measured monthly with its relative importance as participating coefficient in $Mi_{finmon}$ with value of *0,25*; and

d) Relative changes of the prices of houses and flats in the capital sity** (*Ihousing*) measured quarterly with its relative importance as participating coefficient in $Mi_{finmon}$ with value of *0,25*.

Overall importance of $Mi_{finmon}$ as participating coefficient in $X$ is *0,22*.

Hence, the model could be developed as follows:

$$X = (0{,}35 \cdot Mi_{macro}) + (0{,}25 \cdot Mi_{external}) + (0{,}18 \cdot Mi_{fiscal}) + (0{,}22 \cdot Mi_{finmon})$$

Where

$$Mi_{macro} = (0{,}40 \cdot Igdp) + (0{,}30 \cdot Iunempl) + (0{,}20 \cdot Iinfl) + (0{,}10 \cdot Ilabpr)$$

$$Mi_{external} = (0{,}30 \cdot Icuracc) + (0{,}20 \cdot Ifdi) + (0{,}20 \cdot Ifordebt) + (0{,}30 \cdot Ifxres)$$

$$Mi_{fiscal} = (0{,}40 \cdot Iggdef) + (0{,}40 \cdot Iggdebt) + (0{,}20 \cdot Iwbcb)$$

$$Mi_{finmon} = (0{,}25 \cdot Icuracc) + (0{,}25 \cdot Ifdi) + (0{,}25 \cdot Ifordebt) + (0{,}25 \cdot Ifxres)$$

As example for a calculation of an *Iii* index calculated on an average relative change of value of such an indicator in the last three quarters will be used sub indicator *Igdp* in the main indicator $Mi_{macro}$. Based on the data of SSO (*State Statistical Office of Macedonia, 2017:1*) on the GDP growth rates by production approach, volume indices in the last three calculated quarters are: 102,0 (QIII, 2016); 102,4 (QIV, 2016) and 100,0 (QI, 2017). Its average value is 101,5. So in the calculation of the main index $Mi_{macro}$ the value in the first brackets $(0{,}40 \cdot Igdp)$ will be $(0{,}40 \cdot 101{,}5)$ or *40,6*.

Based on the data of SSO (*State Statistical Office of Macedonia /2017 (2)*)on the unemployment rate data in the last four quarters are: 24,0 (QII, 2016); 23,4 (QIII, 2016); 23,1 (QIV, 2016) and 22,9 (QI, 2017). Based on data, the values of indexes of the last three quarters are 97,5; 98,7 and 99,1. Inverse values are 102,5; 101,3 and 100,9, or its average value is 101,6. So in the calculation of the main index $Mi_{macro}$ the value in the first brackets $(0{,}30 \cdot Iunempl)$ will be $(0{,}30 \cdot 101{,}6)$ or *30,5*.

In that case the first main index - $Mi_{macro}$ will be as follows:

$$Mi_{macro} = (0,40 \cdot 101,5) + (0,30 \cdot 101,6) + (0,20 \cdot Iinfl) + (0,10 \cdot Ilabpr)$$
$$Mi_{macro} = 40,6 + 30,5 + \ldots + \ldots$$

By calculation of values of all 15 sub indicators in the 4 main indicators as described in this section, the aggregate indicator (*index X*) will be created.

The value of the *X* above *100* shows the good condition of the national economy, and value under *100* will determine the possible macroeconomic imbalances and the need for urgent reactions of actors of macroeconomic policy.

## 4. CONCLUSION

As economies go through their business cycles, the need to prevent a bigger loses and creation of additional unemployment in periods of crises is crucial. Economists and governments put a lot of efforts to create models for early detection of any bigger macroeconomic imbalances which could lead to a significant decrease of economic activities or even recessions. Within EU, the institutions developed a so called Alert Mechanism Report as the starting point of the annual cycle of the macroeconomic imbalance procedure, which aims to identify and address imbalances that hinder the smooth functioning of the economies of Member States or the economy of the EU and may jeopardize the proper functioning of the economic and monetary union.

The elementary model for early detection of macroeconomic imbalances in Macedonia aims to apply such an idea to domestic conditions. It is appropriate for a high middle-income, small and open economy with high unemployment, traditional external deficits and rudimentary financial markets. The model is relatively simple and easy to apply but it could give good results in detection and prevention of macroeconomic imbalances.

Weaknesses arise from fact that there is not a standard procedure to determine a relative importance as participating coefficient of sub indicators (*Pcii*) in the main indicators ($Pc_{a-d}$) and of those into an aggregate indicator (index *X*). Still the strength of the model is the variety of indicators used as average values in three previous periods which could eventually detect the possible macroeconomic imbalances in the near future.

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