

KONRAD RACZKOWSKI

POLISH ECONOMIC OUTLOOK

TRENDS AND SCENARIOS



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Wydawnictwo Naukowe
Uniwersytetu Kardynała Stefana Wyszyńskiego

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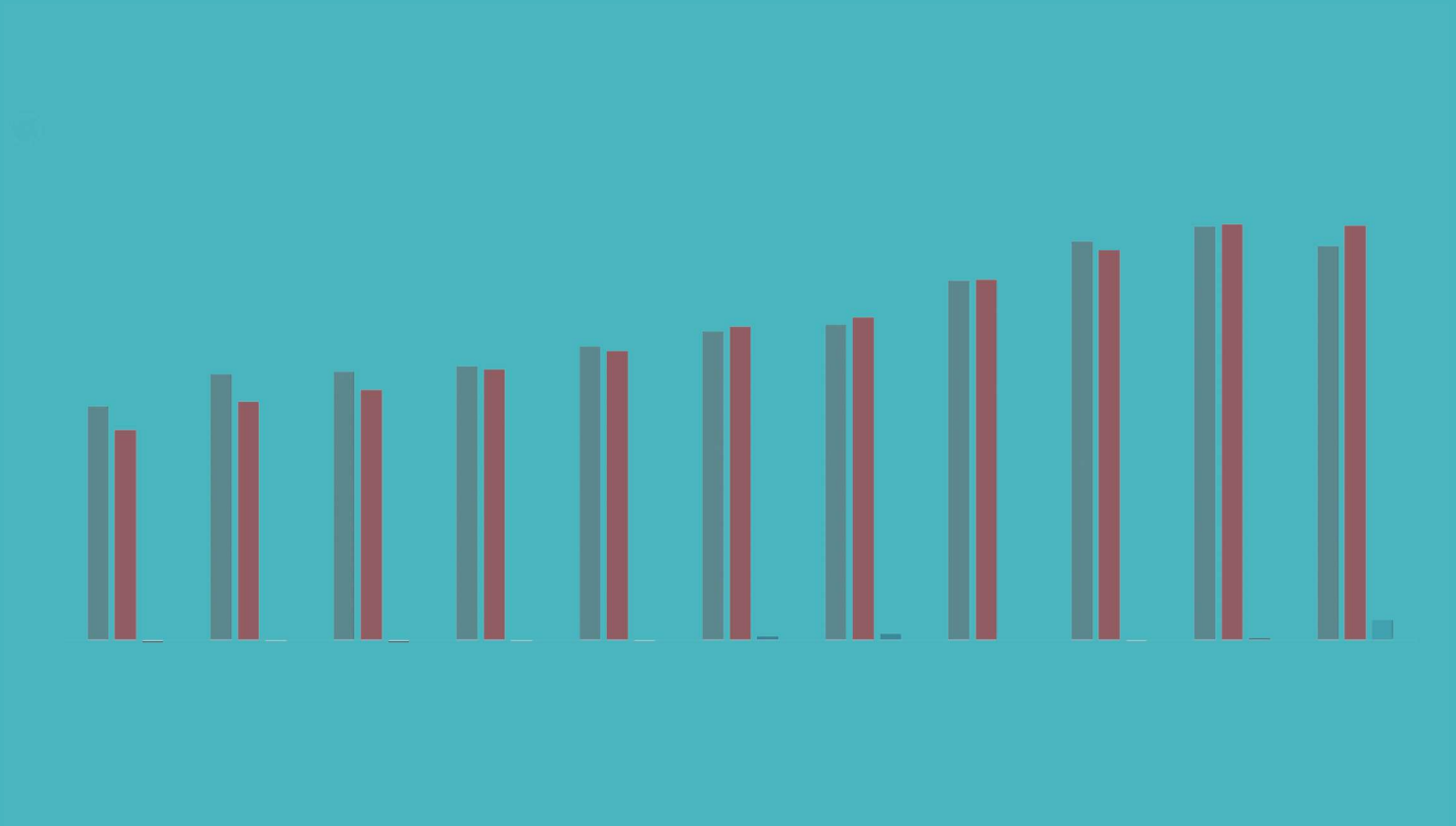
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3. POLAND'S MACROECONOMIC STABILITY



3.1. THE IMPORTANCE OF MACROECONOMIC STABILITY FOR BUILDING SUSTAINABLE ECONOMIC GROWTH

Macroeconomic stability is one of the most widely discussed issues in contemporary economic literature, both Polish⁸⁶ and foreign⁸⁷. It is an ambiguous concept and difficult to define precisely, yet it is a fundamental challenge in building sustainable growth for individual economies and the European Union. This challenge is recognised by the bodies that carry out various state policies, such as governments and central banks⁸⁸.

Most generally, macroeconomic stability is equated with a favourable combination of internal conditions, including the economic situation, in conjunction with a country's political, social

86 It is necessary to point out, first of all: H. Ćwikliński, *Wyzwania dla polityki makroekonomicznej na początku XXI wieku*, UG Publishing House, Gdańsk 2012; *Poland's Path to 2025. Assumptions of long-term strategy in the light of KP PAN studies*, Polish Academy of Sciences. Projections Committee "Poland 2000 plus", Warsaw 2005; J. Kaja, *Polityka gospodarcza. Wstęp do teorii*, SGH Publishing House, Warsaw 2014; G.W. Kołodko, *Kwadratura pięciokąta. Od załamania gospodarczego do trwałego wzrostu*, Poltext, Warsaw 1993; P. Kozłowski, M. Wojtysiak-Kotlarski, *Grzegorz W. Kołodko i ćwierćwiecze transformacji*, Wydawnictwo Naukowe Scholar, Warsaw 2014; *Koniunktura gospodarcza świata i Polski w latach 2015–2018*, Reports, IBR, KiK, Warsaw 2017; J. Misala, *Stabilizacja makroekonomiczna w Polsce w okresie transformacji ze szczególnym uwzględnieniem deficytów budżetowych*, Politechnika Radomska, Radom 2007; *Annual Report 2021*, NBP, Warsaw 2022; *Strategy for responsible development until 2020 (with an outlook to 2030)* Council of Ministers, National Bank of Poland, Warsaw 2017; *Sytuacja makroekonomiczna w Polsce na tle procesów w gospodarce światowej w 2020 r.*, NBP, Warsaw 2021; *Wizja przyszłości Polski. Studia i analizy*, Vol. 1: *Spółeczeństwo, państwo*, PAN, Warsaw 2011; M. Szałański, T. Zalega, W. Zborowska, *Makroekonomiczna polityka stabilizacyjna. Ujęcie krótkookresowe. Symulacje komputerowe*, Wydawnictwo Naukowe Wydziału Zarządzania UW, Warsaw 2019.

87 Noteworthy works include: B. Ames, W. Brown, S. Devarajans, A. Izquierdo, *Macroeconomic Policy and Poverty Reduction*. International Monetary Fund and the World Bank, 2001; Giok In Liem, *Interdependent Economy: From Political Economy to Spiritual Economy*, Legaia Books LLC, 2020; I.B.J. Pine, J.H. Gilmore, *The Experience Economy*, „Harvard Business Review Press”, 2011; J.E.T. Rogers, *Social Economy*, Hansebooks, 2017; P. Krugman, R. Wells, *Makroekonomia*, PWN, Warsaw 2020; P.A. Samuelson, W.D. Nordhaus, *Ekonomia*, WN PWN, Warsaw 2020; J.E. Stiglitz, *Ekonomia sektora publicznego*, WN PWN, Warsaw 2015; L. Walras, *Elements of Theoretical Economics*, Kindle Edition, Cambridge 2014.

88 The issue of macroeconomic stability plays a key role in the discussion of the way forward for building further economic and monetary integration within the Economic and Monetary Union – *Completing the European Economic and Monetary Union*, Report prepared by Jean-Claude Juncker in cooperation with Donald Tusk, Jeroen Dijsselbloem, Mario Draghi and Martin Schulz, European Commission, 2015, and is also included in ECB reports: G. Koester, D. Sondermann, *A euro area macroeconomic stabilization function: assessing options in view of their redistribution and stabilization properties*, No. 216, European Central Bank 2018.

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or demographic situation. The country's situation in the international arena is also important, especially in the sphere of trade with foreign countries. The benefits of macroeconomic stability are undeniable⁸⁹. Macroeconomic stability removes uncertainty in economic activity, increases the investment attractiveness of a country, improves the likelihood of an increase in economic activity in the future, and provides the basis for building the conditions for sustainable and balanced economic growth⁹⁰. Given the role and essence of stability for growth, it is possible to consider this favourable condition as a kind of public good and, thus, its absence as a potentially high social cost⁹¹. There are two main sources of economic instability:

- exogenous shocks,
- wrong policy.

Exogenous shocks (e.g., terms-of-trade shocks, natural disasters, reversal of capital flows, etc.) can put the economy into a state of disequilibrium and require compensatory measures. For example, many low-income countries have a narrow export base, often focused on one or two key commodities. Shocks to global prices for these commodities can, therefore, strongly impact the country's income. However, even diversified economies are routinely exposed to exogenous shocks, although, reflecting their greater diversification, shocks usually have to be particularly large or prolonged to destabilise such an economy. Alternatively, imbalances can be self-induced through macroeconomic mismanagement. For example, excessively loose fiscal policy can increase aggregate demand for goods and services, which puts pressure on the country's external balance of payments and the domestic price level. Sometimes economic crises are the result of both external shocks and mismanagement⁹². Regardless of the source of instability, policy coherence for building conditions for stable, countercyclical economic growth is important. Economic stabilisation policy, therefore, means restoring the economy to a state of internal and external equilibrium.

89 H. Ćwikliński, *Challenges for macroeconomic policy at the beginning of the 21st century*, UG Publishing House, Gdańsk 2012.

90 J. Janecki, *Measurement and evaluation of macroeconomic stability in Poland*, „Folia Oeconomica, Acta Universitas Lodzensis” 2(328) 2017, p. 124.

91 Por. A. Alińska, K. Wasiak, *Czy stabilność systemu finansowego można uznać za dobro publiczne?*, „Studia Ekonomiczne. Uniwersytet Ekonomiczny w Katowicach” no 198, part 1, Katowice 2014, p. 14 et seq.

92 B. Ames, W. Brown, S. Deverajan, A. Izquierdo, *Macroeconomic Policy and Poverty Reduction...*, s. 8.

3.2. FACTORS FOR MEASURING THE STATE OF MACROECONOMIC STABILITY

Considering the available methods of measuring the degree of financial stability, we can mention two basic ones. These are, first, the country-specific recommendations proposed in The Alert Mechanism Report (AMR) to the European Commission. The second method is based on the macroeconomic stabilisation pentagon model (SPM).

The methods above present different approaches to diagnosing and describing the state of macroeconomic stability. It should be noted that an additional challenge for building conditions for macroeconomic stability in the future is predictive ability in the context of macroeconomic developments. Of course, all kinds of predictions and anticipations of future events are subject to a greater or lesser risk of failure, although there are no other tools for mitigating potential risks in the future. An additional challenge is a situation where, as a result of the COVID-19 pandemic and later the war in Ukraine, there have been rapid and fundamental changes in the economy, altering the foundations of functioning, overdriving the previously existing mechanisms, changing the balances and dependencies that have functioned so far. Under such conditions, diagnosis of these changes is necessary to conduct analyses related to creating scenarios for future development.

The following six categories of macroeconomic stability were proposed to measure macroeconomic stability in the model under construction:

- GDP growth rate,
- unemployment rate,
- inflation rate,
- the ratio of the budget deficit to gross domestic product,
- the ratio of the current account balance of the balance of payments to gross domestic product,
- energy security/the general level of energy prices.

While the first five mentioned factors are commonly used in stability analyses, the authors believe that under the current macroeconomic situation, one of the key factors determining the operation of business entities has become the price of energy. Thus, this factor was considered important for building a model of macroeconomic stability.

3.3. A MODEL OF POST-CRISIS MACROECONOMIC STABILITY

The following technologies were used to build a predictive model based on the proposed six macroeconomic stability factors:

- *Data Mining* – analysing large data sets and extracting knowledge by selecting data relevant to the phenomena and processes being analysed. The selected data is the basis for creating predictive models.
- *Machine learning (neural networks)* – build and optimise structural parameters of predictive models.

The following steps were used to create a predictive macroeconomic stability model for the economy in Poland:

- A cluster analysis was conducted to classify the state of stability according to four statistical classes (low stability, medium stability, high stability, and very high stability) for 2003–2021;
- A model was created using the logistic regression method, which estimates the probability of each class given the six factors of macroeconomic stability (inputs, Chart 1);
- Factors were selected to predict the various categories of macroeconomic stability (20 factors, Table 1);
- creating a predictive model in the form of a neural network – blackbox,
- whose structural parameters are optimised using a machine learning method;
- application of forecasts of individual factors to the optimised macroeconomic stability model – obtaining predictions of macroeconomic stability in the period up to March 2024 (Chart 2).

Large datasets were analysed to examine the strength and nature of relationships between variables and to select variables related to the macroeconomic stability factors analysed to select predictive indicators for stability factors. Since the models are predictive in nature, the selection process focuses on selecting data that is predictive of the macro indicator for which the predictive model will be built and optimised. The goal of this stage was to find information that could provide a basis for drawing conclusions about the future behaviour of macroeconomic indicators used to assess macroeconomic stability.

The selection included over 100 million time series collected on the ExMetrix platform. Its result is a set of twenty (Table 1) time series showing an advance relative to the macro indicator for which the predictive model will be built. This set is used in the next stage to build and optimise a model forecasting macroeconomic indicators.

3.3. A MODEL OF POST-CRISIS MACROECONOMIC STABILITY

Table 9. List of time series indices that allow prediction of macroeconomic stability factors

No.	Name of the time series
1	Result (balance) of the state budget (from the beginning of the year to the end of the period), PLN million
2	Total foreign trade goods balance, in PLN million
3	Gross domestic product (constant prices), same period last year=100
4	Gross domestic product (current prices), in PLN million
5	Long-Term Government Bond Yields: 10-year: Main (Including Benchmark) for Poland
6	Total registered unemployment rate (as at year-end), %
7	Staging Cube, Poland, Harmonised unemployment rate (HUR), Total, % of the labour force, Monthly
8	Consumer price indices, same period last year=100
9	Staging Cube, Poland, Inflation (CPI), Total, Annual growth rate (%), Monthly
10	Government deficit/surplus, in PLN million
11	Government deficit/surplus, % of GDP
12	budget deficit since 1991 % of GDP
13	budget deficit since 1991
14	Result (balance) of the state budget (year-to-date)/Gross domestic product (current prices) [%]
15	Total foreign trade goods balance/Gross Domestic Product (current prices) [%]
16	TGEgasDA usw rate [PLN/MWh]
17	POLAND HARD COAL PSCMI 1/T usw [PLN/T]
18	MIX POLAND OZE All usw [%]
19	TGeBase, usw rate [PLN/MWh]
20	Variable costs of power generation in Poland with current usw mix [PLN/MWh]

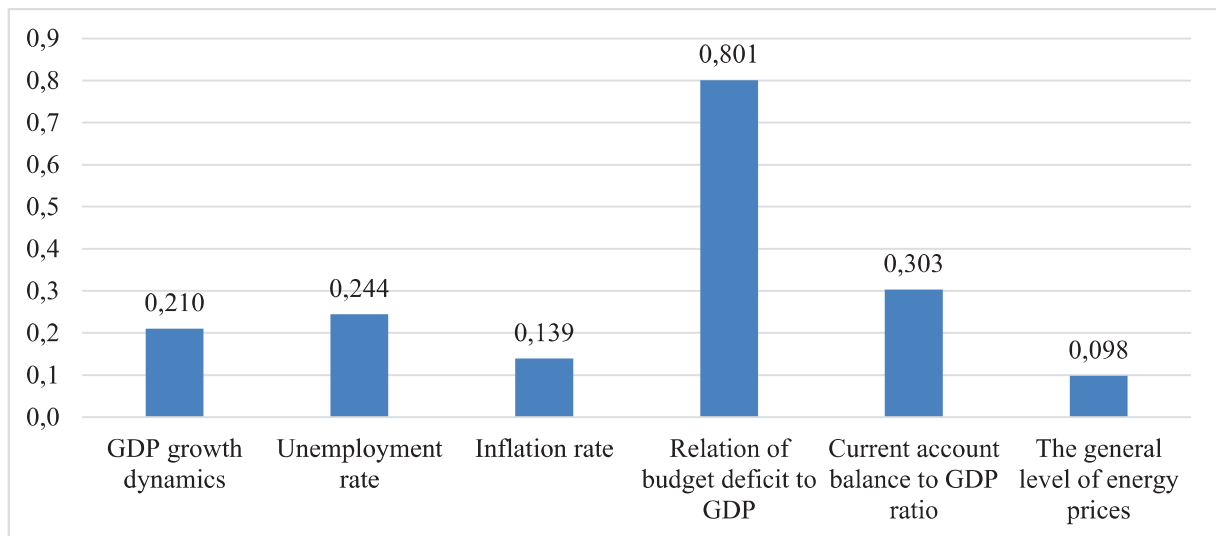
Source: Own compilation based on the EkMetrix database.

Referring to the measurement of macroeconomic stability, it is important to note to what extent the proposed methodology takes into account historical data, current data and macroeconomic forecasts. In other words, to what extent it is possible to spot changes that threaten macroeconomic stability or possibly emerging signs of improvement. Identifying how macroeconomic stability has changed over time and what it might look like in the future can be valuable. In this context, two models were created – one trained on data from 03.2003–01.2021 and another trained on data from 02.2005–02.2023. The purpose of such an exercise was to see if data from the past two years would significantly impact the role of individual criteria in achieving macroeconomic stability.

The following result of weights was obtained for the six categories of macroeconomic stability in the model taught on data from 03.2003–01.2021.

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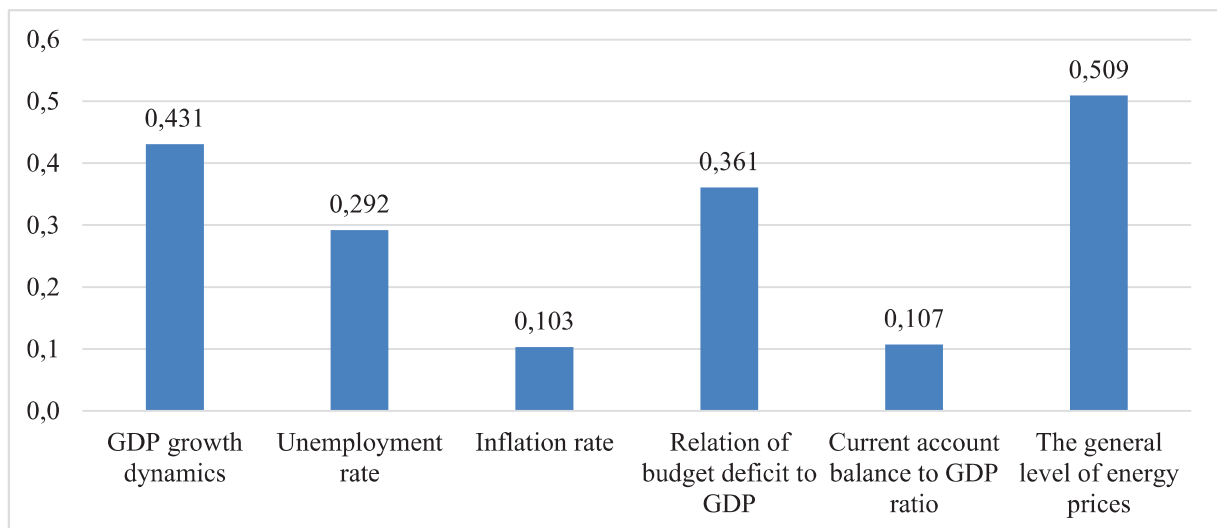
Chart 46. The quantitative role of individual criteria in achieving macroeconomic stability trained on data until 2021



Source: Own compilation based on the E×Metric database.

Next, a predictive model for macroeconomic stability built using the logistic regression method was made. Predictions of macroeconomic indicators used to assess macroeconomic stability for the period up to 03.2024 were used to obtain forecasts. The model was trained on data from 02.2005–02.2023.

Chart 47. The quantitative role of each criterion in achieving macroeconomic stability trained with consideration of data after 2021

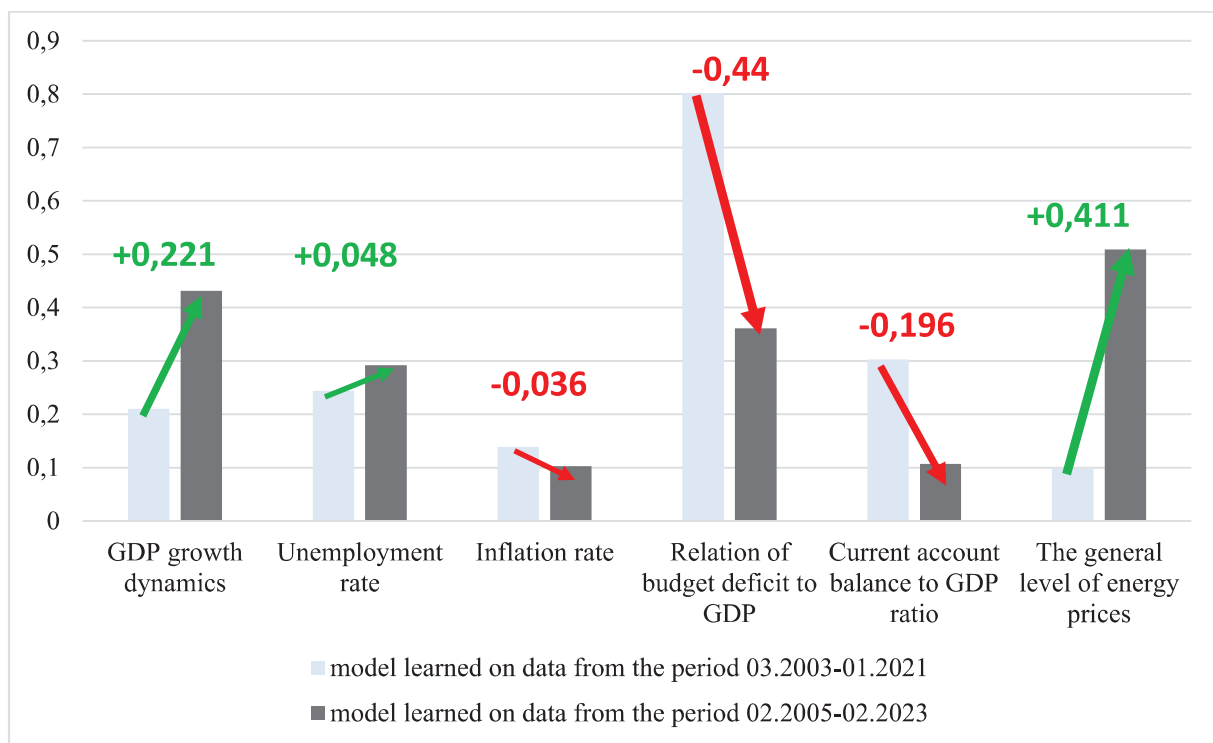


Source: Own compilation based on E×Metric data.

3.3. A MODEL OF POST-CRISIS MACROECONOMIC STABILITY

Comparing the values obtained after considering the data from the pandemic crisis and the war in Ukraine, the weights for each category of macroeconomic stability have changed significantly. First of all, according to estimates, the most significant category for macroeconomic stability until 2021 was the budget deficit-to-GDP ratio (0.801). Other categories include the current account balance to GDP ratio (0.303), unemployment rate (0.244), GDP growth rate (0.21), inflation rate (0.139) and general energy price level (0.098). The occurrence of the pandemic has triggered many fundamental changes of a systemic nature affecting the functioning of the economy, which is also reflected in the characteristics of the data-learning model after 2021. The updated version of the model shows the following relevance: overall energy price level (0.509), GDP growth rate (0.431), budget deficit-to-GDP ratio (0.361), unemployment rate (0.292), current account balance-to-GDP ratio (0.107) and inflation rate (0.139).

Chart 48. Summary of the dynamics of changes in the significance levels of macroeconomic stability factors in learning models on different periods of data



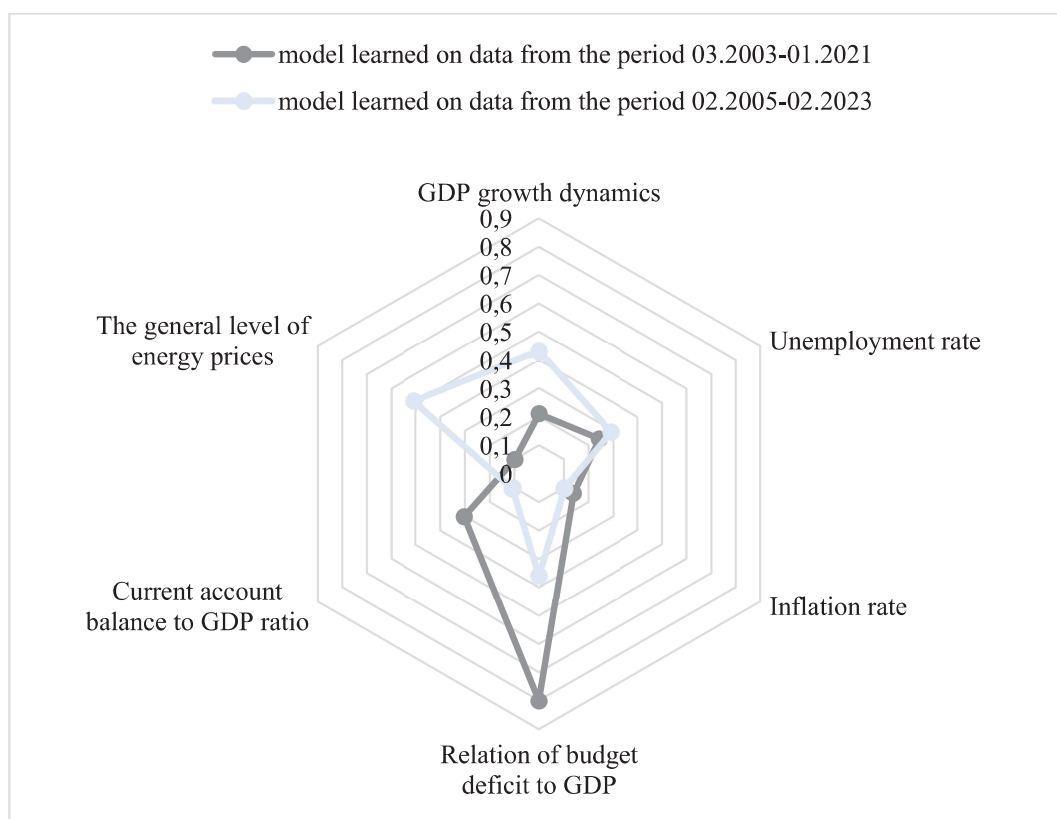
Source: Own analysis.

The most significant change after learning the model based on data from the pandemic period and beyond is a significant increase in weighting for energy price levels. This is the category most relevant to macroeconomic stability in the new model. Thus, the low level of significance for the inflation rate in this model may indicate that the model classified some of the data that dealt with the inflation rate under the general level of energy prices, which is reasonable, as changes in the price of energy have inflationary or deflationary effects. If one were to juxtapose the two categories in models 1 and 2, the sum of significance for inflation and the general level of energy

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prices is 0.237 in the former and 0.612 in the latter. The changes are probably due to the role of energy prices on rising price levels beyond 2021. Another important change is the decrease in the materiality of the budget deficit ratio in favour of an increase in the materiality of GDP growth. This change may be due to trade relationship changes and a trend toward an economic slowdown.

Chart 49. Map of significance levels of macroeconomic stability factors in learning models on different data periods



Source: Own analysis.

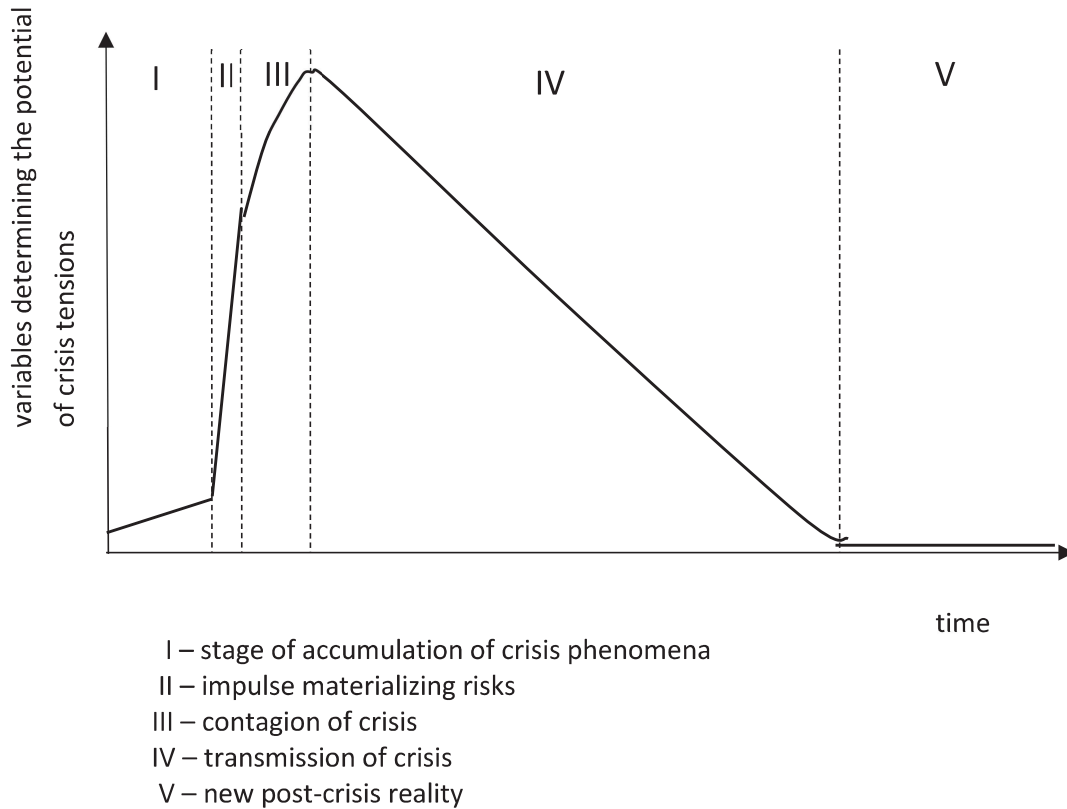
Treating the significance weights of macroeconomic stability factors as a kind of coefficients defining the paradigm of the functioning of the Polish economy before the cut-off period, i.e., before 2021, and taking into account the data after 2021, it should be noted that all kinds of interpretations of present and future events should be updated to the modernised parameters. The indicated changes fit the life cycle model of the crisis⁹³, where the accumulation of crisis-inducing phenomena materialised through the outbreak of the COVID-19 pandemic. In addition, the turmoil was exacerbated by Russia's aggression against Ukraine. The result is fundamental changes in the functioning of economies, as well as regulatory changes bringing the world into

93 P. Komorowski, *Przebieg kryzysu gospodarczego w wymiarze cyklu życia*, [w:] *Wiedza i bogactwo narodów, Kapitał ludzki, globalizacja i regulacja w skali światowej*, red. R. Bartkowiak, P. Wachowiak, OW SGH, Warsaw, 2013.

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a new post-crisis era, where the realities of doing business are new and different, requiring adjustments to both the strategy of operations, the economic policies pursued, and the analyses made based on updated parameters.

Chart 50. Stages of the crisis life cycle



Source: Own analysis.

3.4. RESULTS OF MACROECONOMIC STABILITY ESTIMATION BASED ON THE PREDICTIVE MODEL

The values obtained from the partial prediction models for the received twenty factors having the greatest impact on the economic stability categories were substituted into the obtained model to obtain results estimating future values in the updated macroeconomic stability model. As calculated, Table 2 shows the resulting prediction for macroeconomic stability until the end of 2024.

Table 10. Prediction of macroeconomic stability in the period 03.2023–03.2024 (1- very low, 2 – low, 3 – medium, high)

month	(1-4)	Degree of stability
Mar.23	4	high stability
Apr.23	4	high stability
May.23	4	high stability
Jun.23	4	high stability
Jul.23	4	high stability
Aug.23	4	high stability
Sep.23	2	low stability
Oct.23	2	low stability
Nov.23	2	low stability
Dec.23	4	high stability
Jan.24	4	high stability
Feb.24	4	high stability
Mar.24	4	high stability

Source: Own compilation based on data from EkMetrix.

3.4. RESULTS OF MACROECONOMIC STABILITY ESTIMATION BASED ON THE PREDICTIVE MODEL

The resulting prediction indicates high stability in the months of March-August 2023. The next 3 months saw a drop in stability to category 2, or low stability. This result may be primarily due to the prediction of a deterioration in the foreign trade balance in relation to GDP and may also be related to the preparation period for winter. For the period from December to March 2024, the model predicts a fourth category, namely high macroeconomic stability.

Modern technologies, such as *data mining* and *machine learning*, provide previously unavailable opportunities for mining available data to create predictive models and increase the predictions' effectiveness. The presented model was built with a prediction perspective of 12 months. Of course, this perspective can be extended, but at the cost of increasing the risk of failure.

It should be noted that in the context of the proposed 6 factors shaping macroeconomic stability, models learning on data from other periods presented significantly different weights for each factor. This change demonstrates the fundamental changes in the economy's functioning during the COVID-19 pandemic and the war in Ukraine. In particular, it is important to point out here the increased importance of energy prices over other stability factors.

In the context of predictions for the period up to March 2024, the model indicates mostly high macroeconomic stability, except for the months of March-August, when the deterioration of the foreign trade balance in relation to GDP is mainly predicted, as well as related to the preparation period for the winter season.



Konrad Raczkowski

Economist and manager, professor of economics, and director of the Cardinal Stefan Wyszyński University (UKSW)'s Center for the World Economy. He has held management, supervisory and advisory positions in companies listed on the Warsaw Stock Exchange (WSE), New York Stock Exchange (NYSE) and London Stock Exchange (LSE). Member of the National Development Council to the President of the Republic of Poland from 2015 to 2020, and a former Deputy Minister of Finance. Member of the Royal Economic Society, the British Academy of Management and UN Global Compact. Author of more than 120 scientific publications. Winner of the award of the President of the Polish Academy of Sciences „for outstanding scientific achievements in finance”.

„The global economy is in rough shape—and the extraordinary series of severe economic shocks and serious policy misjudgments are both to blame. Yet years before COVID-19 arrived, governments had already been turning their backs on free and fair trade. And long before the outbreak of the pandemic, governments across the world had developed an appetite for huge budget deficits. They turned a blind eye to the dangers of rising debt-to-GDP ratios. If a lost decade is to be avoided, these failures must be corrected—now, not later”.

Indermit Gill, May 30, 2023

Senior Vice President and Chief Economist World Bank Group

„Over more than a decade, we have witnessed an extraordinary period of de facto zero interest rates, correspondingly benign financing conditions and relative global geopolitical stability. But these benign conditions have now ended – and ended abruptly”.

John C. Berrigan, 7 June 2023

DG Financial Stability, Financial Services and Capital Markets Union

„As trade organizations, i.e. POHiD and EuroCommerce, we understand very well how much change is taking place in the European and global economy, and how difficult it is to correctly read and interpret economic phenomena. That is why it is with such great satisfaction and appreciation to welcome a publication that can be in many areas a signpost for implemented or changed trade and investment strategies, while at the same time being a compendium of knowledge for economic policy”

Renata Juskiewicz

President of the Managing Board of POHiD

Vice-President EuroCommerce



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