Development of Slovenian Macroeconomic Imbalances and their Synchronization with EU Countries

Pavla Bednářová*, Vladimíra Hovorková Valentová
Faculty of Economics, Technical University of Liberec, Liberec, Czech Republic
pavla.bednarova@tul.cz, vladimira.valentova@tul.cz

ARTICLE INFO

Original Scientific Article

Article history:
Received November 2024
Revised November 2024
Accepted February 2025

JEL Classification
F15, O52, O57

Keywords:
Macroeconomic Imbalance Procedure
Slovenia
Cluster Analysis
Dendrogram

UDK: 330.101.541(497.4)
DOI: 10.2478/ngoe-2025-0002

Cite this article as: Bednářová, P. & Hovorková Valentová, V. (2025). Development of Slovenian Macroeconomic Imbalances and their Synchronization with EU Countries. *Naše gospodarstvo/Our Economy, 71*(1), 12-21. DOI: 10.2478/ngoe-2025-0002

Abstract

Slovenia and other EU member states are subject to the Macroeconomic Imbalances Procedure. This article aims to evaluate the macroeconomic imbalances of the Slovenian economy and its synchronisation with other EU countries from 2013 to 2022. Eleven Scoreboard indicators are used to monitor external and internal macroeconomic imbalances. The originality of the paper relates to the use of cluster analysis to determine Slovenia's position among other EU countries in terms of imbalance indicators by dividing EU countries into clusters based on their similarity. The process used the standardized squared Euclidean distance as the basic metric, the furthest neighbour method was used to cluster the objects, which are represented graphically by a dendrogram. Slovenia exhibited relative stability in both external and internal macroeconomic imbalances between 2013 and 2022. However, in the last three years, it showed threshold values for the nominal unit labour cost index, general government gross debt, and there was a risk associated with the development of the house price index. The cluster analysis revealed that Slovenia's external macroeconomic imbalances were significantly synchronized with core EU countries in 2014 and 2022. In 2017 and 2020, macroeconomic imbalances exhibited similarities with the Baltic and Central European countries. The internal macroeconomic balance remained stable in the monitored period, and it developed in sync with the core EU countries and Central European countries.

Introduction

The European Commission monitors macroeconomic imbalances in EU countries through the Macroeconomic Imbalances Procedure (MIP) as a systemic anti-crisis measure in line with the European Semester (EC, 2016). This article aims to evaluate the macroeconomic imbalances of the Slovenian economy and its synchronization with other EU countries from 2013 to 2022. The originality of the paper relates to the use of cluster analysis to provide a spatial view of the similarity or

*Corresponding author

dissimilarity of macroeconomic imbalances and their development over time across EU countries. This information can be an important indicator for early warning of adverse economic developments, as the high degree of interconnectedness of EU countries allows and encourages spillover effects between countries. By effectively monitoring and timely addressing macroeconomic imbalances, policymakers can mitigate risks, increase economic resilience, and promote sustainable growth.

Internal and external macroeconomic equilibrium are crucial conditions for sustainable economic development. Theoretical models, such as the Swan-Salter diagram (Schmitt-Grohé & Uribe, 2021; Frankel, 2023) or the Mündell model of efficient market classification (Mandel, 2000; Krugman, 2021), define this balance. The emergence of macroeconomic imbalances can be attributed to various factors, including the economic maturity of the country, the state of the business cycle, the condition of financial markets, the behaviour of economic entities, and monetary and fiscal policy. Macroeconomic imbalance is defined in Regulation (EU) No. 1176/2011 on prevention and correction of macroeconomic imbalances (EUR-Lex 2011) as: "*any trend giving rise to macroeconomic developments which are adversely affecting, or have the potential to adversely affect, the proper functioning of the economy of a Member State or of the Economic and Monetary Union, or of the Union as a whole*". The EU has implemented the MIP to address and rectify destabilising economic imbalances within its member states. The procedure aims to prevent and correct such imbalances to maintain the overall economic health of the EU (Hodson, 2018). The MIP commences annually with the Alert Mechanism Report (EC, 2024), in which macroeconomic imbalances are monitored through five indicators of external position and competitiveness, six indicators of internal macroeconomic imbalances, and three indicators of unemployment. The indicators are defined in the Scoreboard (EC, 2012; 2017).

The interrelationships between macroeconomic imbalances and economic growth, economic cycle and their synchronization were identified in publications Gros, D. (2012), Sella, Vivaldo, Groth & Ghil (2016), Bandrés, Gadea-Rivas & Gómez-Loscos (2017). The ECB's occasional paper (2018) reviewed the process of accumulating imbalances in the euro area, concluding that these indicators would have predicted the crisis well in advance. Frieden and Walter (2017) highlight that the Eurozone crisis shares many features of previous debt and balance-of-payments crises. Bednářová and Hovorková Valentová (2016) do not support the Endogeneity of the Optimum Currency Area Criteria Hypothesis. The authors recommend that countries joining a currency union should focus more on meeting the criteria ex ante rather than ex post. Bednářová & Hovorková Valentová (2021) also examined the UK's specific position in terms of external macroeconomic imbalances and identified that the UK showed a relatively high degree of synchronization with EU countries only in 2007, but not in the following years. According to the ECB (2019), credible and decisive structural reforms are crucial to address macroeconomic imbalances. Mongelli, Dorrucci, Ioannou & Terzi (2015) provided solutions to the Euro Area crisis through European institutional integration. Collignon (2013) examined macroeconomic imbalances and competitiveness in the euro area, while Camarero, D'Adamo & Tamarit (2018) focused on differences in wage determination in the Eurozone. Heinemann et al. (2018) or Coelho (2019) then examined the effects of fiscal rules and fiscal policies on macroeconomic imbalances. To analyse the development of macroeconomic imbalances in Slovenia, it is important to consider the various factors that affect the country's economic stability. Examining optimal macroeconomic policies during financial crises can provide insights into coping with the economic challenges that Slovenia also faces (Neck et al., 2011). Analyses of the impact of different types of firm growth on macroeconomic aggregates over economic cycles can provide valuable insights into the dynamics of Slovenia's economy (Bonča et al., 2018). The transmission of economic cycles, particularly in the context of EU enlargement and the adoption of the euro, can provide insight into how the Slovenian economy interacts with its European partners (Nguyen & Rondeau, 2019). Examining the relationship between macroeconomic stability and sustainable development in transportation companies across the Eastern European Union countries, including Slovenia, can emphasise the significance of economic equilibrium for sustained growth (Comporek et al., 2021).

Methodology and Data

MIP commences annually with the Alert Mechanism Report (EC, 2024), in which macroeconomic imbalances are monitored through five indicators of external imbalances and competitiveness, six indicators of internal macroeconomic imbalances, and three

indicators of unemployment – see Table 1. The definition of individual indicators on the Scoreboard (EC, 2012; 2016; 2017) includes their calculation and thresholds (Eurostat, 2024). Macroeconomic imbalance is identified when the threshold for each indicator is exceeded.

Table 1

Indicators of external and internal macroeconomic imbalances

Indicator	Definition	Threshold
Current account balance, % of GDP, 3 year average (CA)	$\frac{\left(\frac{CA}{GDP}\right)_t + \left(\frac{CA}{GDP}\right)_{t-1} + \left(\frac{CA}{GDP}\right)_{t-2}}{3}.100$	< -4% >6%
Net international investment position, % of GDP (NIIP)	$\frac{NIIP_t}{GDP_t}.100$	< -35%
Real effective exchange rate - 42 trading partners, HICP deflator, 3 years % change (REER)	$\frac{(REER\_HISC\_42)_t - (REER\_HISC\_42)_{t-3}}{(REER\_HISC\_42)_{t-3}}.100$	± 5% (EA) ± 11% (non EA)
Export market share - % of world exports, 5 years % change (EXP)	$\frac{\left(\frac{EXP_c}{EXP_{world}}\right)_t - \left(\frac{EXP_c}{EXP_{world}}\right)_{t-5}}{\left(\frac{EXP_c}{EXP_{world}}\right)_{t-5}}.100$	< -6%
Nominal unit labour cost index (2010=100), 3 years % change (ULC)	$\frac{(ULC)_t - (ULC)_{t-3}}{(ULC)_{t-3}}.100$	+ 9% (EA) + 12% (non EA)
House price index (2015=100) - deflated, 1 year % change (HPI)	$\frac{\left(\frac{HPI_t}{DEFL_t}\right) - \left(\frac{HPI_{t-1}}{DEFL_{t-1}}\right)}{\left(\frac{HPI_{t-1}}{DEFL_{t-1}}\right)}.100$	> 6%
Private sector credit flow - consolidated, % of GDP (PSCF)	$\frac{PSCF_t}{GDP_t}.100$	> 14%
Unemployment rate - 3 year average (UR)	$\frac{(UR)_t + (UR)_{t-1} + (UR)_{t-2}}{3}$	> 10%
Private sector debt – consolidated, % of GDP (PSD)	$\frac{PSD_t}{GDP_t}.100$	> 133%
General government gross debt - % of GDP (GGD)	$\frac{GGD_t}{GDP_t}.100$	> 60%
Total financial sector liabilities - non-consolidated, 1 year % change (FSL)	$\frac{(FSL)_t - (FSL)_{t-1}}{(FSL)_{t-1}}.100$	> 16.5%

Source: Authors' processing based on data from EC (2017) and EC (2024)

Cluster analysis is used to determine Slovenian position among other EU countries in terms of external and internal imbalance indicators. The principle of cluster analysis is to divide objects, in this case, EU countries, into clusters based on their similarity in terms of the examined indicators. Objects belonging to the same cluster are very similar, while those belonging to different clusters show significant differences. The process employed the standardized squared Euclidean distance as the basic metric, as reported in Everitt et al. (2010):

$$D_N(i, i') = \sqrt{\sum_{j=1}^{p} d_j^2\,(i;\, i')/s^2(x_j)} \qquad (1)$$

where $d_j(i;\, i') = x_{ij} - x_{i'j}\,, j = 1, 2, \ldots, p.$

The metric is selected due to the need to express the observed indicators in different units of measurement. However, it requires that the observed indicators are uncorrelated. To ensure this, a Pearson's correlation coefficient is calculated for each pair of observed indicators (Black, 2010) and a t-test is performed at the 5% significance level - test for zero population correlation (Newbold, Carlson & Thorne, 2013). This test can demonstrate the correlation between variables, as stated in the alternative hypothesis. To ensure objectivity, it is necessary to exclude indicators that are highly correlated with other indicators from the analysis. This will prevent any potential bias in the results. The furthest neighbour method, one of the hierarchical agglomerative methods, is used to cluster the objects. This method clusters variables based on the minimal distance between their outermost elements. The clusters are represented graphically by a dendrogram. The final number of clusters is determined heuristically. The

analysis results may be biased by the presence of outlying objects. An EU country may have values of the observed indicators that are so far removed from the other values that they form a separate cluster. However, a country that is not an outlier may also form a separate cluster. It is necessary to determine whether a country is an outlier by an appropriate test. Davies and Gather (1993) address testing and identification of outliers. Cluster analysis is a state-based method, so it is carried out in three selected years, 2014, 2017, 2020 and 2022 using data from the Alert Mechanism Report (EC, 2024) and Eurostat (2024).

Development of External Macroeconomic Imbalances for Slovenia

Over the period under review, Slovenian external macroeconomic imbalances and competitiveness indicators have exhibited long-term stability, as indicated in Table 2.

Table 2
External Macroeconomic Imbalance Indicators

	Threshold	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Current account balance	-4%/+6%	1.3	3.2	4.1	4.6	4.9	5.6	6.0	6.3	5.5	3.2
Net international investment position	-35%	-39.3	-38.4	-31.2	-28.8	-24.2	-19.0	-16.3	-15.7	-7.7	-1.5
Real effective exchange rate	±5% (EA) ±11% (non-EA)	-0.6	1.2	0.3	-0.6	-1.9	2.0	1.0	1.7	-0.4	-1.3
Export market share	-6%	-18.5	-13.2	-5.0	3.2	17.7	19.3	15.5	19.3	10.6	2.9
Nominal unit labour cost index	9% (EA) 12% (non-EA)	0.1	0.1	-0.1	1.3	3.6	5.7	7.9	14.3	12.7	14.3

Note: Figures highlighted are the ones at or beyond the threshold.
Source: Eurostat 2023; Alert mechanism report 2024

External sustainability concerns remain limited. The current account balance only slightly crossed the threshold in 2019 and 2020. The net investment position has been improving since 2014, as has the share of export markets. In 2022, the current account balance fell due to a decrease in the balance of non-energy goods, and a decrease in the energy balance to a lesser extent. The balance of trade in goods improved in the second quarter of 2023. The net international investment position came in close to balance in 2022 and is projected to improve slightly in 2023 and 2024 (EC, 2024). The HICP-based real effective exchange rate depreciated in 2022, but its appreciation is being observed in 2023. When measured based on core inflation, the real effective exchange rate was broadly stable in 2022 and is displaying some appreciation in 2023 amid higher core inflation than in the euro area in both years. Cost competitiveness concerns have increased recently. Increases in nominal unit labour costs were sizeable in 2022, and were accelerating further in 2023. Moreover, they are growing faster than in the rest of the euro area, driven by significantly higher wage increases amid limited productivity gains (EC 2024).

Cluster Analysis of External Macroeconomic Imbalance Indicators

Table 3 shows the uncorrelated external macroeconomic indicators used for the analysis and the identification of outliers. The results of the cluster analysis are shown in the dendrograms in Figure 1. The number of clusters makes it possible to obtain clear and easily interpretable results, since the small distance of the links (distance up to 8 on the y-axis) explains a high degree of mutual similarity in the occurrence of macroeconomic imbalances between countries within each cluster.

The cluster analysis showed that in 2014, twelve European countries (cluster 1), including Slovenia, had a significant synchronization (cluster distance approximately 6.5). Slovenia, Italy, France, Austria, Finland, Germany, Denmark, Belgium, the Netherlands, Malta, Sweden and Luxembourg collectively had a high net investment position compared to the rest of the world (15.2%). The indicator for the loss of export market shares gradually approached the threshold, and the countries demonstrated stable development of the change in

nominal unit labour costs. The indicators of external macroeconomic imbalances and their development confirm a relatively stable external position and competitiveness. In 2017, Slovenia demonstrated a different state of the external sector and competitiveness than the EU core countries. Slovenia, Spain, Portugal, Hungary, Slovakia, Poland and Croatia were grouped in the cluster. These countries exhibited a negative net investment position abroad (-66.2%), but conversely, increased their share of export markets (14.2%). In 2020, Slovenia was grouped with Bulgaria, Czech Republic, and Estonia, while Romania, Lithuania, and Poland were placed at a greater distance. These countries experienced above-average growth in unit labour costs (18.3%), a deterioration in their net investment position (-27.4%), but an increase in their share of export markets (22.4%). Six clusters were identified in 2022, with a higher number of clusters indicating a lower degree of synchronization across EU countries. Slovenia again showed a significantly high degree of similarity with Austria and was also included in the EU core group (cluster 1). The current account balance fell sharply, from a surplus of 3.3% in 2021 to a deficit of -1%. This change was mainly caused by a decrease in the balance of non-energy goods and, to a lesser extent, by a decrease in the energy balance. The net international investment position (NIIP) came in close to balance. Increases in nominal unit labour costs were more significant than in the rest of the euro zone, driven by significantly higher wage increases with limited productivity growth. When measured based on core inflation, the real effective exchange rate was broadly stable.

Table 3

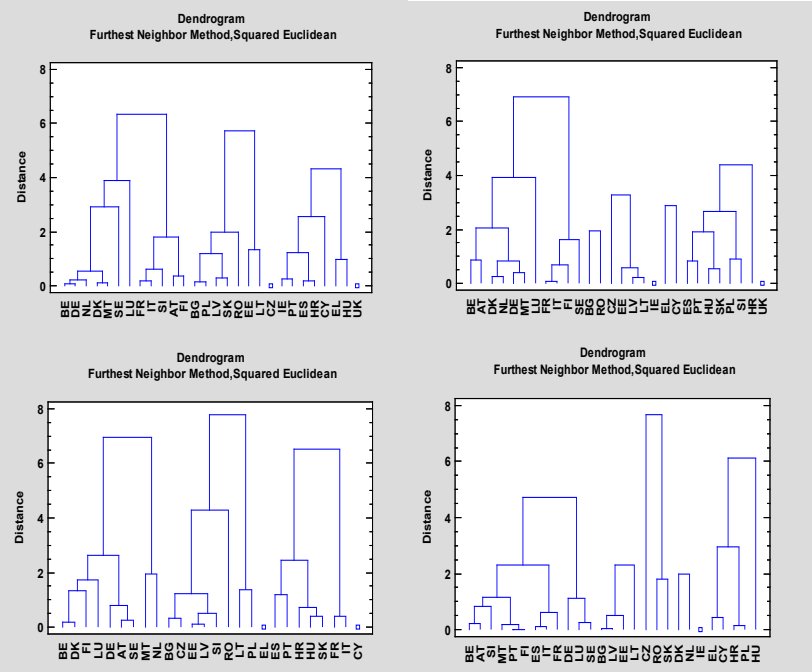
Cluster analysis of External Macroeconomic Imbalance Indicators

Year	Uncorrelated indicators	Identification of outliers
2014	NIIP, REER, EXP	UK (F = 2.958, p-value = 0.052) Czech Republic (F = 2.235, P-Value = 0.109) All the EU countries were analyzed.
2017	NIIP, REER, EXP, ULC	Greece (F = 1.857, p-value = 0.1509) Romania (F = 1.726, p-value = 0.1772) All the EU countries were analyzed.
2020	NIIP, EXP, ULC	Ireland (F = 4.592, p-value = 0.0112) Ireland was excluded from the analysis.
2022	CA, REER, EXP	All the EU countries were analyzed.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Figure 1

Resulting dendrogram for external macroeconomic imbalance indicators



Notes: for 2014 in upper left panel, for 2017 in the upper right panel, for 2020 in lower left panel, and for 2022 in the lower right panel.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Development of Internal Macroeconomic Imbalances for Slovenia

Table 4 records the values of indicators of internal macroeconomic imbalances, their development, and comparison with the established threshold value between 2013 and 2022.

The issue of internal macroeconomic imbalances arises due to the rise in residential real estate prices since 2017. In 2022, house prices were overvalued by almost 10%. The continued development of real estate prices is considered a risk factor for a more significant correction in the future, should economic conditions deteriorate. However, the debt-to-GDP ratio of households and non-financial corporations has remained low for an extended period. Throughout the monitored period, the general government gross debt indicator exceeded the threshold value, but its size is significantly lower than the EU average.

In 2022, government debt decreased to 72.3% of GDP and is forecast to continue declining. Fiscal sustainability risks are medium-term and high in the long term (EC, 2024). The total financial sector liabilities indicator value is significantly below the threshold, indicating a healthy banking sector. Although capitalization is below the EU average, profitability in 2022 was among the highest in the EU (EC, 2024).

Table 4
Internal Macroeconomic Imbalances Indicators

	Threshold	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
House price index	+6%	-7.2	-6.2	1.4	3.6	6.6	6.6	5.3	5.2	7.9	4.3
Private sector credit flow	+14%	-3.7	-4.7	-5.0	-0.8	0.9	1.3	0.8	-0.9	3.5	5.2
Private sector debt	+133%	107.2	97.9	87.4	81.0	76.1	72.5	68.5	69.5	66.2	66.0
General government gross debt	+60%	70.0	80.3	82.6	78.5	74.2	70.3	65.4	79.6	74.4	72.3
Unemployment rate	+10%	9.1	9.6	9.6	8.9	7.9	6.6	5.4	4.8	4.7	4.6
Total financial sector liabilities	+16.5%	-10.1	-0.1	-3.8	3.4	5.3	4.1	9.9	14.0	14.1	-1.4

Note: Figures highlighted are the ones at or beyond the threshold.
Source: Eurostat 2023; Alert mechanism report 2024

Cluster Analysis of Internal Macroeconomic Imbalance Indicators

The uncorrelated internal macroeconomic indicators used for the analysis in individual years and the identification of outliers are written in Table 5.

Figure 2 shows dendrograms that display the results of the cluster analysis of internal macroeconomic imbalances.

In 2014, the first cluster was formed by merging twenty EU countries, which together accounted for over 70% of the total share. These countries demonstrated very good stability in the private sector with private sector credit flow (1.6%) and private sector debt (127.3%). The public debt indicator value (62.1%) was slightly above the threshold level, indicating stable public finances and debt. The indicators of internal macroeconomic imbalances were significantly similar in Slovenia and core EU countries, such as Finland, Austria, and Germany. The cluster also included four other EU countries due to their moderate public sector indebtedness. In 2017, the cluster analysis revealed a significant reduction in the synchronization of the values of internal macroeconomic imbalances indicators in EU countries. Seven clusters were detected at a clustering distance of 10. Slovenia remained in a cluster of eight countries, including Germany, Austria, Malta, Poland, Romania, Hungary, Estonia and now Latvia.

These countries showed stability and good scores on indicators of internal macroeconomic imbalances. In 2020, EU countries were grouped into only three clusters with a clustering distance of approximately 8, indicating a high degree of mutual similarity. Slovenia and the other

12 countries in the cluster reported most indicator values below the thresholds or with only minor deviations. A lower degree of synchronization across EU countries identified a higher number of six clusters in 2022. Very similar characteristics were achieved for Slovenia and eight other EU countries (cluster 4), where house prices were overvalued and still increasing. In these countries, the evolution of house prices can be seen as a risk factor for a future sharper correction if economic conditions were to deteriorate (EC, 2024). At the end of 2022, the general government gross debt was above 60% in Slovenia, Austria, Croatia, Cyprus, Finland, Germany and Hungary, and decreased in all those countries.

Table 5

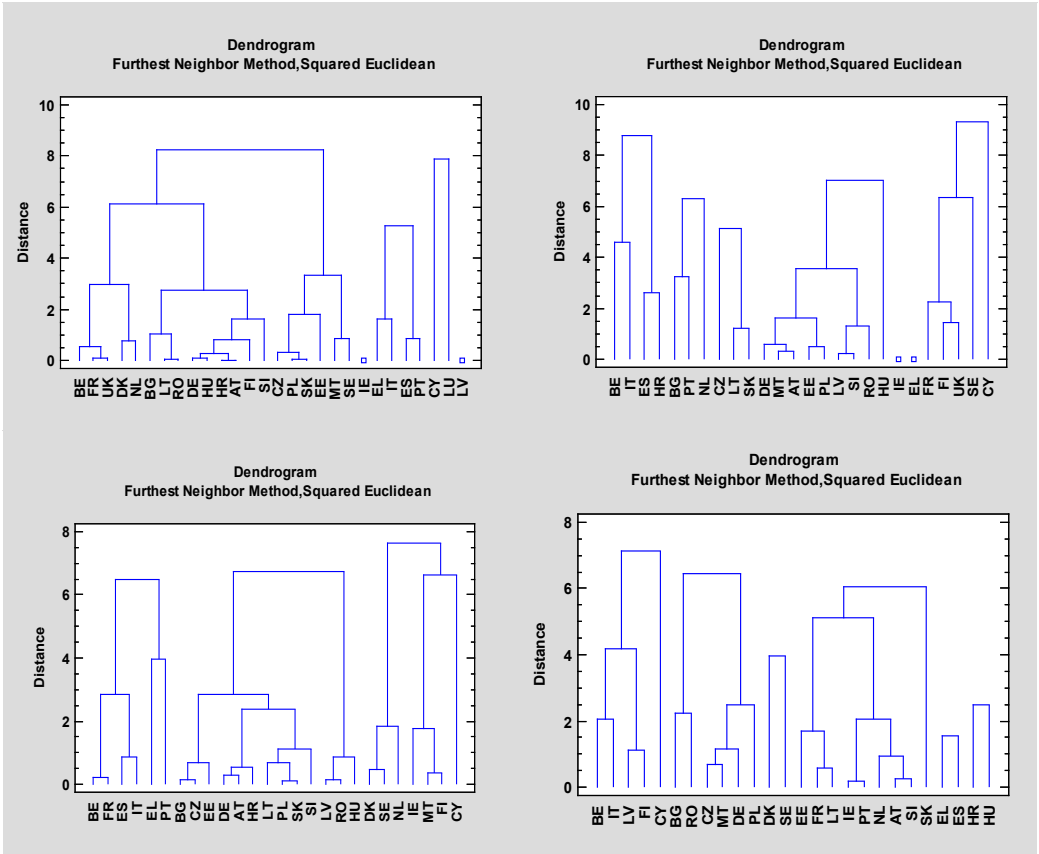
Cluster analysis of Internal Macroeconomic Imbalance Indicators

Year	Uncorrelated indicators	Identification of outliers
2014	PSCF, PSD, GGD	UK (F = 2.958, P-Value = 0.052) Czech Republic (F = 2.235, P-Value = 0.109) All the EU countries were analyzed.
2017	HPI, PSCF, UR, PSD, FSL	Greece (F = 1.857, P-value = 0.1509) Romania (F = 1.726, P-value = 0.1772) All the EU countries were analyzed.
2020	PSCF, PSD, GGD	Ireland (F = 4.592, P-Value = 0.0112) Ireland was excluded from the analysis.
2022	HPI, PSCF, UR, FSL	Luxembourg was excluded from the analysis.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Figure 2

Resulting dendrogram for internal macroeconomic imbalance indicators



Notes: for 2014 in upper left panel, for 2017 in the upper right panel, for 2020 in lower left panel, and for 2022 in the lower right panel.

Source: Authors' own data obtained using STATGRAPHICS Centurion XVIII

Conclusions

Slovenia, along with other EU member states, is subject to the Macroeconomic Imbalances Procedure. This paper aimed to evaluate the macroeconomic imbalances of the Slovenian economy and its synchronization with other EU countries from 2013 to 2022. Eleven Scoreboard indicators were used to monitor external and internal macroeconomic imbalances. The originality of the paper relates to the use of cluster analysis to provide a spatial view of the similarity or dissimilarity of macroeconomic imbalances and their development over time across EU countries. Cluster analysis was used to determine Slovenia's position among other EU countries in terms of imbalance indicators by dividing EU countries into clusters based on their similarity. The process used the standardized squared Euclidean distance as the basic metric, the furthest neighbour method was used to cluster the objects, which are represented graphically by a dendrogram.

Over the period under review, external macroeconomic imbalances indicators exhibited long-term stability in Slovenia. The cluster analysis showed that in 2014, twelve European countries, including Slovenia, had a significant synchronization and they collectively had a high net investment position compared to the rest of the world. The indicator for the loss of export market shares gradually approached the threshold, and the countries demonstrated stable development of the change in nominal unit labour costs. In 2017, Slovenia demonstrated a different external sector and competitiveness position than the core EU countries, showing a negative net investment position abroad but increasing its share of export markets. In 2020, Slovenia was grouped with countries experienced above-average growth in unit labour costs, a deterioration in their net investment position, but an increase in their share of export markets. Slovenia and eight other EU countries displayed some risks of cost competitiveness losses in 2022. All of them showed strong unit labour costs dynamics. Core inflation in all these countries exceeded that in the euro area by visible margins, more significantly in Slovenia and Austria. The general government gross debt indicator identified internal macroeconomic imbalances in Slovenia in all years of the monitored period and the house price index in three years. In 2014, twenty EU countries demonstrated very good stability in the private sector and also stable public finances and debt. In 2017, the cluster analysis revealed a significant reduction in the synchronization of the values of internal macroeconomic imbalances indicators in EU countries. Slovenia remained in the cluster of eight countries that showed stability and good scores in indicators of internal macroeconomic imbalances. Slovenia, like the other twelve EU countries, reported most indicator values below the thresholds or with only minor deviations in 2020 as well. A lower degree of synchronization across EU countries identified a higher number of six clusters in 2022. Very similar characteristics were achieved for Slovenia and eight other EU countries with overvalued house prices and the general government gross debt above 60%. Fiscal sustainability risks remained medium-term.

References

Bandrés, E., Gadea-Rivas, M. D. & Gómez-Loscos, A. (2017). *Regional Business Cycles across Europe*. Madrid: Banco de Espana. Retrieved from: https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/DocumentosOcasionales/17/Fich/do1702e.pdf

Bednářová, P. & Hovorková Valentová, V. (2016). The development of macroeconomic imbalances in European countries in the process of integration. In: *Proceedings of 14th International Conference Economic Policy in the European Union Member Countries* (pp. 44-53). Karviná: Silesian University.

Bednářová, P. & Hovorková Valentová, V. (2021). Brexit in Terms of External Macroeconomic Imbalances. In: *Proceedings from the 22nd International Scientific Conference International Relations 2021* (pp. 67 – 78). Retrieved from: https://fmv.euba.sk/www_write/files/veda-vyskum/konferencia-smolenice/2021/zbornik.pdf

Black, K. (2010). *Business Statistics for Contemporary Decision Making*. 6th ed. Hoboken. New Jersey: Wiley & Sons.

Bonča, D., Tajnikar, P., Ponikvar, M. & Mörec, B. (2018). Firm growth types and key macroeconomic aggregates through the economic cycle. *Journal of Business Economics and Management*, *19*(1), 138–153. DOI: https://doi.org/10.3846/16111699.2017.1422798

Camarero, M., D'Adamo, G. & Tamarit, C. (2018). *Differences in wage determination in the Eurozone* (Working Papers 1811). Retrieved from: https://ideas.repec.org/p/eec/wpaper/1811.html

Coelho, M. (2019). Fiscal Stimulus in a Monetary Union: Evidence from Eurozone Regions. *IMF Economic Review*, *67*, 573–617. DOI: https://doi.org/10.1057/s41308-019-00084-2

Comporek, M., Kowalska, M. & Misztal, A. (2022). Macroeconomic stability and transport companies' sustainable development in the Eastern European Union. *Journal of Business Economics and Management*, *23*(1), 131–144. DOI: https://doi.org/10.3846/jbem.2021.15913

Collignon, S. (2013). Macroeconomic imbalances and competitiveness in the euro area. *Transfer: European Review of Labour and Research*, *19*(1), 63–87. DOI: https://doi.org/10.1177/1024258912469467

Davies L. & Gather, U. (1993). The identification of multiple outliers. *Journal of the American Statistical Association*, *88*(423), 782–792. DOI: doi:10.1080/01621459.1993.10476339

EC (2012). *Scoreboard for the surveillance of macroeconomic imbalances: technical explanations on the scoreboard* (Occasional Paper 92/2012*).* Brussels: European Economy.

EC (2016). *The Macroeconomic Imbalance Procedure. Rationale, Process, Application: A Compendium*. Retrieved from: https://ec.europa.eu/eurostat/documents/16624/0/ip039_en_2.pdf

EC (2017). *Social scoreboard 2017 – Headline indicators – Descriptions and highlights*. Retrieved from: https://data.europa.eu/doi/10.2767/671997

EC (2024). *Alert Mechanism Report*. Retrieved from: https://economy-finance.ec.europa.eu/economic-and-fiscal-governance/macroeconomic-imbalance-procedure/alert-mechanism-report_en

ECB (2018). *Macroeconomic imbalances in the euro area: where do we stand*? Retrieved from: https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op211.en.pdf

ECB (2019). *Macroeconomic imbalances and structural reforms*. Retrieved from: https://www.ecb.europa.eu/pub/conferences/shared/pdf/20190701_CBS2019/ecb.CBS2019_Sondermann_Schuler_Macroeconomic_imbalances_and_structural_reforms_presentation.en.pdf

EUR-LEX (2011). *Regulation (EU) No 1176/2011 of the European Parliament and of the Council*. Retrieved from: https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:306:0025:0032:en:PDF

Eurostat (2024). *Data Browser*. Retrieved from: https://ec.europa.eu/eurostat/databrowser/explore/all/all_themes

Everitt, S. B., Landau, S., Morven, L. & Stahl, D. (2011). *Cluster Analysis*. 5th ed. Hoboken. New Jersey: Wiley & sons.

Frankel, J. (2023). Resuscitating the Salter-Swan model of a small open economy. *CEPR*. Retrieved from: https://cepr.org/voxeu/columns/resuscitating-salter-swan-model-small-open-economy

Frieden J. & Walter, S. (2017). Understanding the Political Economy of the Eurozone Crisis. *Annual Review of Political Science*, *20*, 371–390. Retrieved from: https://www.annualreviews.org/doi/10.1146/annurev-polisci-051215-023101

Gros, D. (2012). Macroeconomic imbalances in the euro area: symptom or cause of the crisis? *CEPS Policy*. Retrieved from: https://www.ceps.eu/ceps-publications/macroeconomic-imbalances-euro-area-symptom-or-cause-crisis/

Heinemann, F., Moessinger, M. D. & Yeter, M. (2018). Do fiscal rules constrain fiscal policy? A meta-regression-analysis. *European Journal of Political Economy, 51*, 69–92. DOI: 10.1016/j.ejpoleco.2017.03.008. Retrieved from: https://www.sciencedirect.com/science/article/pii/S0176268016301471

Hodson, D. (2018). The macroeconomic imbalance procedure as European integration: a legalisation perspective. *Journal of European Public Policy, 25*(*11*), 1610–1628. DOI: http://dx.doi.org/10.1080/13501763.2017.1340326

Krugman, P. (2021). *The Mundell difference*. CEPR. Retrieved from: https://cepr.org/voxeu/columns/mundell-difference

Mandel, M. (2000). Effective Market Classification: Theory and Application in the Czech Economy. *Finance a Uver. 50*(9), 452–461.

Mongelli, F. P., Dorrucci, E., Ioannou, D. & Terzi, A. (2015). Responses to the Euro Area Crisis: Measuring the Path of European Institutional Integration. *Journal of European Integration*, *37*(7), 769–786. DOI: 10.1080/07036337.2015.1079373

Neck, R., Blueschke, D. & Weyerstrass, K. (2011). Optimal macroeconomic policies in a financial and economic crisis: a case study for Slovenia. *Empirica*, *38*(3), 435–459. DOI: 10.1007/s10663-010-9159-7

Nguyen, H. S. & Rondeau, F. (2019). The transmission of business cycles: Lessons from the 2004 enlargement of the EU and the adoption of the euro. *Economics of Transition and Institutional Change*, *27*(3), 729–743. DOI: 10.1111/ecot.12212

Schmitt-Grohé, S. & Uribe, M. (2021). Reviving the Salter-Swan Small Open Economy Model. *Journal of International Economics*, *130*, 103441. DOI: https://doi.org/10.1016/j.jinteco.2021.103441

Sella, L., Vivaldo, G., Groth, A. & Ghil, M. (2016). Economic Cycles and Their Synchronization: A Comparison of Cyclic Modes in Three European Countries. *Journal of Business Cycle Research 12*(1), 25–48. Retrieved from: https://dept.atmos.ucla.edu/sites/default/files/tcd/files/sella_etal_eurobc-jbcma_accepted.pdf

Razvoj slovenskih makroekonomskih neravnovesij in njihova sinhronizacija z državami EU

Izvleček

Slovenija je skupaj z drugimi državami članicami EU vključena v postopek v zvezi z makroekonomskimi neravnotežji. Namen članka je oceniti makroekonomska neravnovesja slovenskega gospodarstva in njegovo sinhronizacijo z drugimi državami EU v obdobju 2013-2022. Za spremljanje zunanjih in notranjih makroekonomskih neravnovesij se uporablja enajst kazalnikov. Izvirnost članka se nanaša na uporabo klastrske analize za določitev položaja Slovenije med drugimi državami EU glede na kazalnike neravnovesij z razdelitvijo držav EU v skupine na podlagi njihove podobnosti. V postopku je bila kot osnovna metoda uporabljena standardizirana evklidska razdalja v kvadratu, za razvrščanje v skupine držav, ki so grafično prikazane z dendrogramom, pa je bila uporabljena metoda najbolj oddaljenega soseda. Slovenija je med letoma 2013 in 2022 izkazovala relativno stabilnost zunanjih in notranjih makroekonomskih neravnovesij. V zadnjih treh letih pa je pokazala mejne vrednosti za indeks nominalnih stroškov dela na enoto, bruto javni dolg in obstajalo je tveganje, povezano z gibanjem indeksa cen stanovanj. Klastrska analiza je pokazala, da so bila zunanja makroekonomska neravnovesja Slovenije v letih 2014 in 2022 pomembno sinhronizirana z državami jedra EU. V letih 2017 in 2020 so makroekonomska neravnotežja kazala podobnosti z baltskimi in srednjeevropskimi državami. Notranje makroekonomsko ravnotežje je v opazovanem obdobju ostalo stabilno in se je razvijalo sinhronizirano z državami jedra EU in srednjeevropskimi državami.

Ključne besede: postopek v primeru makroekonomskega neravnovesja, Slovenija, klastrska analiza, dendrogram