




# The macroeconomic stability of United Kingdom after Brexit

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## Abstract

**Motivation:** The United Kingdom has been triggered Article 50 of the Lisbon Treaty on 29th March 2017 and formally has been begun Britain's exit from EU. The Withdrawal Agreement entered into force on 1 February 2020. The very announcement of Brexit aroused many concerns and uncertainty. The Withdrawal has taken place in an orderly manner, the UK and the EU remain in close partnership with new agreements. Such a significant institutional change also may affect economy and indirectly macroeconomic stability.

**Aim:** This research aims to identify and assess the changes in macroeconomic stability in United Kingdom, from the year before the Brexit referendum to the first year outside the EU, i.e. in 2015–2021.

**Results:** The method used in the study is a comparative analysis that employs a macroeconomic stabilization pentagon model (MSP). The macroeconomic stabilization pentagon is based on the GDP growth rate, the unemployment rate, the inflation rate, the budget balance and the current account balance. Time range of research is 2015–2021. The MSP indicators for United Kingdom and EU-27 are compared. In the period 2015–2018, i.e. during the uncertainty as to the results of the Withdrawal Agreement negotiation, the MSP index fluctuates slightly, which we interpret as very small changes in macroeconomic stability. The UK's macroeconomic stability has fallen dramatically in 2020, the first year out of the EU. It is worth emphasizing that the UK's macroeconomic stability was lower than EU-27 one throughout the period studied.

**Keywords:** *macroeconomic stabilization pentagon; macroeconomic stabilization; Brexit*

**JEL:** E02; E66; F15

## 1. Introduction

In a referendum on the 23rd of June 2016, the British people voted to leave the European Union. The withdraw process turned out to be more complicated than the voting people thought. Prolonged negotiations on the withdraw agreement caused a lot of uncertainty among the stakeholders. Britain would be carving out an unprecedented path. No nation state has ever held a referendum and then left the EU. While the process of economic integration is quite well researched, the theory of disintegration does not actually exist. It is a significant institutional change, similar to the transition. Institutions are responsible for ordering and coordinating otherwise chaotic and unpredictable reality even if this happens only in actors' minds through the creation of expectations or maybe even stereotypes (Czech, 2014, pp. 310–312). Such a significant institutional change also may affect economy and indirectly macroeconomic stability. The EU and trade agreements have been very successful in reducing trade costs and boosting trade between its members. This is a source an economic success and welfare increase. Therefore it could be expected that disintegration will hinder economic activity and result in a decline in prosperity. The prolonged uncertainty about Brexit has affected economic conditions thus far (Makrychoriti & Spyrou, 2022). The United Kingdom withdrew from the European Union on 31 January 2020, a transitional period ended on 31 December 2020. Ultimately, the UK ceased to be a member of the EU at the beginning of 2021. The Brexit agreement has been implemented, causing a rise in barriers to trade, investment, and migration with the UK's largest economic partner (De Lyon & Dhingra, 2021).

This research aims to identify and assess the changes in macroeconomic stability in United Kingdom, from the year before the Brexit referendum to the first year outside the EU, i.e. in 2015–2021.

The study period covers the years 2015–2021, that is, the period from the year before the Brexit vote to the UK's first year outside the European Union. To achieve the goal of the study, the macroeconomic stabilization pentagon (MSP) is calculated for Great Britain and EU-27.

The structure of the present study begins with this an introduction, which presents the relevance of the topic and is followed by a literature review. Next, the research methodology section explains the methods and states a hypothesis. The subsequent section presents the results, followed by a discussion and the conclusions.

## 2. Literature review

Brexit has no precedent, never an advanced economy withdraws from such a deep and a complex trade agreement as the EU. There is therefore a high level of uncertainty, so it should come as no surprise that frequent attempts are being made to estimate the consequences of Brexit. Both theoretical and empirical

studies on Brexit's are increasingly numerous but return extremely mixed results. The inconsistencies among the results are — in part — due to the diverse methods and assumptions underlying the research (and probably also different intentions), but also due to unceasing and frequently radical changes in the Brexit process (Mroczek-Dąbrowska & Matysek-Jędrzych, 2022).

In the literature, Brexit is assessed mainly through the prism of its impact on trade, investment and migration. Before Brexit, almost all short-term workers came from the EU. For some sectors, particularly those that rely on short term or seasonal migrant workers, Brexit appears to be having an effect (De Lyon & Dhingra, 2021). Dhingra et al. (2023) has examined the trade and welfare impacts of Brexit, which reduces the UK's deep trade commitments with European Union — its largest trading partner but opens up new avenues for deep trade agreements with economies outside the EU. They concluded that in every scenario analysis the UK economy experiences a welfare loss. There is a lot of literature focusing mainly on assessing the impact of Brexit on the trade, migration and financial markets. Studies on the assessment of overall macroeconomic stability after Brexit are relatively scarce, which is why this study will fill the existing gap.

Campos et al. (2019) find that growth effects from EU membership are large and positive. They suggest that the UK benefited more from the Single Market while the benefits may have slowed down in later years due not adopting the common currency.

United Kingdom has ceased to be a member of the Single Market, which means that it has left the regulatory union. Veterinary, sanitary, technical, etc. certificates became necessary for many goods. Obtaining them required additional time and entailed higher costs. There have also been changes in the UK. Great Britain in the settlement of VAT, excise duty and many others. This may have prompted some companies to reorient their sales and purchases on the EU market. According to the British statistical office ONS, an important factor hindering the exchange of goods in January was also introduced in the UK. In the first month of trading under the new legal conditions, there were huge perturbations at the borders. In Calais, the main port through which cars move from the continent to the UK. In the UK, there were huge queues of lorries that were stopped because of missing or incorrect documents. Some transport companies suspended their services because they were unable to cope with the additional administrative, logistical, regulatory, etc. requirements and the cost of very long downtimes (Kawecka-Wyrzykowska & Ambroziak, 2021, pp. 55–82).

There are a number of studies that focus on the uncertainty effects of Brexit. Investigation of Makrychoriti and Spyrou (2022) shows overall results indicate that the prolonged uncertainty about a potential Brexit had a positive effect on the economies of major EU countries like France, Spain and Italy and negative effects for the UK economy. Domestic activity and gross investment seem to be importantly affected while there is a weaker effect on finan-

cial variables and economic sentiment. Steinberg (2019) finds a different results for short run and long run, using a dynamic, stochastic, general equilibrium model. In the short run, uncertainty about Brexit will have little impact on U.K. macroeconomic dynamics and welfare. However, in the long run, Brexit will have a large impact on the U.K. macroeconomy. Real GDP will fall by 0.5–1.4%, consumption will fall by 0.5–1.3%, and trade flows with the remainder of the European Union will fall by 8.2–44.8% (Steinberg, 2019).

The macroeconomic stability is the basic economic goal of every country. It is manifested in the achievement of basic goals determined by economic growth, price stability, high employment rate and positive international trade balance (Razić & Kasumović, 2019, p. 25). Vasylieva et al. (2018, pp. 159–170) concludes growth of macroeconomic stability has a more positive impact on GDP growth compared to foreign direct investments, indicating the need for implementation of the appropriate macroeconomic policies of governments to ensure the prospects for economic growth. In practice, macroeconomic stability and the progress with transition are closely interlinked and both are important for sustainable growth and a functioning market economy (Sorsa, 2006, p. 4). Macroeconomic analysis examines the behaviour of the entire economy and establishes the interdependence among its more important aggregates such as: national income, aggregate expenditure, savings, investment, export, import, etc. These aggregates constitute certain economic dimensions of a nation which are used to register its production capacities (total material and subjective resources) as well as its economic results (Razić & Kasumović, 2019, p. 25)

Several studies have examined the macroeconomic effects of the Brexit referendum's outcome. Broadbent et al. (2019) list key stylised facts about the macroeconomic adjustments after the vote, highlighting a significant slowdown of economic activity relative to its long-term trend, and use a small open economy model to analyse the response to news about Brexit. Similarly, Sampson (2017) has reviewed studies of the likely economic effects of Brexit. There is considerable uncertainty over how large the costs of Brexit will be, with plausible estimates ranging between 1 and 10 percent of UK per capita income. As the exact form of the UK's future relationship with the EU was largely unknown until late 2020, a number of studies such as McGrattan and Waddle (2020) or Steinberg (2019) rely on simulations of the neoclassical growth model and a DSGE model, respectively, to identify the impact of rising trade costs and foreign investment policies. Dhingra et al. (2023) apply the reduced form estimates and the structural model to Brexit. Following the signing of the Trade and Cooperation Agreement between the UK and the EU, the Bank of England (2021) estimated that in the long term the UK trade will be 10.5% lower, and productivity and GDP will be 3.25% lower under the Agreement relative to a frictionless arrangement. In general, all researchers estimate a negative impact of Brexit on the British economy.

The passage of time allows us to assess changes in the macroeconomic stability of a country leaving the European Union. The assessment of changes

in the macroeconomic stability of Great Britain during Brexit is an important and necessary study. Such a study is difficult to find in the literature on the subject. Therefore, this study fills the existing research gap.

### 3. Methods

The research hypothesis was formulated: Macroeconomic stability has decreased to a greater extent in the UK than in the EU-27.

Macroeconomic stabilization means the existence of a permanent economic balance (internal and external), both in real and monetary terms. R. Mundell and A.W. Phillips put forward a method of analysis of the economy, the so called magic quadrangle, presenting the achievements in each year in terms of one of the four objectives of economic policy: rapid growth, full employment, low inflation and external balance. From the magic quadrangle method is derived the concept of the macroeconomic stabilization pentagon (Żuchowska, 2013, p. 49).

In Poland, the concept of macroeconomic stabilisation pentagon, supplemented by an additional criterion (state budget), was developed in 1990 at the Foreign Trade Research Institute (Instytut Koniunktur i Cen Handlu Zagranicznego), and in subsequent years was used in the analysis by Kołodko (1993). This model is useful in the assessment of the degree of economic policy coordination in achieving the objective of macroeconomic equilibrium (Moździerz, 2019, pp. 295–315). The macroeconomic stabilisation pentagon model is mostly used to assess the transition economy. However, the disintegration, like Brexit, is a significant institutional change, that affects various areas of the economy. Therefore, the use of this method seems reasonable.

The model of the macroeconomic stabilisation pentagon includes five basic macroeconomic indicators:

- economic growth rate (GDP), a synthetic expression of the level of economic development of the country;
- unemployment rate (UNE), measured as the people unemployed as a percentage of the labour force;
- inflation rate (INF), regarded as an indicator of internal balance and measured by the consumer price index;
- state budget balance (GOV), measured in relation to the GDP;
- current account balance (CAB), measured in relation to the GDP.

The pentagon vertices are calibrated in such a way that the better the development of the analysed indicators, the further away they move from the centre. The scales adopted for each variable are increasing or decreasing, depending on which direction of change is considered positive for the economy (for example, decreasing for the rates of unemployment and inflation, and increasing for the rate of GDP). The macroeconomic stabilisation pentagon has five triangles (Żuchowska, 2013, pp. 50–52):



- a — the real sphere triangle, bounded by the GDP changes and unemployment rates;
- b — the stagflation triangle, i.e. of unemployment and inflation;
- c — the budget and inflation triangle, the shape of which depends on the inflation dynamics and the state budget balance;
- d — the financial equilibrium triangle, determined by the sizes of the state budget balance and the current account state;
- e — the external sector triangle, resulting from the formation of the current account balance and the GDP growth.

$$MSP = a + b + c + d + e = \\ = (GDP \cdot UNE + UNE \cdot INF + INF \cdot GOV + GOV \cdot CAB + CAB \cdot GDP)k, \quad (1)$$

where:

$$k = \frac{1}{2} \sin 72^\circ = 0.4755;$$

*GDP* — economic growth rate;

*UNE* — unemployment rate;

*INF* — inflation rate;

*GOV* — state budget balance;

*CAB* — current account balance.

$MSP1 = a + b + c$ , determines the formation of the inner sphere, and  $MSP2 = d + e$ , represents the sphere dependent on external factors (Żuchowska, 2013, p. 52). This model characterises selected macroeconomic values only at a given moment. By using this set of indicators, the macroeconomic stability of individual countries can be compared with each other. According to the model, one can talk about destabilisation in the case of the decline in the MSP indicator, and about progressive stabilisation — in the case of its growth.

The calculation of MSP indicators, as well as MSP1 and MSP2, required the arbitrary determination of the maximum and minimum values of the analysed macroeconomic variables. They were used to determine the vertices of the pentagon and the scale for each variable. On their basis, the areas of the partial triangles were estimated (assuming that the maximum value of such a field is 0.2, and the area of the pentagon MSP1) (see Grynia & Marcinkiewicz, 2017, p. 46; Żuchowska, 2013, p. 53). It follows that the calculated indicators are relative, they show which of the surveyed countries are more and which are less stable.

Studying the macroeconomic effects of Britain's withdrawal from the European Union faces a serious problem, namely the occurrence of a pandemic crisis at the same time. Due this coincidence, it is difficult to judge to what extent the Covid-19 pandemic is responsible for the macroeconomic imbalance, and to what extent Brexit is responsible. This is a weakness of this methodology. The lockdown policies implemented by most governments in response to the spread of the Covid-19 epidemic in the spring of 2020 result negative macroeconomic and welfare effects (Auray & Eyquem, 2020). However, the pandemic crisis affected all European countries (Privara, 2022, pp. 355–377), there is no evidence that the UK has been affected significantly differently

by Covid-19 than the rest of the EU on average. Therefore, EU-27 countries were used as a comparative group. Comparative analysis of the main macroeconomic indicators is the basis for assessing the current state of a given economy in relation to other countries (Roszko-Wójtowicz & Grzelak, 2020, pp. 657–688). As the Covid-19 pandemic affected all the countries surveyed, this decline in macroeconomic stability could be a result of the UK leaving the EU.

The source of data is Eurostat Database. Time range of research is 2015–2021. Year 2022 remains out of scope. This is an intentional exclusion, in 2022 the increase in the prices of raw materials and energy caused by the war strongly disturbs macroeconomic stability, and the intention of the research was to examine the impact of Brexit.

## 4. Results

The MSP indicator remained almost at the same level throughout the negotiation period (Table 1 and Table 2). This indicator even slightly increased for Great Britain from 0.521 in 2015, 0.523 in 2016, 0.555 in 2017, 0.560 in 2018, to 0.602 in 2019. Similar for EU-27, the MSP increases from 0.637 in 2015 to 0.696 in 2019. Uncertainty about the UK's future relationship with the EU has not been reflected in the deterioration of macroeconomic stability. But in 2020 this indicator decreased rapidly, to 0.285 for United Kingdom and to 0.422 for EU-27. United Kingdom remained macroeconomically less stable than the rest of EU, but in the year of withdrawal the instability increased dramatically. Of course, partially this instability occurs due pandemic crisis, but in UK the decrease is much more deeper than the rest of EU.

The MSP1 indicator, which, determines the formation of the inner sphere (the real sphere triangle, bounded by the GDP changes and unemployment rates; the stagflation triangle, i.e. of unemployment and inflation; and the budget and inflation triangle, the shape of which depends on the inflation dynamics and the state budget balance) remained stable until 2019 (see Chart 1). The inner sphere was more stable in UK than in EU-27 till 2019. Later, the deterioration in stability was greater in the United Kingdom.

The MSP2 indicator, which determines the formation of the sphere dependent on external factors remains lower for UK compare to EU-27 (see Chart 1). Great Britain experienced much more macroeconomic instability in the spheres the financial equilibrium triangle, determined by the sizes of the state budget balance and the current account state; and the external sector triangle, resulting from the formation of the current account balance and the GDP growth. As with previous indicators, we also see a significant decline in stability in 2020, much stronger for the UK.

In 2020, not all components of the synthetic indicator were worse in the UK than the EU average. Unemployment rate grew in UK from 3.9% to 4.6%, whereas in EU-27 grew from 6.7% to 7.1%. Inflation rate was 1% in UK and 0.3% in EU-27. A much worse situation of Great Britain was recorded in changes

in GDP and budget deficits. The GDP growth was negative,  $-11\%$  in UK compare  $-5.7\%$  EU average. The government deficit increased from  $-2.45\%$  of GDP to  $-13.1\%$  of GDP in UK, whereas in EU-27 from  $-0.5\%$  to  $-6.7\%$  of GDP. The Great Britain's Current Account Balance deficit rose from  $-2.8\%$  of GDP to  $-3.2\%$  of GDP, situation in EU-27 started from surplus  $2.4\%$  of GDP in 2019, in 2020 that CAB surplus fell to  $2\%$  of GDP.

It is optimistic that in 2021 the MSP, MSP1, MSP2 indicators for all the countries surveyed increased, which should be interpreted as an increase in macroeconomic stability. However, a detailed analysis of the data from Table 1 shows the decline of stability in the area b — the stagflation triangle in both cases in 2021. In addition, we see no improvement and even a slight increase in instability the shape of which depends on the inflation dynamics and the state budget balance for UK in 2021.

## 5. Discussion

The *ceteris paribus* assumption is not met in the real world. This is the most serious limitation of this research, despite the use of comparative analysis, we cannot be sure to what extent factors other than Brexit caused a decline in macroeconomic stability. Given the timing of the UK's departure from the EU and the outbreak of the Covid-19 pandemic, it is not possible to fully isolate their individual economic effects from one another. An interesting attempt to separate the effects of Brexit from the effects of Covid-19 was made by Ellington et al. (2022). The researchers estimated Bayesian VAR models accounting for the extreme outliers in macroeconomic and financial data when evaluating the impact of economic policy uncertainty on the real economy. Their results indicate that accounting for the outliers in the data brought by the Covid-19 pandemic allows for the identification of an economically and statistically significant contractionary effect of economic policy uncertainty shocks on UK GDP growth (Ellington et al., 2022).

Steinberg (2019) argues that the UK's macroeconomic uncertainty and instability was higher than in the EU's largest economies already before the Brexit vote. So it was the weaker condition of the British economy that was the reason for voting for Brexit.

The findings of Dhingra and Sampson (2022) state that voting for Brexit had large negative effects on the UK economy between 2016 and 2019, leading to higher import and consumer prices, lower investment, and slower real wage and GDP growth. However, at the aggregate level, there was little or no trade diversion away from the European Union, implying that many of the anticipated long-run effects of Brexit did not materialize before the new UK–EU trade relationship came into force in 2021.

Similar results were observed in a study by Mroczek-Dąbrowska and Matysek-Jędrych (2022), they argue that in many EU countries there should hardly



be discernible impacts on macroeconomic variables according to the applied purely economic approach to assessing Brexit's impact.

On other sides, according Campello et al. (2022, pp. 3178–3222) transmission of uncertainty generated by the 2016 Brexit referendum strongly affect not only Great Britain but also United States. Such uncertainty has real and financial consequences not only for the country that originates it, but for other countries as well.

## 6. Conclusion

The Brexit is a significant institutional change. Even without the common currency Great Britain was a part of Single European Market, ensuring the free movement of capital, labour, services and goods without tariff and non-tariff barriers. The prolonged wait for the future agreement between the UK and the EU resulted in high economic uncertainty. But the long period of negotiations did not destroy macroeconomic stability. The macroeconomic stabilization pentagon (MSP) indicator remained stable almost at the same level during period 2015–2019.

It should be noted, however, that throughout the period under review, the macroeconomic stability of the United Kingdom remained at a noticeably lower level than the comparable stability of the group of EU-27 countries.

We observe a massive increase in macroeconomic instability in 2020. This is the year of the United Kingdom's exit from the European Union, but at the same time the Covid-19 pandemic crisis beginning. The MSP indicator decreased much more for Great Britain than for the rest of the EU-27 countries. We interpret this excess decrease compared to the control group as a result of Brexit. Next year the macroeconomic stability increase in both case, but in UK remain at lower level than in European Union.

The research hypothesis, macroeconomic stability has declined more in the UK than in the EU-27, has been confirmed. As the Covid-19 pandemic affected all the countries surveyed, this decline in macroeconomic stability could be a result of the UK leaving the EU. As the effects of Brexit are long-term, research should continue into the future.

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## Appendix

**Table 1.**  
**United Kingdom sub-indices and the MSP index**

	2015	2016	2017	2018	2019	2020	2021
area a	0.137	0.142	0.145	0.151	0.154	0.017	0.122
area b	0.145	0.144	0.136	0.140	0.148	0.146	0.136
area c	0.133	0.138	0.131	0.134	0.138	0.075	0.099
area d	0.045	0.044	0.064	0.060	0.072	0.036	0.064
area e	0.061	0.056	0.079	0.075	0.091	0.010	0.089
MSP1	0.415	0.424	0.412	0.425	0.439	0.239	0.357
MSP2	0.106	0.100	0.143	0.135	0.163	0.046	0.153
MSP	0.521	0.523	0.555	0.560	0.602	0.285	0.510

Source: Own preparation based on Eurostat database.

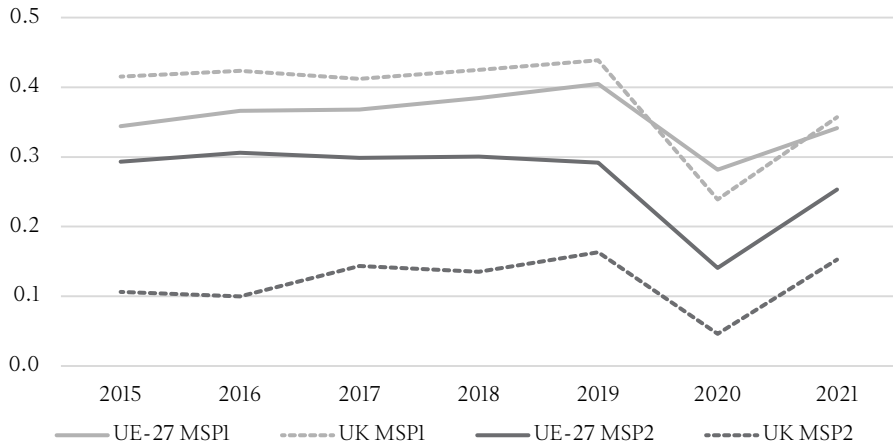
**Table 2.**  
**EU-27 sub-indices and the MSP index**

	2015	2016	2017	2018	2019	2020	2021
area a	0.093	0.103	0.109	0.120	0.126	0.034	0.110
area b	0.099	0.108	0.110	0.116	0.125	0.127	0.113
area c	0.152	0.156	0.149	0.149	0.154	0.120	0.118
area d	0.132	0.139	0.140	0.140	0.135	0.098	0.113
area e	0.161	0.167	0.159	0.161	0.157	0.043	0.140
MSP1	0.344	0.366	0.368	0.385	0.405	0.282	0.341
MSP2	0.293	0.306	0.299	0.301	0.292	0.141	0.253
MSP	0.637	0.672	0.666	0.685	0.696	0.422	0.595

Source: Own preparation based on Eurostat database.



**Chart 1.**  
**MSP1 and MSP2 macroeconomic stability pentagon indicators**



Source: Own preparation based on Eurostat database.

