

# Sustainability of the Public Debt of Czech Republic and the Risks of its Development

Olga REGNEROVÁ\*, Jitka ŠIŠKOVÁ and Daniela ŠÁLKOVÁ

Czech University of Life Sciences Prague, Prague, Czech Republic; oregnerova@pef.czu.cz;  
siskova@pef.czu.cz; salkova@pef.czu.cz

\* Corresponding author: oregnerova@pef.czu.cz

**Abstract:** The article focuses on the evaluation of the sustainability of the public debt of the Czech Republic based on its development since 1995 and a comparison with other countries of the Visegrad Group, Slovakia, Hungary, and Poland. Using a forecast based on an econometric model in the Gretl software, the development of the public debt until 2024 is outlined. The rate of growth of the Czech public debt has been growing for a long time, but there is still a relatively large reserve for the convergence criteria of the European Union. However, if the development of the share of public debt in the gross domestic product were to increase in the long term, it would indicate that the Czech Republic lives in higher standards than the economy allows. At the same time, the structure of the Czech public debt can be considered satisfactory, as the majority of the debt is made up of domestic residents.

**Keywords:** public debt; Czech Republic; forecast; comparison; Visegrad Group

**JEL Classification:** C13; H68

---

## 1. Introduction

Different economic theories look at public debt from different perspectives. The classical theory, whose supporter was, for example, Adam Smith, speaks of the principle of a balanced budget. Keynes held the view that slow economic growth is due to insufficient demand, which prevents the economy from reaching its potential, and which must be revived from public budgets even at the cost of deepening the deficit. However, the second part of his theory explains that during periods when the economy is prosperous, it is necessary to reduce these deficits. The neoclassical theory is built on the foundations of the so-called lifelong income, which came up with the renowned economists Modigliani and Friedman, winners of the Nobel Prize in Economics, and which, according to them, is more important for consumption than disposable income. An individual's income may change negligibly or fundamentally during his life, but consumption remains almost constant. Monetarists were convinced that it was necessary to limit state interventions in the economy to the necessary minimum, since the final effect hinders the growth of the economy and increases unemployment. The view of the theory of the intergenerational distribution of expenditure shocks and the tax burden, which advocates a deficit in public finances if it is caused by large-scale investments in the public sector that are indirect or difficult to identify in terms of returns, is highly debatable. The essence of the definition of the theory is the financing of investments through deficit management across generations, as it is assumed that future generations will also benefit from

these investments (Peková, 2005). On the basis of the mentioned variants of opinion, it is clear that there is no ideal solution for the sustainability of the public debt. Debt is primarily a function of economic conditions reflecting both the need to borrow and the capacity of states to repay debt. However, political factors such as culture, partisan competition, and electoral cycles also affect debt (Clingermayer & Wood, 1995). Expansionary fiscal policies that increase the level of debt may reduce long-run growth, and thus partly (or fully) negate the positive effects of the fiscal stimulus. (Panizza & Presbitero, 2013).

The methodology for measuring public debt in the European Union is governed by the standardized method of Eurostat ESA 2010 (CNB), which replaced the previous method ESA 95. In the Czech Republic, the Czech Statistical Office is responsible for processing this methodology. In parallel with the ESA methodology, the International Monetary Fund's GFS 2001 methodology is also used in the Czech Republic, which is based on the foundations of the now outdated GFS 1986 methodology (Ministry of Finance of the Czech Republic, 2012).

Quantification of public debt is usually in the form of gross public debt, which is a collective designation for all obligations that the public sector has to domestic and foreign entities. Public indebtedness can also be stated in the form of net public debt, which represents the gross public debt reduced by public sector claims to other entities. Gross public debt is subsequently reported as a share of the debt quota, where the following formula describes this relationship:

$$\text{Debt quota share} = \frac{\text{gross public debt}}{\text{GDP}} \quad (1)$$

A prime example of the difference between gross and net debt is the Scandinavian countries; although, the share of public state debt to GDP is almost 50%, the share of net public debt is in negative numbers, which implies that the states have an active balance (Nečadová, 2012).

The sustainability of public finances is the ability of the governments of individual countries to maintain their current spending, tax and other policies in the long term without jeopardizing solvency or defaulting on obligations in the future.

## 2. Methodology

The aim of the presented article is to analyze the sustainability of the public debt of the Czech Republic based on its development since 1995 and a comparison with the countries of the Visegrad Group (V4). Using the forecast of the ARIMA model in the Gretl software, which is based on the modeling of stationary series, the development of the public debt until 2024 is outlined. The processed secondary data is drawn from the sources of the CNB, Eurostat, the Ministry of Finance of the Czech Republic and the Czech Statistical Office.

Based on the analysis, the current risks of social development will be identified and the future development of the public debt of the Czech Republic will be evaluated.

The development of public debt in all monitored V4 countries shows growth from 2020 and therefore the long-term sustainability of public finances is very low. The situation is worst in Hungary and Slovakia, which have already exceeded the share of public debt to GDP of 60%, which exceeds the sanction zone of the so-called debt brake.

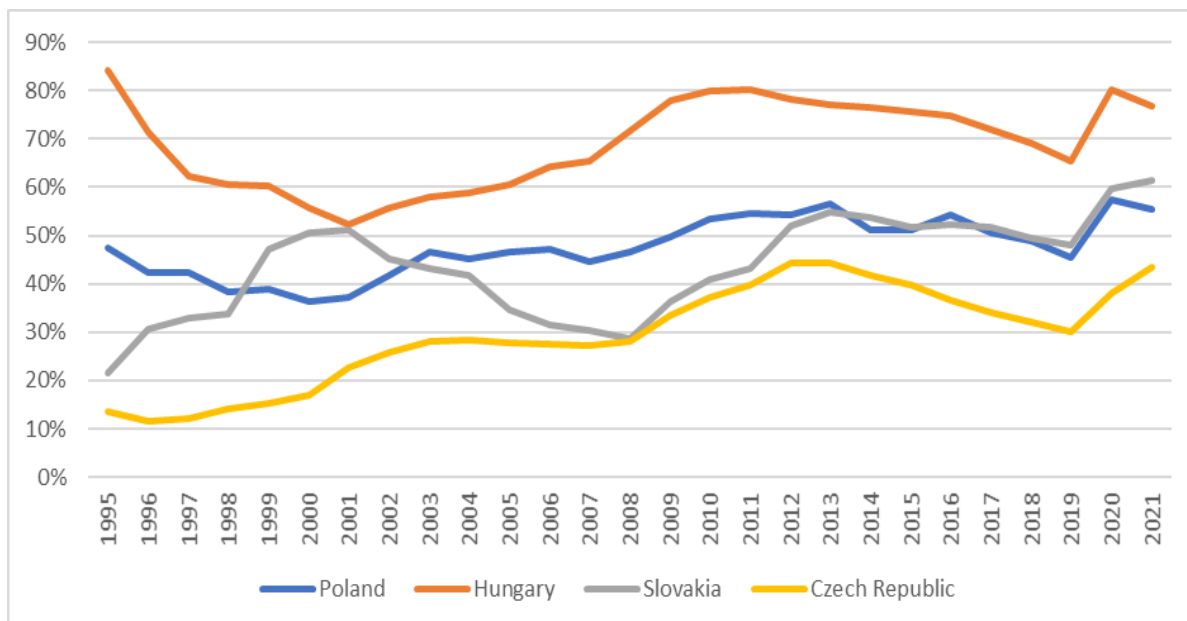


Figure 1. Development of public debt of V4 countries (share of GDP) in the years 1995-2021. Own work based on EUROSTAT, STATISTA (2021)

According to development forecasts, the Czech Republic will exceed this limit in two to three years. The forecast for the next few years is very problematic, as the risks acting on its development show a rocket rise, starting with the coronavirus pandemic from 2020, through the current state of war in Ukraine and the associated charitable expenses for aid to the attacked territory of Ukraine and social benefits to immigrants from the war zone in Czech Republic.

In the same way, the expenses to support the armament of the Ukrainian army and the effects of sanctions on the import of petroleum substances from Russia, which lead to a dizzying increase in the price of fuel and its subsequent projection into the entire economic development of the state, significantly influence the risks of its development.

The forecasting of the current situation is only indicative according to the mentioned significant risks, and the ARIMA forecasting model used will make it possible to show the dispersion interval of future development.

The principle of the ARIMA model is the appropriate differentiation and transformation of the original time series into a stationary series, which can be achieved, for example, by nonlinear transformation using the Box-Cox transformation or by power transformations. When differentiating, in most cases a maximum differentiation order of  $d = 2$  is sufficient, but often a difference of the first order is sufficient.

The difference conversion process plots the following relationship:

$$\Delta y_t = y_t - y_{t-1} \quad (2)$$

The mission of ARIMA models is to describe processes in which level changes occur and these changes have a non-systematic random character, as is common for most time series in practice. These models stochastically model trends as well as random fluctuations.

The mathematical notation of the forecast of the ARIMA model then looks as follows:

$$y_t = \varepsilon_t + \sum_{i=1}^q \theta_i \varepsilon_{t-i} \quad (3)$$

where  $y_t$  symbolizes the original series and  $\varepsilon_t$  denotes the so-called white noise process, where the mean value is independent of time.

### 3. Results

The development of public debt in the compared V4 countries manifested itself differently until 2000, after 2000, when displaying the share of GDP, it has already shown an increasing trend in the vast majority (Figure 1). Hungary has the highest share (up to 80%), the Czech Republic has had a share of around 40% in recent years. When compared with EU countries, the Czech Republic is in a very good sixth place. However, according to the Czech Fiscal Council, the forecast for the years 2022-23 is increasing in the Czech Republic. After 2023, the share of GDP in the Czech Republic could exceed 50%.

In the Czech Republic, as well as in the EU countries, public debt in nominal value has been growing significantly since 2020. From the point of view of the debt structure, however, there is a slight improvement, with the share of foreign debt falling to the current 7% since 2018. Likewise, the share of debt among non-residents is decreasing, which fell from the original 42% in 2019 to the current 26.5%. The situation is caused by the fact that the vast majority of newly issued debts were purchased by Czech entities.

The analysis of the possible future development of the public debt and the risks related to its sustainability is of fundamental importance for all EU countries. The recent negative development of the economy has made it difficult for some countries to access the market due to the debt crisis.

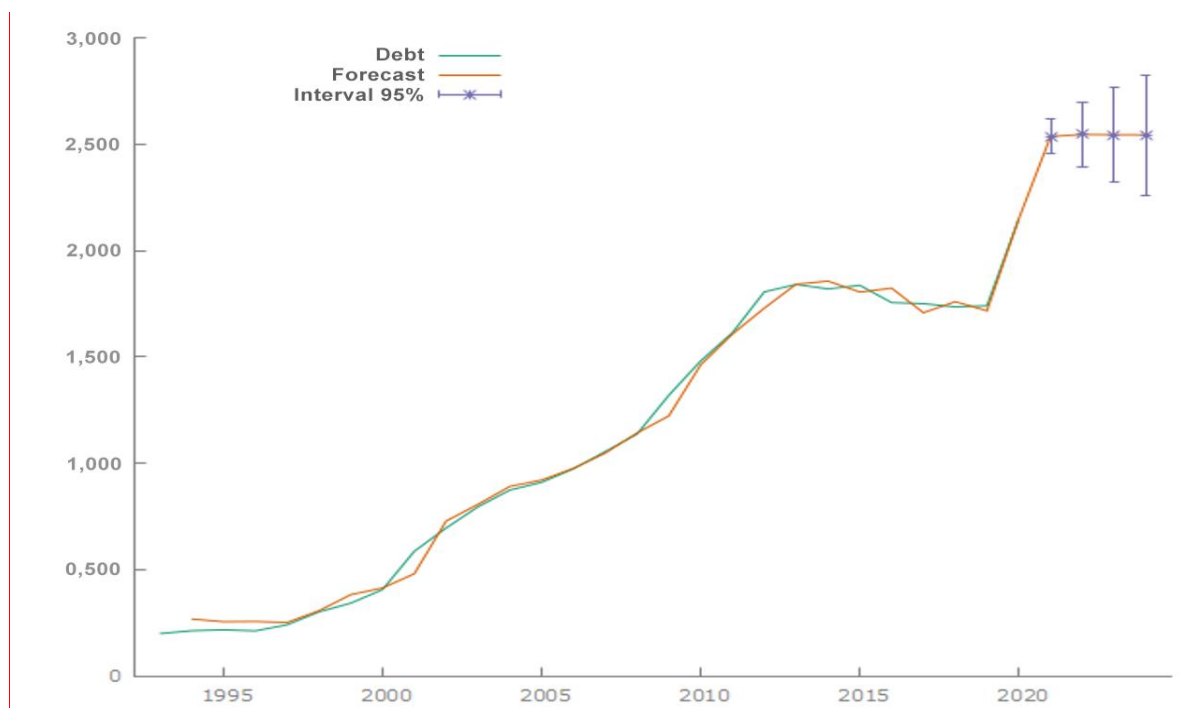


Figure 2. Forecasted values of public debt in millions of CZK until 2024. Own work according to Gretl software (ARIMA model)

When assessing fiscal sustainability, attention must be paid to the current and future level of public debt. Countries with high debt-to-GDP ratios are very vulnerable to economic downturns.

According to forecast modeling carried out using the Gretl software (Figure 2), the value of the public debt for the year 2024 is CZK 2,543.4 billion (in the range of CZK 2,260.8 – 2,825.9 billion). However, this forecast is rather indicative, as the constancy of internal and external conditions cannot currently be guaranteed. Within this framework, even the three-year horizon is quite imprecise.

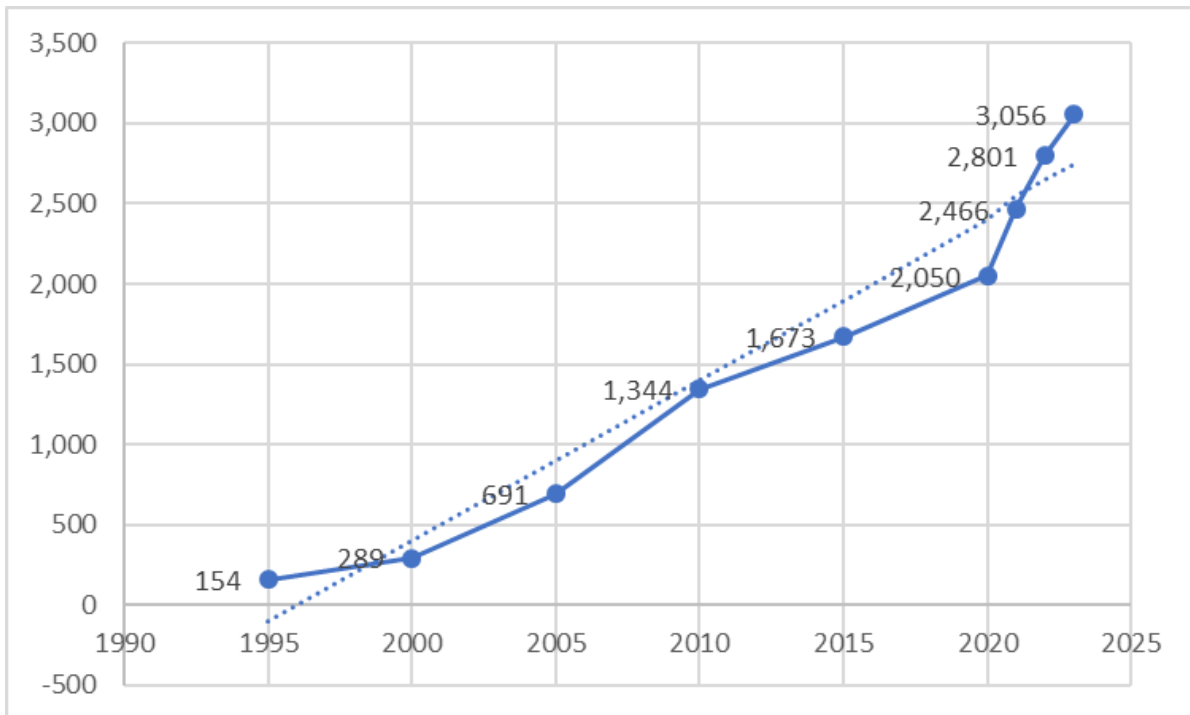


Figure 3. Forecast of the national debt of the Czech Republic until 2024

The forecasted values are also confirmed by the forecast of the Office of the National Budget Council (Figure 3), where the public debt in 2024 will exceed the value of CZK 3,000 billion.

When assessing the medium- and long-term sustainability of public finances, it is important to monitor several different factors. The so-called equation of debt dynamics is thus most often used to assess sustainability:

The key factor for debt dynamics is the so-called debt trap coefficient, i.e. the ratio of the implicit interest rate and the GDP growth rate. If the public budget balance is balanced and the GDP growth rate is higher than the implicit interest rate in the long term, one can speak of a situation of stable debt dynamics. On the contrary, in the case of long-term higher interest rates compared to GDP growth rates, we can talk about a situation that is unsustainable in the long term and the economy is headed for a so-called debt trap. A key parameter in the development of public debt is the balance of public budgets, which is closely linked to the growth of public debt. The tightness of this dependence is primarily represented by the item stock-flow adjustment (hereinafter referred to as SFA) in the equation of debt dynamics. SFA expresses the size of the difference between the deficit of public budgets and the change in

public debt. The operation of the SFA can be divided into three basic categories. The main factor of SFA is the net acquisition of financial assets, which, however, do not have a direct impact on public debt. However, there will be a knock-on effect if the government uses the proceeds from the sale to repay the public debt. Another factor is debt adjustments, among which it is possible to include, for example, valuation effects or exchange rate movements. And the third category contains statistical discrepancies connected mainly with irregularities and updating of monitored data (Czech Fiscal Council, 2022).

Table 1. Stock-flow adjustment (% of GDP) in V4 countries. Own work according to The Czech Fiscal Council

Year	Poland	Hungary	Slovakia	Czech Republic
2017	-1.6	0.7	0.3	1.4
2018	1.1	1.7	-0.1	0.6
2019	-0.3	0.4	-0.4	0.4
2020	5.5	7.2	4.7	1.2

Negative SFA values indicate a lower amount of government debt than its deficit. Although the Czech Republic has shown a positive value in recent years, in 2020 it was significantly lower than in the compared V4 countries.

Other indicators of the sustainability of public finances include indicators S0, S1 and S2 established by the European Commission. This set of indicators is used as part of EU countries' budgetary plans under the Stability and Growth Pact. The short-term fiscal problem is analyzed by the S0 indicator for early warning of risks during the year. The medium-term indicator S1 is generally defined as the fiscal effort required to achieve a set debt-to-GDP ratio. Specifically, the European Commission for the S1 indicator works with a medium-term period (15 years) and with a debt threshold of 60% of GDP. According to this indicator, the Czech Republic shows a sustainable state of public finances in the next few years.

The S2 indicator is a basic element of the analysis of the long-term sustainability of public finances at the EU level. For the assessment of the S2 indicator, the European Commission works with an unlimited horizon and thus expresses the fiscal effort that is necessary for the discounted income and expenditure to be equal and thus to stabilize the indebtedness. The main drivers of long-term fiscal sustainability include the costs associated with an aging population (public spending on pensions) and spending on health and long-term care. In 2020, the Czech Republic ranked fourth worst among EU countries in an international comparison, behind Luxembourg, Slovakia and Romania (Czech Fiscal Council, 2022). The question of the connection of state expenditures with the aging of the population must be addressed now.

#### 4. Discussion

In the vast majority of developed economies, public budgets suffer from long-term recurring deficits and growing public debt (Pospisil, 2016). Higher levels of public debt are associated with lower levels of fiscal sustainability (Aizenman et al., 2013; Fournier & Fall, 2017). In this context, the political consequences of high public debt are also discussed (Blanchard, 2019). It is pointed out that financial market participants usually allocate

sovereign risk by evaluating several sources of sovereign debt risk. According to Attinasi (2009), the main determinants that influence bond spreads of a given country are, for example: default risk, liquidity risk, overall degree of international risk aversion. Various research studies usually try to explain the risk premium of government bonds using the explanatory variables of public debt to GDP ratio and government budget deficit ratio, real GDP growth and inflation rate (Costantini et al., 2014; Rafiq, 2015; Stamatopoulos et al., 2017). Other studies include other variables such as demographic factors, pension obligations or labor productivity growth rates (Afonso et al., 2015; Haugh et al., 2009; Ichiue & Shimizu, 2015).

Baldacci and Kumar (2010) find that significant fiscal deficits and public debts exert considerable upward pressure on sovereign bond spreads of advanced economies, especially in the medium term. Higher inflation means faster nominal GDP growth, which has the effect of reducing the public debt/nominal GDP ratio (Poghosyan, 2014). Understanding the relationship between risk premia and government indebtedness is important because higher risk premia are likely one of the channels through which higher government indebtedness negatively affects economic growth (Reinhart & Rogoff, 2010; Gómez-Puig & Sosvilla-Rivero, 2017). Research by Reinhart et al. (2012) and an analysis of advanced economies found that there is a negative relationship between public debt and long-term growth across countries, i.e. that the excess of public debt slows down the year-on-year rate of economic growth. The mission of the European Central Bank (ECB) is to maintain currency stability and not to act as a lender of last resort for the countries of the monetary union. This is a very important factor for defining the role of public debt on economic growth (Snieška & Burksaitiene, 2018).

It was stated in the article that the value of the public debt itself is not the only essential information. As confirmed by Lagoa et al. (2022) when assessing the sustainability of a given country's public finances, not only the current ratio of public debt to GDP, but also where this ratio is headed, must be considered.

## 5. Conclusions

Based on the analysis carried out, it can be concluded that the rate of growth of Czech public debt has been increasing for a long time, however, there is still a relatively large gap to the limit of the EU convergence criterion. However, if the development of the share of public debt to GDP were to increase in the following years, it would indicate that the Czech Republic lives in higher standards than the economy allows. At the same time, the structure of the Czech public debt can be considered satisfactory, as the majority of the debt is held by domestic residents, and over 91% of the total public debt is denominated in the Czech crown, which means that the CNB has a powerful tool in the form of at least partial management of this debt, its monetary politics. Consequently, the balance of preferences of political parties does not benefit the Czech Republic on the debt issue, which leads to the impossibility of a long-term conceptualization of public debt management, when populist expenditures are very often carried out in a relatively undisciplined manner, given the nature of the state of public finances, before elections, which only deepens indebtedness.

There are several ways to solve public debt, from monetization of debt to privatization of state assets, to reforms of pension systems and linking the retirement age to the average

life expectancy in society. Considering that in the domestic environment over 90% of public indebtedness is made up of state debt, which has been dealing with deficit management for a long time, it is possible to consider a budgetary solution, where it is necessary to stabilize the state debt and the interest arising from it with the help of government instruments (structural component). This could make the GDP growth rate outpace the public debt growth rate and thus become less problematic. The Czech Republic has a reserve against the convergence criteria and should manage its finances in such a way as to maintain this reserve as long as possible.

Towards the future, it will be very difficult to estimate the development of public debt, because it will depend on several circumstances that can hardly be influenced. In particular, the subsequent development of the global epidemic of the disease Covid-19, and quite undoubtedly also how long the military conflict in Ukraine will last, and the related help of the Czech government to its citizens and Ukraine itself. Likewise, extreme price increases or even fuel shortages associated with sanctions against Russia. All these critical factors negatively affect the possible sustainability of the development of public debt not only in the Czech Republic, but throughout Europe.

In principle, public debt is not a huge problem, but only if that it is possible to underpin it with an efficient economy. Its role within public debt is also influenced by its structure, especially that which distinguishes between domestic and foreign creditors. Currently, the debt structure of the Czech Republic is in a sustainable state for the following period of two to three years. From 2020 on the basis of the mentioned risks, the public debt is skyrocketing, not only in the Czech Republic, and due to the current problems of global economic development, it is not possible to significantly reduce it. It is necessary to proceed very cautiously not only at the level of individual states, but also to deepen mutual unity, cooperation and solidarity between the V4 states and the entire European Union, with an emphasis on the development and maintenance of the common market.

Conflict of interest: none.

## References

- Afonso, A., Arghyrou, M. G., & Kontonikas, A. (2015). *The determinants of sovereign bond yield spreads in the EMU* (Working Paper 1781). European Central Bank. <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1781.en.pdf>
- Aizenman, J., Hutchison, M., & Jinjara, Y. (2013). What is the risk of European sovereign debt defaults? Fiscal space, CDS spreads and market pricing of risk. *Journal of International Money and Finance*, 34, 37–59. <https://doi.org/10.1016/j.jimonfin.2012.11.011>
- Attinasi, M.-G., Checherita, C., & Nickel, C. (2009). *What explains the surge in euro area sovereign spreads during the financial crisis of 2007-2009?* (Working Paper 1131). European Central Bank. <https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1131.pdf>
- Baldacci, E., & Kumar, M. (2010). *Fiscal deficits, public debt and sovereign bond yields* (Working Paper WP/10/184). International Monetary Fund.
- Blanchard, O. J. (2019). Public debt and low interest rates. *American Economic Review*, 109(4), 1197–1229. <https://doi.org/10.1257/aer.109.4.1197>
- Clingermayer, J., & Dan Wood, B. (1995). Disentangling Patterns of State Debt Financing. *American Political Science Review*, 89(1), 108–120. <https://doi.org/10.2307/2083078>



- ČNB. (2022). *Vládní dluh a jeho struktura* [dataset]. Czech National Bank. Retrieved January 16, 2022, from [https://www.cnb.cz/cnb/STAT.ARADY\\_PKG.PARAMETRY\\_SESTAVY?p\\_sestuid=57025&p\\_strid=ABE&p\\_tab=1&p\\_lang=CS](https://www.cnb.cz/cnb/STAT.ARADY_PKG.PARAMETRY_SESTAVY?p_sestuid=57025&p_strid=ABE&p_tab=1&p_lang=CS)
- Costantini, M., Frassetto, M., & Melina, G. (2014). Determinants of sovereign bond yield spreads in the EMU: an optimal currency area perspective. *European Economic Review*, 70, 337–349. <https://doi.org/10.1016/j.euroecorev.2014.06.004>
- EUROSTAT. (2022). *GDP per capita in PPS* [Data set]. Retrieved February 22, 2022, from <https://ec.europa.eu/eurostat/databrowser/view/tec00114/default/table?lang=en>
- EUROSTAT. (2021). *Government consolidated gross debt* [Data set]. Retrieved January 16, 2022, from [https://ec.europa.eu/eurostat/databrowser/view/GOV\\_10DD\\_EDPT1\\_\\_custom\\_2307699/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/GOV_10DD_EDPT1__custom_2307699/default/table?lang=en)
- EUROSTAT. (2021). *Government deficit/surplus, debt and associated data* [dataset]. Retrieved January 16, 2022, from [https://ec.europa.eu/eurostat/databrowser/view/GOV\\_10DD\\_EDPT1\\_\\_custom\\_2258849/default/table?lang=en](https://ec.europa.eu/eurostat/databrowser/view/GOV_10DD_EDPT1__custom_2258849/default/table?lang=en)
- Fournier, J.-M., & Fall, F. (2017). Limits to government debt sustainability in OECD countries. *Economic Modelling*, 66, 30–41. <https://doi.org/10.1016/j.econmod.2017.05.013>
- Gómez-Puig, M., & Sosvilla-Rivero, S. (2017). Heterogeneity in the debt-growth nexus: evidence from EMU countries. *International Review of Economics & Finance*, 51, 470–486. <https://doi.org/10.1016/j.iref.2017.07.008>
- Haugh, D., Ollivaud, P., & Turner, D. (2009). *What drives sovereign risk premiums? An analysis of recent evidence from the Euro Area* (Working Papers, No 718). OECD Economics Department. <https://doi.org/10.1787/222675756166>
- Ichiue, H., & Shimizu, Y. (2015). Determinants of long-term yields: A panel data analysis of major countries. *Japan and the World Economy*, 34–35, 44–55. <https://doi.org/10.1016/j.japwor.2015.04.001>
- Lagoa, S. C., Leão, E. R., & Bhimjee, D. P. (2022). Dynamics of the public-debt-to-gdp ratio: can it explain the risk premium of treasury bonds? *Empirica*, 49(4), 1089–1122. <https://doi.org/10.1007/s10663-022-09547-8>
- MFČR. (2022). *Metodická příručka fiskálního výhledu ČR*. Ministerstvo financí ČR, odbor finanční politika.
- Nečadová, V. (2012). *Veřejné finance: studijní opora*. Jihlava: Vysoká škola polytechnická Jihlava.
- Panizza, U., & Presbitero, A. F. (2013). Public debt and economic growth in advanced economies: A survey. *Swiss Journal of Economics and Statistics*, 149(2), 175–204. <https://doi.org/10.1007/BF03399388>
- Peková, J. (2005). *Veřejné finance. Úvod do problematiky* (3rd ed.). ASPI.
- Poghosyan, T. (2014). Long-run and short-run determinants of sovereign bond yields in advanced economies. *Economic Systems*, 38(1), 100–114. <https://doi.org/10.1016/j.ecosys.2013.07.008>
- Pospisil, R. (2016) The debt cap for public finance - the current situation in the Czech Republic. In *International Scientific Conference on Knowledge for Market Use 2016 - Our Interconnected and Divided World* (pp. 369–380).
- Rafiq, S. (2015). *How important are debt and growth expectations for interest rates?* (IMF Working Paper WP/15/94). International Monetary Fund. <https://www.imf.org/external/pubs/ft/wp/2015/wp1594.pdf>
- Reinhart, C. M., Reinhart, V. R., & Rogoff, K. S. (2012). Public debt overhangs: Advanced-economy episodes since 1800. *Journal of Economic Perspectives*, 26(3), 69–86. <https://doi.org/10.1257/jep.26.3.69>
- Reinhart, R., & Rogoff, K. (2010). Growth in a Time of Debt. *American Economic Review*, 100(2), 573–578. <https://doi.org/10.1257/aer.100.2.573>
- Snieška, V., & Burksaitiene, D. (2018). Panel Data Analysis of Public and Private Debt and House Price Influence on GDP in the European Union Countries. *Engineering Economics*, 29(2), 197–204. <https://doi.org/10.5755/j01.ee.29.2.20000>
- Stamatopoulos, T., Arvanitis, S., & Terzakis, D. (2017). The risk of the sovereign debt default: the Eurozone crisis 2008–2013. *Applied Economics*, 49(38), 3782–3796. <https://doi.org/10.1080/00036846.2016.1267851>
- STATISTA. (n.d.). *Hungary: Share of economic sectors in gross domestic product (GDP)* [dataset]. Statista. Retrieved February 20, 2022, from <https://www.statista.com/statistics/339742/share-of-economic-sectors-in-the-gdp-in-hungary>
- STATISTA. (n.d.). *Poland: Distribution of gross domestic product (GDP) across economic sectors.* [dataset]. Statista. Retrieved February 20, 2022, from <https://www.statista.com/statistics/375605/poland-gdp-distribution-across-economic-sectors/>
- STATISTA. (n.d.). *Slovakia: Distribution of gross domestic product (GDP) across economic sectors.* [dataset]. Statista. Retrieved February 20, 2022, from <https://www.statista.com/statistics/375606/slovakia-gdp-distribution-across-economic-sectors/>
- Úřad Národní rozpočtové rady. (2022). *Vývoj státního dluhu ČR, sekce Makroekonomických a fiskálních analýz, květen 2022*. [https://unrr.cz/wp-content/uploads/2022/05/Informacni-studie\\_Vyvoj-statniho-dluhu-CR.pdf](https://unrr.cz/wp-content/uploads/2022/05/Informacni-studie_Vyvoj-statniho-dluhu-CR.pdf)