

Should Bulgaria wait for 90% real convergence before joining the Eurozone?

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Резюме на български

В оживения публичен дебат в България по присъединяването към еврозоната се твърди, че реална конвергенция от поне 90% е ключово предусловие за присъединяване и поради това България трябва да изчака поне до началото на 2040-те, защото едва тогава се очаква да достигне това ниво. Твърдението се основава на теоретични аргументи, емпирични данни и прогнози. Тук всички те са изследвани в детайл в контекста на уникалната позиция на България като страна в ЕС с валутен борд привързан към еврото. Направено е заключение, че икономическата теория не предполага като предусловие каквато и да било реална конвергенция за присъединяване към паричен съюз. На теория, присъединяване на по-бедна страна към по-богата парична зона може да доведе, а може и да не доведе до проблеми като свръхинфлация или завишена амплитуда на бизнес цикъла. Също е направено заключение, че нито твърдението за съществуване на праг от 90% конвергенция в реалните доходи на човек, нито твърдението за необходими поне 20 години за България да достигне този праг издържат дори на елементарна проверка за стабилност на емпиричната оценка. Така е установено, че както теоретично, така и емпирично твърдението, че България трябва да чака достигане на 90% реална конвергенция поне до началото на 2040-те преди да се присъедини към еврозоната няма никакви икономически основания.

Abstract

In the lively public policy debate in Bulgaria on the country joining the Eurozone, a claim is being made that real convergence of at least 90% is a crucial precondition for joining and therefore Bulgaria should wait until the early 2040s, because only then it is expected to achieve such convergence. The claim is supported with theoretical arguments, empirical evidence and forecasts. Here they are examined in some detail in the context of Bulgaria's unique position as a country in the EU with a Currency board regime anchored in the euro. It is concluded that economic theory does not pose a requirement for any level of real convergence for an economic area to join a monetary union. In theory, problems due to a less-rich country joining a more affluent monetary union may, but also may not, cause problems such as excess inflation or amplified business cycle. It is also concluded that neither the claim that there exists a convergence threshold of 90% of real income per capita, nor the claim that Bulgaria will necessarily need at least two decades to reach it can withstand even most elementary checks for empirical robustness. Both the theoretical and the empirical claims that Bulgaria should wait for a 90% real convergence until at least the early 2040s before joining the Eurozone are found to have no real economic foundation.

Keywords: Bulgaria; optimal currency area; monetary union; real convergence; currency board

JEL: E52; E58; E63

Introduction: brief background of Bulgaria's Euro debate

In the beginning of 2022 in Bulgaria an open public debate was started about whether the country should join the Eurozone. This happened after a period of more than a decade, in which such a question did not really exist for the Bulgarian society. At least not in the open public record. Ever after the country joined the European Union in 2007 it was simply assumed, and no significant voice in the Bulgarian public discourse expressed any opposition, that the correct strategy would be to join the Eurozone as soon as possible.

This quickly changed within several months. The major public agent of this change was the political party Vazrazhdane with avowed pro-nationalistic, pro-Kremlin, anti-EU and anti-NATO positions. After spending some years in the fringes of Bulgarian politics, this party managed to overcome the 4% electoral barrier to enter the Bulgarian parliament in late 2021, increasing its political weight in the following two years approximately threefold.

A major postulate in all its official positions throughout this period was a ban of the adoption of the euro in Bulgaria for at least two decades. This position was supported by a broad movement to cement such a policy through a national referendum, in support of which the initiating committee of citizens and Vazrazhdane party activists collected a very significant (for Bulgarian standards) number of citizen signatures.²

As a result of this political development, the debate about Bulgaria's membership in the eurozone became very public and very vigorous. Many arguments for and against were exchanged.

Some of them were practically entirely empirical – e.g. on whether eurozone membership will cause prices to rise inordinately, or on whether workers and savers may suffer real losses in the recalculation of wages and bank accounts. But many arguments, ultimately, rested on specific theoretical considerations.

The supporters of the policy of delaying Bulgaria's entry into the Eurozone ultimately based the whole of their position on two related claims. First, besides the nominal convergence criteria theory posits that real convergence is crucial in determining whether the country should join the Eurozone. Second, Bulgaria's dismally large lag from real convergence with the Eurozone economy means, theoretically and empirically, that joining the Eurozone will inevitably mean undesirably large inflation which will be a shock to Bulgarian households and detrimental to their wellbeing.³

² The party itself claimed more than 600,000 signatures, while the administration recognized officially only about 470,000 of them (https://parliament.bg/pub/referendum/20230607155748_PG-49-339-01-6_Protokol_GD_GRAO.PDF), still well above the threshold forcing Parliament to decide whether to hold a referendum or not.

³ Papazov et al, 2023, "Proposal to hold a national referendum on the question: do you agree the Bulgarian lev to be the only official currency in Bulgaria until 2043?", submitted to the Bulgarian National assembly on 2023-04-07, available at <https://parliament.bg/pub/referendum/3393b3e94b25530c6decc1cb7ab95425e29e85ea.pdf>

It turns out Bulgaria, with its quite unique position in terms of its incumbent monetary regime, offers a fertile ground for an informative look at these theoretical and empirical considerations. An analysis in this direction may prove useful for other countries contemplating membership in the eurozone, or any other monetary union, in the future. It is the goal of the study presented here to provide such analysis on the relevance of real convergence, both theoretically and empirically for the case of Bulgaria, as a deciding indicator on whether to join the Eurozone.

The structure of the argument below involves several steps.

First, the theory of optimal currency areas is briefly presented, as it is the actual theoretical basis for the claims made by the opponents of Bulgaria's membership in the Eurozone.

Second, the theoretical inclusion of real convergence as an important indicator for optimality of a country joining a currency area is discussed.

Third, the empirical basis of arguments that joining the Eurozone before very advanced real convergence may be detrimental to wellbeing due to high inflation differential is examined.

Fourth, the unique position of Bulgaria as the only remaining country in the EU with a Currency board regime anchored in the euro is emphasized to inform both theoretically and empirically the real decision facing the country.

Optimal currency area theory: a brief outline with an eye on preconditions and potential costs and benefits

The theoretical literature on optimal currency areas began in the early 1960s⁴ and became globally important with the push to establish the Eurozone two decades later. It has undergone several stages in terms of clarifying the conditions under which a currency area joining several countries may be considered optimal. One such stage were theoretical works during the creation and early stages of the Eurozone.⁵ A later stage included considerations raised in the wake of the global financial and economic crisis of 2007–2009 and the following severe troubles with at least several Eurozone countries.⁶

⁴ Mundell (Mundell, Robert "A Theory of Optimum Currency Areas." *American Economic Review* 51 (1961): 657–75) and McKinnon (McKinnon, Ronald "Optimum Currency Areas." *American Economic Review* 53 (1963): 717–25). May be useful to add a link to Mundell's Nobel Lecture --

<https://www.nobelprize.org/uploads/2018/06/mundell-lecture.pdf> (to ease the access by students, readers - ?!

⁵ Buiter 1999 (Buiter, Willem "The EMU and the NAMU: What is the Case for North American Monetary Union?" *Canadian Public Policy* 25 (1999): 285–305); Alesina et al 2002 (Alesina A., R. Barro and S. Tenreyero, 2002, "Optimal currency areas", NBER Working Paper, No. 9072, July); Broz 2005 (Broz, Tanja. "The theory of optimum currency areas: A literature review." *Privredna kretanja i ekonomska politika* 15.104 (2005): 52-78).

⁶ Aizenman 2016 (Aizenman, Joshua, 2016, "Optimal currency area: A 20th century idea for the 21st century?", NBER Working Paper, No. 22097, March)

Theoretically, the idea for the concept of optimal currency areas appeared in the context of the Bretton Woods system of fixed or heavily managed exchange rates under the gold-dollar exchange standard.⁷ In the 1950s a strain of arguments appeared that such a system is suboptimal with respect to a system of flexible exchange rates.⁸ The idea behind the concept of optimal currency areas is that under some conditions it may be preferable for some economies to use a common currency, whether by having exactly the same money or by having a hard exchange rate peg. Of course, when such conditions are not met, such a common currency or hard pegs may not be optimal.

The initial period of the literature on optimal currency areas stresses conditions which, if not met, may cause economic problems to an economic region or country – member of the currency area.

The list of most important such recognized factors includes:

- Mobility of factors of production, especially labor mobility, between regions and industries;
- Price and wage flexibility;
- Size of the economy;
- Size of trade flows (degree of openness);
- Product diversification (for shocks to specific industries);
- Degree of synchronization of business cycles (for general macroeconomic shocks);
- Inflation differentials;
- Importance/effectiveness of domestic monetary policy;
- Financial integration and international risk sharing.

A later period of the literature, coinciding with the efforts to create the Eurozone in the 1990s, while recognizing the potential costs for a region/country in joining a currency area, emphasized the potential benefits. A list of more important such benefits includes:

- Reduced transaction and accounting costs;
- Improved economic calculation by entrepreneurs due to transparent relative prices;
- Increased trade flows, and therefore gains from trade, among regions/countries;
- Improved capital mobility due to deepened financial integration under a common currency;

⁷ This system, based on the Bretton Woods agreement of 1944 established the first global set of rules of commercial relations among 44 countries. It was based on the countries' currencies being pegged to the US dollar within a 1% band, and the dollar being pegged to gold at \$35 an ounce with both gold and dollars serving as international reserves. The system aimed at preventing competitive devaluations by providing balance-of-payments support for countries with problems, with the supervision over rules compliance and provision of loans when necessary being the task of the newly created International Monetary Fund. The system collapsed and was abandoned in the early 1970s in favor of flexible exchange rates.

⁸ Friedman M., 1953, "The Case for Flexible Exchange Rates", in Friedman M. (ed.), *Essays in Positive Economics*, University of Chicago Press, Chicago, pp. 157-203

- Denationalization of money;⁹
- Streamlining of fiscal and economic policies due to decreased access to accommodating monetary policy.¹⁰

After this second period of the literature on optimal currency areas, a third period followed in the second decade of the 21st century, adding to the criteria. One, which may be found in Aizenman (2016) is the realization that a common currency area may be more beneficial if there is a common framework of financial regulation and especially prudential supervision in terms of possible accumulation of asymmetric balance-sheet exposures due to the deepened financial integration.

Extension of the theory: real convergence as a new precondition

It is in this context that the Hungarian central bank recently publicized¹¹ the theoretical idea that from the point of view of a smaller, catching-up economy, a high degree of real income convergence before joining the common currency is a crucial precondition for avoiding undesirable developments such as high inflation and inability to soften real shocks through policy.

Following this idea with some empirical investigation, the Hungarian central bank researchers reach a conclusion that a catching-up EU country should reach at least 90% real convergence of per capita incomes before even starting to consider joining the Eurozone.

Most concisely this claim is made in the pre-chapter summary of Chapter 4.1 of the report of the Hungarian central bank mentioned above:

“When considering the above criteria, it is of particular importance to evaluate the adequate level of real economic development, since the closer an economy is to the level of the euro area, the lower its inflation surplus resulting from convergence. Generally speaking, when the country’s level of development has reached around ninety per cent, the inflation surplus resulting from catching up becomes negligible. In those cases, the common monetary policy will result in a similar level of real interest and monetary orientation.”¹²

⁹ Hayek, F.A., 1990, “Denationalization of money – the argument refined. An analysis of the theory and practice of concurrent currencies”, Third edition, Institute of economic affairs, 1990. Elaborate this note: in what sense the Euro fits Hayek’s view, in what sense it does not – and a link to Hayek.

¹⁰ Huerta de Soto, Jesus, 2013, “In Defense of the Euro: An Austrian Perspective”, *Journal des Economistes Et des Etudes Humaines* 19 (1), 2013:1-28.

¹¹ Magyar Nemzeti Bank, 2020, “Long-term sustainability and the euro – how to rethink the Maastricht criteria?”, Prospektus Kft, 2020.

¹² Magyar Nemzeti Bank, 2020:237. In the same and following paragraphs the authors also mention the importance of synchronization of business cycles, of productivity and competitiveness, and of financial depth, but such criteria are not a novelty in the literature.

It is precisely this claim which forms the basis of the desire to postpone Bulgaria's move towards the Eurozone through the call for a referendum.

The claim itself has two theoretical predispositions that lead to some empirical and one political arguments, namely:

First is a theoretically posited link between the size of the gap between a country with relatively lower level of economic development, i.e. a catching-up economy, and a richer common currency area, and the size of what the authors call its "inflation surplus" over the overall currency area which will be caused by joining the currency area and thus fixing the exchange rate.

Second is a theoretically posited link between such "Inflation surplus" and the effect of common for the whole area monetary policy on the country experiencing the "inflation surplus" through the real interest rate channel. Lower real interest rates in the catching-up economy, it is claimed, cause problematic, undesirable events, such as the higher inflation itself, higher amplitude of the business cycle, potential bubbles and financial crises.

Third is an empirically argued claim that it is only when the catching-up economy is at least at 90% of the level of real economic development, measured in GDP per capita at PPP, that this "inflation surplus" becomes "negligible", meaning that the common monetary policy will result in "similar" levels of real interest rates.

Fourth, the Bulgarian opponents of the country joining the Eurozone in the foreseeable future add the empirical claim that Bulgaria will reach 90% of the level of real development of the Eurozone at the beginning of the 2040s, therefore it should postpone its decision whether to join by about 20 years.

In the following two sections, first the theoretical and then the empirical claims outlined above will be considered in some detail to reach a conclusion about their validity.

Theoretical check on the 90% real convergence claim for the case of Bulgaria

The first theoretical claim is that when a catching-up country joins a richer currency area, it will experience an "inflation surplus" relative to this area. No theoretical problems can be discerned with such a claim, provided that, before joining, the country in question has a floating exchange rate regime and an independent monetary policy. In effect, in such a situation the claim simply becomes a restatement of the well-known in the literature Balassa-Samuelson effect,¹³ the economics of which are richly analyzed.

The second theoretical claim is that there is a link between the "inflation surplus" and a discrepancy between real interest rates in the catching-up economy and the rest of the

¹³ Balassa, Bela, (1964), "The Purchasing Power Parity Doctrine: A Reappraisal", *Journal of Political Economy*, **72** (6) 1964:584-596; Samuelson, Paul (1964), "Theoretical Notes on Trade Problems", *Review of Economics and Statistics*, **46** (2) 1964:145-154.

common currency area. It is difficult to agree that such a claim follows unambiguously from economic theory. It may be very well true that the real central bank rates are different due to the inflation differential, but it does not follow from there that real deposit and lending rates will also necessarily show such a discrepancy. It is a question of what will happen to equilibrium deposit and lending rates after joining the common currency area given that structurally overall expected rates of return in a catching-up economy are theoretically higher than the ones in the already developed region and also given that levels of perceived risk are also expected to be relatively higher in the relatively poorer economy.

Inasmuch as the theoretical basis of the claim that inflation differentials cause problems is a restatement of the Balassa-Samuelson effect, the claim does not follow from the theory. The Balassa-Samuelson effect, whose existence in theory and reality is not disputed, does not imply in any way an inevitability of problems for the catching-up economy. On the contrary, it is considered a theoretical description of an equilibrium, possibly even optimal, process of catching up. The inflation differential does indeed exist in Balassa-Samuelson, but the theory says nothing about it being either destabilizing or unsustainable.

A variant of this theoretical claim may be a reference not necessarily to real interest rate discrepancies, but to the natural, or neutral, interest rate.¹⁴ Without going into too much detail, the natural interest rate is the one which best coordinates saving and investment decisions. An actual interest rate which is too low relative to the natural rate will cause discoordination in the direction of too many risky entrepreneurial project being financed, many of which will turn out to be mal-investments and will lead to an economic bust after some period of time.¹⁵

As far as it goes, the natural interest rate argument is theoretically sound. However, the argument is theoretically valid only statically. Dynamically, the natural interest rate is not a constant for any country, and a major determinant of its level is the institutional setup of the respective economy. Joining a common currency area is, inevitably, a major change of this institutional setup of any country and, therefore, must certainly have an effect on the level of the natural interest rate. If this effect is in a downward direction and stronger than the drop in the real interest rate due to the inflation differential, joining the common currency area may in reality stabilize, rather than destabilize, the joining economy. Nothing in economic theory excludes such a possibility.

¹⁴ Originated, based on work by Böhm-Bawerk, by Wicksell, Knut, 1898(1936), *Interest and Prices*, reprinted in 1962 by Sxtry Press, New York. More recent empirical work can be found, among others, in Laubach, Thomas, 2006, "Measuring the Natural Rate of Interest". *The Review of Economics and Statistics*. **85** (4) 2006:1063–1070; Jose Dorich, Abeer Reza and Subrata Sarker, 'An Update on the Neutral Rate of Interest', *Bank of Canada Review*, Autumn 2017; Rachel McCririck and Daniel Rees, 'The Neutral Interest Rate', *Bulletin*, Reserve Bank of Australia, September quarter 2017.

¹⁵ This argument was outlined by the Vazrazhdane candidate for the position of Governor of the Bulgarian central bank Dr. Lubomir Hristov in his introductory statement during the parliamentary committee hearing of the candidates for the position on July 14, 2023. The transcript in Bulgarian is available at: <https://parliament.bg/bg/parliamentarycommittees/3200/steno/7423>.

Thus, the claim that joining a common currency area from a position of relatively lower economic development, floating exchange rate, and independent monetary policy will affect the relative real interest rates – compared to the rest of the currency area or to the country’s own natural interest rate – is well grounded in economic theory. The further claim, however, that this change will necessarily and inevitably lead to economic problems, such as inflation shocks, amplified business cycle, financial crises, is not supported by economic theory. Theory does allow for such a problematic effect. But equally it allows for the exact opposite. The question is empirical.

Empirical check on the 90% real convergence claim for the case of Bulgaria

The empirical question will be addressed by three checks. The first two stem directly from the claims made in Magyar Nemzeti Bank, 2020, and in Papazov et. al. 2023. The third is an empirical check of a result which is necessarily inevitable if the other (theoretical and empirical) claims are valid.¹⁶

The first check is about the claim, made in Papazov et. al. 2023:10, namely that Bulgaria’s GDP per capita at PPP will reach the level of 90% of the same indicator for the EU at the earliest in the early 2040s, if ever. This claim is based on the December 2022 Country economic memorandum for Bulgaria by the World Bank.¹⁷ In this document there is¹⁸ a graph based on World Bank staff calculations using Conference Board data on GDP per capita in purchasing power and different scenarios for reforms in Bulgaria.¹⁹

The Graph 1 by the World Bank immediately raises three questions.

The first is why does the World Bank staff use Conference Board data and not the data generated by the World Bank itself in its World Development Indicators, which

¹⁶ It is not pursued here, but a look at Bulgaria’s history may be informative on these issues. BNB monetary policy has often been based on metal standards or pegs in the past, and the lack of high prior convergence has never impeded “catching up” growth prospects. This is true also for periods when the country was directly managed by foreign institutions (e.g. after the WWI) . On the contrary, when it has been part of politically/militarily rather than monetarily defined currency areas – like the Reich’s Mark or Soviet Ruble, the economy was fully integrated with the economies of Nazi Germany and the USSR but the final outcomes depended on non-monetary factors.

¹⁷ World Bank Group, 2022, “A Path to High Income”, *Bulgaria Country Economic Memorandum*, December 2022.

¹⁸ World Bank Group, 2022:16. Reproduced in Papazov et. al. 2023:10.

¹⁹ Different reform scenarios are important in the context of Bulgaria’s move towards the Eurozone. They were explicitly, and unprecedentedly, mentioned in the very press release announcing Bulgaria’s entry in ERM II. Besides the usual commitments made by a new country in ERM II regarding its monetary and fiscal spheres, Bulgaria was explicitly asked to make commitments in areas such as insolvency procedures, money-laundering detection, judicial reforms and fight against corruption and organized crime (see <https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200710~4aa5e3565a.en.html>). Implementation of such reforms is crucial for the long-run trajectory of Bulgaria, but thinking about them gets lost in the 90% real convergence discussion.

does include data on GDP per capita at PPP in both constant and current “international” (i.e. purchasing power adjusted) dollars.

The second is what are the econometric models used to estimate various coefficients linking the multitude of independent variables with the dependent variable. This is especially important since the graph itself does not provide any confidence intervals for the forecasts and it is not known how reliable they are.

Third is what assumptions are made about the future values of these independent variables under the different scenarios of reforms in Bulgaria in the time horizon until 2050, where the graph ends. (The memorandum does not refer to published research on any of these questions and at present they have no answer.)

Due to the lack of those answers the World Bank graph cannot be rigorously replicated. Because of this its empirical check must rest on guesses and approximations.

First, using the Conference Board data, as it existed at the end of 2022, the graph of Bulgaria’s GDP per capita at PPP is replicated and looks identical to the graph in the World Bank memorandum.

Then the slopes and shapes of the forecasted series for the two extreme scenarios – under no reforms and under ambitious reforms – have been replicated using simple formulas in a way which makes them visually close to identical with the World Bank graph. The result is shown below in Figure 1a.

Then two changes are introduced in the data underlying the forecasts.

First, the dataset used is Eurostat’s series of the very same indicator: Bulgaria’s GDP per capita at PPP as a percentage of EU-27.

Second, the observed data is extended by four years up to 2023. With this new underlying data, coming from an extremely reputable source, the same simple functions used to replicate the World Bank graph are used to make forecasts. The result is shown below in Figure 1b.

Figures 1a and 1b are shown vertically aligned, so that easy visual comparison can be made about the year in which Bulgaria reaching the 90% level is forecasted.

Figure 1a. Replication of forecast for Bulgaria’s convergence in World Bank Group 2022:16.

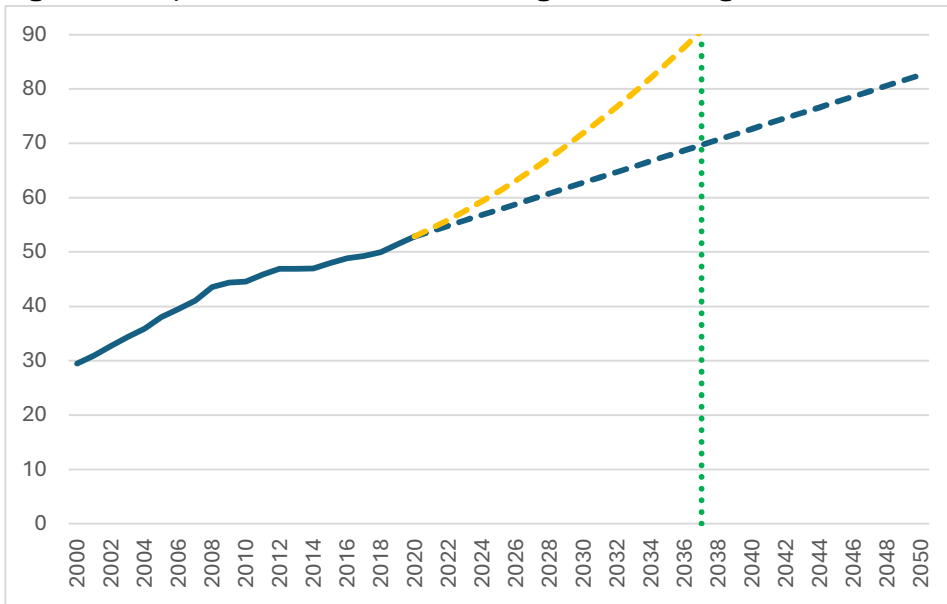
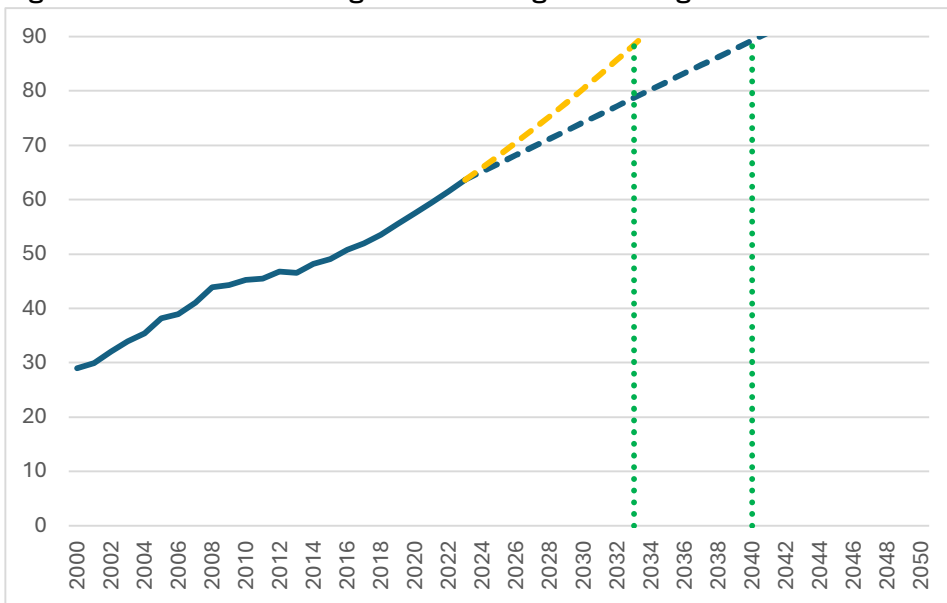


Figure 1b. Forecast for Bulgaria’s convergence using Eurostat data until 2023.



Sources: Conference Board, Eurostat, author calculations

The result of the empirical investigation is quite clear. Using Eurostat, instead of Conference Board, data and extending it by four years decreases the forecasted moment of Bulgaria’s 90% convergence by four years (from 2037 to 2033) in the most optimistic “ambitious reforms” scenario, and from never to 2040 in the least optimistic “business as usual” scenario. This means that the empirical claim that Bulgaria can realistically expect to converge to 90% of the European Union somewhere around 2043 is not robust to simple and quite reasonable changes in the underlying data and therefore is not sufficiently grounded in empirical reality.

After establishing that it is highly empirically possible for Bulgaria to reach a real convergence of 90% a whole decade before the demonstrably non-robust estimate about the early 2040s, it is time to check if the 90% threshold itself has been established empirically in a robust way.

The 90% threshold has been arrived at in the already mentioned Chapter 4.1 of Magyar Nemzeti Bank (2020). In fact, the only empirical justification of the claim is found in two scatter plots: one correlating GDP per capita at PPP as a percentage of the Eurozone with the inflation differential relative to the Eurozone for 26 EU countries,²⁰ and one correlating GDP per capita at PPP as a percentage of the Eurozone with the degree of synchronization of business cycle with the Eurozone for 17 EU countries.²¹ Here the empirical check is performed with respect to the inflation differential scatter plot.²²

Replicating the scatter plot from Magyar Nemzeti Bank 2020:244 immediately raises three questions which have not been clarified by the authors. The first is why the chosen time period is 2000–2007, when at the moment the study was published many more years of relevant observations were available. The second is, given this choice of time period, why are Romania and the UK excluded from the plot.²³ The third is, as in the previous check, why were the World Development Indicators used instead of the Eurostat data. No justification is given for any of these choices. This fact in itself creates doubts about the robustness of the empirical findings. These doubts are strengthened by the fact that the Hungarian central bank researchers never actually either define, nor quantify, what precisely they mean by the word “negligible”. It is difficult to evaluate the validity of their claim when they are highly specific on the 90% real convergence requirement, but highly non-specific on when precisely an inflation differential is “negligible”.

The above considerations notwithstanding and using WDI data of vintage²⁴ as close as possible to the unspecified vintage used by the Hungarian central bank researchers, their result is reasonably closely replicated in Figure 2a below. One addition is the R^2 of the second order polynomial fit-line, indicating that it accounts for about 43,5% of the observed variation in the scatter plot.

The empirical result is checked for robustness by changing the data source from WDI to Eurostat and the time period from 2000–2007 to 2010–2019, when, as opposed to the first

²⁰ Chart 4-1 in Magyar Nemzeti Bank 2020:244. Identically reproduced in Papazov et. al. 2023:9.

²¹ Chart 4-2 in Magyar Nemzeti Bank 2020:245.

²² The reasons for not looking at the other scatter plot are two. First, the explanations by the authors on how they arrived at the first scatter plot are sufficient for a decently close replication, there are absolutely no explanations enabling a replication for the second scatter plot. Second, no justification is given for excluding many EU countries from the second scatter plot. Bulgaria, which is the main focus of the present study, is one of the excluded, while it is present in the first scatter plot.

²³ The exclusion of Luxembourg is much more understandable and does not require justification.

²⁴ “Vintage” here means a dataset as it was at the time the previous research was performed and before later revisions of the data. The WDI dataset gets updated twice a year, and revisions of past data for some countries happen regularly.

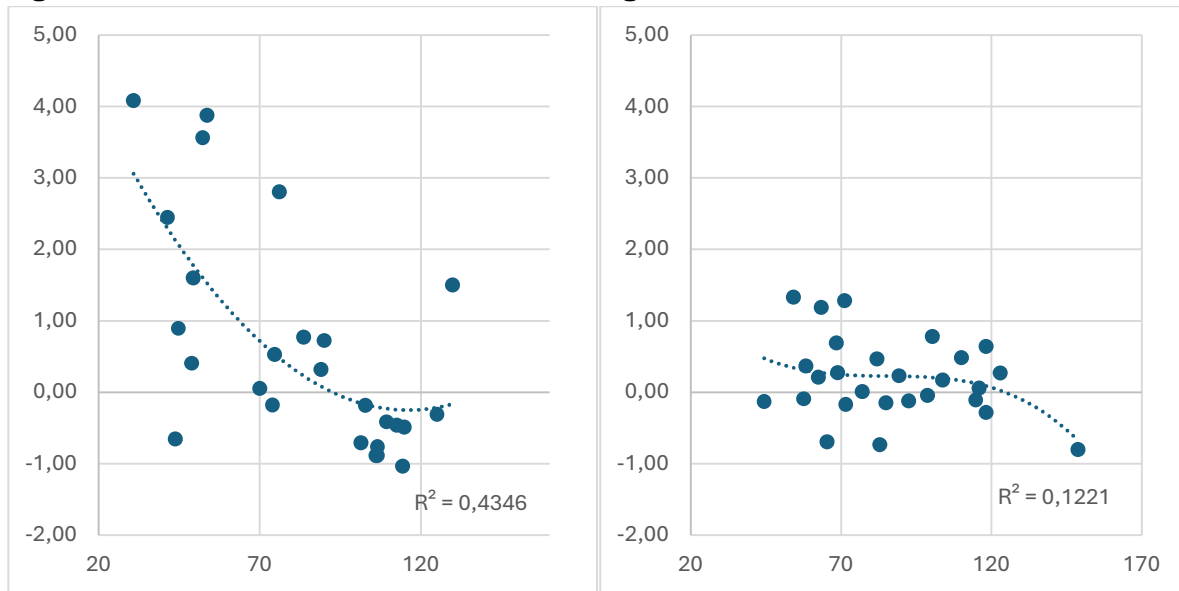
period, all the countries involved were actually members of the EU. The resulting scatter plot, with a second order polynomial fit line and its R^2 is shown below in Figure 2b.

Figures 2a and 2b are shown horizontally aligned, keeping the vertical axis range the same so that the differences are easily visually discernible.

Figure 2. Inflation differential vs real convergence to the Eurozone, 26 EU countries

Figure 2a. WDI for 2000–2007

Figure 2b. Eurostat for 2010–2019



Sources: WDI, Eurostat, author calculations

The result of this empirical check is clear. Under simple and reasonable changes in the specification, the empirical finding reported by the Hungarian central bank completely disappears. In Figure 2b the largest inflation differential is barely above one percentage point per year. The inflation differential for two of the three poorest, relative to the Eurozone, countries is, in fact, negative. The simple polynomial fit line explains three and a half times less than in Figure 2a. Finally, and most importantly, there is no level of real convergence relative to the Eurozone, anywhere between 40% and 120%, at which the inflation differential is necessarily larger than “negligible”.

This means that the empirical claim that any EU country must necessarily converge to 90% of the Eurozone real per capita income before considering joining the Eurozone is not robust to simple and quite reasonable changes in the underlying data and therefore is not sufficiently grounded in empirical reality. In this case the inference that there is a lack of basis in reality is even stronger than in the first check: the simple empirical re-specification completely overturns the original empirical claim.

A final empirical check is also performed on whether inevitable implications of the theoretical claims outlined in the third section of the present study actually hold in the observed data. These necessary implications are two. First, if the theoretical claims are true, then it must be that catching-up countries adopting the euro should see their inflation differential relative to the Eurozone increase in comparison with the period before

their joining, because after joining it is only through inflation that the real exchange rate can be equilibrated. Second, if the theoretical claims are true and for the absolutely same reasons, a catching-up country joining the Eurozone should see its inflation differential being larger than the inflation differential in the catching-up countries which have not joined the Eurozone.

This empirical check is performed using Eurostat's HICP data for the whole period in which the Eurozone has been in existence – from 1999 to 2023, exactly a quarter of a century. The results are summarized in Table 1.

Table 1. Inflation differentials and joining the Eurozone, 1999–2023.

Country	Year joining	Inflation differential* BEFORE**	Inflation differential AFTER***	Average inflation differential of 5 non-members**** AFTER year of country joining
Slovenia	2007	3,4	0,3	1,8
Slovakia	2009	3,9	0,9	1,5
Estonia	2011	2,2	1,9	1,4
Latvia	2014	2,2	1,5	1,7
Lithuania	2015	0,6	2,1	1,9

*Difference of country's HICP inflation to Eurozone HICP inflation. Averages are geometric.

** From 1999 to end of year preceding year of joining.

***From year joining to end of 2023.

****Bulgaria, Czechia, Hungary, Poland and Romania.

Sources: Eurostat, author calculations.

The empirical results in Table 1 are also quite clear. As opposed to the theoretical prediction, in four out of the five catching-up economies which joined the Eurozone the inflation differential fell, rather than increased, after joining. In three out of these same countries the inflation differential was smaller for the joining country between the year of joining and the end of 2023 than it was for the five non-joining countries. In the other two of the joining countries the difference from the non-joiners can easily be qualified as “negligible”.

Thus, the observed empirical reality flatly contradicts the necessary implications of the theoretical claims about the 90% real convergence²⁵ and about the inflation differentials, therefore contradicting the theoretical claims themselves.

A small side note here may be quite adequate to expose the extremity of the claim that a high level of real convergence among geographical components of a currency area is the most important single condition for the desirability or optimality of such an area. Because, if it is true, then it has to be true not only at the super-national level, but at the sub-national level as well.

If, just to illustrate the case with Bulgaria, the 90% real convergence criterion would be raised to a status of valid theory and accepted as the leading benchmark for the readiness

²⁵ None of the five countries in the first column of Table 1 were anywhere near the 90% level of real convergence to the Eurozone at the time they joined it – they ranged between 57 and 76% of the Eurozone.

of an economic region to be in a currency area with other regions, then 11 out of the possible 15 pairs of Bulgarian NUTS2 regions and 261 of the possible 378 pairs of Bulgarian NUTS3 regions (in both cases about 70%) fail to meet this criterion and accordingly should introduce different currencies, float their exchange rates and conduct independent monetary policies. Disparities within Bulgaria are significantly greater than between Bulgaria and any country in the Eurozone, including Luxembourg with its highly distorted GDP per capita data. If the 90% real convergence requirement becomes the leading criterion for the readiness of a geographically defined economic region to be a part of a common currency area, then most probably more than 90% of the states in the world will fail to meet it and should stop being single currency areas.

Instead of conclusion: a note on Bulgaria's specific context

Unlike all other EU countries outside of the Eurozone, Bulgaria is in a currency board pegged to the euro. The country adopted the regime in 1997, pegging to the Deutsche Mark, and pegged to the euro on January 1, 1999. Since that day the exchange rate to the euro has never changed. The fixing of the exchange rate is highly institutionalized and changing it, while theoretically thinkable, is in practice credibly very unlikely.

A major consequence of this monetary regime is that Bulgaria does not have an independent monetary policy, except for a limited ability of the central bank to influence bank reserve requirements and in a strictly limited way under very special circumstances to be a lender of last resort.

This means that Bulgaria has, by and large, internalized, and that for a quarter of a century, all of the effects of a country joining the Eurozone discussed up to now in this study.

All the theoretical and all the empirical claims do not apply to Bulgaria's situation. This is so because, as opposed of the other EU countries outside the Eurozone, Bulgaria is actually a member of the euro currency area and has been since January 1, 1999.

It is also a member of the EU exchange-rate mechanism II and banking union since 2020. From the point of view of the theoretical and the empirical arguments discussed here up to now, Bulgaria's joining the Eurozone will not change anything at all. It will only enable the Governor of the Bulgarian central bank to sit, and every now and then vote, on the Governing council of the European central bank, avail Bulgaria to a small portion of the ECB seigniorage and secure the country access to financial mechanisms specific for the Eurozone.

So, the actual choice facing Bulgaria, as opposed to all other EU countries not in the Eurozone, is not whether to join a common currency area, but whether to enter the formal institutional framework of a currency area which it already joined 25 years ago. None of the theoretical and empirical arguments outlined above inform the choice faced by Bulgaria in any way. Raising such arguments in the present-day discussion about how fast Bulgaria should attempt to join the Eurozone is of no help.

At what we practically arrive after the above analysis is the following.

The theoretical and empirical claims serving as a basis for the proposal to postpone Bulgaria's joining the Eurozone by about two decades are carefully examined and found lacking.

The theoretical claim that fixing the exchange rate for a catching-up economy may cause inflation higher than otherwise, also known as the Balassa-Samuelson effect, is by itself quite sound. The only note about it is that Bulgaria has been in a fixed exchange rate to the euro for 25 years, so in that respect formally joining the Eurozone will change nothing.

However, the further theoretical claim that this inflation differential will necessarily cause problems for the catching-up economy due to discrepancies in the real interest rates is found to be ambiguous at best.

The empirical claims that it is necessary for a country to be at the level of real per capita income of at least 90% of that in the Eurozone for the suggested problems from joining to be "negligible" is found to be non-robust, and in fact completely overturned, by a relatively simple and reasonable re-specification of the empirical test. The empirical test also contradicts two major and necessary implications of the theoretical claims.

Finally, it is shown that the empirical forecast that Bulgaria will reach the threshold of 90% real income relative to the Eurozone in the beginning of the 2024s at the earliest is found to also be non-robust to elementary empirical re-specification and extension of the observed data.

Thus, the theoretical claims that Bulgaria is too poor to join the Eurozone are found to be ambiguous at best, and the empirical claims that Bulgaria should wait for the 90% real convergence until the early 2040s are found to not have any real economic foundation.