

Business Cycles Synchronization between Baltic and Western European Countries

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Abstract: - This study examines the synchronisation of the business cycles between the Baltic States and the countries of Western Europe. The study covers the following countries: Latvia, Lithuania, France, the United Kingdom, Germany, and Estonia; and the quarterly GDP growth data during the period 1995-2017. The GDP growth data have been modified using the Hodrick-Prescott and Baxter filters to distinguish business cycles. To measure the synchronisation between the business cycles of the selected countries, the correlation between the business cycles of the countries was used. The results show that the business cycles of the Baltic and Western European countries were more synchronised in 2009-2014 than in 1998-2014. It shows that the Baltic economies are becoming more related to the European Union countries and less related to the post-Soviet countries.

Key-Words: - Business cycles, Synchronization, Baltic countries, Western European countries, Post-communist countries, Economic growth.

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1 Introduction

After years of economic instability and financial crises, the world is paying more attention to the economic situation. In this context, economic and business cycle indicators play an important role today, not only for governments but also for companies. [1], argue that knowing in advance the possible economic direction of a country and the occurrence of its events will improve the process of decision-makers. Government policymakers, economists, businessmen, investors, employees, and consumers all rely on forecasts to make future judgments and base their strategic decisions on the information, [2]. Over the last decade, most European countries have experienced changes in the business cycles. The situation has shown that financial crises and periods of economic recovery can be regional and worldwide. Therefore, analysing the synchronisation of the Baltic countries' business cycles with the Western European countries can show how much the economies of these countries

are related to each other and whether the Baltic countries' economies have become more related to the Western European countries during the last decades.

This study is relevant for understanding how different business cycle movements in the Baltic countries compare with those in Western European countries, and how the business cycles between these countries are more or less synchronised. It contributes to the knowledge of the development and economic process of countries that recently changed their economic system from a planned to a market economy in the 1990s. And its importance is also underlined by the fact that research studies on the Baltic countries' business cycles are scarce, so the results of this work can be useful for policy and investment decisions. At the same time, this paper contributes to the improvement of economic knowledge by comparing the differences in business cycle synchronisation between the post-Soviet countries and the Western European countries.

After this introduction, section 2 presents the literature review on the topics under study with a characterisation of cooperation after the collapse of the Soviet Union; and section 3 presents the data and methodology. The following section presents and discusses the results obtained, and section 5 concludes.

2 Literature Review

[3], explain that one of the reasons for the change in synchronisation between post-communist countries was regional cooperation, which helps to exploit the comparative advantages of all these countries and allows them to present themselves as part of a whole at the global level, thus defending their common interests. For example, [4], [5], say that the Baltic countries have moved from strong cooperation with Russia to cooperation with the European Union (EU). In this study, we have chosen to analyse the Baltic countries as three post-communist countries: Lithuania, Estonia, and Latvia.

According to, [6], "*Business cycle synchronisation is the correlation of output growth - the correlation of aggregate productivity growth between two trading partners - with different measures of international trade (trade volume, extensive trade margin, and intensive trade margin)*". [7], finds a positive effect of financial integration and trade on business cycle synchronisation. He shows that countries that have trade relations are related by their business cycle movements. Moreover, [8], makes research on business cycle synchronisation, economist decomposes the variance of growth into global, European, and country-specific factors. The results showed that the European component of the business cycle has a strong influence among European countries. Furthermore, [9], say that at the EU level, where there is an Economic and Monetary Union (EMU), the regional component influences the national one, which explains a large component of national European cycles (around 30%).

It was found that not only the EMU business cycles have influenced the business cycles of the EU member states, but also these shocks that occurred in the EMU business cycles are reflected in the national economies of the euro area members. It shows that business cycles in the EU and its member states can be synchronised. According to, [10], the GDP growth of EMU member states differs from that of the EU due to specific differences in their business cycles, but national business cycles also respond to shocks to EU business cycles. Furthermore, [11], using one-way

and two-way ANOVA techniques, found that common shocks are more important than country-specific shocks for most EMU members.

Thus, in general, the business cycles of the EU member states depended on the country's integration into the EU and trade relations, in the case of the Baltic countries, according to the research results of, [4], on Lithuania, Latvia, Estonia, during the period 1993-2002, at the beginning Russian and Baltic economies have a strong relationship because of trade, but later the relationship became weaker, and the Baltic economies' relations started to strengthen with Western countries. It shows that belonging to a particular union in the period of integration affects your trade relations and together economic business cycles begin to be related to that union, which in the case of the Baltic countries was the EU countries. This supports that in this study we have chosen the EU-28 as one of the variables influencing the business cycles of the Baltic countries, France, Germany, and the United Kingdom.

3 Data and Methodology

In this research, nominal GDP growth has been used to measure economic growth and business cycles. In the literature review analysis, the majority of authors use GDP to measure economic growth and business cycles movements, [12], [13], [14], [15], [16]. Another reason for choosing nominal GDP growth as an indicator was the availability of quarterly data. The selected research period under analysis is 1995-2017. The data were collected from the OECD database.

Six countries were selected for the research sample: Latvia, Lithuania, Estonia, Germany, the United Kingdom, and France. These countries were chosen to be able to compare the characteristics of business cycle dynamics between post-communist and Western European countries. Moreover, the reasons for comparing these countries were differences in geographical location, level of economic development, and time of using the market economy system.

There are several different methods to identify business cycle stages. [17], mentions that the most commonly used are the Hodrick-Prescott (HP) filter and the Baxter-King filter, [18], and, [19], estimated business cycles using a Markov switching factor model with time-varying transition probabilities. According to, [19], the Markov switching model can detect the phases of the classical cycle, the model indicates some differentiation in the growth rate of the economy. [20], points out that it is possible to consider a VAR model with parameters depending

on a common Markov chain. This method describes the data as futures of the different phases of the economy and can be useful to provide information about the phases of economic cycles and to show how they evolve. [21], also agree that the Markov switching vector autoregressive (MS-VAR) model can be successfully used to identify turning points of business cycles and phases of business cycles.

[17], and, [22], point out that the Hodrick-Prescott (HP) filter is the most commonly used method to identify the stages of the business cycle. This filter is a smoothing technique that decomposes the time series y_t into two components: a trend component g_t and a cyclical component ct , hence $y_t = g_t + ct$. According to, [23], the HP filter is one of the most widely used econometric methods for measuring business cycles and potential output in empirical research. It is also a smoothing method that belongs to a very general class of non-parametric smoothing procedures that depend on a tuning parameter that determines the properties of the smoother, [24], [25]. Finally, based on two criteria: literature review and availability of the method with the GRETl software, we chose to use the HP filter over the Markov switching model. [5], explain the HP filter method by the expression (1):

$$\sum_{t=1}^T (y_t - g_t)^2 + \lambda \sum_{t=2}^{T-1} ((g_{t+1} - g_t) - (g_t - g_{t-1}))^2 \quad (1)$$

"The first term above is the sum of the squares of the cyclical components $ct = y_t - g_t$. The second term is a multiple λ of the sum of squares of the second differences of the trend component. This second term penalises fluctuations in the trend component's growth rate: the larger the value of λ , the higher the penalty and hence the smoother the trend series", [26].

To measure the synchronisation of cycles, we use the method of, [27]. We calculate the correlation between the cyclical components of output across countries, where a higher correlation implies a higher degree of cycle synchronization. This method was also used by, [28]. Following, [28], we use the Baxter and King filter to remove cyclical components. We fit this model with quarterly data from 1995-2017 and with 2006-2017 to check how the synchronisation between countries has changed. Due to the fact that we lost some years of the data sample by using the Baxter and King filter, the

comparison of business cycle synchronisation is between 1998 and 2014.

4 Results and Discussion

4.1 Business Cycles Synchronization between Western European and Baltic Countries

In this section, we have used graphical analysis and correlation between business cycles to identify the synchronisation of business cycles between the Western and Baltic countries. Using the Hodrick-Prescott and Baxter & King filters, we plotted the business cycle movements in selected countries in Figure 1 and Figure 2. The synchronisation between the business cycles of France and Germany was found (Figure 1). Figure 2 shows that the UK business cycle is less synchronised with the French and German business cycles.

[29], emphasize the perception of a cyclically coherent group consisting of Eurozone countries (Germany, France, and Italy) and that the UK is more synchronized with the United States and Canada than with EU member states. [25], points to the existence of a high degree of business cycle synchronisation among members of the monetary union. France, Germany, and the Baltic states have the same currency, the euro, while the UK has the British pound as its currency. This is one of the reasons pointed out to explain why the UK business cycle is not synchronised with France and Germany.

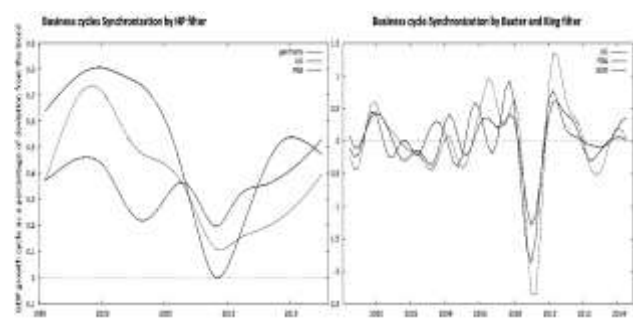


Fig. 1: Business cycles synchronization in Germany, France, and UK.

Source: Figure made by authors using GRETl program.

The Baltic business cycles are synchronised (Figure 2). They have coincident turning points in their business cycles (1999 and 2009 are troughs and 2004 is a peak). [30], argue that the Baltic countries experience asymmetric shocks with the Western European countries, as the structure and processes they go through are significantly different from euro members such as Germany or France.

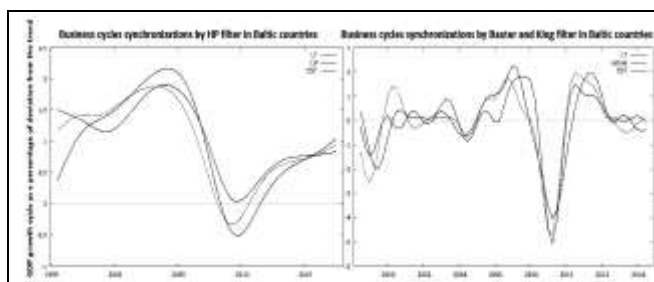


Fig. 2: Business cycle synchronization in Baltic countries.

Source: Figure made by authors using GRETL program

Figure 1 and Figure 2 show that the synchronisation of Baltic countries and Western European countries differs in terms of business cycle turning points. In 1999, the Baltic countries are in recession, while the Western European countries are in expansion. In 2004, Germany overcomes its recession and the Baltic countries have an expansion phase of the business cycle. The differences in business cycle synchronisation between the Baltic and Western European countries can also be explained by trade relations. The Baltic countries have more trade relations with Russia and other post-Soviet countries, while Germany and France have more trade relations with North American countries. That's why in 1998-1999 Russian financial crisis affected Baltic countries' business cycle movements, but not Western European countries, while in 2001-2004 the slowdown of world economic growth did not affect Lithuania, Latvia, and Estonia's GDP growth, but Germany's.

According to, [31], the decline in output and income of trading partners will reduce imports and negatively affect business cycle co-movements. [32], believe that the increase in trade and financial linkages between developed and emerging economies is associated with the emergence of group-specific cycles. The Baltic countries have all adopted the euro currency since 2015, so their level of integration with the EU is increasing. According to, [27], economic and monetary integration should stimulate intra-industry trade relations, which in turn will lead to related business cycles between countries.

Finally, we compute the correlation between the cyclical components of output in countries. As a result, we find that the synchronisation of business cycles between the Baltic countries is higher than between the Western European countries during the period 1998Q3 - 2014Q3 (Table 1). Furthermore, we found a high correlation of 0.85 between the business cycles of Estonia and Germany. The business cycles of Germany and France were found

to be less correlated with the UK (correlation coefficient of 0.79), compared to the correlation of 0.93 between the business cycles of France and Germany.

Table 1. GDP correlation after adapting Baxter and King Filter during 1998Q3 – 2014Q3.

	Lithuania	Latvia	Estonia	Germany	France	UK
Lithuania	1	0.84	0.85	0.74	0.64	0.71
Latvia	0.84	1	0.87	0.68	0.61	0.61
Estonia	0.85	0.87	1	0.85	0.76	0.72
Germany	0.74	0.68	0.85	1	0.93	0.79
France	0.64	0.61	0.76	0.93	1	0.79
UK	0.71	0.61	0.72	0.79	0.79	1

Table 2. GDP correlation after adapting Baxter and King Filter during 2009Q1 – 2014Q3.

	Lithuania	Latvia	Estonia	Germany	France	UK
Lithuania	1	0.92	0.98	0.9	0.89	0.8
Latvia	0.92	1	0.9	0.71	0.72	0.6

Source. Table made by authors using GRETL.

During the period 2009Q1-2014Q3, there was a strong synchronisation of business cycles between all countries except Latvia (Table 1). Latvia was highly correlated with the Baltic countries, but less correlated with the Western countries (Table 2). The strong synchronization during 2009Q1-2014Q3 can be explained by the global financial crisis in 2008 and the subsequent recovery phase.

4.2 Business Cycle Stages Comparison between Western and Baltic Countries

We use the HP filter to distinguish business cycle phases. This method does not show any complete business cycle in France during the period 1995-2017 (Appendix 1). However, using the BK filter, we found two business cycles during 1998-2014. Moreover, using the Markov switching factor model, [33], found three business cycles in France during 1993-2015. Appendix 1 shows the GDP growth of France during different stages of business cycles. France's business cycle has the same peak point, in 1999Q1, and trough point, in 2008Q2, as Germany's. We find that France has long periods of slowdown and expansion, while downturns and recoveries were shorter by only a few years during the period 1995-2017. However, France's GDP growth during expansion periods remains relatively low, around 0.5% per quarter until 2008 (Figure 3).

During the 2008Q3-2009Q1 downturn, GDP fell by an average of -0.97% per quarter (Appendix 1).

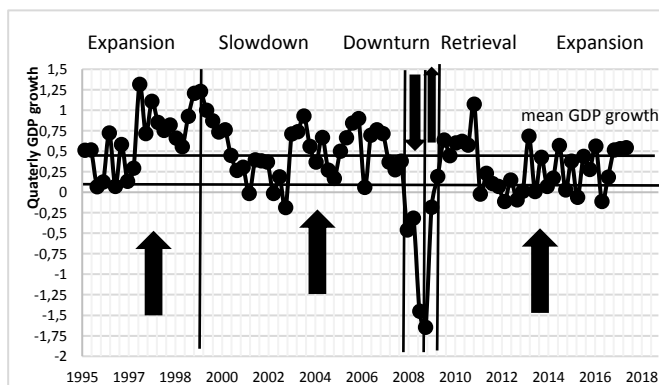


Fig. 3: France's GDP growth during the business cycle stages 1995-2017.

Source. Figure made by authors using data from OECD database.

During the period 1995-2017, using the HP filter, we distinguish two expansion and two slowdown stages in the UK (Appendix 2). During the expansion period 1995Q1-1999Q4, the average GDP growth per quarter was 0.76%, during the slowdown period 2000Q1-2008Q1 the average GDP growth per quarter was 0.67% (GDP growth is shown in Appendix 3). After the 2008-2009 crisis, growth rates decreased, during the 2009Q4-2014Q4 expansion growth per quarter was 0.53% and during the 2015Q1-2017Q2 slowdown GDP growth per quarter was 0.41%. There was a downturn in 2008-2009, during which average quarterly GDP growth was -1.56%. Using the HP filter, we distinguish a full business cycle in the UK from the peak in 1999Q4 to the peak in 2014Q4. GDP volatility is similar to France and the UK, but lower than in the Baltic countries. It is possible that the economic slowdown in the UK from 2015 was the consequence of Brexit. According to, [34], Brexit is reflected in several effects on the UK economy: higher trade costs, and lower foreign direct investment. In the opinion of, [35], the main consequences of Brexit are the decrease in trade in goods and services between the UK and the EU27 countries.

Using the HP filter method, two complete business cycles were distinguished in Germany (Appendix 2). From the peak in 1999 Q1 to the peak in 2006Q2 and from 2006Q2 to the peak in 2011Q3. According to, [36], business cycles in Germany are characterised by an interval between 2.1 and 7.5 years.

During 1995-2017, there were two downturns and three recovery periods in Germany, when economic growth was negative or close to 0 (Appendix 4). The downturns in Germany were during 2008Q3-2008Q4 (average GDP growth was -2.26 per quarter) and during 2001Q3-2003Q1 (average GDP growth was -0.17% per quarter). Downturn periods have usually been followed by 1-2 years of recovery and a few years of expansion when GDP growth is boosted (Appendix 5).

Moreover, Germany is only one of the selected Western countries to have experienced a downturn and a recovery in the period 2001-2005 (Appendix 4). France and the UK also experienced lower economic growth in 2002, but not as low as Germany. [37], says that the stagnation in Germany in 2001-2004 was caused by uncertainty in expectations of future economic growth. This uncertainty was largely due to the rise in world oil prices, the 11 September attacks in the USA, the changeover of the national currency to the euro, and the stock market crisis in Germany. These events make companies concerned about future growth and they reduce production levels, which reduces consumption, which increases unemployment. [38], explains that the 2001-2004 stagnation in Germany was caused by the global decline in economic activity. According to, [38], Germany is characterised by very close relations with the US, that's why any downturn in the US negatively affected Germany's GDP growth. On the other hand, the Baltic countries' GDP grew during 2001-2004. Baltic countries are small open economies and their main trade relations are continental with Russia (the main exporting country, foreign direct investment, energy resources) and European countries.

Furthermore, the evidence for the different business cycles in Germany and the Baltic countries is the business cycle correlation between selected countries. We have tested the correlation of Germany's business cycle with the business cycles of other selected countries. The results show that Germany's business cycle is highly correlated with France 0.93, UK 0.79, and Estonia 0.85 and less correlated with Lithuania and Latvia.

Using the HP filter method, we constructed Appendix 7 to show the dynamic movements of the Latvian business cycle. Appendix 7 and Appendix 8 shows that during 1995-2008 there were expansion and contraction phases of the business cycle in Latvia. The growth during the 1995Q2-2004Q1 expansion stage was 1.39%, and during the 2004Q2-2007Q3 slowdown stage was 2.66%. After a long period of GDP growth, the Latvian economy experienced a downturn during 2007Q4-2009Q3.

During the downturn, the average GDP growth rate in Latvia was -2.46 % per quarter. Even recovery after crises was fast for Latvia's economy, but the country did not exceed the same growth rates as in the 2000-2008 period. From 2010Q4 to 2017Q2 Latvia's GDP growth rate was 0.9 % per quarter.

On the other hand, Appendix 9 shows the business cycle stage of Estonia, where it is observed that during 1995-2008 expansion and slowdown business cycle stages occurred in Estonia. The GDP growth during the 1995Q2-1999Q3 expansion stage was 1.83%, and during the 1997Q4-1998Q2 slowdown stage was 0.95%, while during the 1998Q3-2007Q4 expansion stage was 1.45% per quarter. After a long period of GDP growth, the Estonian economy experienced a downturn during 2008Q1-2009Q1. During this downturn, the average GDP growth rate was -3.23% per quarter. According to, [39], Estonia has hardly experienced past crises due to speculative bubbles in asset and financial markets.

Based on the HP filter method, a full business cycle was distinguished in Lithuania from the 1999 Q1 trough to the 2009 Q3 trough. During 1995-2017, the main business cycle phases were slowdown and expansion, which have a positive output gap (Appendix 11). The average GDP growth during the expansion phases in Lithuania was 1.16%. The average GDP growth during slowdown periods was 1.63% (Appendix 11 shows Lithuania's GDP growth during different business cycle periods). As represented in Appendix 11 and Appendix 12, we can observe that during the periods 1998-1999 and 2008-2010, Lithuania had slowdown and expansion stages when the output gap was negative, which, according to, [25], was caused by the Russian crisis in 1998 and the financial crisis in 2008-2009. During the 2008Q2-2009Q3 downturn, Lithuania's quarterly GDP growth rate was -2.5%. Lithuania survived the last crises with hard consequences, by decreasing GDP, increasing unemployment, increasing migration, and decreasing capital flows, while the 1998-1999 downturn was a temporary decrease in exports.

Using the HP filter method, we found a downturn period in 1998-1999 only in Lithuania, but Latvia and Estonia also verified a decline in their GDP growth in the same period. This was explained by, [39], [40], and, [41], by the impact of the Russian economic downturn when the Russian currency was devalued, which affected Baltic exports. Even in 1998, the Baltic countries and Russian business cycles were strongly related, from that time the Baltic countries integrated into the EU and established relations with Western European

countries, which means that the Russian influence on the Baltic countries' business cycle dynamics is decreasing in these days.

As can be seen in Appendix 6 and Appendix 13, the Baltic countries and the selected Western European countries passed through a downturn phase in 2008-2009. However, the decline in GDP in the Baltic countries is higher than in the Western European countries. [38], explains this fact on the basis of stronger recession in Baltic countries as a result of an overheated economy. According to this author, between 2000 and 2008, the economies of Lithuania, Latvia, and Estonia verified economic growth due to high domestic consumption, easy access to cheap credit, and rapid inflow of foreign investment. Foreign investment between 1994 and 2008 averaged about 8% of GDP in Estonia, more than 5% in Latvia, and almost 4% in Lithuania. This made the Baltic countries particularly sensitive to changes in external markets. However, the financial crises reduced all foreign capital inflows, especially in the financial and banking sectors. The loss of exports, foreign capital inflows, and high debt levels were factors in the deepest recession in the EU in 2008-2009.

5 Conclusion

After analysing the obtained results, we can say that the business cycle dynamics of the Baltic countries are dependent on external shocks, which is in line with the main conclusions of, [25]. We tested the business cycle correlation between the Baltic countries and the Western European countries, and the results show that the Baltic countries are highly correlated with each other, above 0.85. These results are also consistent with those of, [25], who explained that there is a high business cycle correlation between Baltic countries because these countries trade extensively with each other and have common import and export markets. Finally, the correlation between the business cycles of the Baltic countries and the business cycles of the Western European countries was examined. Estonia's business cycle was most correlated with the business cycles of the Western countries (0.85 with France, 0.74 with Germany, and 0.72 with the UK), while Latvia's business cycle correlated with France and the UK around 0.6, with Germany 0.68 and Lithuania's business cycle correlated with Germany 0.74, with the UK 0.71 and with France 0.64.

So, in conclusion, we found that the business cycles of the Baltic countries and Western European countries are becoming more synchronised, as the correlation coefficients between these countries are

higher in 2009-2014 than in 1998-2014. However, if we look at the period 1995-2017, we can see that there are similar movement dynamics of business cycles during some periods between Baltic countries and Western European countries, but the business cycles of Baltic countries have different movement dynamics than Western European countries. The evidence of this is the different business cycle expansions, downturn phases between these Western and Baltic countries, and higher correlation of business cycles between Baltic countries, proving their economic, social, and cultural symmetries compared to Western European countries.

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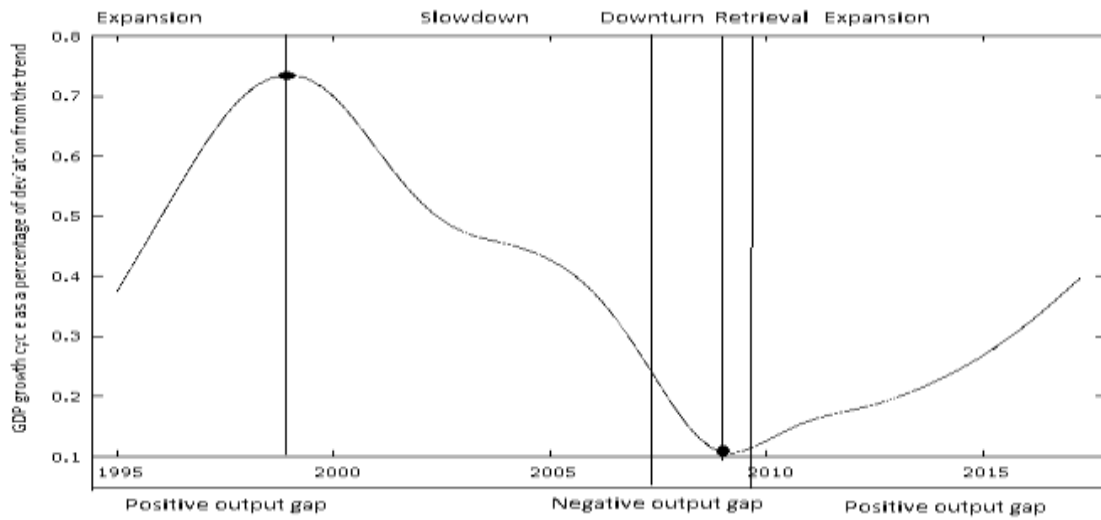
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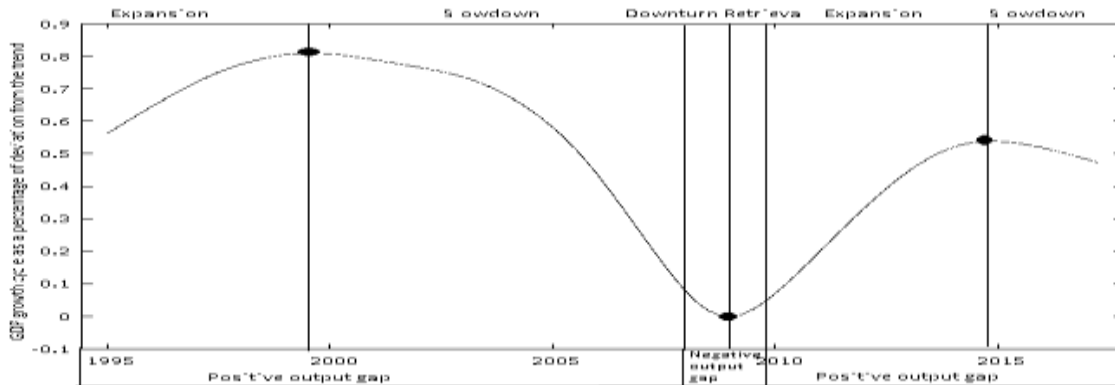
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APPENDIX



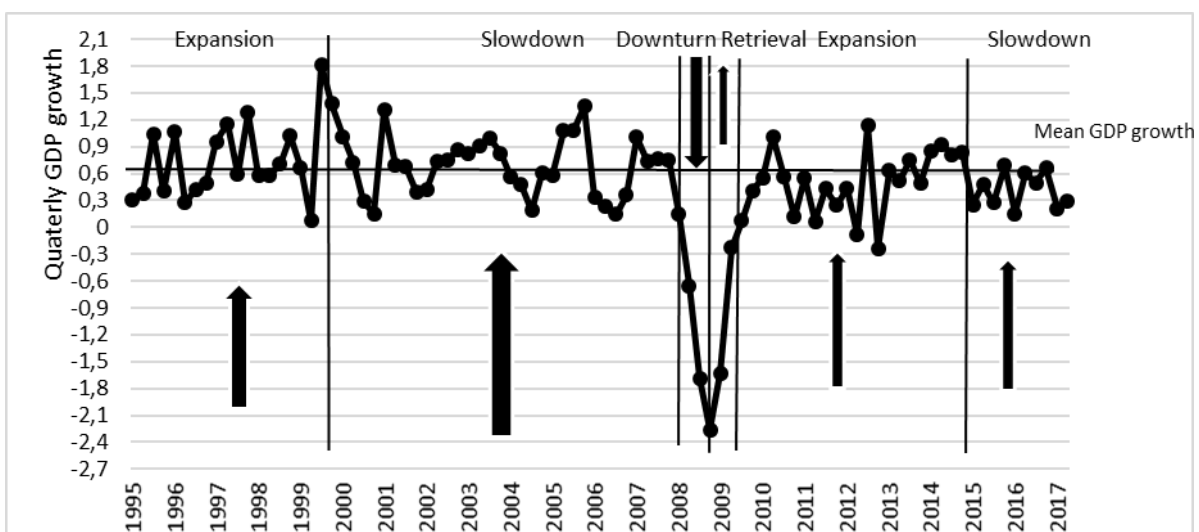
Appendix 1. France's business cycle by HP filter during 1995-2017.

Source. Figure made by authors using GRETLM modified data from OECD database



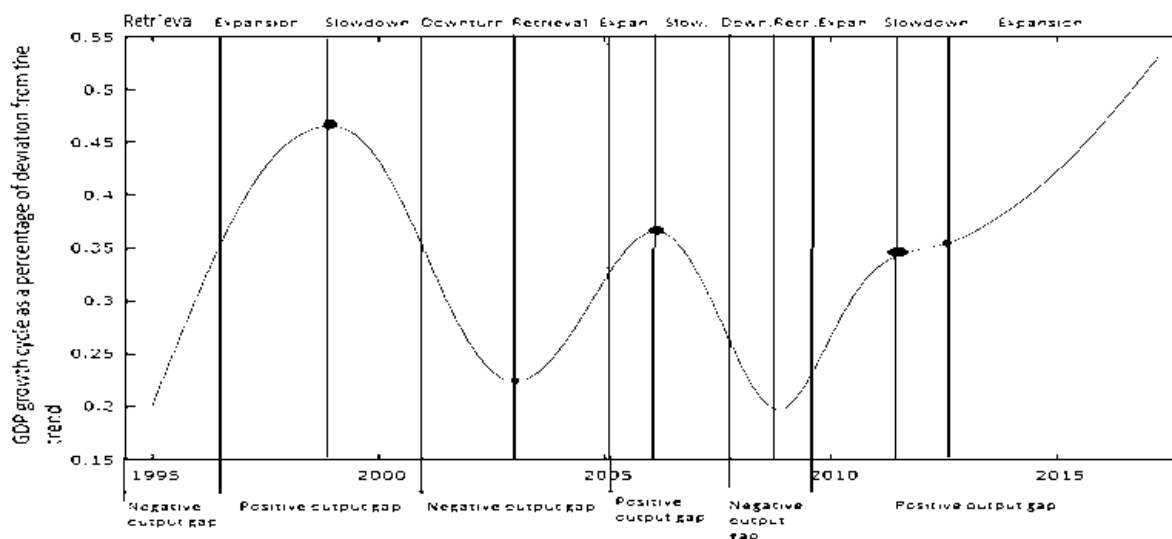
Appendix 2. UK business cycle by HP filter during 1995-2017.

Source. Figure made by authors using GRETLM modified data from OECD database

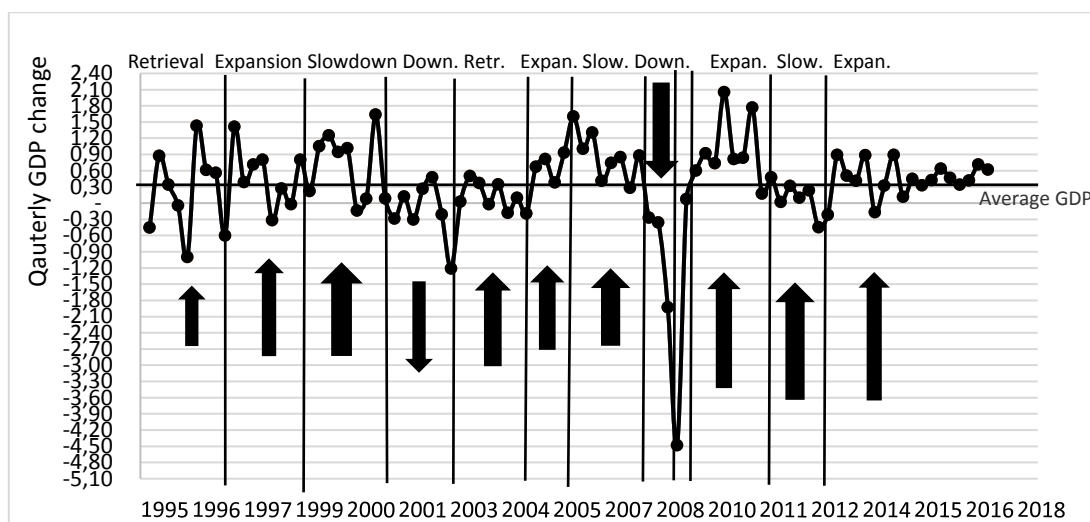


Appendix 3. UK GDP growth during business cycle stages 1995-2017.

Source. Figure made by authors using data from OECD database



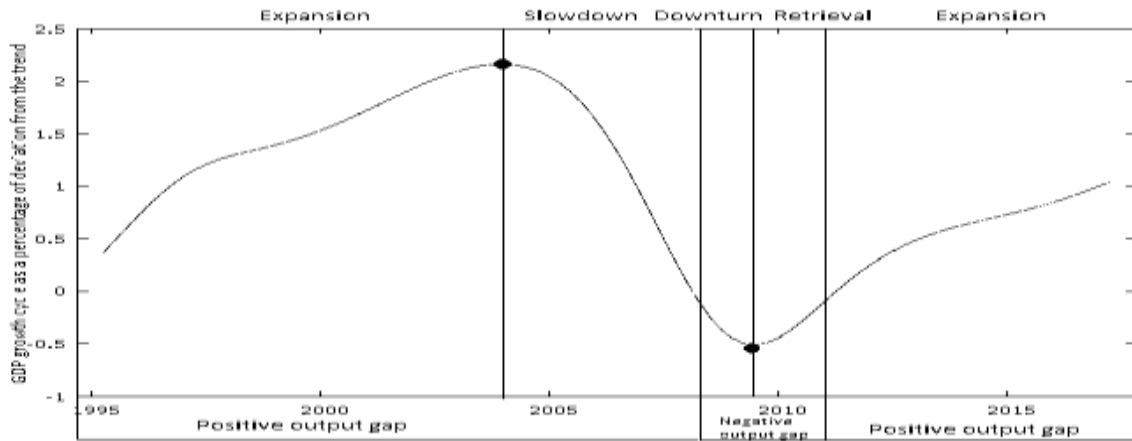
Appendix 4. Germany's business cycle by HP filter during 1995-2017.
 Source. Figure made by authors using GRETL modified data from OECD database.



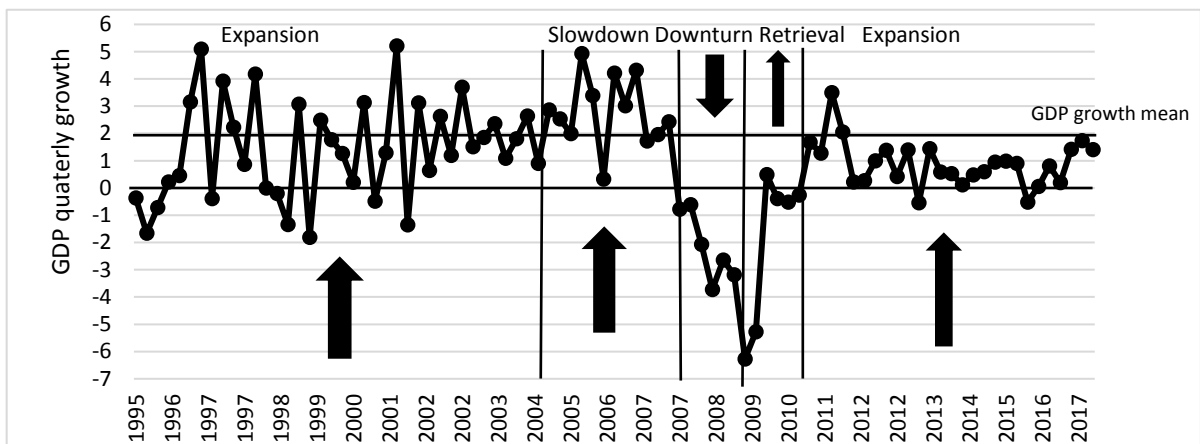
Appendix 5. Germany's GDP growth during the business cycle stages 1995-2017.
 Source. Figure made by authors using GRETL modified data from OECD database.

HP-Filter method Germany			HP-Filter method France			HP-Filter method UK		
Stage	Duration	Economy growth %	Stage	Duration	Economy growth %	Stage	Duration	Economy growth %
Retrieval	1995Q1-1997Q1	0.19	Expansion	1995Q1-1999Q1	0.58	Expansion	1995Q1-1999Q4	0.76
Expansion	1997Q2-1999Q1	0.50	Slowdown	1999Q2-2008Q2	0.54	Slowdown	2000Q1-2008Q1	0.67
Slowdown	1999Q2-2001Q2	0.68	Downturn	2008Q3-2009Q1	-0.97	Downturn	2008Q2-2009Q1	-1.56
Downturn	2001Q3-2003Q1	- 0.17	Retrieval	2009Q2-2009Q3	0.01	Retrieval	2009Q2-2009Q3	-0.08
Retrieval	2003Q2-2005Q2	0.18	Expansion	2009Q4-2017Q2	0.31	Expansion	2009Q4-2014Q4	0.53
Expansion	2005Q3-2006Q2	0.93				Slowdown	2015Q1-2017Q2	0.41
Slowdown	2006Q3-2008Q2	0.65						
Downturn	2008Q3-2008Q4	- 2.26						
Retrieval	2009Q1-2009Q3	0.53						
Expansion	2009Q4-2011Q3	0.98						
Slowdown	2011Q4-2013Q1	0.00						
Expansion	2013Q2-2017Q2	0.48						
Full cycle length (2):	6.375 Years		Full cycle length:	No full cycle		Full cycle length:	15 years	

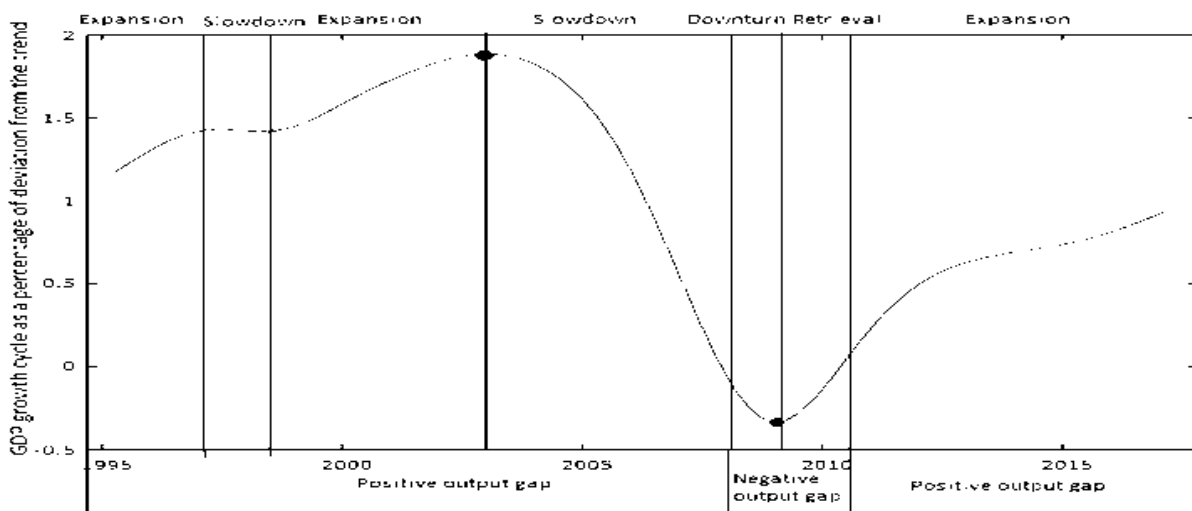
Appendix 6 . Germany, France and UK business cycle stages during 1995 – 2017 using HP filter.



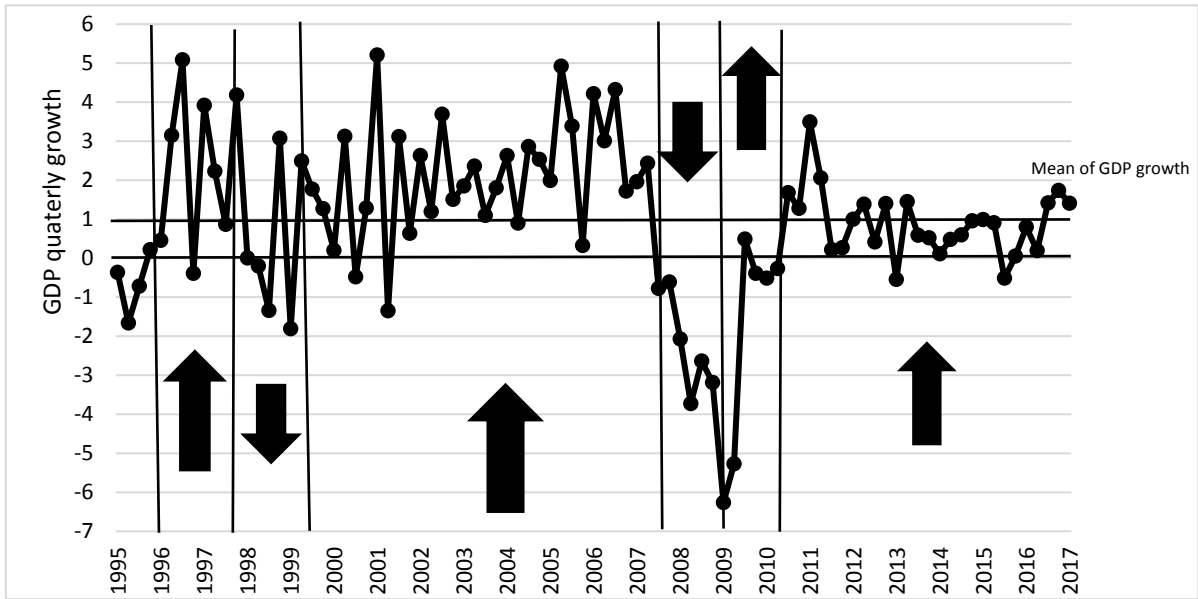
Appendix 7. Latvia business cycle by HP filter during 1995-2017
 Source. Figure made by authors using data from OECD database.



Appendix 8. Latvia GDP growth during business cycles stages 1995-2017.
 Source. Figure made by authors using data from OECD database.

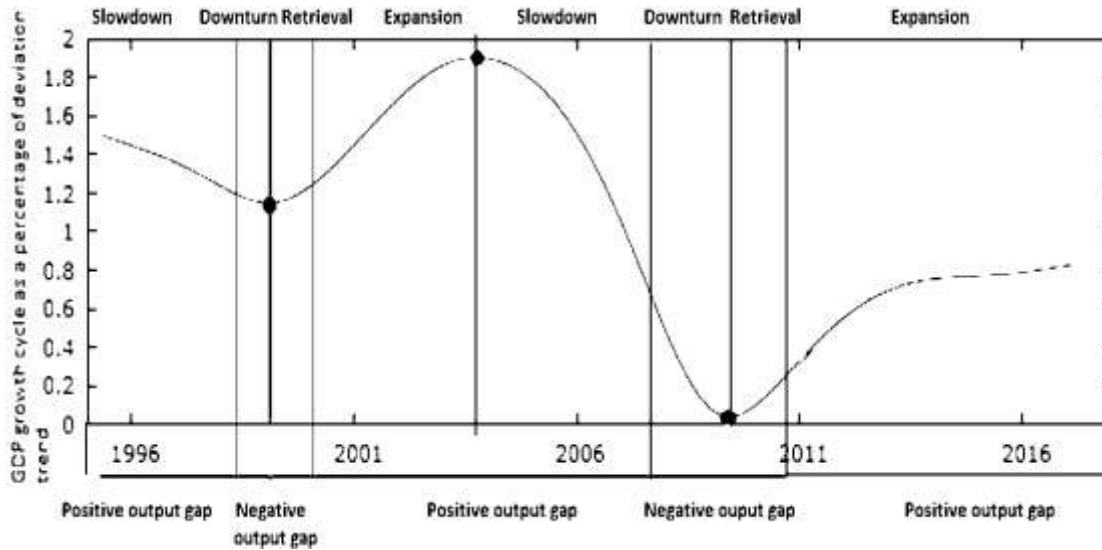


Appendix 9. Estonia business cycle by HP filter during 1995-2017.
 Source. Figure made by authors using data from OECD database.



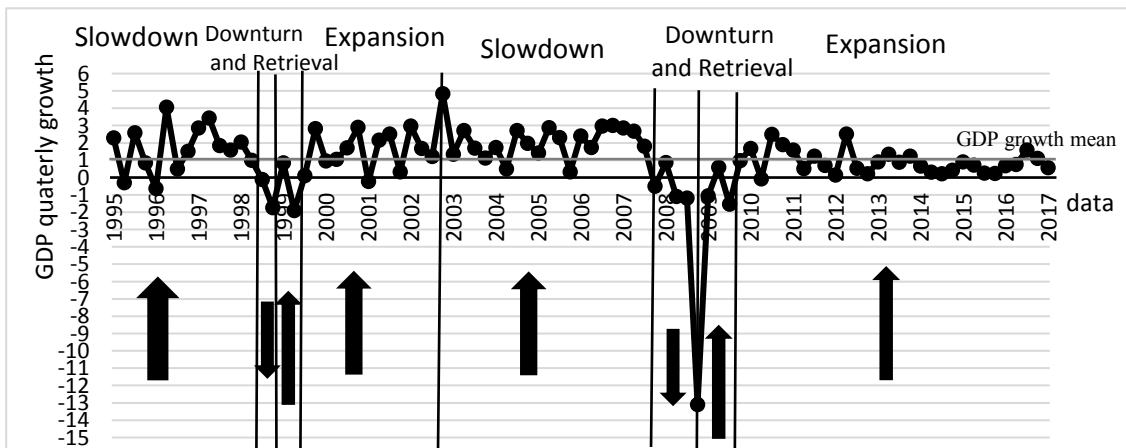
Appendix 10. Estonia GDP growth during business cycles stages 1995-2017.

Source. Figure made by authors using data from OECD database.



Appendix 11. Lithuania business cycle by HP filter during 1995-2017.

Source. Figure made by authors using GRETl modified data from OECD database.



Appendix 12. Lithuania GDP growth during business cycles stages 1995-2017.

Source. Figure made by authors using data from OECD database.

HP-Filter method Lithuania			HP-Filter method Latvia			HP-Filter method Estonia		
Stage	Duration	Economy growth %	Stage	Duration	Economy growth %	Stage	Duration	Economy growth %
Slowdown	1995Q2-1998Q3	1.68	Expansion	1995Q2-2004Q1	1.39	Expansion	1995Q2-1997Q3	1.83
Downturn	1998Q4-1999Q1	-0.92	Slowdown	2004Q2-2007Q3	2.66	Slowdown	1997Q4-1998Q2	0.95
Retrieval	1999Q2-1999Q4	-0.31	Downturn	2007Q4-2009Q3	-2.46	Expansion	1998Q3-2003Q1	1.45
Expansion	2000Q1-2003Q4	1.91	Retrieval	2009Q4-2010Q3	-0.17	Slowdown	2003Q2-2007Q4	1.78
Slowdown	2004Q1-2008Q1	1.88	Expansion	2010Q4-2017Q2	0.90	Downturn	2008Q1-2009Q1	-3.23
Downturn	2008Q2-2009Q3	-2.50				Retrieval	2009Q2-2010Q3	-0.73
Retrieval	2009Q4-2010Q1	-0.28				Expansion	2010Q4-2017Q2	0.89
Expansion	2010Q2-2017Q2	0.91						
Full cycle length (2):	6.375 Years		Full cycle length:	No full cycle		Full cycle length:	No full cycle	

Appendix 13. Baltic countries business cycle stages during 1995 – 2017 using HP filter.

Source. Figure made by authors using data from OECD database.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The authors equally contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

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Conflict of Interest

The authors have no conflicts of interest to declare.

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