



National Bank of Serbia

WORKING PAPERS BULLETIN

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Foreword by the Governor

As expected, the period since the last Working Papers Bulletin saw the start of monetary policy easing in many countries, including Serbia. The decision to embark on monetary easing was motivated by the notable subsiding of inflationary pressures following a period of turbulence caused by the post-pandemic opening of economies, by the conflict in Ukraine, energy crisis in Europe and geopolitical tensions. Still, inflation remains stubbornly elevated in most countries (especially core inflation). Cited as one of the key factors behind such inflation profile is the growth in wages, which compensated for the global rise in the prices of many products in the prior period. Wage growth has been also powered by the strong demand for labour force, particularly striking in some sectors of the economy.

Given the importance of this inflation channel, the first paper in the Bulletin analyses the impact of the labour market on consumer prices in Serbia. The authors outline how labour market factors are used in the NBS medium-term inflation model, and how the movement of real wages and the unemployment rate influences inflation. The estimate of the non-accelerating inflation rate of unemployment (NAIRU) is also given. A particularly important finding in the paper is a proof of the existence of the hysteresis effect on unemployment in Serbia, i.e. it has been determined that NAIRU can be impacted not only by structural factors, but also by the long-term deviation of the unemployment rate from trend. Namely, longer periods of high unemployment induce the loss of skills of workers and dampen their negotiation power, which pushes up structural unemployment (higher NAIRU).

The second paper is an analysis of the concepts of open banking and open finance as data sharing models in the banking and financial industry. These models involve two key market participants, account information service providers and payment initiation service providers. Unlike open banking, where the scope of services includes payment services and account information services, the scope of open finance is broader and encompasses other financial services, such as investment, insurance, etc. By combining a descriptive-comparative method and the case study method, the paper covered the features of open banking and open finance, their differences and the experience in implementing these concepts in advanced markets, such as those of Great Britain and Brazil. The experience from these two markets so far indicates that the key factors for the success of open banking and open finance are digitalisation and the participating population, which is closely tied to comprehending these concepts and raising awareness about them. The same applies both to households and payment service providers who see these models differently and therefore differently perceive the costs and benefits of implementing these concepts.

The final paper in the Bulletin analyses Serbia's indicators pertaining to foreign direct investment flows and goods exports, both in historical and comparative terms. Serbia has come a long way from a politically and economically isolated to an open country, comparable with other countries of similar size and development level, as confirmed by the calculated relative indicators. One of the main observations in the paper is that Serbia had one of the largest shares of cumulative foreign direct investment inflow in GDP in Europe in the period from 2000 until 2023, with the largest contributions to such trends being recorded over the last ten years. Since 2015, Serbia has seen a progressive improvement of its position on a global scale in terms of the foreign direct investment inflow, and in the four consecutive years 2020–2023, it was among the first 50 countries with the highest value of foreign direct investment inflow. Apart from that, Serbia witnessed an extremely fast growth of the total value of exports, one of the fastest in the world in the period observed. Based on the trends so far, we can expect Serbia's above-average performance relative to global indicators to continue going forward, both when it comes to direct investment inflow and goods exports.

In the coming period, the NBS will keep a close eye on global economic flows, as well as trends in economic analysis and further development of the tools used. We will strive to apply the best world practice in our analyses in order to facilitate the decision-making process and the discharge of the functions that we are responsible for, according to the Law on the National Bank of Serbia, and above all in order to achieve our main goals – price and financial stability. Without prejudice to the achievement of these two goals, we will continue to support the economic policy of the Government of the Republic of Serbia and contribute to GDP growth.



Dr. Jorgovanka Tabaković, Governor

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Working Papers describe research in progress by the author(s) and are published to encourage discussion and suggestions for future work.

National Bank of Serbia

ANALYSIS OF THE LABOUR MARKET AND ITS IMPACT ON INFLATION IN SERBIA

Jelena Momčilović and Mirjana Miletić

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Analysis of the labour market and its impact on inflation in Serbia

Jelena Momčilović and Mirjana Miletić

Abstract: In this paper we showed how labour market factors are included in the macroeconomic model which the National Bank of Serbia uses for the medium-term inflation projection, thus enabling an insight into labour market trends, as well as an analysis of the link with other macroeconomic indicators, notably their effect on inflation. The estimates obtained by applying the Kalman filter indicate that NAIRU is still below the unemployment rate, suggesting a positive unemployment gap and showing that the labour market in Serbia is not exerting any major pressures on inflation.

The paper also presents the results of testing the relevance of the hysteresis effect in the unemployment rate for Serbia. The hysteresis effect was confirmed by applying the unit root test and estimating the statistical significance of the stochastic trend in the NAIRU series.

Key words: labour market, inflation, NAIRU, monetary policy

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Non-Technical Summary

Labour market factors may impact inflation from the supply-side, as the rise in employment and wages increases production costs, as well as from the demand-side, by impacting consumption. Due to the implications this may have on monetary policy, central banks pay great attention to the labour market. The effects of labour market factors in inflation projection models used by central banks are mostly monitored through the real wage gap and the unemployment gap. The NBS Working Paper Bulletin from September 2022 explains how private sector wages are included in the National Bank of Serbia's medium-term inflation projection model, while this paper will elaborate in more detail the equations through which the unemployment gap is included in the model.

The unemployment gap is the difference between the actual unemployment rate and the efficient unemployment rate which does not drive inflation up, i.e. which is consistent with maintaining medium-term price stability. This is known in literature as NAIRU (non-accelerating inflation rate of unemployment). When the unemployment rate is above NAIRU, i.e. when the unemployment gap is positive, there is a labour surplus, which should drive wages and inflation down. The same is true vice versa, when the unemployment rate is below NAIRU, the labour market is considered tight because the environment of low unemployment exerts increasing pressures on wage growth and by extension on inflation.

However, unlike the unemployment rate, which is measurable and obtained based on data from labour force surveys, NAIRU is an unobserved component. There are different techniques for estimating NAIRU, and the estimate in this paper was obtained based on the structural New Keynesian model that contains a large number of equations that connect key macroeconomic variables from the domestic and international environment and estimate the effect on inflation, using the Kalman filter.

NAIRU is impacted by the structural factors and frictions in the labour market, and it can also be influenced by aggregate demand, i.e. the level of unemployment from the prior period. Extended periods of unemployment, which mostly occur in periods of higher unemployment rates, result in the loss of workers' skills, thereby decreasing their negotiating power, which results in growth of structural unemployment and lowers the potential output. In literature, this effect is known as hysteresis and is often tested in empirical literature. The presence of hysteresis suggests a more lasting impact of shocks on unemployment, as well as that economic policy measures can be utilised for lowering unemployment.

In our estimate, NAIRU is still lower than the unemployment rate and will remain so until the end of the projection horizon, which indicates that the labour market should not have a large inflationary effect in the coming period, despite the fact that we anticipate a further decline in the unemployment rate and real wage growth.

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1 Introduction

Though labour market factors were not a key source of global inflation growth in the wake of the coronavirus pandemic outbreak, they can result in inflation turning out to be more persistent than anticipated and in slowing the disinflation process. A spike in consumer demand after the initial phase of the pandemic triggered labour force demand, hence conditions in the labour markets of many countries tightened increasingly over time because nominal wages recorded significant growth, and unemployment was at a historical minimum in a number of countries. Also, inflation trending at an elevated level longer than initially expected increased the risk of opening the wage-inflation spiral, i.e. the risk of increased pressures towards further wage growth in order to keep up the pace with inflation or even exceed it, given that wages in many countries were declining in real terms, despite nominal growth. In a number of countries, the unemployment rate dropped so low that we may wonder if it is below the NAIRU level. This brought the so-called Phillips curve concept back into the game. For a long time during the low inflation period in the wake of the 2008 world financial crisis, the Phillips curve was claimed to be vertical and that the reverse proportion between inflation and economic activity (unemployment) is invalid.

Because of this, the analysis of the labour market and the estimate of its impact on inflation gains special importance in the current circumstances, and is increasingly more often the subject of central banks' empirical analyses. Also, central banks adjust their inflation projection models to have a more adequate view of the potential effects of the labour market on inflation.

One of the concepts used for assessing the impact of labour market factors on inflation is the unemployment gap, which compares the unemployment rate with NAIRU – the unemployment rate that generates neither inflationary nor disinflationary pressures, i.e. at which the labour market exerts no pressures on inflation and the output potential. As an indicator of the level of labour market tightness, the unemployment gap is among the more significant factors affecting nominal wages and inflation. When negative, it leads to increased pressure on wages and inflation.

Given that unemployment in Serbia was on the decline in the previous decade, i.e. in the period 2014–2024, that there is a shortage of workforce in some groups of occupations and that wages in the prior period posted two-digit growth rates, the question arises as to whether conditions in the labour market are tight and therefore exert an inflationary effect. From the aspect of monetary policy conduct, this is a very important thing that must be estimated because an adequate monetary policy response may mitigate the effect of cyclical factors on unemployment and, by extension, on inflation, arising on this account. Therefore, this paper will show how the National Bank of Serbia's (NBS) medium-term inflation projection model includes labour market factors and estimates their effect on inflation. Data on wages that we

use pertain to private sector wages. At the same time, we will give an assessment of the NAIRU level for Serbia based on the estimated model.

The paper is structured into several sections. In the second section, we will present the definition of NAIRU and its relevance for the monetary policy; in the third, we will briefly present the methodology used for the estimate; and in the fourth, the results of empirical analyses for other countries (Central, Eastern and Southeast Europe). In section five we will present the dynamics of the labour market in Serbia over the past decade according to the key indicators. In section six, we will show the manner in which the labour market is included in the model used by the NBS for medium-term inflation projection. The section with the results of the empirical analysis provides an estimate of NAIRU based on models used for medium-term inflation projections; it also tests Okun's law and the hysteresis effect. The final section provides a summary of the main conclusions of the analysis.

2 The definition of NAIRU and its relevance for monetary policy

The labour market yields significant effects on the level of production activity and inflation, which is why central banks carefully monitor labour market indicators (wages, employment, unemployment rate, etc.), project their movement, and estimate the impact on other macroeconomic indicators. One of the key labour market indicators in terms of monetary and fiscal policy measures is NAIRU (non-accelerating inflation rate of unemployment), which was first defined by Modigliani and Papademos (1975). According to the definition, NAIRU is the unemployment rate that does not accelerate or decelerate inflation, i.e. the unemployment rate consistent with price stability in the medium term. As such, it is used to estimate the degree of unutilised capacities and the strength of inflationary pressures. The difference between the actual unemployment and the estimated NAIRU rate is called the unemployment gap. Generally, when the unemployment rate is above NAIRU, i.e. when the unemployment gap is positive, there is a labour surplus, which should drive wages and inflation down. The same is true vice versa, when the unemployment rate is below NAIRU, the labour market is considered tight because the environment of low unemployment exerts increasing pressures on wage growth and by extension on inflation. The reverse proportion between unemployment and inflation is known as the Phillips curve.

The Phillips curve was sharply criticised by monetarists, notably Friedman, who believed that a certain trade-off between unemployment and inflation only exists in the short term, while the long-term Phillips curve is vertical. Friedman (1968) introduced the term NAIRU as the unemployment rate at which inflation is stable. In contrast, Phelps (1967) believed that the Phillips curve is valid in the long term as well.

The practical implementation of the NAIRU concept is enabled by the New Keynesian models, based on the assumed nominal rigidity of wages. According to this group of models, corporate profits decline in periods of economic slowdown, which companies can compensate for either by trimming nominal wages or by downsizing their workforce. Given that wages are rigid downward, the adjustment is mostly made through layoffs. Moreover, unemployment growth widens the unemployment gap, which results in lower wages of the newly employed. This way it is possible to project wage movements, therefore this approach becomes an

important analytical instrument that central banks may use in the process of monetary policy decision-making.

NAIRU is often interchangeably used with the natural rate of unemployment (NRU), for instance, by Gordon and Blanchard, though there are some differences between the two terms. When the unemployment rate is equal to the so-called natural rate of unemployment, this means that all who are able and willing to work are employed, i.e. there is no cyclical unemployment which is under the impact of the production cycle phase (demand-side factors), but it is determined only by the structural factors and labour market friction. Both NAIRU and the NRU are under the impact of structural factors and labour market friction; however, NAIRU is not a measure of the equilibrium unemployment rate, but rather a measure that is estimated based on the link between the unemployment rate and inflation, which is why it fluctuates more than the NRU. Still, in the long term, NAIRU converges toward the NRU, because of the exhaustion of the effect of shocks that may impact its movement. With the NRU, the markets are in equilibrium, but this need not be the case with NAIRU. While NAIRU is primarily important for the monetary policy conduct, because monetary policy can reduce fluctuations of cyclical unemployment, monetary policy has quite a small or no impact on the equilibrium unemployment rate which is determined by structural factors, therefore the NRU is relevant primarily for the fiscal policy conduct. Beside NAIRU and the NRU, the concept of NAWRU (non-accelerating wage rate of unemployment) is also used, linking structural unemployment with wages instead of with inflation, and in empirical analyses this concept is used by the European Commission, for example. The NAIRU concept can be distinguished from the short-term NAIRU, which indicates unemployment that stabilises inflation in the coming period at the current inflation level.

In theoretical literature, factors determining the level of NAIRU are usually macroeconomic factors (total factorial productivity, real interest rate, risk premium, etc.), **demographic factors** (share of active population in total population, migration indicators, etc.), **degree of labour market regulation and strength of workers' unions** (minimal wage level, facilities in the labour market such as partial work hours, flexible forms of employment, unemployment benefit system, etc.), **education system** (possibility of dual education), **tax treatment of the labour market**, etc. Economic conditions can have an extended effect on NAIRU, which is known as the hysteresis effect in literature and was introduced in economic theory by Blanshard and Summers (1988). At the same time, this is one of the explanations why NAIRU is not a constant, but changes over time. Thus, for instance, longer periods of unemployment, which mostly occur in periods of a high unemployment rate, result in the loss of workers' skills, which in turn degrades their negotiating power. This results in the rise of structural unemployment and reduced potential output. In conditions of high hysteresis, the consequences of shocks on the labour market are greater – in case of recession, unemployment rises more, and it also remains elevated even after the recession. This implies that NAIRU also depends on the actual unemployment rate from the previous period.

Although the theoretical concept of NAIRU is quite important in the inflation and wage analysis and forecasting, as well as the economic policy conduct, its practical implementation poses an issue since NAIRU, and by extension the unemployment gap, are not variables that

can be directly measured or identified. In view of this, several different techniques for the assessment of NAIRU are used in literature, which we will describe in more detail below.

3 Methods for estimating NAIRU

Several different ways for modelling NAIRU are used in empirical analysis, which can be divided into three main groups. The first group includes statistical models based on the estimate of the unemployment rate trend on the basis of Hodrick-Prescott or Baxter-King filters, and the Beveridge–Nelson model (1981), but a shortcoming of these models is the fact that they do not take into account the impact of other factors on its level (Fabiani and Mestre (2000)). The other group includes models based on the concept of a reduced form of the Phillips curve, taking into account the unemployment and inflation rates, but can also include the impact of other factors, such as imported inflation or inflation expectations, while assessments are made by applying the Kalman filter which enables the modelling of variables that are not directly measurable **or are unobserved**, such as NAIRU. The third group of models are the **New Keynesian** structural models which enable us to estimate NAIRU, as well as to estimate the NRU **in the equation system** (Galí, J., Smets, F. & Wouters, R. (2011)).

The simplest version of the Phillips curve is based on the theory that the deviation of unemployment (U_t) from the equilibrium level (U^{NAIRU}) is reversely correlated with inflation (π_t), i.e. that a level of unemployment higher than NAIRU lowers inflation and vice versa, which can be presented as the following equation:

$$\pi_t = \pi_t^e + \beta(U_t - U^{NAIRU}). \quad (1)$$

If expectations are adaptive, then the following is true:

$$\pi_t - \rho\pi_{t-1} = \beta(U_t - U^{NAIRU}) + \Delta\psi_t. \quad (2)$$

This means that inflation will rise or fall until the unemployment rate is equal to NAIRU.

If there is the hysteresis effect, i.e. if NAIRU is dependent on the previous unemployment rate, and not just structural factors (Z_t), the following is true:

$$U^{NAIRU} = \varphi U_{t-1} + Z_t. \quad (3)$$

Given that the hysteresis effect assumes a change in NAIRU over time, this effect is tested in empirical analyses via a deterministic or stochastic trend in the movement of NAIRU. Alternatively, this effect can also be tested using unit root tests that estimate the stationarity of the NAIRU series (Gordon (1997)). If the existence of the unit root in NAIRU is confirmed, the hysteresis effect is identified.

When it comes to structural New Keynesian models, the so-called gap analysis models, NAIRU is estimated starting from whether it can be presented in the following manner:

$$U_t^{NAIRU} = U^* + \hat{U}_t^{NAIRU}, \quad (4)$$

where U^* is the long-term balanced unemployment rate, which is, statistically, the provisional medium in the model, and \hat{U}_t^{NAIRU} is the cyclical deviation from the equilibrium unemployment rate.

Further:

$$\hat{U}_t^{NAIRU} = \lambda \hat{U}_{t-1}^{NAIRU} + \epsilon_t. \quad (5)$$

This means that in the short term, NAIRU may deviate from the natural rate due to the effect of cyclical factors whose impact on NAIRU can turn out to be more persistent.

Okun’s law is assumed to be valid in this group of models, thus the link between the unemployment gap ($U_t - U_t^{NAIRU}$) and the output gap (\hat{y}_t) is established as follows:

$$U_t - U_t^{NAIRU} = \beta(U_{t-1} - U_{t-1}^{NAIRU}) - (1 - \beta)\varphi\hat{y}_t. \quad (6)$$

In his paper [Okun, A. M. (1962)], Arthur Okun empirically examined the relationship between changes in the unemployment rate and changes in real GDP. The analysis established that a 1 pp reduction in real GDP growth increases the unemployment rate by 0.3 pp. Many studies have confirmed this finding and in a way, Okun’s law has become a formula and a useful reference for calibration when estimating macroeconomic models. When estimating trends (e.g. U_t^{NAIRU}) and gaps (e.g. output gap \hat{y}_t) unidimensional (HP) and multidimensional filters (Kalman) can be used. We also use the Kalman filter to estimate trends and gaps in equations in our medium-term inflation projection model.

4 An overview of empirical literature on NAIRU estimate and Okun’s law

Below we will present a brief overview of the results of empirical studies of NAIRU estimate conducted for Central and Eastern European countries (Table 1). The results of analyses were mostly based on unit root tests (time series or in panel) and for the most part they corroborated the non-stationary nature of the NAIRU series and the hysteresis effect.

Table 1 Overview of empirical literature on NAIRU estimate and testing the hysteresis effect for CESEE countries

Author(s)	Sample	Method of analysis	Findings of analysis
Leon-Ledesma, McAdam (2003)	Czech Republic, Poland, Hungary, Slovenia, Slovakia, Latvia, Lithuania, Estonia, Bulgaria, Romania, Russia, Croatia and EY15; 1991: M1-2002: M3	Unit root testing of time series and in panel, Markov models	Unit root testing rejects the hysteresis hypothesis for Central and Eastern European countries if the effects of structural changes and the production cycle are controlled, but the adjustment effect is faster than in EU-15
Camamero, Carrion-i-Silvestre, Tamarit (2005)	Czech Republic, Poland, Hungary, Slovenia, Slovakia, Latvia, Lithuania, Estonia, Romania, Croatia, Malta and Cyprus; 1998: M1-20007: M12	GLS unit root testing which tests the hysteresis in contrast with the natural unemployment rate	The hysteresis effect is confirmed, but rejected if the presence of two structural breaks is allowed during unit root testing
Cuestas, Gil-Alana, Staehr (2011)	Czech Republic, Poland, Hungary, Slovenia, Slovakia, Latvia, Lithuania, Estonia; 1998: M1-20007: M12	Unit root testing and ARFIMA models	Unemployment is non-stationary, thus confirming the hysteresis effect, the least persistence is recorded in Hungary and Slovenia, and the strongest in Poland
Nemec, Vasicek (2011)	Czech Republic and New Zealand; 1996: Q1-2007: Q3	Bayesian estimation, DSGE model, Kalman filter	The hysteresis effect is confirmed for the Czech Republic, while testing for New Zealand was completed using the Bayesian model that enables the estimation of time-varying parameters. In the Czech Republic, NAIRU is influenced by previous unemployment, and in New Zealand by the structural factors

Author(s)	Sample	Method of analysis	Findings of analysis
Gözügör (2013)	Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Poland, Slovakia, Slovenia; 1998: M1-2012: M1	Unit root testing in panel	Hysteresis effect confirmed
Marjanović, Maksimović, Stanišić (2014)	Bulgaria, Romania, Czech Republic, Poland, Hungary, Slovenia, Slovakia, Croatia; 2000: Q1-2012: Q4	Kalman filter for the NAIRU estimate; unit root testing for estimating the hysteresis effect; panel regression with fixed effects for estimating the link between NAIRU and inflation	Hysteresis effect confirmed for the greater part of the sample; significant fall in NAIRU for all countries except Hungary, in 2012 the Czech Republic had the lowest NAIRU (6.5%), and Bulgaria the highest (9.7%); inflation has a significant effect on NAIRU
Szabo (2015)	Hungary; 1998–2014	HP filter, state-space model with Kalman filter for estimating NAIRU and the unemployment gap, VAR models for estimating prediction power	The best results in terms of the wage prediction power were recorded by the model based on the Phillips curve, halt in the labour market is still present at end-2014
Mladenović (2016)	Bulgaria, Romania, Hungary, Slovenia, Croatia; 2004: M1-2015: M7	Unit root testing and ARFIMA models	Hysteresis effect confirmed for Hungary and Slovenia, systemic component of the trend is impacted by strong shocks and the series show a greater degree of persistence than purely stationary series
Kaderabkova, Jasova (2020)	Czech Republic and Poland; 2000: Q1–2016: Q4	Phillips curve, HP filter for NAIRU estimate	Low slope coefficient of the Phillips curve in the case of the Czech Republic (-0.19) and Poland; NAIRU for the entire observed period for the Czech Republic is 6.7%, and for Poland 12.5%. NAIRU is impacted by unemployment incentives, in the Czech Republic also by the minimum cost of labour, and in Poland by imported inflation

In his paper, Andreescu, F. D. (2024) analysed to which extent Okun's law is valid in Central and Eastern European countries. The sample in this paper covers the period from 2010 to 2019, observed quarterly. Okun's coefficient varies among observed countries and the conclusion is that it can be used as a tool for comparing labour market performance among countries. The coefficient of determination is low, indicating that the parameter does not have a high statistical significance, but can be used for projections of relationships between the observed variables bearing in mind the tests of the significance of the tested relationship. The paper concluded that the unemployment rate in developing countries is less sensitive to changes in real GDP than in advanced economies, which the author associates with different employment policies implemented in those countries.

In their paper, An, Z., Ball, L., Jalles, J., and Loungani, P. (2019) tested whether Okun's law is applicable on data for 70 countries in the period between 1990 and 2015 on several groups of countries, yielding results for each individual country. The authors used the estimate of a simple linear relationship between changes in the unemployment rate and changes in real GDP, and analysed how well this relationship can be forecast on the grounds of the historically-based estimated coefficients. The paper gives a detailed overview of the obtained coefficients by groups of countries according to their income level, suggesting the conclusion that on average, the estimated coefficients confirm Okun's law in the majority of high-income advanced countries, i.e. the values of estimated coefficients are around 0.3, while the value of this coefficient is on average lower for lower-income countries. As in the previously mentioned paper, this can be attributed to structural differences in the labour market.

5 Dynamics of movement of labour market indicators in Serbia in the past decade

The labour market recovery in Serbia over the past decade (2014–2024) was brought about by favourable macroeconomic movements, responsible economic policy conduct, accelerated economic growth and a more favourable business and investment environment, resulting in a high inflow of FDI and the creation of new jobs. Improved labour market indicators and the market's increased efficiency was also the result of labour market reforms and the implementation of active employment measures, enabled by amendments to the Law on Labour, adopted in 2014. The amendments enabled the extension of the maximum length of the fixed term contract from one to two years, work from home and part-time work, while severance pay and the past years of service are calculated according to the years of service with the latest employer, and not in total, etc.

All key indicators in the Labour Force Survey – activity, employment and unemployment rates – suggested an improvement in the labour market. Though data for the past period are not fully comparable because of methodology changes in the Labour Force Survey, in which as of 2021 indicators according to the 2022 population census were presented, it is clearly evident that all key indicators displayed an upward trend over the past decade.

The activity (participation) rate, that measures the share of labour force in working age population, averaged 62.5% in 2014, only to exceed 66% in 2020. In the past three years the participation rate rose further, reaching around 72% in 2023. With the rise in activity, the total employment rate also increased: in the period 2014–2020 it climbed almost 7 pp to 47%. Calculated according to the new methodology, in 2023 this rate exceeded 50%. Thanks to FDI, which were diversified not only in terms of production sectors but geographically as well, better alignment of labour market indicators by region was secured.

Table 2 Labour market indicators according to the Labour Force Survey

Year	Participation rate (15–64)	Activity rate (15+)	Employment rate	Unemployment rate	Long-term unemployment rate	Inactive population rate
2013	62.2	50.3	38.3	24		49.7
2014	62.5	50.7	40.3	20.6		49.3
2015	62.7	50.3	40.7	18.9		49.7
2016	64.6	51.8	43.3	16.4		48.2
2017	65.6	52.4	44.8	14.5		47.6
2018	66.7	52.9	45.6	13.7		47.1
2019	66.8	52.9	47	11.2		47.1
2020	66.4	52.2	47.1	9.7		47.8
2021*	69.7	53.8	47.8	11.1	5.5	46.2
2022	70.9	54.7	49.5	9.5	4.4	45.3
2023	71.7	55.4	50.2	9.4	4.2	44.6
Q1 2024	72.5	56.2	50.9	9.4	4.1	43.8

Note: Since 2021, data were revised in line with the 2022 population census. The table shows annual averages.

Increase in activity and employment was accompanied by a significant decrease in the total unemployment rate, which was practically halved in six years, from 20.6% in 2014. In the past two years the rate stabilised at around 9.5%, with a mild fall in long-term unemployment to the level of slightly above 4%. According to data of the National

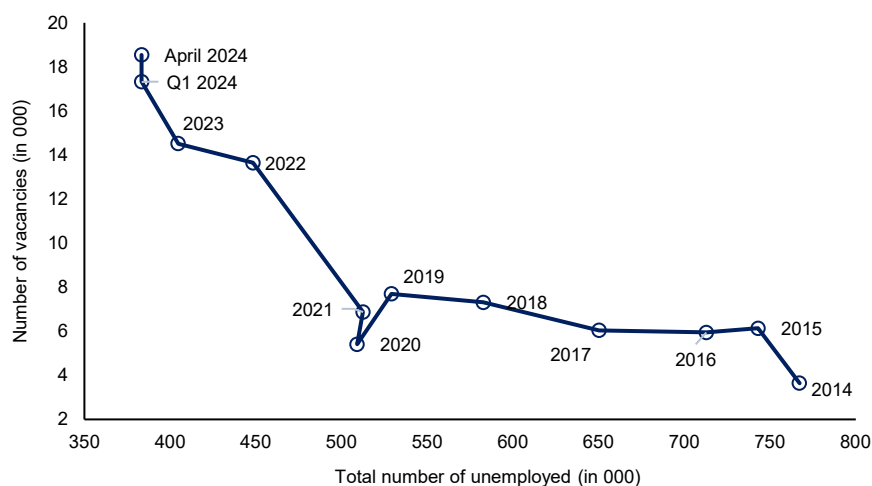
Employment Service, in July 2023 total unemployment dropped below 400,000 persons, and in April 2024 measured slightly more than 382,000 compared to 742,000 at end-2014.

The total number of the formally employed rose by almost 380,000 persons in the past ten years, to 2.4 mn persons in April 2024. Formal employment rose primarily in the private sector, measuring close to 1.75 mn persons in April, having risen by almost 407,000 persons relative to the average employment level from 2014. By activity, the biggest employment increase was recorded in manufacturing (128,000 persons), followed by trade (60,000) and the ICT sector (59,000). The number of employed persons decreased only in agriculture (by around 11,000), as did the number of individual agricultural producers, where the share of the so-called vulnerable employment (self-employed and family workers) is the highest. Concurrently with the increase in total formal employment, there was a decrease in the share of informal employment, i.e. the percentage of persons working without a formal employment contract in the total number of employees – from the average of 21% in 2014 to around 12.5% in 2023, owing to stepped-up inspections and a more efficient fight against the grey economy.

The following charts show the relationship between the average number of unemployed persons and the number of job vacancies (approximated with the corporates' reported demand for employment by age) – **Beveridge curve**, as well as the relationship between the unemployment rate and average core inflation by year – **Phillips curve**.

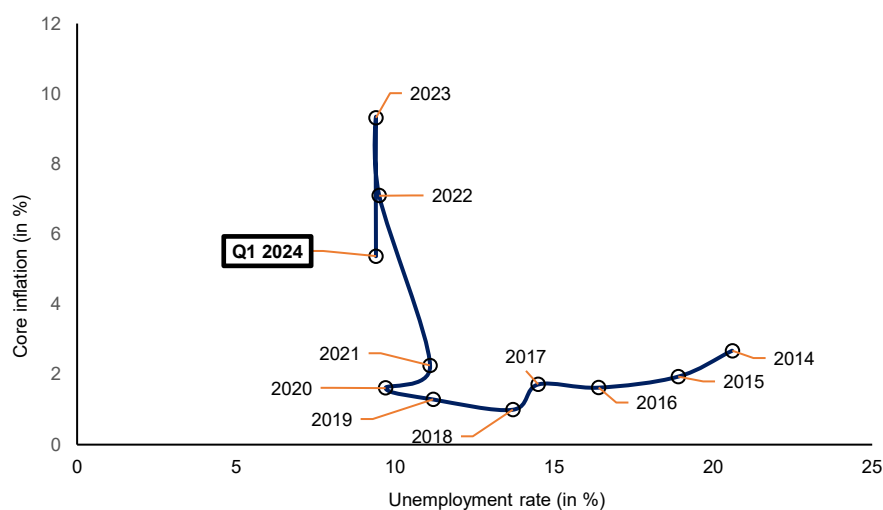
The Beveridge curve graph shows that the curve had a negative slope during the observed period – it moved left and up, indicating an increase in labour market flexibility and efficiency in connecting labour force supply and demand, as well as that the total economic recovery spilled over onto the labour market by creating new jobs and lowering unemployment numbers.

Chart 1 Relationship between unemployment numbers and the job vacancy rate – Beveridge curve



Source: National Employment Service and NBS calculation.

Chart 2 Relationship between the unemployment rate and core inflation – Phillips curve



Source: SORS.

For the bulk of the observed period (2014–2020), the Phillips curve did not have a negative slope which would have been anticipated according to economic theory. Because of the fact that unemployment was high in the prior period and above NAIRU, its decrease did not reflect on inflation growth, which was extremely low in this period, owing to the full coordination of monetary and fiscal policy measures, with efficient fiscal consolidation and the preserved relative stability of the exchange rate in the domestic market, as well as low prices of primary commodities in the global market.

Since 2021, against the backdrop of rising global prices of energy and other primary commodities and halts in supply chains, further intensified with the outbreak of the conflict in Ukraine, inflation rose both globally and at home. Despite stronger inflationary pressures and monetary tightening, labour market conditions did not deteriorate, and the unemployment rate did not increase, but rather started to edge down slightly. With wages simultaneously posting two-digit y-o-y growth rates, and labour force shortages occurring for some occupation groups, the question arises as to whether conditions in the Serbian labour market have become tight and whether they are having an inflationary effect. This is why the model used for medium-term inflation projection was supplemented to include labour market factors to a greater degree.

6 Inclusion of the labour market into the NBS medium-term inflation projection

The medium-term inflation projection model, whose main postulates are explained in a paper in the NBS *Working Papers Bulletin*,¹ has been adjusted to improve the monitoring of labour market factors and estimate their impact on inflation and economic activity.

¹ [wp_bulletin_09_22.pdf\(nbs.rs\)](#).

In the current model, real wages are an important factor impacting inflation. It has been assumed in the model that the movement (deviation) of real wages, together with the real exchange rate and real production – relative to their potential, i.e. the equilibrium level – ultimately determine the total marginal costs included in inflation equations. The definition of real wages ($dl_realwage$) is standard:

$$dl_realwage_t = \pi_t^{wage} - \pi_t, \quad (7)$$

i.e. nominal wage growth (π_t^{wage}) is adjusted by inflation movement.

The measure of inflationary wage pressures is presented by the deviation of real wages from equilibrium:

$$wage_gap_t = l_realwage_t - l_realwage_tnd_t. \quad (8)$$

To achieve the equilibrium real wage, real wage growth should be equal to productivity growth in the long run. In this case, productivity growth is defined as productivity growth per worker or GDP growth adjusted to employment growth. In equilibrium, this definition of productivity growth ($ss_dl_realwage_tnd$) would become potential GDP ($ss_dl_y_tnd$) adjusted to equilibrium employment growth ($ss_dl_empl_tnd$) (Karel, M, Pranovich, M. & Vlcek, J. (2018)).

The equation of real wage trend ($dl_realwage_tnd$) is as follows:

$$dl_realwage_tnd_t = a_{11} \cdot dl_realwage_tnd_{t-1} + (1 - a_{11}) \cdot ss_dl_realwage_tnd + \varepsilon_t^{wedge}, \quad (9)$$

where

$$ss_dl_realwage_tnd = ss_dl_y_tnd - ss_dl_empl_tnd. \quad (10)$$

As we assume in the model, the steady state of potential GDP growth rate ($ss_dl_y_tnd$) will equal 4% in the long run. Employment growth ($ss_dl_empl_tnd$) is assumed to measure 0.6% in the long run, and the steady state of the real wage growth trend ($ss_dl_realwage_tnd$) will be 3.4%.

After defining the equations for real wages and their trend, in the model, the real wage gap ($wage_gap_t$), as a component of real marginal costs of the Phillips curve, is obtained as a difference between real wages and their trend.

The real wage gap approximately reflects unit labour costs that employers face. In fact, the real wage gap reflects real wages adjusted to equilibrium productivity, while the definition of unit labour costs concerns real wages adjusted to current productivity. The real wage series was previously logarithmed.

Though real wages are the reason why inflation deviated from the target, the basic equation we start from concerns nominal wages. In the model, nominal wages follow the Phillips curve (wage inflation), which depends on the wage expectation and nominal wages from the previous period. The movement of nominal wages is also depended on the real wage and output gaps. The real wage gap plays an equilibrium role: if it is positive, it is not only that nominal wages rise above headline inflation, but real wages rise above productivity as well.

The productivity gap in the model is measured through the difference in the GDP gap and the employment gap ($y_gap_t - empl_gap_t$), which is why employers will be forced to reduce nominal wages. The employment gap will be explained further on, once we introduce the equations relating to labour market dynamics (Botha, B., Jager, Sh., Ruch, F. & Steinbach, R. (2017)).

The nominal wage equation is as follows:

$$\pi_t^{wage} = a_{12} \cdot \pi_{t-1}^{wage} + (1 - a_{12}) \cdot E_t \pi_t^{wage} + (a_{13} \cdot (y_gap_t - empl_gap_t) - a_{14} \cdot wage_gap_t) + \varepsilon_t^{\pi^{wage}}, \quad (11)$$

which means that nominal wages depend on past wages, expectations of future wages and the difference between the productivity gap and the real wage gap. Compared to the model changes presented in the paper in the *Working Papers Bulletin* for 2022, in the meantime we added a new equation for the wage expectation. It is a combination of the model projection of the expected change of nominal wages and the movement of inflation expectations ($E_t \pi_{t+4}$), adjusted by the equilibrium level of wages:

$$E_t \pi_t^{wage} = a_{15} \cdot \pi_{t+1}^{wage} + (1 - a_{15}) \cdot (ss_dl_realwage_tnd + E_t \pi_{t+4}) + \varepsilon_t^{\pi^{wage}}. \quad (12)$$

Introducing the labour market in the medium-term projection model, New Keynesian model, implied a previous estimate of unobserved components (gap and trend), by using the HP filter.

Given the specificities of the labour market and data from the Labour Force Survey, we analysed the period from Q1 2010 to Q1 2024. First, we had to estimate potential employment for Serbia as the equilibrium level of wages is obtained once potential GDP growth is adjusted for potential employment growth.

We used the Labour Force Survey data on the working-age population outside agriculture² ($pop64_t$), the activity rate outside agriculture³ (pr_t) and the unemployment rate (unr_t), with the assumption that there are no unemployed persons in agriculture. We applied the HP filter to each of the specified series, and obtained their trend components. The $unr_tnd_hp_t$ series is used in our analysis only temporarily as the NAIRU measure to obtain the estimate of potential employment. Finally, based on the obtained data, we can calculate potential employment ($empl_tnd_t$) by applying the following:

$$empl_tnd_t = pop64_tnd_hp_t * pr_tnd_hp_t * (1 - unr_tnd_hp_t). \quad (13)$$

The employment gap equation ($empl_gap_t$) is an autoregression processes adjusted by the unemployment rate gap. The trend in employment is an autoregression process, assuming the employment growth trend measures around 0.6% in the long run.

² The working-age population outside agriculture includes persons aged 15 to 64, not engaged in agriculture. This number is obtained by excluding from the total number of employed persons those who are employed in agriculture and family workers.

³ The activity rate outside agriculture is a share of the active population outside agriculture in the working-age population. The active population, i.e. the labour force, consists of all employed and unemployed persons aged 15+.

$$empl_gap_t = a_{21} \cdot empl_gap_{t-1} - a_{22} \cdot unr_gap_t + \varepsilon_t^{emplgap} \quad (14)$$

$$empl_tnd_t = a_{23} \cdot empl_tnd_{t-1} + (1 - a_{23}) \cdot ss_dl_empl_tnd + \varepsilon_t^{empltnd} \quad (15)$$

$$empl_t = empl_gap_t + empl_tnd_t \quad (16)$$

Also, the equation for gap in the unemployment rate (unr_gap_t) is estimated according to Okun's law, with the unemployment rate trend, i.e. NAIRU, estimated in line with it. Given that our model estimates gaps, we estimated this relationship by using the GDP gap and the unemployment gap.

$$unr_gap_t = a_{31} \cdot unr_gap_{t-1} - a_{32} \cdot y_gap_t + \varepsilon_t^{unrgap} \quad (17)$$

$$nairu_t = a_{33} \cdot nairu_{t-1} + (1 - a_{33}) \cdot ss_nairu + \varepsilon_t^{nairu} \quad (18)$$

$$unr_t = unr_gap_t + nairu_t \quad (19)$$

We calibrated to -0.15 the coefficient with the GDP gap in the unemployment rate gap equation, bearing in mind the econometric analysis that we carried out on data for Serbia (section 7) and empirical findings from literature. This means that the growth of 1 pp in the GDP gap narrows the unemployment gap by 0.15 pp. We assumed that the equilibrium level of the unemployment rate in the long run (ss_nairu) is 6%.

The equations for inflation of food and non-food products and services, and the equation for aggregate demand, did not change compared to data presented in the 2022 *Working Papers Bulletin*.

The equation for inflation of non-food products and services is as follows:

$$\pi_t^{nonfood} = a_{41} \cdot \pi_{t-1}^{nonfood} + a_{42} \cdot \pi_t^M + (1 - a_{41} - a_{42}) \cdot E_t \pi_{t+4} + a_{43} \cdot z_gap_{t-1} + a_{44} \cdot y_gap_{t-1} + a_{45} \cdot wage_gap_t + \varepsilon_t^{nonfood}. \quad (20)$$

The equation for inflation of industrial-food products is as follows:

$$\pi_t^{food} = a_{51} \cdot \pi_{t-1}^{food} + a_{52} \cdot \pi_t^M + (1 - a_{51} - a_{52}) E_t \pi_{t+4} + a_{53} \cdot RMCP_gap_{t-1} + a_{54} \cdot z_gap_{t-1} + a_{55} \cdot y_gap_{t-1} + a_{56} \cdot wage_gap_t + \varepsilon_t^{food}. \quad (21)$$

The aggregate demand equation is as follows:

$$y_{gap_t} = a_{61} \cdot y_{gap_{t-1}} - a_{62} \cdot rmci_t + a_{63} \cdot y_{gap_t}^{ez} + a_{64} \cdot fi_t + a_{65} \cdot wage_{gap_{t-1}} + \varepsilon_t^{ygap}. \quad (22)$$

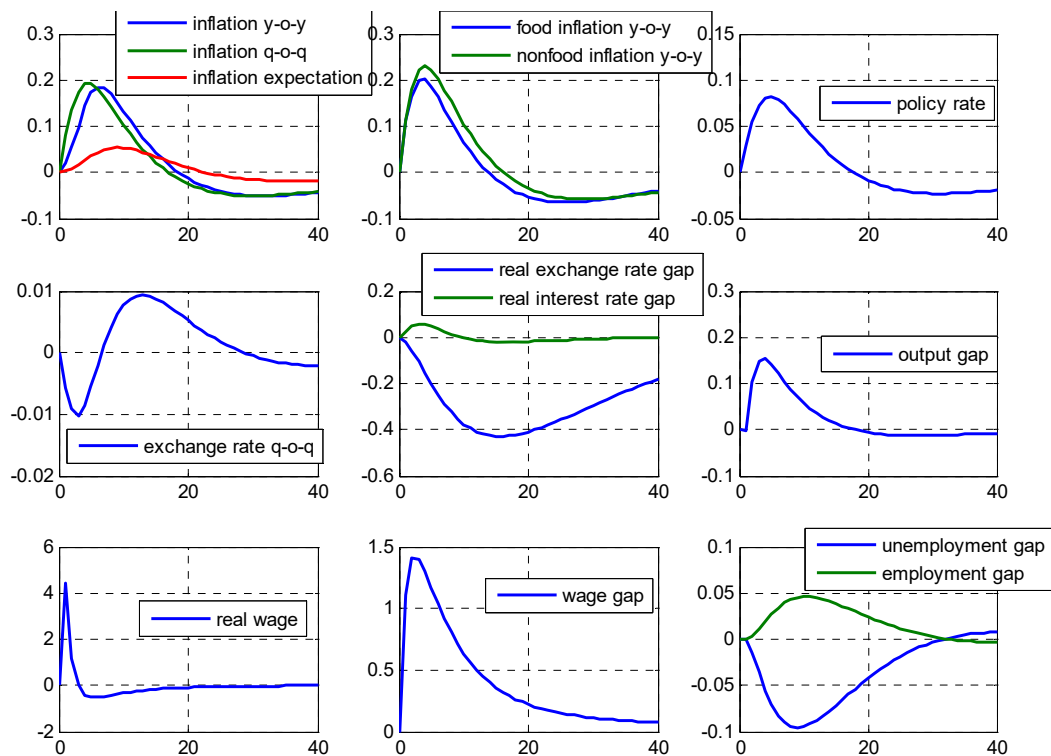
We observed the behaviour of variables in the estimated New Keynesian model through the impact of shocks in inflation, nominal wages, aggregate demand and monetary policy response, which we shall present later in the text. For identification of the notation given in the equations see Appendix.

6.1 Shock in nominal wages

If we assume the autonomous nominal minimal wage growth of 1% in a single quarter,⁴ this directly leads to the y-o-y nominal wage growth in the following four quarters.

⁴ The growth rates in the model are annualised, i.e. multiplied by four, which is why the nominal wage growth in Chart 3 equals 4% in Q1, although the shock is 1%.

Chart 3 Function of response to the shock in wage movement



The nominal wage growth that is faster than inflation increases real wages, opening the positive gap in real wages due to employer costs being higher than productivity growth. Higher company costs (a positive gap in real wages) place inflationary pressures in the food and non-food inflation component. Also, higher consumption opens a positive output gap. Higher demand reduces the unemployment rate following Okun's law, due to employment growth. Real wage growth higher than productivity growth quickly reduces nominal wages due to rising labour costs, which closes the positive gap in real wages.

The central bank responds by raising its key policy rate, basing that decision on projected headline y-o-y inflation for four periods ahead. A rise in nominal interest leads to a rise in real interest and the opening of the positive gap in real interest. Tight monetary policy, along with a reduction in real marginal costs of net importers, generates disinflationary pressures. Prices rise for a while longer as a consequence of inertia, exerting pressure on a reduction in real wages, while the central bank's response returns inflation to the target. A reduction in real wages contributes to the gradual opening of the negative output gap in the coming period.

6.2 Shock in the key policy rate

A shock simulation in the function of monetary policy response assumes a 1 pp rise in the key policy rate in one quarter. The function of monetary policy response in the medium-term projection model defines the way in which the central bank makes key policy rate decisions (i_t):

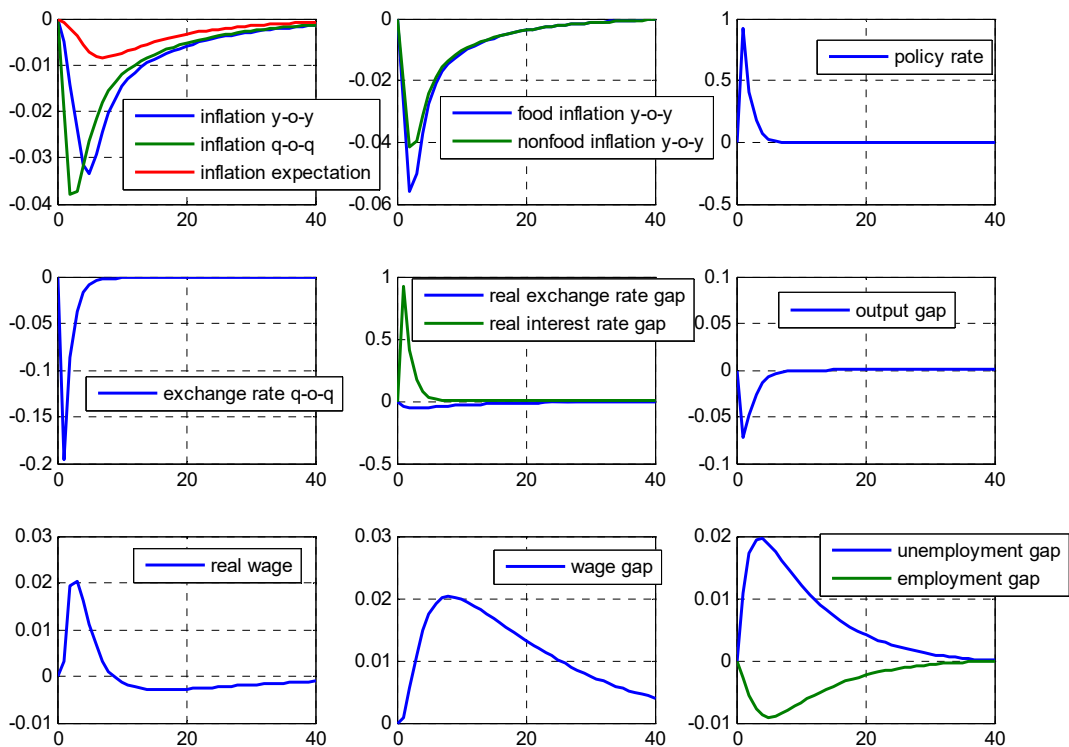
$$i_t = a_{71} \cdot i_{t-1} + (1 - a_{71}) \cdot [i_t^n + a_{72} \cdot ((1 - a_{73}) \cdot (\pi_{t+4} - \pi_{t+4}^{tar}) + a_{73} \cdot y_gap_t)] \tag{23}$$

Given the price rigidity, a rise in nominal interest leads to a rise in real interest. According to the uncovered interest rate parity, a rise in real interest triggers real appreciation, which leads to a drop in real marginal costs of net importers. This opens a real appreciation gap, which produces disinflationary pressures.

The opening of a positive gap in real interest, i.e. a rise in borrowing costs to finance consumption and investment, triggers a fall in demand, which also has a disinflationary effect. Reduced aggregate demand impacts unemployment growth and the opening of a positive gap in unemployment, i.e. a negative gap in employment.

In the following period, inflation’s decline leads to a rise in real wages and the opening of their positive gap. However, a fall in productivity and real wage growth above trend impacts a reduction in nominal wages, which, together with a rising interest rate, gradually brings inflation back to the target.

Chart 4 Function of response to a rise in the key policy rate

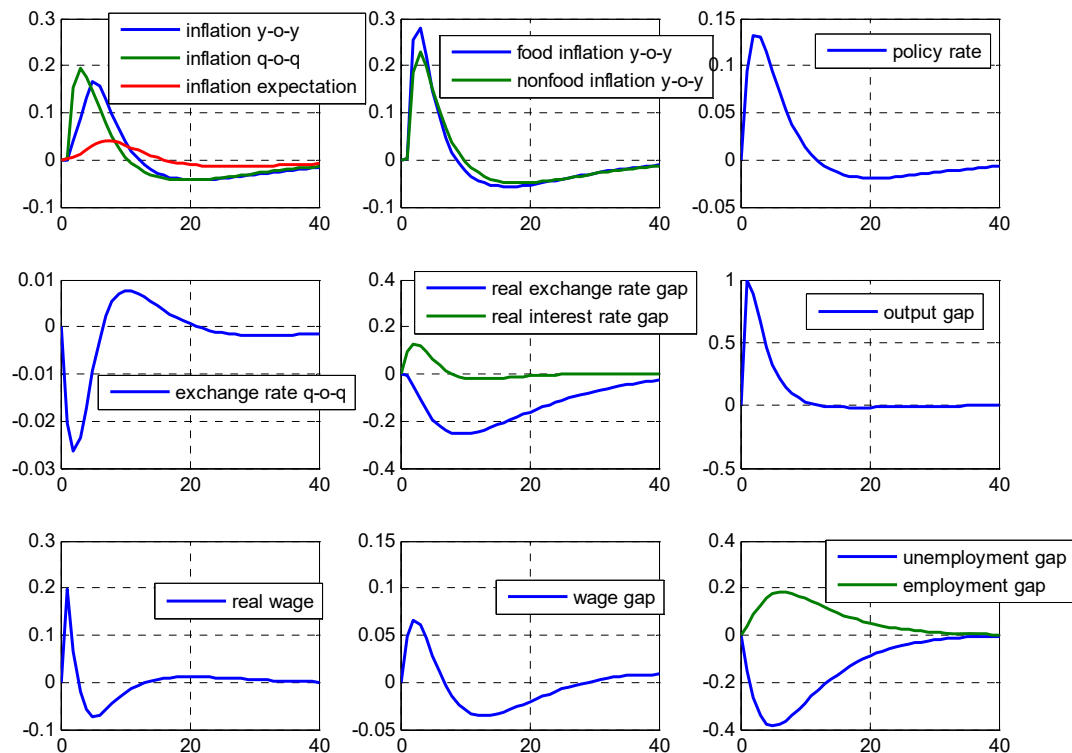


The central bank is forced to ease monetary policy in the coming quarters in order to return inflation to the target. The lowering of the key policy rate calms appreciation pressures, which, along with inflation going back to the target, leads to the closing of the appreciation gap, and thus of the negative output gap. This leads to the closing of the gap in real wages, employment and unemployment.

6.3 Demand shock

Let us assume that the autonomous demand growth of 1% took place and that the effects of this shock will remain for some time yet. Demand growth impacts a rise in real wages because productivity goes up. This results in an increase in nominal wages and employment, which opens a negative gap in unemployment. After two quarters, the negative gap in unemployment, together with demand, pushes inflation up. The central bank responds by raising the key policy rate, which, due to its movement rigidity, touches its peak five quarters later, resulting in the closing of the output gap and further influencing a reduction in productivity. By extension, all of this leads to a decline in nominal wages, which, along with real appreciation, leads to inflation's reduction.

Chart 5 Function of response to shock in the output gap



7 Results of the estimate of NAIRU and other labour market indicators based on the medium-term inflation projection model and testing the hysteresis effects

7.1 Empirical analysis of Okun's law for Serbia

This section elaborates on the empirical relation between real GDP and the unemployment rate. To prove the link between the unemployment rate and the GDP growth rate, Okun applied two different approaches:

1. Gap method – based on the estimate of the linear relationship between the deviation of the unemployment rate from NAIRU and the deviation of real GDP from potential GDP:

$$unr_{gap_t} = \beta \cdot y_{gap_t} + \varepsilon_t^{unrgap}, \beta < 0. \quad (24)$$

2. Difference model – based on the relationship between a change in the unemployment rate and the GDP growth rate:

$$\Delta unr_t = \alpha + \beta \cdot \Delta y_t + \omega_t. \quad (25)$$

By using data for Serbia, we estimated the relationship between unemployment and real GDP in the 2010–2024 period at the quarterly level, by applying the above two methods. Before estimating the coefficients that confirm whether there is a link between unemployment and GDP, we checked the stationarity of the series in levels and implemented the Granger causality test. The stationarity of the series of the unemployment rate and real GDP are tested by the Augmented Dickey-Fuller (ADF) test. The time series we have analysed – the unemployment rate and real GDP – are stationary in the first difference, while the deviations of these series from their trends, which we have estimated with the HP filter for these purposes, are stationary in levels.

Table 3 Results of the Granger causality test

Zero hypothesis	F statistics	Probability	Order of integration (ADF)
<i>Y does not Granger Cause U</i>	5.64889	0.0062	<i>I(1)</i>
<i>U does not Granger Cause Y</i>	1.32450	0.2753	

The Granger causality test confirms that real GDP growth impacts a reduction in the unemployment rate and that the reverse relationship is not true.

Table 4 Results of the ADF stationarity test

Variable	Order of integration	ADF		Exogenous
		T statistics	Probability	
ΔY	<i>I(0)</i>	-3.867328	0.0043	constant
ΔU	<i>I(0)</i>	-3.660437	0.0077	constant
Y_{gap}	<i>I(0)</i>	-4.296239	0.0001	–
U_{gap}	<i>I(0)</i>	-4.797625	0.0002	–

By estimating the equations (24) and (25) by the OLS method, the hypothesis of the negative relationship between unemployment rate and GDP is confirmed, when it comes both

to the gap method and the first difference method. According to the results obtained, the higher GDP growth rate of 1 pp will decrease the unemployment rate by 0.12 pp at the quarterly level. It should be noted that Okun’s coefficient may be sensitive to the approach used to estimate cyclical components (HP filter). In case of Serbia, the coefficient estimated by the gap method is similar with the first difference method estimation, which confirmed the direction and intensity of the relation we have estimated.

Table 5 Estimate of Okun’s law

Okun’s coefficient		<i>p value</i>		<i>R value</i>	
Gap method	Difference method	Gap method	Difference method	Gap method	Difference method
-0.111904	-0.123185	0.0256	0.0001	0.090539	0.247098

7.2 Estimate of NAIRU and other labour market indicators based on the medium-term inflation projection model and testing the hysteresis effects

We estimated NAIRU based on the model used for the medium-term inflation projection and the Kalman filter.

First, when it comes to the estimated NAIRU, the Chart below shows that in the past years it had a downward trajectory, supported by a reduction in the unemployment rate. However, the NAIRU remained below the level of actual unemployment rate. According to our estimate, the NAIRU currently stands at around 8%.

Chart 6 Unemployment rate and NAIRU (in %)

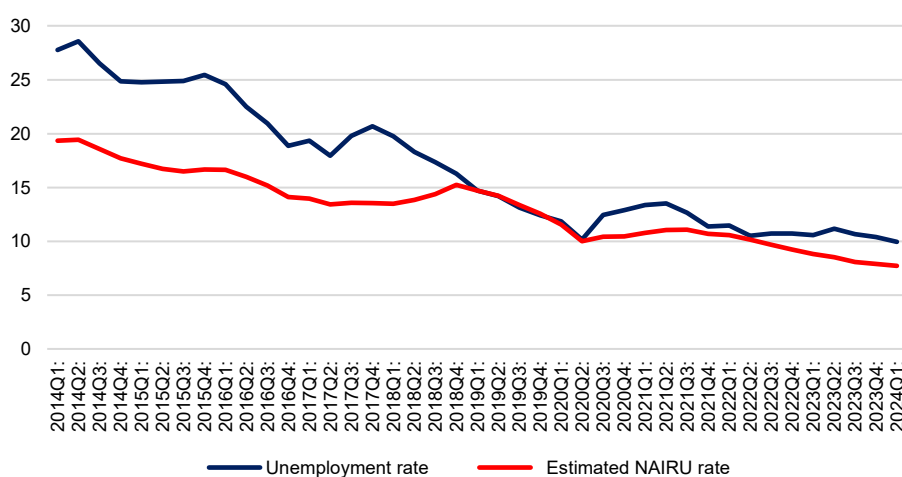


Chart 7 Employment (without agriculture) and the trend

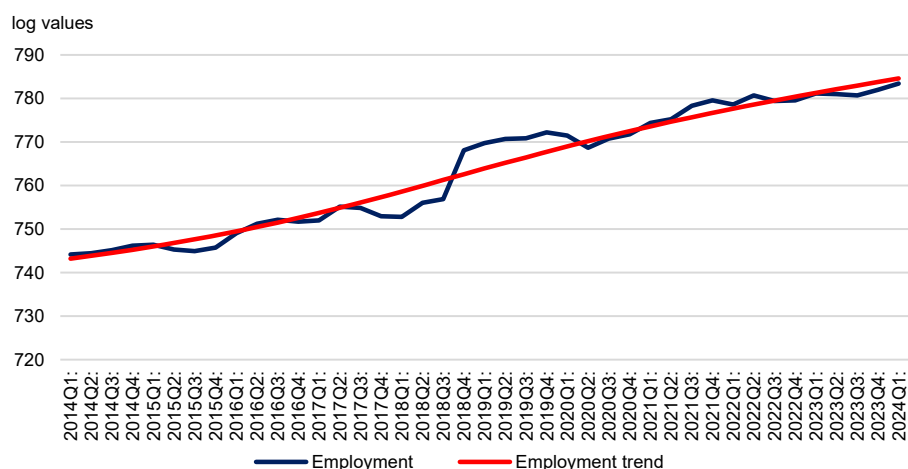
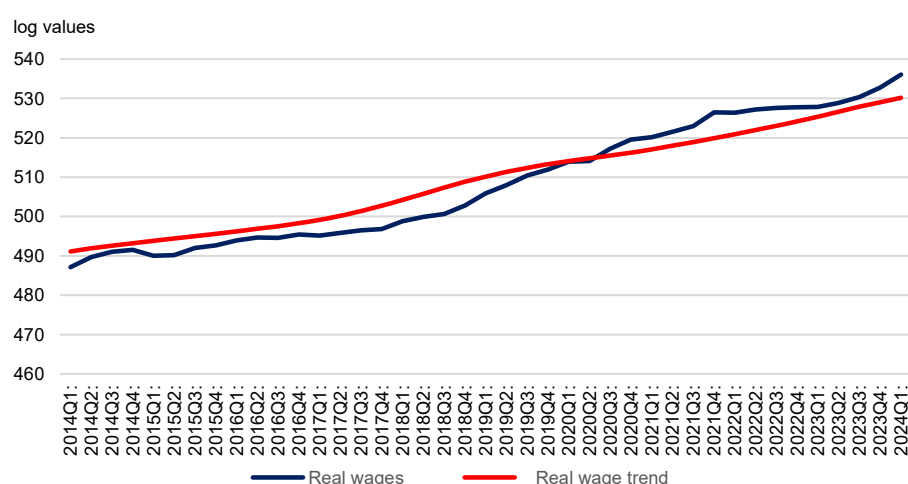


Chart 8 Real wages (private sector) and the trend



Given that the hysteresis effect means a change in NAIRU over time, we tested this effect by checking the statistical significance of the stochastic trend in the estimated NAIRU series. A negative and statistically significant trend value (-0.1626) is confirmed for the period from Q1 2014 to Q1 2024. We also tested the hysteresis effect by applying the ADF unit root test, as shown in the table below. The ADF also confirmed that the NAIRU series is non-stationary in the level, and stationary at the level of first differences, meaning that hysteresis effect is confirmed.

Table 6 Testing of NAIRU stationarity

Unit root test	ADF	
	H0: series contains the unit root	
	test value	number of lags
Level	-2.821952	1
First difference	-3.414401**	0

Note: ** refers to the statistical significance of 5%. The model with a constant and trend is estimated in the level, and the model with a constant is estimated in the first difference.

8 Conclusion

Empirical analysis of the labour market and the estimate of its impact on inflation are particularly gaining in importance in the current circumstances, notably for central banks. As the unemployment rate in Serbia is declining and there is high demand for some types of occupations, with wages recording two-digit growth rates in the past two years, an adequate estimate of labour market factors on inflation is important for the NBS.

To more adequately examine the effect of labour market factors, the NBS has upgraded its medium-term inflation projection model. While the paper in the September 2022 *Working Papers Bulletin* of the NBS elaborates on the model coverage of the impact of wages on inflation both on the supply- and demand-side, this paper outlines the impact of other labour market factors, starting from the concept of the unemployment gap, i.e. the difference between the achieved unemployment rate and the unemployment rate that does not raise inflation (NAIRU).

By applying the Kalman filter, NAIRU was estimated – it currently stands at around 8% and is likely to decline to around 6.6% until end-2026. According to our projections, it is likely to stay below the unemployment rate, indicating that the labour market is still not tight and is not generating any major inflationary pressures.

By means of impulse response functions, we have also shown the effects of the autonomous increase in wages, the key policy rate and demand on the key model variables (notably inflation).

At the end of the paper, by applying unit root tests and the statistical significance of the stochastic trend, we tested and confirmed the existence of the hysteresis effect – which points out that economic policy measures on the demand side can influence unemployment rate.

Appendix

Series used in the analysis

Code	Description	Source of data
L_{wage}_t	s-a nominal wages in the private sector, log series	SORS, seasonal adjustment carried out by tramo-seats method
π_t^{wage}	quarterly change in nominal wages	SORS, authors' calculation
$L_{realwage}_t$	real wages, log values	authors' calculation
$dl_{realwage}_t$	change in real wages	authors' calculation
$L_{realwage_tnd}$	real wage trend, log values	authors' calculation
$dl_{realwage_tnd}$	change in real wage trend	authors' calculation
$wage_gap_t$	real wage gap	authors' calculation
$empl_t$	number of employed persons in the economy, excl. the agricultural sector, log values	SORS
$empl_tnd_t$	employment trend	authors' calculation
$empl_gap_t$	employment gap	authors' calculation
unr_t	unemployment rate	SORS, Labour Force Survey
$nairu_t$	unemployment rate trend	authors' calculation
unr_gap_t	unemployment gap	authors' calculation
$pop64_t$	number of working-age population outside agriculture	SORS, authors' calculation
pr_t	activity rate outside agriculture	SORS, authors' calculation
$pop_64_tnd_hp$	trend of working-age population obtained by HP filter	authors' calculation
$pr_tnd_hp_t$	activity rate outside agriculture obtained by HP filter	authors' calculation
$ss_dl_realwage_tnd$	equilibrium real wage growth rate	authors' calculation
$ss_dl_y_tnd$	potential GDP growth rate in the long run	authors' assumption
$ss_dl_empl_tnd$	equilibrium employment growth	authors' assumption
ss_nairu	equilibrium level of the unemployment rate in the long run	authors' assumption
$E_t\pi^A_{t+4}$	one-year ahead inflation expectations	
$\pi_t^{nonfood}$	quarterly inflation of non-food products and services, s-a series	SORS, authors' calculation
π_t^{food}	quarterly inflation of industrial-food products, s-a series	SORS, authors' calculation
y_gap_t	output gap, obtained based on the series of non-agricultural value added	SORS, authors' calculation
$rmci_t$	real monetary conditions index	authors' calculation
$y_gap_t^{ez}$	euro area output gap	Eurostat, authors' calculation
z_gap_{t-1}	real exchange rate gap	authors' calculation
$RMCP_gap_t$	gap of real marginal costs in agriculture, ratio of prices of primary agricultural commodities and food prices	
fi_t	fiscal impulse, difference between two structural fiscal deficits	Ministry of Finance, authors' calculation
i_t	central bank policy rate	National Bank of Serbia
i_t^n	neutral interest rate	authors' assumption
π_{t+4}^{tar}	inflation target, four quarters ahead	National Bank of Serbia
π^A_{t+4}	y-o-y inflation, four quarters ahead	authors' assumption

Model coefficients

Coefficients	Values	Coefficients	Values
<i>Wages</i>		<i>Labour market</i>	
a_{11}	0.9	a_{21}	0.8
a_{12}	0.5	a_{22}	0.25
a_{13}	0.1	a_{23}	0.9
a_{14}	0.1	a_{31}	0.9
a_{15}	0.7	a_{32}	0.15
		a_{33}	0.9
<i>Non-food inflation</i>		<i>Food inflation</i>	
a_{41}	0.35	a_{51}	0.25
a_{42}	0.15	a_{52}	0.2
a_{43}	0.125	a_{53}	0.15
a_{44}	0.18	a_{54}	0.135
a_{45}	0.1	a_{55}	0.25
<i>Output gap</i>		a_{56}	0.1
a_{61}	0.2	<i>Monetary policy</i>	
a_{62}	0.15		
a_{63}	0.7	a_{71}	0.8
a_{64}	0.15	a_{72}	2
a_{65}	0.1	a_{73}	0.3

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CONTEMPORARY DATA SHARING MODELS: OPEN BANKING AND OPEN FINANCE

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Contemporary data sharing models: open banking and open finance

Ivan Radanović

Abstract: The goal of this paper is to analyse the concepts of open banking and open finance as data sharing models in banking and financial industry. A key idea behind these concepts is to enhance competition among payment service providers, ensure greater transparency of their work, expand the range of choices for consumers and, most of all, add value for the final consumer by improving the quality and reducing the price of services. In Europe, service providers from several European Union countries (Germany, the Netherlands, and Sweden – Sofortüberweisung, iDeal and Trustly) became the key drivers of data sharing models, prompting the European Union to regulate this new type of payment services in order to improve competition in the payment services market and ensure better consumer protection. The Payment Services Directive 2 (PSD2) 2015/2366 was thus adopted, requiring banks to allow access to customer information to all third-party providers such as payment institutions, e-money institutions, FinTech companies and other credit institutions, subject to customer's consent. PSD2 recognises two new types of non-banking market participants – account information service providers (AISP) and payment initiation service providers (PISP). The paper combines the descriptive and comparative methods, as well as the case-study method, to give an outline of important data sharing regulations and models, and of the abovementioned payment service providers. The paper also looks into the experience of applying open banking and open finances in the United Kingdom and Brazil. The final section of the paper deals with institutional assumptions for developing the data sharing model in the Republic of Serbia. The current Law on Payment Services (RS Official Gazette, Nos 139/2014 and 44/2018) is largely harmonised with PSD2, as the original Payment Services Directive 2007/64 was fully transposed into the national legislation. Full harmonisation with PSD2 has been achieved through amendments to the Law on Payment Services (RS Official Gazette, No 64/2024) of 31 July 2024, which lay down measures to further enhance competition, innovation and the range of choices for the end-consumer. This Law will be applied as of 6 May 2025. Among other things, open banking will be introduced, as will the domestic equivalents to AISP and PISP participants.

Keywords: data, open banking, open finance, payment initiation, account information, Law on Payment Services

[JEL Code]: E42, G15, G21, G28

Non-technical summary

Over the past years, banking and financial markets have increasingly relied on an expanding volume of data generated by the global economy and private individuals, mostly by using products and services on the internet. The result is a wide range of modern services which are becoming available to an ever-greater number of users – e- and m-banking, digital or cryptocurrencies, and numerous other financial technologies. Internet and smartphone use has reshaped the way banks and financial institutions organise their business, broadening access to financial services and increasing the transparency of work of payment service providers. Open banking and open finance are among the key financial technologies today.

The goal of this paper is to give an outline of these concepts, starting from their basic features to the benefits and challenges of their application. Introduced by the Payment Services Directive 2 (PSD2), they are the next step in demonopolising data and decentralising the provision of payment services, the hub of which has traditionally been in credit institutions, i.e. banks. By definition, this should mean increased market competition, enhanced transparency of work of payment service providers, wider range of choices for consumers and overall added value growth for end-consumers. The extent to which these intentions are realised depends on the market and characteristics of regulation.

Independent from regulatory details, open banking and open finance models imply two key market participants – account information service providers and payment initiation service providers. By contrast to open banking, which includes payment services and account information services, open finance is broader in scope and includes other financial services such as investment, insurance, etc. By combining the descriptive-comparative method and the case-study method, the paper analyses the features of open banking and open finance, their differences and the experience of their application in advanced markets such as the UK and Brazil. Experiences in these two markets so far indicate that the key factors behind the success of open banking and open finance are digitalisation and the private individuals participating in it, which refers mostly to the understanding and awareness of these concepts. This holds true both for private individuals and for payment service providers which view these models differently and have a different perception of the costs and benefits of their application.

The final section of the paper focuses on institutional assumptions for the introduction of these models, primarily of open banking, in our country. Though at this point domestic legislation, primarily the Law on Payment Services from 2014, is largely harmonised with important European Union regulations in this area, full harmonisation has been achieved with the adoption of the new Law on Payment Services which will, among other things, create the preconditions for introducing open banking and for the start of operation of account information services providers and payment initiation service providers as independent non-banking participants in the payment services market.

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1 Introduction

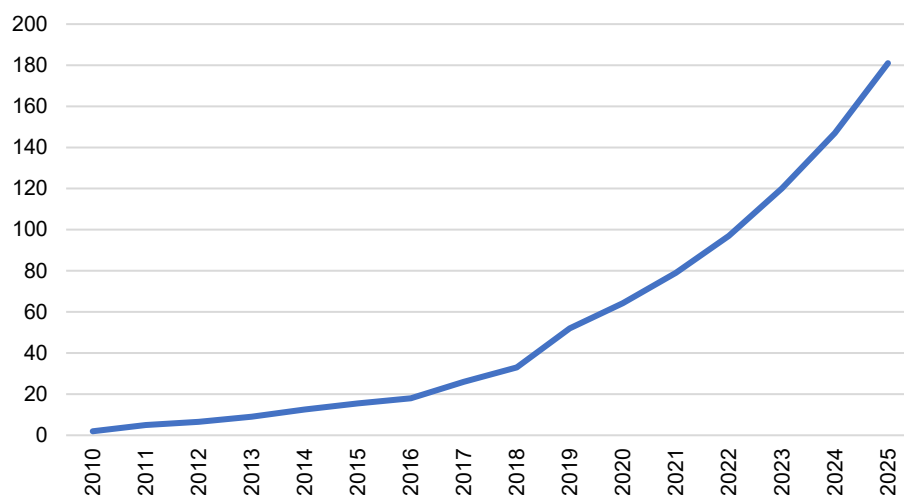
The history of economic development is the history of multiplying information. From the simplest forms of exchange, through the first outlines of a market organisation, to complex financial markets, development is accompanied by exponential growth in the volume and complexity of information. This has shaped decision-making in the market, by companies and private individuals. As the organisation of human societies became more complex, information collection, processing and dissemination techniques were developed, leading to the knowledge-based economies, post-industrial or information societies of today.

The information society is characterised by the integration of information technology as a key factor in all kinds of production (Eriksen, 2001). Information technologies, particularly the internet, are increasingly becoming vital. Over the past decades, the internet has fundamentally transformed market operations and led to greater interconnectedness and speed of exchange of information locally, regionally and globally. The number of internet users rose in the 2005–2023 period from one billion to 5.4 billion people – from 16% to 67% of the global population – with almost 40% of the world’s population now covered by 5G (ITU, 2023). In the services sector, such dynamics boosted the significance of online education, remote work and other ways of earning money remotely. In the industry, the internet enabled automation through AI, integration of robotics and other ways to enhance productivity.

In the financial sector, another harbinger of change is the increased use of contemporary non-cash payment instruments, such as e- and m-banking, digital and cryptocurrencies, and different financial technologies which have broadened access to financial services. Internet and smartphone use has reshaped the way banks and financial institutions organise their business. Already today, a fifth of all commerce takes place online, with e-commerce expected to expand from USD 5.8 trillion to USD 7.9 trillion in the 2023–2027 period (Forbes Advisor, 2024). The global FinTech market was valued at USD 295 bn in 2023 and is projected to be worth as much as USD 1.2 trillion by 2032 (Fortune, 2024), posing a growing threat to the traditional banking market.

The digital transformation of financial services has expanded the business ecosystems, changing the traditional roles in the market and giving rise to new ones. The driving force of change is immense: around 329 billion gigabytes of data are generated daily in the global network, and the total quantity is rising exponentially. Over the last two years alone 90% of the data in the world was generated (Bernard Marr, 2024).

Chart 1 Global amount of data created since 2010, with forecasts to 2025
(in billion gigabytes)



Source: Statista, 2024.

The above amount of data is created through internet searches, exchange of e-mails, use of social networks, online stores or multimedia content, as well as the internet of things products and services and similar. The bulk of these data are stored with data custodians.

As the historical boundaries between sectors and services are getting blurred, new trends are emerging, such as platformisation, where financial service consumers request an increasing variety of services from a limited number of market players.

Data sharing has turned out to be an increasingly important factor of innovation and greater economic efficiency in many activities. The dual nature of data is thus recognised (Krivokapić et al., 2019). The collected and generated data are analysed, aggregated and matched in search of patterns and new insights supporting initiatives and business ideas. Therefore, the collected and generated data can most of all be seen as a tool for making more informed decisions in our work. The second role of data is that of a resource created as we use different digital solutions in our everyday work, i.e. the digital data footprint. Hence data sharing has both a cooperative and a competitive dimension, as data commercialisation is an important factor of competitive advantage.

With the multiplication of information and the integration of business systems, companies have become increasingly aware of the significance of data sharing based on which it is possible to optimise business processes and create new value in the market. This also refers to e-commerce platforms which can use consumer behaviour data to create personalised content, and for research purposes.

In addition to creating benefits, data sharing mechanisms also carry different ethical and security risks or risks relating to consumer privacy. For this reason, one of the greatest business challenges is to strike the subtle balance between benefiting from the power of using a large quantity of data and preserving the integrity and privacy of consumers. The users of internet and internet-based devices for the most part have no access to their digital data footprint. It has therefore become necessary to regulate this area so as to give consumers more control over how data on their behaviour are used and who they can be shared with.

When it comes to financial services, the changeability of preferences of payment and other financial services consumers has prompted governments, central banks and international organisations to upgrade the legislation relating to such services. For this reason, below we present an overview of regulation of the payment products and services market and banking operations in Europe in order to trace the development of the above trends.

2 Data sharing – a regulatory retrospective

A single market for financial services has been under construction in the European Union since 1973 (Kokkola, 2010). Initially, the focus was on the provision of a secure prudential environment for the cross-border activities of banks. Financial markets were still divided along national lines. Integrative processes accelerated after the changeover to the euro in 1999 and the creation of the euro area. The single money market was the first important step in integrating the market of financial services, i.e. the market for the provision of payment and securities services, while ensuring fair competition and appropriate consumer protection.

To achieve this, it was not enough to remove only technical barriers (to upgrade infrastructure), but legal ones as well. Only a modern and efficient legal and regulatory framework is capable of guaranteeing the safety and efficiency of payments and securities transactions. This also entailed the exchange of payments data among payment service providers, and there was a rising awareness of the importance of this exchange. Since the 1980s, the European Commission issued a number of recommendations relating to payment systems, including Commission Recommendation 87/598/EEC on a European Code of Conduct relating to electronic payment, Commission Recommendation 88/590/EEC concerning payment systems, and in particular the relationship between cardholder and card issuer, and Commission Recommendation 97/489/EC concerning transactions by electronic payment instruments and in particular the relationship between issuer and holder. These were non-binding documents.

In late 1990s, as the market became more complex, the internet and internet-based technologies developed and the EU was enlarged, binding legal documents as we know them today were adopted – regulations and directives. The main difference between the two is that regulations are applied directly, in all members states, without intervention by national parliaments, while directives indicate a target to be achieved, and it is up to the national governments to achieve it in the most appropriate manner. Already in 1997, the first Directive 97/5/EC on cross-border payments was adopted, followed by Directive 98/26/EC on settlement finality in payment and securities settlement systems.

Despite the regulatory dynamism of the European Union,¹ at the start of the century it was still difficult to say who was allowed to provide payment services. An entity wishing to provide these services faced widely differing national regulations, with one member state requiring

¹ In March 2000, the importance of responding to the shift to a 'digital, knowledge-based economy, prompted by new goods and services' was recognised. This involved the creation of a more favourable environment for the expansion of e-commerce and for the wider use of the internet and information technologies. In order to help achieve those objectives, a comprehensive 'eEurope Action Plan' was drafted in 2002, and upgraded in 2005 (Athanasios & Mas-Guix, 2008).

customer authorisation and the other not. In some member states, payment services could only be provided by credit institutions (e.g. banks), while in others a special e-money licence or another type of licence was required. In the conditions of dynamic economic growth – which also entails rising demand for cashless payments and increasing diversity of financial services – such heterogeneity required regulation.

2.1 Payment Services Directive – PSD

In 2007, the European Commission adopted the Payment Services Directive 2007/64/EC (PSD), repealing Directive 97/5/EC. The main aim of the Directive was to create a single and homogenous payments market within the European Union, and:

- i)* ensure that cross-border payments are carried out as easily, efficiently and securely as domestic payments within various member states;
- ii)* encourage competition in the payment services market, upgrade consumer protection and enhance the transparency of payment service providers.

The second task was to try to eliminate the exclusivity of banks in payment services provision. For this reason, one of the most obvious consequences of introducing PSD was the definition and regulation of the category of payment institutions and improved regulation of electronic money institutions.²

The Directive was largely successful, because it facilitated market entry for new payment service providers, and increased competition and choice for consumers. It established clarity with regard to the rights and obligations of payment service providers and users, reduced transaction costs and time, reinforced users' right to refund, and ensured that pan-European payments are completed a maximum of one day after the payment order is given. Thanks to the harmonisation of national rules on cashless payments and the resulting economies of scale, PSD established a framework for creating the Single Euro Payment Area (SEPA), its further constitution³ and successful implementation of its rules (European Commission, 2018).

Though it resulted in improvements, PSD had its downsides too. The unclear language and abstract principles led to different approaches of national regulators (Kroes, 2010). This made communication and cooperation between governments difficult, as well as intensifying other problems relating to its implementation, consumer protection and the scope of regulation.

Namely, some authors believe that the Directive has unintendedly strengthened the power of already established actors on the market and therefore made it difficult for new actors to find a way in (Janczuk-Gorywoda, 2015). Namely, companies that wanted to provide a service not regulated or insufficiently regulated by the Directive were often forced to have a contract with a bank to be able to provide this service. On the other hand, when it comes to payment

² E-money institutions were first included in the existing definition of credit institutions under Directive 2000/28/EC and then regulated as a special type of institution under Directive 2000/46/EC.

³ The fundamental and comprehensive SEPA regulation was Regulation 2012/260 establishing technical and business requirements for credit transfers and direct debits in euro and amending Regulation 2009/924 on cross-border payments in the European Community.

services provision, banks were disproportionately affected relative to other payment institutions as they are subject to stricter regulation and supervision. Although this is explained by the fact that payment institutions provide only payment and not other banking services, it still means an additional cost burden for a bank's financial services.

According to some authors, insufficient regulation of payment institutions also became visible through risks for consumer protection. Namely, while credit institutions were still obligated to have sufficient own funds to cover operating and liquidity risks, there was no such protection scheme for payment institutions. And whereas this made sense from the viewpoint of supporting new market players, it also meant a risk that payment institutions' clients would lose their money if these institutions became insolvent. For this reason, many consumers avoided payment institutions and chose banks in order to protect their money, thwarting the good intentions of the regulators (Nilsson, 2018).

When it comes to the scope of regulation, some of the payment services already used in practice were not classified as such or regulated at all,⁴ giving their providers an advantage in the market. On the side of demand for such services, natural persons were affected the most as they used these services much more than legal persons. This mostly referred to online payments. In addition, many provisions of the directive turned out to be too generalised, unclear or even obsolete in light of market development. This has resulted in "legal uncertainty, potential security risks in the payment chain and a lack of consumer protection in certain areas."⁵ In practice, this meant that, in case of unconfirmed fraudulent payments, the payer did not have adequate legal grounds for complaint. For this reason, though the initial intention was to enable users to use payment services provided by any service provider within the European Union, as many as four-fifths of Europeans continued to prefer providers from their home state (Nilsson, 2018; 29). According to Donnelly, perhaps the most obvious disadvantage was missing the opportunity to regulate two important services: payment initiation and account information services.

2.2 Payment Services Directive 2 – PSD2

The Second Payment Services Directive 2015/2366 (PSD2) was created to close the gaps of PSD, provide more legal clarity and ensure a consistent application of the legislative framework, enabling new means of payment to reach a broader market, and, most importantly, ensuring a high level of consumer protection and transparency.⁶ As specified in Article 107 of Directive 2015/2366, this implies the need for full harmonisation to minimise the possibility of different interpretation of the provisions.

This Directive, fully implemented as of 2018, requires banks to allow access to information about their clients to all providers – third parties – payment institutions, FinTech companies and other credit institutions – subject to client's consent. Banks are required to share the transaction data of their clients and to enable payment initiation. The intention was

⁴ Directive (EU) 2015/2366, recital (29).

⁵ Directive (EU) 2015/2366, recital (4).

⁶ Directive (EU) 2015/2366, recital (6).

to ensure a uniform and decentralised payment system as a basis for further development of e-commerce and online payments. This makes PSD2 both an *ex post* response to the development of the payments market, and an *ex ante* driver of further development.

The key difference between PSD and PSD2 is in the scope of regulation. The second directive covers more payment services and more types of market players, allowing access to payment service users' account information to all participants.

2.2.1 *New payment service providers*

The second directive recognised two new types of payment service providers: account information services providers (hereinafter: AISP) and payment initiation service providers (hereinafter: PISP). They belong to the group of third-party providers. These are payment institutions with which consumers do not have payment accounts and which do not hold the funds whose transfer they initiate.

Payment initiation service is defined as “a service to initiate a payment order at the request of the payment service user with respect to a payment account held at another payment service provider” (Directive 2015/2366). In practice, this service is provided when a user selects a product in an online store via his mobile phone and enters his account data. He then gets to choose the payment instrument, such as PayPal, card payment or PISP payment, usually in the form of the Pay by bank, Pay through bank, etc. option. When the user selects payment through a third-party provider, in the next step he chooses the service provider and the account from which to make the payment, if there are several. The user is then offered a choice between traditional banks and new participants such as FinTech companies, neo banks,⁷ etc. Upon selection, the user confirms his identity and the payment is made. Among the largest providers of such services in Europe are the British Volt and the Swedish Trustly.⁸

Account information service is defined as an “online service to provide consolidated information on one or more payment accounts held by the payment service user with either another payment service provider or with more than one payment service provider” (Directive 2015/2366). This information is provided through an application which aggregates data on transactions and balances from several payment accounts in one place. The main idea is to make it easier for the user to manage personal finances. It is precisely the AISPs that develop and offer such applications in the market. Both AISP and PISP services can be provided only subject to clear consent of the client, i.e. payment service user.

New market participants were now able to offer financial services based on the banks' information and infrastructure. However, banks can themselves also become PISPs or AISPs in the market. This is interesting because they are thus given access to information on the accounts of customers of other banks – their competitors.

⁷ Neo banks are financial institutions which base their business on advanced technologies and do not have a network of physical branch offices, but operate on digital banking platforms.

⁸ An interactive animation of the entire process of payment through these service providers is available at the website of the above payment institution: <https://www.volt.io/>.

2.2.2 Application programming interface

The PISPs and AISPs were able to provide their payment services before PSD2 was implemented, but only based on special agreements with financial institutions that held customers' payment accounts and account information. This was a barrier to growth in the number of participants and market competition.

For this reason, Articles 35 and 36 of PSD2 envisage that “payment institutions shall have access to credit institutions' payment accounts services.” This means an obligation for banks to allow access on an objective, non-discriminatory and proportionate basis, in a way that allows payment institutions to operate in an unhindered and efficient manner. Under the Directive, access to accounts and account information no longer depends on a contractual relationship with a bank, as it did when PSD was in force. This is known as the access to account rule – XS2A.

It is important that banks do not apply the XS2A rule at their own discretion, but in line with the Regulatory Technical Standards (RTS) developed by the European Banking Authority (EBA) in cooperation with the European Central Bank. The RTS suggest that banks can allow access to third parties in two ways: by letting the third party apply the bank's own application solutions (e.g. m-banking) or by establishing a dedicated application programming interface. An API is a “set of rules or protocols that enables software and applications to communicate with each other to exchange data and functionalities” (IBM, 2024).

Such interfaces are not a novelty – they have long been used by banks and companies wishing to integrate different applications and facilitate interorganisational information flows. When both the API producer and user belong to the same organisation, this is a private API. When a bank allows a key stakeholder to use an API due to different types of business synergies, this is a partner API. Public APIs are available to all and their use does not depend on a business relationship with the organisation that created them. This type of interface enables all authorised third parties to build new services on top of the existing infrastructure of a bank and it is precisely this type of interface that banks must use to comply with PSD2 (Moen & Helgøy, 2018).

In this way, PSD2 set up a new minimum of information to be shared in the payments market. This minimum refers to information on clients' payment accounts. If they wish, banks may offer a wider range of information, e.g. on savings accounts, loan repayments, etc.

Three approaches can be identified in the response banks took to PSD2 in order to preserve their market position, particularly in the light of new market participants such as FinTech companies. The first is the compliance approach, where the new directive is treated as a regulatory and technical compliance issue. Banks solely focus on implementing the regulatory necessities, such as a basic set of APIs. Though this approach requires the least effort, it is risky in the long run, as it increases the risk of falling behind market development and more agile competitors.

A proactive approach was taken by the banks which decided to provide new, value-added services themselves. They regarded the new regulation as an opportunity rather than a mandatory regulation and used this opportunity by developing their solutions internally, expanding the product catalogue and becoming digitally more competent, e.g. by investing in

internal IT departments. In this way, some banks started providing account information or payment initiation services themselves. Another option of the proactive response was collaboration of banks in the same market, involving a blend of cooperation and competition – co-competition. Though this can be risky because of the potential stealing of clients, benefits prevail – encouraging investment, economies of scale, exchange of knowledge and experiences which can strengthen their competitive position against new market entrants. Some banks have, however, seen an opportunity precisely in new market entrants, through potential synergies resulting from the combination of different key competences: stable infrastructure, user and resource base of banks with innovative culture, digital expertise and the innovative culture of FinTech companies (Moen & Helgøy, 2018).

A third option for banks was to respond to new regulatory circumstances by even more openness, i.e. by sharing a broader scope of data than requested by PSD2. This business model is known as open banking.

3 Open banking and open finance

PSD2 is considered to be the main driver for open banking as it has obligated banks to open their data to all interested third parties in the market, which can provide an even wider range of services than those enabled by the mandatorily shared information. This platformisation of the banking ecosystem is similar to the transformation in tourism (Air BnB) or transportation (Uber). Even when it comes to payments, an already well-established example comes from China where applications such as AliPay or WeChat function successfully, integrating options for the provision of different types of services, including payment services. The value of platforms rises with the number of users, which is a textbook example of network externalities.

3.1 Features and possibilities of open banking

Though there are as many definitions of open banking as there are markets which apply this concept, it can be said that open banking is “the financial technology innovation whereby consumers allow financial services providers to access and aggregate their financial information for wider and more competitive choices of financial management” (Oi Chan, 2020). This means that payment services provision is further decentralised by enabling third parties to access data through API.

According to the Juniper market research agency (2024), open banking was valued at USD 57 trillion in 2023. Open banking transaction values are expected to exceed USD 330 bn. Such growth is feasible, as this concept is used by a long list of users: from individual payment service users, through financial institutions, FinTech companies, SMEs and regulatory authorities, to e-commerce platforms. Thanks to improved access to financial data, they can all simplify payment procedures or improve income flows in another way.

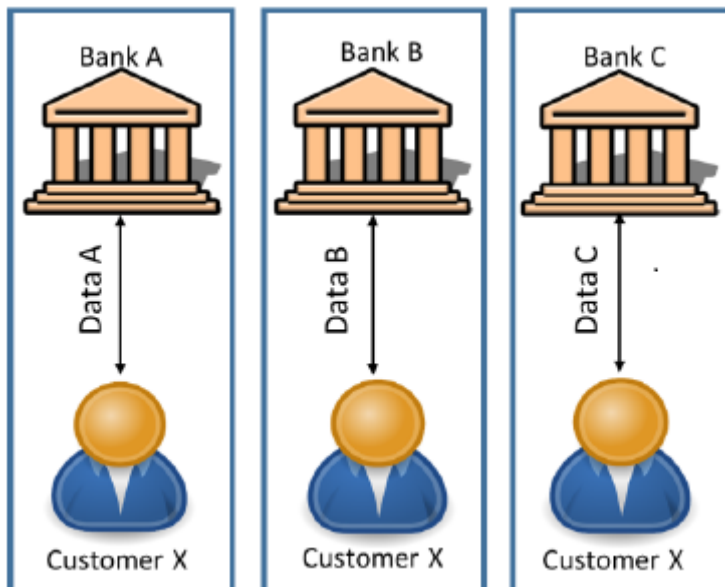
Open banking is not a specific product or service – it is a technological and business framework for developing and providing numerous and different financial services. Though

this is an evolving field, here are some of the ways open banking is most often used (Stripe, 2024):

1. *Payment initiation services* – Payment institutions can initiate payments directly in the name and for the account of a payment service user, bypassing the need for a traditional payment gateway;
2. *Account aggregation* – Companies can pull in more data from multiple accounts, which enables more accurate and personalised services, i.e. services with greater added value;
3. *Instant loans and credit scoring* – Financial institutions can access real-time data to assess credit more accurately, speeding up loan approval processes;
4. *Automated invoice reconciliation* – Companies can use open banking to automate some regular payments, reducing administrative work and improving accuracy;
5. *Multibanking platforms* – Corporations operating in multiple markets could consolidate their accounts from different banks into a single dashboard, making it easier to monitor financial operations;
6. *Personalised marketing* – Companies can analyse transaction data to provide targeted promotions or advertisements that are directly relevant to an individual’s spending habits;
7. *Real-time fraud detection* – By analysing transaction data instantaneously, businesses can detect unusual activity more easily, reducing financial and operating risks.

Below is an illustration of the difference between the current model of banks’ operations and open banking. In Figure 1, the information flows are bilateral and the payment service user shares separate sets of information with each of the payment service providers with which it has a contractual relationship.

Figure 1 Information sharing before open banking

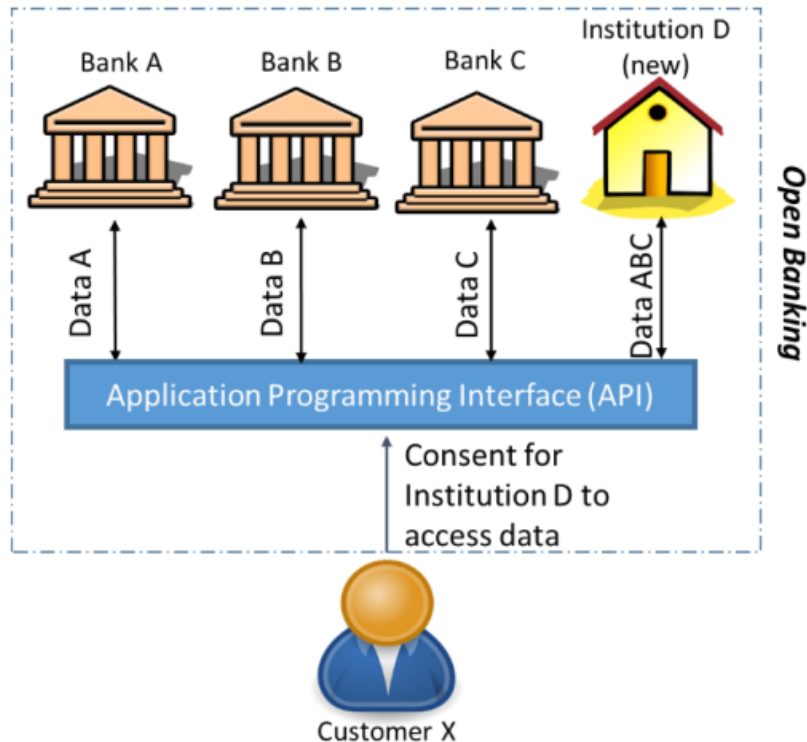


As in: Oi Chan, 2020.

By giving consent to open banking, on the other hand, the consumer shares information with financial institutions, even if he does not have a contractual relationship with them. In

return, based on the consumer's financial picture, financial institutions can offer better and more personalised services.

Figure 2 Information sharing in open banking



As in: Oi Chan, 2020.

Another advantage of open banking is operational agility, as open banking offers accelerated data flows, creates an environment where FinTech companies and banks can innovate jointly, enables a more effective use of personnel, and, perhaps most importantly, allows for more direct payment methods resulting in lower transaction costs (Stripe, 2024).

It seems that open banking and similar data sharing models might favour better informed, technologically literate users. Yet, open banking can foster financial inclusion – by improving the process of borrowing and saving money, managing monthly bill payments, and other financial soundness indicators (Reynolds & Chidley, 2019). PSD2 has encouraged the development of new services targeting underbanked groups, such as credit assessment, faster loan approvals and different solutions for mobile payments (Vives, 2019). Not only individuals but even inclusive-finance organisations can benefit from open banking. Thus, open banking may empower the activities of what has been termed “MicroFinTech” (Moro-Visconti, 2021), an organisation created by the convergence of microfinance patterns with FinTech applications.

Like any technological advancement, open banking may be a challenge in terms of data vulnerability, inconsistent quality of service provided by third parties, potential incompatibility between different services and software solutions of companies with API platforms, etc. For regulators, increased complexity of the open banking system makes regulation more challenging, requiring more resources. This might result in the establishing of

special teams whose dominant task will be to deal with all aspects of markets based on the open banking technology. This does not mean that data sharing models are not advancing – to the contrary. For this reason, below we give an outline of the open finance concept.

3.2 Features and possibilities of open finance

Open finance is an expanded open banking concept. While open banking introduces the account information services and payment initiation services, open finance includes products and services beyond the scope of payment services. This means that third parties gain authorised access to a wide spectrum of consumer data concerning various accounts, including savings, investments, insurance, mortgage data, etc., which would be used to create more personalised products and services. One of the definitions of open finance is that it is “the next step of open banking, allowing third-party service providers to access a wider range of customer data from various accounts, including savings, investments, pensions and insurance” (Open Banking Ltd, 2024). The goal of open finance is similar to that of open banking – giving consumers greater control over their financial data.

The main advantages of open finance could include the following (Kiskyte, 2023):

- i)* Improved user experience – automatization of money transfers between different accounts, such as savings or investment accounts;
- ii)* Better financial management – enabling consumers a holistic view of their finances by combining all important information in a single place;
- iii)* Improved business efficiency – just as open banking increased the efficiency of payment methods, open finance can create even more options in other segments of business;
- iv)* More innovation and competition.

When speaking of financial inclusion, we recognise the potential of open finance in low and medium-developed countries. Even more than open banking, open finance enables the underserved population to acquire data sharing mechanisms that use a wider range of data in order to thus gain access to a broader spectrum of services otherwise unavailable to them. This particularly pertains to the unbanked part of the population as it enables a potential transfer of data from non-traditional sources (e.g. e-money account) to information systems of traditional service providers such as banks.

Although customer transaction data sharing typical for open banking models is most often at the heart of open finance definitions, the majority of open finance models regulates the sharing of the following types of data (Plaitakis, *et al.*, 2020):

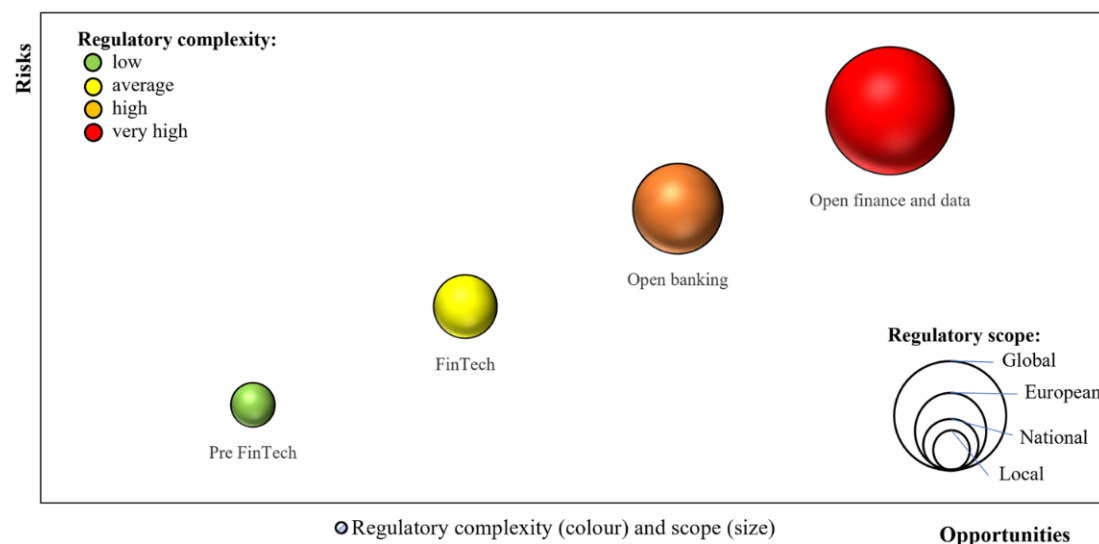
1. Generic services data, i.e. publicly available information on specific financial services, locations of ATMs, branches or offices. They do not carry personal data based on which someone’s identity could be determined.
2. Customer data which are required when opening an account and for administrative purposes, including registration and KYC data.
3. Transaction data, including data about account balances, transaction values with currency dates, identity of the other party in the transaction, etc.

In addition to open banking and open finance, as the third level of sharing – and as such, the widest – we have open data. These are data that can be freely available to all to be used in any way, for any purpose, with no copyright limitations or control mechanisms (Кривокапић и др., 2019). Open data is the exchange of consumer data between different private and public sector institutions, including banks and non-bank payment service providers, providers of telecommunication, utility and similar services, with customer consent (Medine & Plaitakis, 2023). The mutual relationship between the three levels of data sharing is illustrated in Figure 6.

Accordingly, increased data sharing in the open finance context can result in end-users not fully understanding what it is that they are consenting to, increasing their vulnerability to financial crime, fraud and scams (Truchet, 2023). Financial institutions may face various operational risks such as API security risk, risks arising from stronger interconnectedness with third parties, cyber-risks, as well as a possible shortage of staff and skills for managing all the risks in an increasingly complex environment. On the part of the regulator, no major risks to the country's financial system stability are expected given that, due to its size, open finance still does not have the potential to become a source of systemic risk.

This means that any scope of data sharing, beside the benefits, also brings some regulatory risks arising from the complexity of the data sharing infrastructure. Accordingly, Figure 3 shows the increasing levels of regulatory complexity and scope surrounding financial markets through four periods: before 2008 and the emergence of FinTech companies; the FinTech period (2008–2018); the open banking period from 2018 until today; and the upcoming period of open finance and open data. Moving from left to right, increased regulatory complexity (from low to high) and scope (from local financial services to global) require credible and comprehensive regulation.

Figure 3 **Inclusive finance – regulatory complexity and scope**



As in: Preziuso *et al.* (2023), p 24.

To successfully manage the described risks, and for regulators to ensure that the development of data sharing platforms – such as open banking and open finance – does not threaten their main objectives in any way – including price and financial stability objectives

of central banks – these regimes must be adequately regulated. Accordingly, the following section is dedicated to the practice so far in the functioning of these data sharing models.

4 Data sharing in practice

This year, the number of users of open banking-based services is projected to exceed 132 million (Zimpler, 2024), while the total value of open banking transactions equalled USD 57 billion (Statista, 2024). At the moment, the most promising is the European market, accounting for 49% of all global users.

When it comes to regulations within the European Union, open banking is limited to the said payment initiation service providers and account information service providers. So far, more than 350 such participants have been registered in the European Union, and more than 330 in the United Kingdom alone.

The implementation of open banking in the United Kingdom was entrusted to the Open Banking Implementation Entity (OBIE),⁹ in line with the existing regulatory preconditions in the country (The Payment Services Regulation 2017, PSR – equivalent to the EU’s PSD2). The implementation unfolded in cooperation with EcoSpend, the first company in the world to set up an integrated open banking system that enables the execution of A2A instant payment via pay by bank account. In 2018, secure data sharing was enabled within the open banking system and, by extension, the provision of better-quality and more personalised financial products and services under fairer terms. After five years of implementation, there are almost seven million regular users of open banking technologies in the UK and more than one billion API calls a month, as at December 2022 (Gov.uk, 2023). As a leading national European market, the United Kingdom has developed many practical uses of open banking-based services – from collecting property rental payments, through advisory services, to increased efficiency of collecting payments for public sector products and services. A large part of the improvement pertains to the comparable cheapening of transactions executed in the open banking environment.

The latter stands out in particular, given that tax authorities in this country have estimated that the cost of an open banking payment is less than taking a card payment and have therefore enabled payment services to citizens for more than 40 different types of taxes and customs via open banking. In January 2024 tax authorities collected GBP 3.5 billion in tax payments via open banking, or 16% more than in the same period a year earlier (Open Banking Ltd, 2024).

According to data of the Organisation for Economic Cooperation and Development (OECD), data about the current data sharing frameworks, such as open banking, attest to the positive impact on consumers and the financial services market. Open banking has, namely, encouraged innovation and competition, decreased costs and enabled a better consumer experience (OECD, 2023), which is particularly true for European Union countries.

⁹ The development of open banking began after the report of the main regulatory authority for the protection of competition which stated that the largest market players did not have to compete hard enough and smaller and new participants found it hard to access the market and achieve sustainable growth. At that point the implementation of open banking was declared an obligation for the nine largest market participants in Great Britain and Northern Ireland (CMA9).

An equally important aspect of open banking is the fact that financial services are becoming more available to the unbanked population by improving the business models pertaining to lending, savings, management of regular payments such as household bills and the financial wellbeing of consumers. The share of this population in the European Union more than halved in the period 2017–2021, contracting from 31 to 13 million, i.e. to less than 4% of the population (WSBI-ESBG, 2022). Considering the large difference in the shares of the population that does not use or has no access to financial services (from 0.00% in Denmark to 30.88% in Romania), open banking could have the biggest potential precisely in the countries faced with this type of problem. According to the estimate of the Boston Consulting Group (2023), almost 80% of adults globally are still unbanked or underbanked.

This does not mean that there are no challenges. To the contrary, it has been recognised that the open banking ecosystem still does not function as intended (European Commission, 2023). Namely, last year's proposed text of the future payment services directive (PSD3) recognises the need for additional strengthening of competition in the market and the position of third-party payment service providers relative to traditional banks. This mostly pertains to (Loyens & Loeff, 2023):

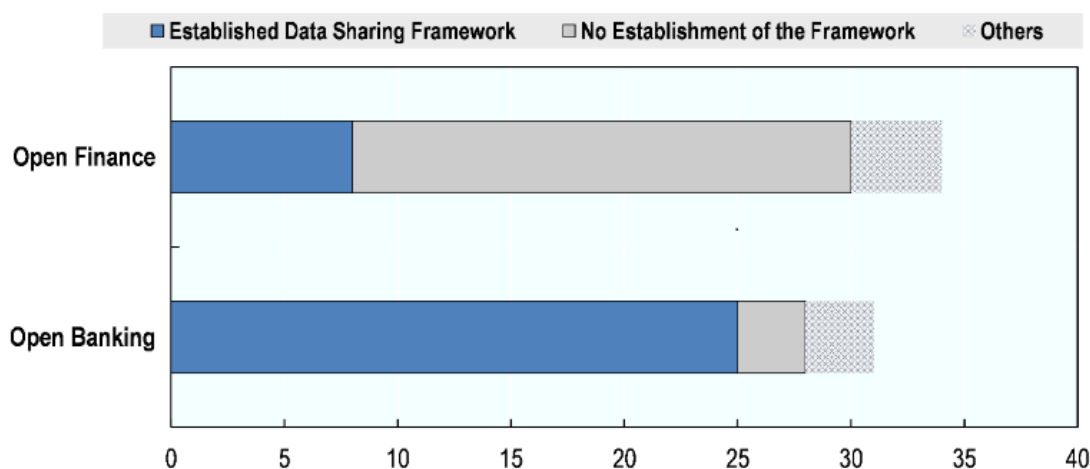
1. Further SCA enhancements;
2. Expanding the reach to bank accounts for payment and e-money institutions;
3. Removing obstacles hindering data access for third-party providers and stifling innovation;
4. Allowing direct participation to non-bank payment service providers in all payment systems in the EU.

This time, the European legislator plans to introduce changes by improving the present payment services directive, but also by introducing the Payment Services Regulation (PSR). This will eliminate disparity in the implementation of unified rules by different member states given that the regulations are “more direct” when it comes to practical implementation.

In view of the described relationship between the respective scopes of open banking and open finance, it must be said that the majority of OECD countries still lacks a definitive legal definition of open banking, though it is understood as described in the paper. Countries with explicitly defined open banking frameworks include Australia, Brazil, Columbia, Israel, South Korea and Turkey. In Israel, a law from 2021 sets out that sources of information (mostly banks) have to share their data with third-party providers. In Turkey, open banking is defined as “an electronic distribution channel through which consumers [...] can perform payment transactions by remotely accessing the financial services offered by the bank through methods such as API, web service, file transfer protocol.” In South Korea, the relevant financial services commission established an open banking policy in order to enhance competition in the financial market and maximise the welfare of consumers. This allowed third-party providers to have access to the previously unavailable infrastructure.

Open finance is defined in an even fewer number of cases and generally builds on the open banking definition to expand to other data sources and types. In Israel, the open finance framework includes payment accounts and data about payment cards, deposits, savings, loans and securities. For instance, in Australia open finance is defined as non-bank lending, and the provision of insurance and pension fund management services (OECD, 2023).

Figure 4 Established framework for open banking and open finance in OECD countries



Source: OECD (2023), p 10.

In June 2023, in line with the Digital Finance Strategy, the European Commission published a proposed regulatory framework for Financial Data Access (FiDA), which will pertain to access and continued use of user data, with consumer consent, in many areas of financial services. This would be based on the principle of user control of data supplied to market participants and generated based on user behaviour. The goal is to enable more innovative financial products and services, as well as to encourage competition in the financial sector. This regulation should pertain to the following categories of data (Hoogeveen, 2024):

1. on mortgages, loans and accounts, except payment accounts regulated under PSD2, including data on balances and transactions;
2. on savings, investments and financial instruments, insurance-based investment products, crypto, financial and other assets, as well as data about the economic benefits arising therefrom;
3. on the rights arising from operations with pension funds, defined in the Directive 2003/41/EC;
4. on non-life insurance, excluding data on sickness and health insurance products;
5. data which forms part of a creditworthiness assessment related to firms, collected in the loan application or credit rating assessment processes.

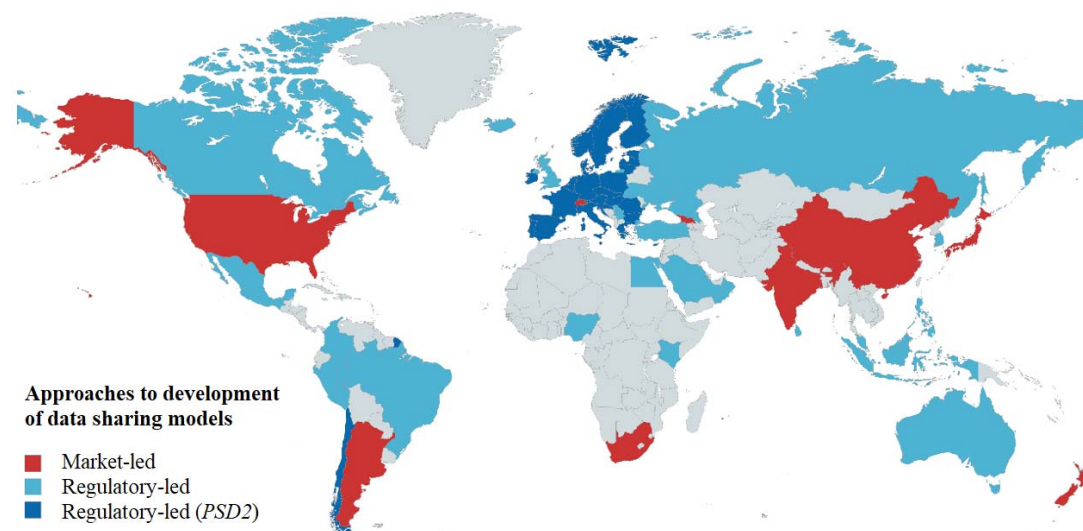
The above implies the possibility, though not an obligation, for consumers to share their data with financial institutions or other participants. On the other hand, it also implies an obligation of financial institutions and other holders of consumer data to make these data available to all potential users (other financial institutions or third parties) by setting up the necessary technical infrastructure. In return, they will be encouraged to set up high-quality interfaces for third parties, i.e. data users, with clear rules as to the mechanism for resolving any disputes. Also, users will be given full control over who and why is accessing user-related data.

Unlike the EU and other regulation-led countries, some countries have adopted an industry-led approach to developing data sharing models. In the USA, innovative companies in the field of financial technologies recognised the benefits of accessing data as a means to

enable better services for payment service consumers, while banks took up the initiative and developed solutions to allow consumers to share their user data. The key position in this country has been taken by the Financial Data Exchange (FDX), a consortium of private participants (financial institutions, FinTech companies, data aggregators, etc.), which formulates open standards for financial data sharing and operates in Canada as well. Some countries, such as Nigeria, changed their approach after their central bank introduced a legal framework to regulate the existing activities of market participants.

Since an analytical overview of the experiences of countries that have made progress in data sharing models would greatly exceed the scope of this paper, as well as its purpose, below is a figure with an overview of global progress in this field.

Figure 5 Different approaches to developing data sharing models



Source: Author's analysis based on the data from openbankingmap.com.

4.1 Open finance in Great Britain

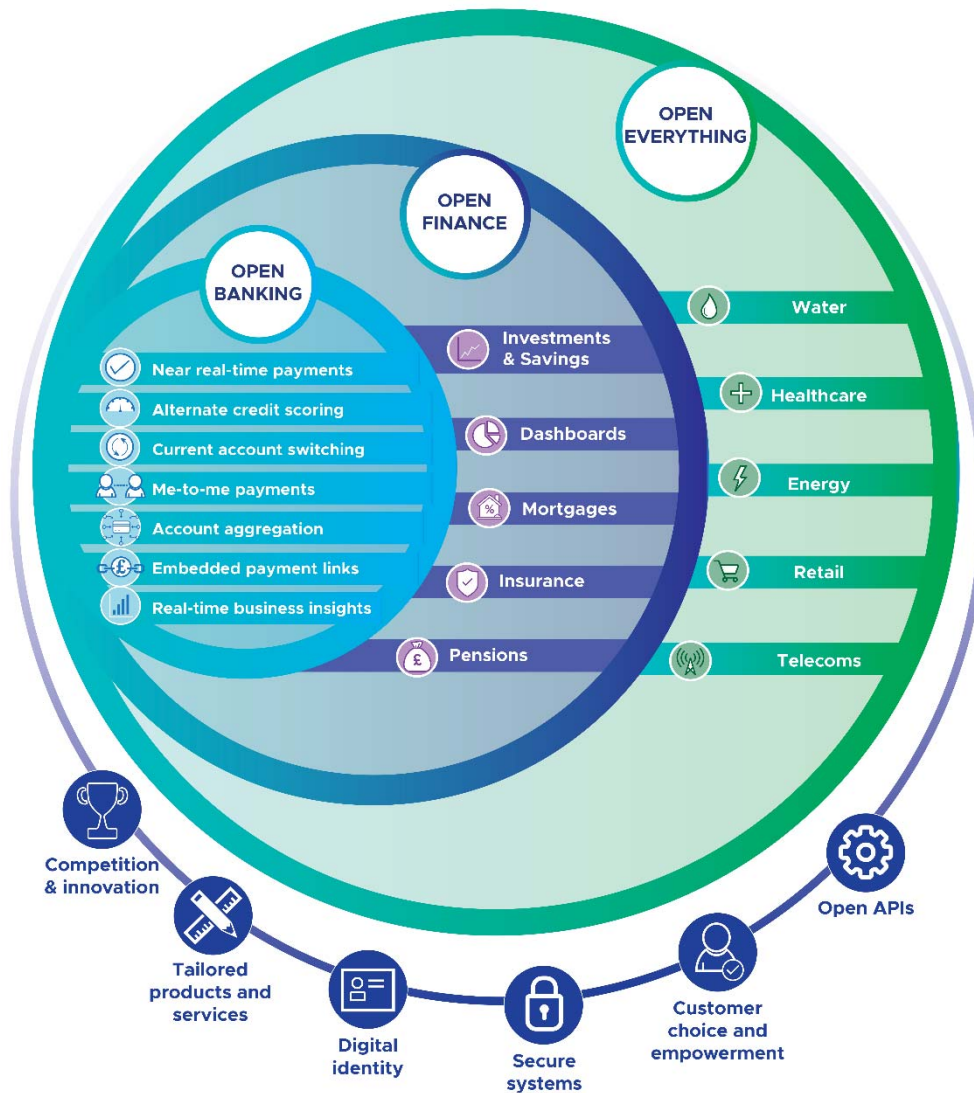
The regulators and the market in Great Britain are evolving from open banking to open finance. For more than six years, open banking has been mandatory, and there are currently more than nine million users of products and services via apps within this ecosystem (Open Banking, 2024). Concurrently, the services enabled by open banking are used by around 750,000 small enterprises. As stated on the official website on open banking services, open finance will extend these benefits to mortgages, pensions, investments and savings, while “applying the same sharing principles to other key sectors will lead to the open everything concept.”¹⁰

Practical implementation does not always unfold ideally, and there are often misunderstandings in the markets, even scepticism as to the benefits of open finance. In this regard, a useful research has been conducted, titled “Open Finance Paradox” (Cognizant, 2022). Open finance industry players are divided into several groups: neo banks, as the most

¹⁰ Open data, as the broadest scope of data sharing.

agile part of the market; incumbent banks, which are still in a risk/reward conundrum; leading banks (CMA9) which understand the benefits and threats, but still do not cooperate enough; challenger banks, which are ready to push, but still lack confidence in their ability; and, finally, building societies,¹¹ which are slower, more reactive and inclined to turn a blind eye to business risks.

Figure 6 From open finance to open data in Great Britain



As in: Open Banking Ltd, 2024.

At the moment of this report, open finance was in a development stage, as substantiated by the data that in the 2020–2023 period transactions arising from this ecosystem’s framework, as well as the number of users, have increased many times over: the number of users from one to seven million (almost 13% of the adult population), and transactions from around 5.3 to

¹¹ Small financial institutions owned by their members, rather than shareholders, traditionally engaged in providing financial and lending services, notably in housing construction. They are a feature of all British Commonwealth countries and are the most conservative organisations in the market.

26.6 million. The average number of products and services based on the open finance model equalled 2.4 for all payment service providers – the lowest for building societies (0.5), and the highest for neobanks (5.5). The survey-like report included viewpoints of more than 200 financial institution managers.

In their response to the question: “What are the main benefits of open finance for your organisation?”, neo banks recognised the greatest potential in open finance because the highly innovative nature of the business model best fits with their business priorities. Leading banks also see a potential in it, primarily as a method for further digitalisation and cutting down operating costs. In contrast, the remaining participants mostly see the introduction of open finance as an act of meeting regulatory demands. It is interesting that 57% of managers from incumbent banks think that open finance is an over-hyped concept, whereas as much as 92% of neo bank managers stated that open finance is important for the future success of their organisation. This difference can be explained by the level of understanding the benefits of open finance. As much as 90% of neobank managers stated that they “fully understand the benefits of open finance” in contrast to merely 23% of incumbent bank managers. The percentage of all interviewed managers who are completely unfamiliar with open finance is 3%.

Not accidentally, there are a mixed opinions about open finance: many decision makers do not immediately see the benefits of open finance for their clients, therefore they do not invest sufficient efforts to implement the concept successfully. Even if they did, there would be obstacles, the most important being a lack of resources, and technological and security factors. This is an average assessment for all types of financial institutions, with resources posing an issue for 58% of neo banks, and culture issues (such as user conservatism) for three-quarters of leading banks.

4.2 Open finance in Brazil

Brazil is among the most successful countries when it comes to implementing open finance, with 41 million accounts within the system and more than 27 million active users, or 16% of the adult population. The main task of implementing the open finance system was to accelerate and improve the functioning of the banking and payment services market by promoting inclusion and competition, not jeopardising the security of consumer data or safety of the financial system.

When developing data sharing models, the idea of the regulator was that the competitive advantage in the market is not based on capital, but on the ability to predict and adequately understand the dynamic needs of consumers. This is important, considering that more than 170 banks operate in the Brazilian market, the biggest six of them¹² accounting for around 70% of the financial market.

Brazil’s current level of data sharing development is the result of a series of reforms that build on each other, both with regard to infrastructure development and to regulation. The first major step was made in 2002 with the launching of the retail payments modernisation project

¹² The largest of them both in Brazil and the continent – Itaú Unibanco – has the capital of around USD 360 bn.

(Vidal *et al.*, 2023). This transpired at a time when the Central Bank of Brazil projected a new payment system to modernise the procedures and reduce systemic risks, which had been impacted by inflationary pressures for a long time. A law regulating the work of payment institutions was adopted in 2012, and financial inclusion was further enhanced in 2016 by lowering the requirements for poorer citizens when opening a digital payment account and using payment services. In May 2018, the Central Bank of Brazil set up a Financial and Technology Innovation Laboratory (LIFT) to encourage technological innovation in finance and cut costs and efficiency of the national payment system. Initially, 18 projects in blockchain technology, AI, cyber-security tools, etc. were included in its scope (Banco Central do Brasil, 2019). The following year it became possible to test open banking solutions (Regulatory Sandbox), and in 2020 the PIX instant payment system began to operate.

The implementation of open finance unfolded gradually by broadening the scope of the shared information/services.

- Phase one (early 2021): Sharing of information by financial institutions about products and services;
- Phase two (mid-2021): Sharing of registration and transactional data about products and services from the previous phase;
- Phase three (2021–2023): Introducing payment initiation services via PIX,¹³ allowing account holders to make payments using the open finance ecosystem;
- Phase four (starting from 2023): Enhancing the data sharing scope, including data on products and services of currency exchange, time savings accounts and other services in the area of insurance, investments and pension funds.

Data sharing is based on an open integrated platform that ensures secure, fast and easy sharing. Open finance participants are responsible for the security of shared data, transparency of data handling, as well as their quality (integrity, reliability and availability). Also, they are responsible for acting in accordance with the principles of user equality, reciprocity and interoperability. All the mentioned activities take place only after the consumer approves them in a free, informed and unequivocal decision. This authorisation is given through a specially designed electronic interface, is valid for 12 months and can be withdrawn at any time at his request – for which secure, precise and simple procedures are provided. Data sharing exclusively with a user's consent is a fundamental principle of open finance. Data sharing procedures and processes must be in accordance with the data protection law (General Data Protection Law, 2019).

Participants in Brazilian open finance can only be institutions licensed by the Central Bank of Brazil. They must submit a proposal for an interface solution (API) intended for sharing data and services, which will be accessed through digital means and without restrictions on their use.¹⁴ Also, they must comply with the established rules, procedures and standards for monitoring envisaged by the open finance ecosystem.

¹³ Launched in late 2020, today it processes more payments than the card systems and is used by 92% of all payment services consumers.

¹⁴ According to a report of the Central Bank of Brazil, there were 26,099,733 successful API calls in April 2021, which accounts for 99.67% of all calls and indicates the efficiency of the system in the mentioned period.

Figure 7 **Key building blocks in the development of Brazil's inclusive data ecosystem and open finance**
As in: CGAP, 2024.

Indicative policy measures	Building blocks	Indicative success metrics
Establishment of open banking regime (2020) and expansion into open finance (2022)	Open Finance	41M accounts in open finance and 800+ financial service providers
Reforms to ease licensing and market entry of new financial service providers, including fintech	Diversity of providers	1,500+ fintech startups—most in the region; \$10B+ fintech lending portfolio
Launch of Pix by Central Bank of Brazil (2020)	Fast digital payments	453M accounts registered on PIX as of September, 2023
Early adoption of agent banking models and proportional payments regulation	Digital accounts	77% of the adult population has reported making or receiving a digital payment (FinDex 2021)

Depending on the scope of shared data and services, the regulation foresees the existence of mandatory and voluntary participants: mandatory participants are those financial institutions whose economic size reaches 1–10% of Brazil's GDP or which perform relevant international activities independent of capital. These are “Regulatory segment 1” (S1) and “Regulatory segment 2” (S2), where the first segment includes entities as big as or bigger than ten percent of GDP or having relevant activities, while the second includes those with a size of 1–10% of GDP (Banco Central do Brasil, 2020). Voluntary participants are all institutions that wish to participate, and their size does not belong to either S1 or S2. This is a specific type of segmentation of financial institutions, created so that the Central Bank's measures would affect the participants proportionately. The principle of reciprocity is also important, i.e. that participants who receive information must also share information with others.

The number of ways in which open finance can be used is continuously growing. They relate to managing personal and business finances, paying money from multiple accounts at once, simply moving financial assets from account to account without leaving the open finance environment or even the main account interface, personalised offers, opening an account in another bank based on data already owned by the primary bank without the need to re-enter data, etc. Banco do Brasil payment account holders can use the bank's official WhatsApp channel for easier access to the bank's various services.¹⁵ Also, for example, users of the Nubank's FinTech app receive a notification if any of their accounts has a negative balance; if the user has funds in other accounts, optimisation is suggested in order to avoid problems with overdraft.

As for the user base and awareness and acceptance of the concept of open finance, survey analyses (Vidal et al., 2023) showed that fintech companies are more successful in obtaining user consent than the traditional ones, especially large banks. According to data from the end of last year, about 56% of open finance users are women. Advanced financial inclusion is evidenced by the fact that 96% of the population has a bank account, and 98% of all used

¹⁵ An overview of options available when using this app is available at: <https://www.bb.com.br/site/pravoice/atendimento/whatsapp-bb/>.

mobile phones are smartphones, necessary for the functioning of open finance. Within the poor population segment, 92% of people own a bank account and 96% own a smartphone. Of the bank account users among the poor, 71% of people chose to open an account with a traditional bank and the rest with a digital bank.

An analysis conducted on a sample of two thousand people showed that 52% of people are not even aware of the existence of open finance. Of those aware, the majority heard of open banking through their mobile banking app, while the next most frequent source are conversations with family and coworkers. Data were also collected on users' willingness to share data, and it turned out that:

1. willingness to share is higher for high income segments;
2. willingness to share decreases for older age groups;
3. men are 40% more willing to share data than women.

The analysis concluded that the main obstacles to greater acceptance of open finance are insufficient awareness and understanding of the concept, for which the English name of the brand (Open Finance) is responsible, the fear of risks associated with sharing sensitive data, especially the risk of adopting something new, and there is also a kind of a stigma due to the worry that a previous bad experience with one bank could negatively affect the future relationship with another bank. It can be concluded that the main drivers of open finance are digitalisation and the population that participates in it.

4.3 Institutional assumptions for data sharing in Serbia

In the Republic of Serbia, the open data and data sharing initiative is at an early stage. There is a great demand for open data from the civil society and the business community. The first open data appeared in 2015 in the work of the Ministry of Education, Science and Technological Development, and in the same year a study on the readiness of our country for open data was published. In it, the integration of open data into the existing e-government strategy was assessed as an "excellent basis and starting point" for the further development of data openness and sharing. It was also stated that the country's legal framework is sufficiently established to serve as a basis for implementing an open data programme (UNDP, 2015). As part of the Open Data Initiative from 2015, the Open Data Hub was created as a unique address for all participants in the open data ecosystem – individuals, startups, companies, media and the rest of the civil sector – to support the opening and use of open data.

The opening of data is a strategic commitment of the Serbian Government, recognised in the Strategy for the Development of eGovernment and the Action Plan for the Implementation of the Open Government Partnership Initiative in the Republic of Serbia. Data from the national Open Data Portal¹⁶ are automatically published on the European Open Data Portal as well.

¹⁶ The Open Data Portal (<https://data.gov.rs/sr/>) is the hub where open data of public institutions are consolidated and made available to citizens and the private and non-government sector. It currently has 2,667 sets of data.

The stated demand for open data is a dynamic category and depends on the knowledge and awareness of the value of open data. One of the important measures in this field was the Open Data Week, organised by the Office for Information Technologies and eGovernment, and the United Nations Development Programme to mark the International Open Data Day. Workshops, lectures, seminars and conferences on the features and possibilities of applying open data are organised in several cities.¹⁷

When it comes to data sharing from the perspective of payment and financial services, the Republic of Serbia is developing a technical-infrastructure and normative framework for alignment with the best international practices. The focus of regulatory activity is primarily reflected in the adoption, amendment and implementation of the Law on Payment Services (RS Official Gazette, Nos 139/2014 and 44/2018).

In other words, the Law on Payment Services and the corresponding secondary legislation are fully aligned with the relevant regulations of the European Union – the Payment Services Directive (PSD) 2007/64/EC, E-Money Directive 2009/110/EC, the provisions of Directive 98/26/EC on settlement finality, as well as the Payment Accounts Directive 2014/92/EU. As for Directive 2015/2366 (PSD2), as a cornerstone for the development of the data sharing model, the National Bank of Serbia has largely harmonised the legal framework with this regulation, bearing in mind the provisions that were foreseen in the previous Directive 2007/64.

With the adoption of the Law on Payment Services, realistic assumptions were created for the development of a modern, comprehensive and efficient payment system in the Republic of Serbia, based on market principles, as well as in line with the standards accepted at the time by advanced countries in this field. That law further improved and modernised payment transactions in the country and abroad, and improved the framework for increasing competition and innovation in the payment services market between existing and new payment service providers, such as payment institutions and electronic money institutions.

Amendments to the Law from 2018 improved the transparency and regulated the comparability of fees charged to payment service consumers in connection with their payment accounts, defined the rights of payment service consumers regarding changes to payment accounts, and prescribed the conditions and method of exercising the right to open and close a payment account with basic services free of charge or with a reasonable fee for unbanked citizens. By improving the volume of data that payment service providers submit to the National Bank of Serbia, the quality of reporting on the provision of payment services and the issuance of electronic money has increased.

¹⁷ An interesting example is the first Datathon in Serbia, held in 2018, focused on the visualisation of open data sets found on the Open Data Portal. At the time, the winning team used open data about the locations of primary and secondary schools in Belgrade and matched them with data about the locations of betting shops downloaded from another website. Since the Law on the Games of Chance prescribes the minimum distance of a betting shop from primary and secondary school buildings of 200 meters, mapping showed that this provision of the law was violated in 70 locations. Another case of good practice is the cross-checking of data from the Geosrbija portal with data from the Ministry of the Interior on the number of traffic accidents, which showed that the highest frequency of accidents on the Pančevo bridge in Belgrade is right in the middle of the bridge. This suggests that accidents could be prevented by installing additional cameras and warnings at that location.

However, the changes in the last few years, detailed in this paper, gave rise to the need to ensure a more comprehensive and effective protection of payment service consumers and, to an even greater extent, the stability of the financial and payment systems as a whole. It is recognised that the current framework established by the said law no longer provides adequate conditions for further development of the payment services market in our country, or the real economy. Therefore, in June of this year, the National Bank of Serbia prepared Draft Amendments to the Law on Payment Services with the aim of further encouraging innovation in the market and ensuring greater competition and transparency in the field of payment services, as well as greater consumer protection and payment security. This includes the regulation of open banking, with associated new services and operations of payment service providers. The draft defines the payment initiation service as “a service to issue a payment order at the request of the payment service user with respect to payer’s payment account held at another payment service provider”¹⁸ – and the account information service as “an online service to provide consolidated information on one or more payment accounts held by the payment service user with either another payment service provider or with more than one payment service provider.” The Law Amending the Law on Payment Services (RS Official Gazette, No 64/2024) was adopted by the Serbian National Assembly on 31 July 2024 and entered into force on 8 August this year, while its implementation will begin on 6 May 2025.

The law provides a clear, comprehensive set of rules that will be applied to existing and new payment service providers, with a special focus on the security of electronic payments, as well as security measures to protect the confidentiality and integrity of data. At the time of writing this paper, the adoption of these amendments is expected to bring numerous benefits for all payment service consumers – primarily in the form of greater consumer protection, a broader range of services, lower costs – but also for the entire market of payment services in the Republic of Serbia, as it implies establishing a legal basis for the development of new, innovative business models and services.

5 Conclusion

The continuous growth of the world economy is increasingly accompanied by a growing volume and complexity of generated data, resulting in the need to improve the methods of their acceptance, systematisation and processing. Information technologies, and especially the internet, are becoming key determinants of the information society, which is characterised by increasing connectivity and speed of information exchange at the local, regional and global levels. Automatisation, robotics, artificial intelligence and machine/deep learning are just some of the technologies in which these trends are manifesting. The use of the internet has greatly changed the organisation and operations of banks and other financial institutions, while on the demand side it has led to the popularisation of modern non-cash payment instruments such as digital banking, digital and crypto-currencies, and other financial technologies. The

¹⁸ Law on Amendments of the Law on Payment Services, available at: http://www.parlament.gov.rs/upload/archive/files/lat/pdf/predlozi_zakona/14_saziv/Predlog%20zakona%20o%20izmenama%20i%20dopunama%20Zakona%20o%20platnim%20uslugama%20LAT.pdf

growth of the financial technology market itself is higher than the average growth of the world economy, which speaks volumes about the disruptive potential of this activity, especially when it comes to banking.

One of the prerequisites for achieving this potential is the development and integration of data sharing models into existing and future business models. Data sharing is becoming an increasingly important factor in innovation and growth of economic efficiency and productivity. In this way, data have become both a working tool and a resource created by using different digital solutions. This means that, in addition to being cooperative, data sharing has a competitive dimension as well. The application of data sharing models in banking and finance in a broader sense is recognised in the practices of open banking and open finance.

The aim of the paper was the analysis of those concepts. Open banking is an innovation in the field of financial technology, which allows consumers to give consent to payment service providers accessing their financial data based on a common technological standard, and service providers can manage those data in a competitive and innovative way. Within open banking, the set of new innovative services is limited to those related to payment initiation and account information. Open finance, on the other hand, represents an expansion of the scope of data sharing, i.e. third-party access to data, so that it includes other financial businesses such as insurance, savings, investments, etc. These models are expected to continue the decentralisation of the provision of banking and financial services, to demonopolise the possession of data and to further encourage competition and innovation, with the aim of generating value for end users.

The analysis of these concepts was first performed by presenting a brief history of the regulation of payment services, with reference to data sharing, and especially in terms of the Second Payment Services Directive of the European Union 2015/2366, its provisions and the way in which market participants adapted. Next, the topics of open banking and open finance were addressed separately, from the point of view of the definition, the scope of the term, the services they entail and their application in practice. The application itself is presented on the examples of Great Britain and Brazil, whose markets are among the most developed ones in terms of data sharing models globally.

Open finance is a near future in the Republic of Serbia as well, considering the new Law on Payment Services, which was recently adopted with the goal of encouraging innovation in the market and ensuring conditions for enhancing competition and transparency in the work of payment service providers, as well as for greater protection of consumers and payment security. In line with the advances made in the most developed markets, the new regulation will, among other things, regulate the work of two new payment service providers – account information service providers and payment initiation service providers.

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SERBIA'S PLACE IN DIRECT INVESTMENT FLOWS AND GLOBAL GOODS EXPORTS

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Serbia's Place in Direct Investment Flows and Global Goods Exports

Miroslav Zdravković

Abstract: The paper examines Serbia's absolute and relative indicators relating to FDI flows and goods exports. Serbia has come a long way from politically and economically isolated to an open country, comparable with other countries of similar size and development level, as confirmed by the calculated relative indicators. Based on the past tendencies, in the future we can also expect Serbia's indicators to be above-average in case of direct investments inflow and goods exports relative to global indicators.

Keywords: FDIs, goods exports, global indicators, globalisation.

[JEL Code]: F40, F41.

Non-technical summary

FDIs and trade in goods are the most important ways of a country's integration into the global economy (coupled with loans, portfolio investments, trade in services ...). The paper presents Serbia's results for these two indicators since 2008 and 2006.

In case of FDIs, the data presented date back from 2008 as this is the year when our balance of payments data were aligned with international standards.

Data on trade in goods cover the period since 2006, because from that year onwards data for Serbia are presented independently and not together with Montenegro.

In view of the initiated process of deglobalisation and fragmentation of the global economy, the data presented for Serbia seem excellent. They indicate the need for further non-alignment of Serbia in global divisions that occurred and that will persist.

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1 Introduction

The first part of the paper analyses data about the flows and stock of direct investments in Serbia and globally for the 1991–2023 period. Absolute and relative comparisons of Serbia and other countries and territories were made from 2008 until 2023, for the period for which comparable data exist.

Objective reasons caused Serbia's delay in the process of integration in the international division of labour and investment flows for full ten years, as it was subject to strict sanctions of the UN and collective West in the last decade of the 20th century.

The presented data, absolute and relative indicators suggest that Serbia made up for this delay and intensively fitted in global production chains and international division of labour.

Serbia posted particularly good relative results in the past few years, pursuing a versatile foreign policy without aligning with any side in clashes that broke out after the onset of the deglobalisation and geopolitical conflicts.

The value of announced greenfield investments in Serbia at end-2023 points to the possibility of a further rise in the value of FDI inflows in the years to come, despite global shocks and instabilities. In addition to rising FDI inflows, it is desirable to increase domestic companies' investments abroad, as this will indicate that they passed the test of international competitiveness.

The second part of the paper presents indicators, absolute and derived ones, about the dynamics of Serbia's goods exports in the 2006–2023 period.

Following the block division of the world into the eastern and western military alliances, the international division of labour quickly progressed since the 1990s until the outbreak of the global economic crisis in 2008, but lost momentum thereafter. Nowadays, we live in a dangerous period of deglobalisation and fragmentation of the global economy.

Serbia started its process of integration in the international division of labour with a delay and from a low base.

In global foreign trade bases, data for Serbia are present since 2006, while until that year they were entered under "Serbia and Montenegro".

In the period following the Montenegro separation, from 2006 until 2023, Serbia experienced extremely fast growth in goods exports and imports. Exports growth was faster, so the export-to-import coverage ratio increased.

This part of the paper includes data about the dynamics of Serbia's exports of goods compared to other countries in the world and presents products with the highest value in Serbian exports and with the largest share of Serbia in the global exports.

Based on the large share of the production in total FDI inflow in the coming years we can also expect that Serbia will continue to increase its relative shares in the global exports and imports of goods.

2 The place of Serbia in flows and cumulative direct investments

2.1 World Development Report: topics by year

UNCTAD annual reports on FDIs in the past 33 years are precious testaments of the globalisation era, as its witnesses but also important promoters. The first Report, from 1991, coincides with the disintegration of Yugoslavia, USSR and the end of the Cold war. The world was full of hope (particularly the Eastern Europe) that the globalisation process will bring great benefits to everyone included, and in the last decade of the past century restrictions to foreign investments were massively removed, their attraction was encouraged, inter-state agreements were signed to avoid double taxation, different measures and actions were taken to increase foreign investment flows and intensify mutual integration of the countries involved.

The global economic crisis of 2008 is at the midpoint of this globalisation and deglobalisation process from 1991 until 2024. The exact timing of the onset of the deglobalisation process is yet to be determined – did it start with the global economic crisis in 2008 or with the American trade sanctions imposed on China in 2018, the coronavirus pandemic or the outbreak of the Ukraine war in 2022? Global FDIs reached the highest absolute and relative significance in 2008. From that year onwards, they have been slowly declining, with the world trade's share in the global GDP also going down.

Serbia's inclusion in this globalisation process was delayed until 2000. It, too, had great expectations from the process of integration into the global economy, as had most countries of Eastern Europe ten years before. Measured by the share of cumulative FDIs in GDP, Serbia overtook most of these countries in the past almost a quarter of a century, but the effects on its overall development can be analysed.

Annual reports on global direct investments addressed different effects of foreign investments on development, employment, and foreign trade depending on investors motivation and host countries' policies.

The global investment report focuses on trends in foreign investments across the globe, at regional and local level, and measures for improvement of their contribution to development. It also contains the analysis of global value chains and operations of multinational companies, with the special focus on their development implications.

Every annual report includes:

- the analysis of FDI trends in the last year with a special focus of development implications;
- ranking of the largest transnational corporations in the world;
- a detailed analysis of selected topics in relation to FDIs;
- the analysis of policies and recommendations;
- statistical annex with data on flows and amounts of FDIs at country level.

Since the start of the publication of this important annual document on FDIs, special topics regarding this area were addressed every year. Below is the list of titles of annual publications

on foreign investments from 1991 until 2024. Based on the titles of annual publications we can understand how the perspectives and restrictions to FDI growth developed and what dominant topics were in some periods.

- 1991: The Triad in Foreign Direct Investment
- 1992: Transnational Corporations as Engine of Growth
- 1993: Transnational Corporations as Integrated International Production
- 1994: Transnational Corporations, Employment and the Workplace
- 1995: Transnational Corporations and Competitiveness
- 1996: Investment, Trade and International Policy Arrangements
- 1997: Transnational Corporations, Market Structure and Competition Policy
- 1998: Trends and Determinants
- 1999: *Foreign Direct Investment and the Challenge of Development*
- 2000: *Cross-border Mergers and Acquisitions and Development*
- 2001: *Promoting Linkages*
- 2002: Transnational Corporations and Export Competitiveness
- 2003: FDI Policies for Development: National and International Perspectives
- 2004: The Shift Towards Services
- 2005: Transnational Corporations and Internationalization of R&D
- 2006: FDI from Developing and Transition Economies: Implications for Development
- 2007: Transnational Corporations, Extractive Industries and Development
- 2008: Transnational Corporations and the Infrastructure Challenge
- 2009: Transnational Corporations, Agricultural Production and Development
- 2010: Investing in a Low-Carbon Economy
- 2011: Non-Equity Modes of International Production and Development
- 2012: Towards a New Generation of Investment Policies
- 2013: Global Value Chains: Investment and Trade for Development
- 2014: Investing in the SDGs: An Action Plan
- 2015: Reforming International Investment Governance
- 2016: Investor Nationality: Policy Challenges
- 2017: Investment and the Digital Economy
- 2018: Investment and New Industrial Policies
- 2019: Special Economic Zones
- 2020: International Production Beyond the Pandemic

- 2021: Investing in Sustainable Recovery
 2022: International Tax Reforms and Sustainable Investment
 2023: Investing in Sustainable Energy for all
 2024: Investment facilitation and digital government

Based on the titles of annual reports we can see that in the beginning they emphasized the importance of transnational companies' operations, only to refocus on their impact on economic development as the time passed.

2.2 Globalisation process expressed using two indicators

Globalisation of the world economy is the process of economic integration of countries in the global economy and a consequent rise in dependence of economic development from the rest of the world. FDI's facilitate and accelerate this integration process. Countries can develop even without FDI's by expanding their own companies via exports and investments abroad. The development driven by foreign investments implies greater flows of trade in goods, but it can also mean simply taking over others' resources, without affecting the growth of the economy in which the investment is made, depending on the investor's motives.

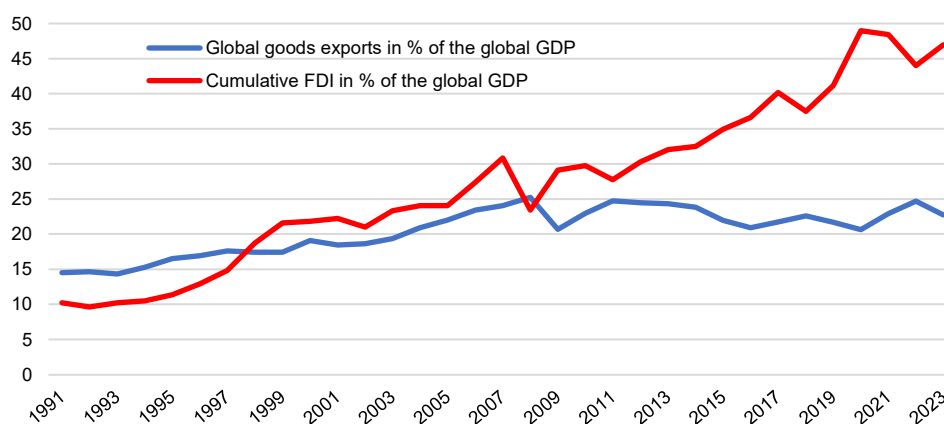
We calculated two indicators of the globalisation process: (1) the share of goods exports in the global GDP and (2) the share of cumulative FDI inflow in the global GDP.

The first indicator rose steadily until the global economic crisis reaching the climax in 2008 with the 25.2% share of the global goods exports in the global GDP. Since that year it stagnated and declined only to rocket abruptly – to 24.7% in 2022. The reason for this abrupt increase after 2020 was the rise in the prices of primary commodities, which was the case in 2008 as well. Likewise, a decline in primary commodity prices pushed down the share of global exports in the global GDP from 2009 until 2020. The second factor behind the decline in the share of goods exports in GDP was a faster rise in services compared to the manufacturing sector in the period observed. In 2023, the share of global goods exports dropped to 22.8%, in accordance with the decline in primary commodity prices.

The second indicator, the share of cumulative FDI inflows in the global GDP, was relatively stable in the period from 1991 until 1994, where the share of cumulative investments was around 10% of the global GDP, only to go abruptly up – to 21.6% in 1999. This was when Western Europe integrated Eastern Europe in its production processes. The share of cumulative FDI inflow exceeded 30% of the global GDP in 2012. In 2017 it was over 40% and in 2020 reached the record high 49.0%. The growth and integration of the global large capital occurs independently of trends in the share of trade in goods in the global GDP, and the main reason is a high increase of the share of FDI in services, particularly the IT sector. In 2023, this indicator stood at 47.0%.

Table 1a in the statistical annex shows the main indicators of operations of branches of transnational companies in the period preceding the outbreak of the global economic crisis in 2007–2008 with the addition of derived indicators of the relative importance of branches of

Chart 1 Selected globalisation indicators



Source: author's calculations based on IMF and UNCTAD bases.

transnational companies for GDP, exports and investments, as well as the latest data, which are not as methodologically updated as the older ones.

The purpose of these selected indicators was to point to the significance of transnational companies for the global economy. In the total global trade, parent transnational companies accounted for a third of exports, their branches for the second third, and smaller companies which did not acquire global character for the third.

In the period from 1990 until 2007, the global GDP increased nominally 2.46 times, total fixed investments 2.42 times and the global trade in goods and services 3.88 times.

In the period following the global crisis, the relative importance of the branches of transnational companies declined, as can be seen from their share in the global GDP and the share of FDIs in global investments, which went down after the crisis.

After two decades of the rising impact of FDIs, the third decade saw their stagnation. In the 1990s FDIs were rising at the rate of 15.3%, trade at 6.2%, and GDP at 3.8% on average annually. In the first decade of the 21st century, FDIs were going up at the annual rate of 8.0%, trade at 9.0%, and GDP at 7.0%. In the second decade of the 21st century, FDIs were rising only at 0.8% rate, trade at 2.7%, and GDP at 3.1% on average annually.¹

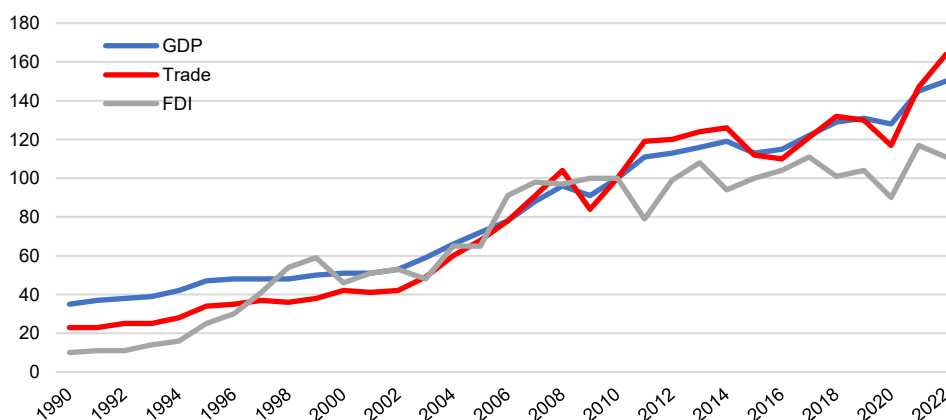
In addition to this FDI lag behind production and trade, there is an increasing gap between the production sector and services, with investments channelled more and more into services.

From 2004 until 2023, the share of cross-border greenfield projects in the services sector increased from 66% to 81%.

At the same time, FDIs in the production stagnated for two decades, before they dropped significantly, with the negative annual rate of -12% in the three years that followed the outbreak of the coronavirus pandemic.

¹ World Investment Report 2020 "International Production Beyond the Pandemic", p 123.

Chart 2 FDI, GDP and trade (2010=100)

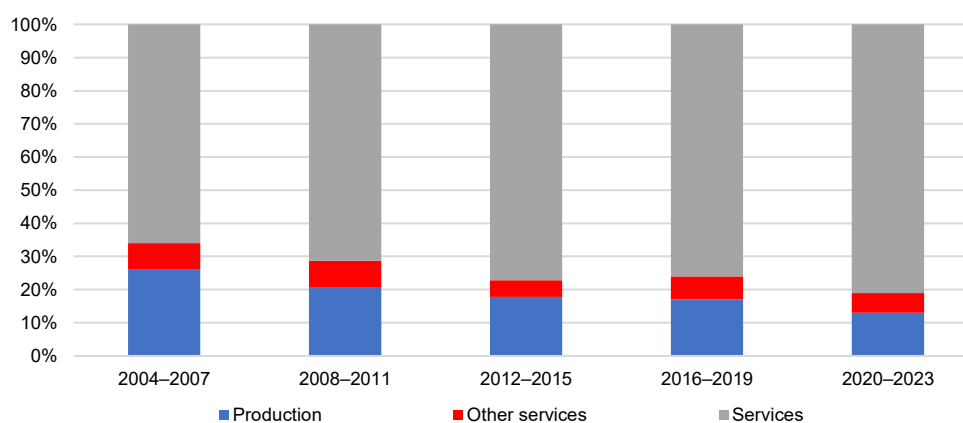


Source: <https://unctad.org/news/global-crises-fracturing-foreign-investment-impacting-developing-economies>.

At the beginning of the third decade of the 21st century, the global production system experienced a perfect storm with the coronavirus pandemic-induced crisis that broke out at the time of challenges posed by the new industrial revolution, growing economic nationalism and sustainable development imperative. The temporary effects of this perfect storm were the production and supply chain halts, global recession, and supply- and demand-side shocks. Long-term impacts of this storm made it imperative to bolster supply chain resilience and increase the national and regional autonomy of production capacities.²

The IMF addressed this new phenomenon of geo-economic fragmentation, as a process which is in opposition to the global economic integration and introduced the notion of slowbalization, which is an antonym of globalisation.³

Chart 3 Shares of sectors in greenfield investments



Source: <https://unctad.org/news/global-crises-fracturing-foreign-investment-impacting-developing-economies>.

² For more details, see World Investment Report 2020, “International Production Beyond the Pandemics”, p 120–178.

³ For more details, see World Economic Outlook, April 2023, Chapter 4 “Goeconomic Fragmentation and Foreign Direct Investment”.

2.3 Serbia in the process of globalisation 1991–2023

In the period from 1991 until 2023, the nominal value of the global GDP increased 4.3 times, from 24.2 to 104.5 thousand billion US dollars. In this period Serbia's GDP rose 2.7 times, from estimated USD 28.3 bn in 1991 to USD 75 bn in 2023.⁴

Global population enlarged by almost 60%, while in Serbia it declined, due to both excluding Kosovo and Metohija from the official records since 1999, and negative birth rates and people leaving Serbia since 1991, which was mitigated by the inflow of refugees from Croatia, Bosnia and Herzegovina and Kosovo and Metohija.

In the period from 1991 until 2023, global commodity exports increased 6.7 times, and Serbian 6.6. Though it seems that following 2000 the decline from the 1990s was offset, this still largely concerns the effect of the introduction of former Yugoslav republics in the statistics of external trade, where they did not appear until 1992. In 1991, Serbia's exports of goods to the former Yugoslav republics were two times higher than exports to "former" foreign countries, so by including these republics in goods exports of 1991 we can conclude that, in fact, by 2023 the exports rose somewhat more than two times, while they reached the nominal value recorded 22 years earlier only in 2013. The global trade also increased by the effect of inclusion of trade among former USSR countries and the Czech Republic with Slovakia, as well as mutual exchange between other former Yugoslav republics, but these effects are significantly lower.

The annual value of the global FDI inflow increased 8.7 times from 1991 until 2023. A record nominal value was posted in 2015 (USD 2,050 bn) when the old record from 2007 was broken (USD 1,889 bn). In 2020, for the first time since 2005, FDI fell to below USD 1,000 bn, only to recover in 2021 and 2022. In 2023, they declined by 1.8% from 2022.

A cumulative value of FDI inflow rose 19.9 times, from USD 2,471 bn in 1991, to USD 49,131 bn in 2023, which pushed up its share in the global GDP, as mentioned earlier.

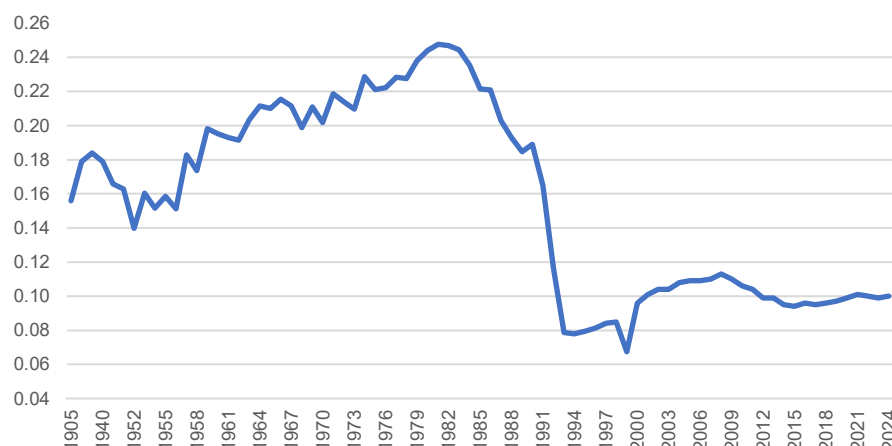
In 1991, Serbia saw a record high share of 0.165% in the global GDP in the observed period, expressed in currency purchasing power. The actual record share of Serbia's GDP was posted in 1981, when it reached 0.248%.

Influenced by the sanctions and bombing, Serbia's share in the global economy dropped to the minimum 0.096% in 2000, down by 42% from 1991. The subsequent recovery was fast paced until 2008, when it reached 0.113%, while following that year it declined to around 0.094% in 2015, due to unpopular measures of fiscal consolidation. After 2015, it recovered to 0.099% in 2023.⁵

⁴ UNCTAD database quotes USD 71.9 bn in prices from 2015 for Yugoslavia. Serbia participated with 38% in Yugoslavia's GDP in 1989.

⁵ Data from the IMF database World Economic Outlook, April 2024.

Chart 4 Serbia's share in global GDP at currency purchasing power (%)



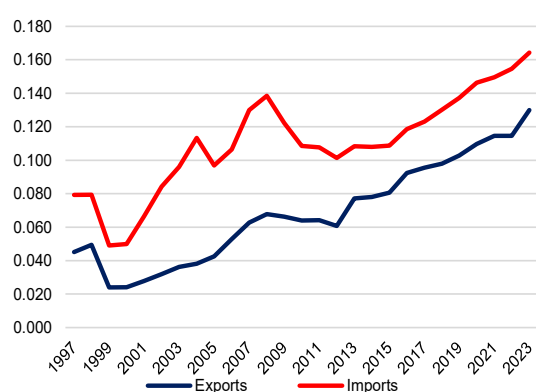
Source: Author's calculations based on Maddison Historical Statistics.

In 1991, Serbia's share in the global exports of goods equalled 0.134%, similar to its share in the population number. This share dropped to the minimal 0.024% in 1999 and 2000, 5.6 times lower than the starting level in 1991. Serbia's share in the global exports was recovering thereafter and reached 0.130% in 2023, almost the same as in 1991, and the same notes about the inclusion of former Yugoslav republics in the foreign trade statistics can be applied here as well.

Serbia's imports share declined from 0.153% in 1991 to only 0.043% in 1995, and in 2022 it outstripped the 1991 share only to reach a record high in 2023 (0.164%).

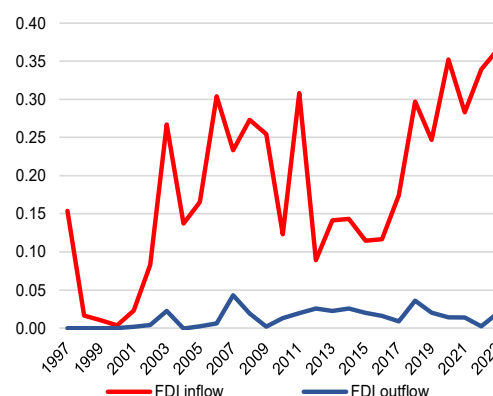
Since 2006, Serbia recorded a higher share in the global FDI inflow relative to the share in the world population, which means that its share of inflow per capita was above average throughout this period. It posted a record high share in the global FDI inflow in 2023 (0.366%) and as of 2018 it was higher than 0.24%.

Chart 5 Shares of Serbia in the global goods exports and imports



Source: UNCTAD Database.

Chart 6 Shares of Serbia in the global FDI flows



Source: UNCTAD World Investment Report Database.

Serbia's highest share in the global FDI outflow was recorded in 2007 (0.043%), when the company Telekom Serbia acquired Telekom of the Republic Srpska. So far, this indicator has

not outstripped Serbia's share in the world population, which means that its outflow of direct investments per capita is below the average.

Serbia's share⁶ in the global cumulative FDI inflow stood at 0.123% in 2023, which is 46% above its share in the world population and it is as much higher than the average inflow per capita at the global level.

Serbia's share in the global cumulative FDI outflow stood at 0.011%, which is almost eight times lower than the share in the global population. The global FDI outflow is highly concentrated on a relatively small number of highly developed countries, so in the case of this indicator an abrupt and sharp rise in Serbia's share in the global FDI outflow cannot be expected.

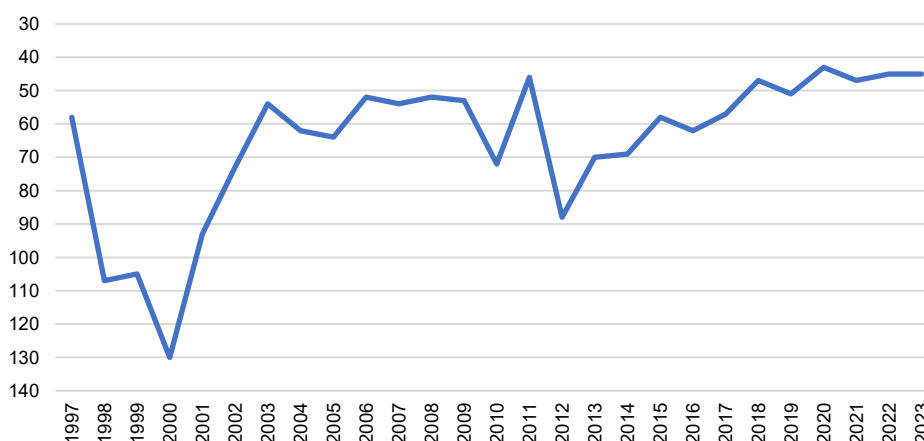
2.4 Comparable indicators of direct investments by country

2.4.1 Annual value of FDI inflows

Serbia's ranking when it comes to annual values of FDI inflows depends on its values and the dynamics of global FDI flows.

Serbia entered the globalisation process from the 130th place according to the value of inflows in 2000 and stabilised its share between the 52nd and 64th place from 2003 until 2009. Following the worsening of the position in the period from 2010 until 2014, between 69th and 88th place with an exception of 2011 when it was on the 46th place, as of 2015, it regained better positions, and in the four consecutive years 2020–2023, it was among the first 50 countries with the highest value of FDI inflows, which is two times better than its ranking by the size of the economy (83rd place).

Chart 7 Serbia's ranking in FDI inflow



Source: Author's calculation based on UNCTAD database on annual values of FDI inflow.

⁶ Data presented here concern the total investments inflow and outflow until 2023, and not only in the 2008–2023 period, as in the following parts of the paper.

In 2022, Serbia was in the 45th place in the world and only Romania and Hungary, among the neighbouring countries had a higher value of FDI inflow. With USD 4,571 mn worth of inflows, Serbia was comparable to Cyprus and Denmark.

In 2023, Serbia preserved its 45th place and increased the value of its inflows to USD 4,888 mn. Romania in the 38th and Hungary in the 41st place were still ahead of Serbia, but with significantly lower values. Romania's value decreased from USD 11.3 bn in 2022 to USD 7.1 bn in 2023, and Hungary's from USD 8.6 bn to USD 6 bn. In 2023, Serbia was comparable to South Africa and Oman.

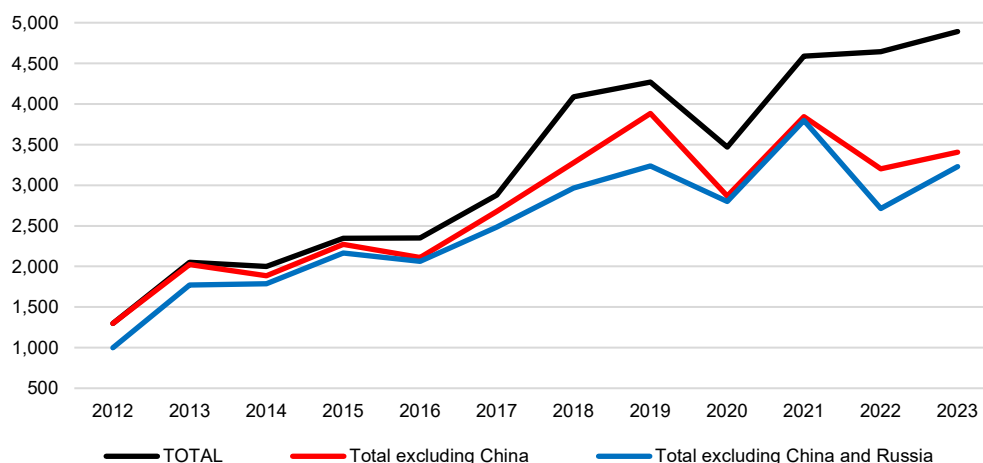
Table 1 Country ranking by value of FDI inflow (USD mn)

1	USA	310,947
2	China	163,253
3	Singapore	159,670
4	Hong Kong, China	112,676
5	Brazil	65,897
6	Canada	50,324
7	France	42,032
8	Germany	36,698
9	Mexico	36,058
10	Spain	35,914
38	Romania	7,130
41	Hungary	6,016
45	Serbia	4,888
54	Bulgaria	3,913
63	Croatia	2,749
79	Albania	1,630
98	Bosnia and Herzegovina	946
113	North Macedonia	667
118	Montenegro	655

Source: Author's calculation based on UNCTAD database on annual values of FDI inflow.

At the time of the perfect storm for FDI flows, at the end of the second and the beginning of the third decade of the 21st century, Serbia had an excellent relative result, with the share higher than 0.24% in the total global FDI inflow in the 2020–2023 period. This is a result of the policy of Serbia's and China's "steel friendship" and friendly relations with the Russian Federation, along with good relations with the EU, towards which we converge.

Chart 8 Value of FDI inflows to Serbia, total and excluding China and Russia (USD mn)



Source:NBS.

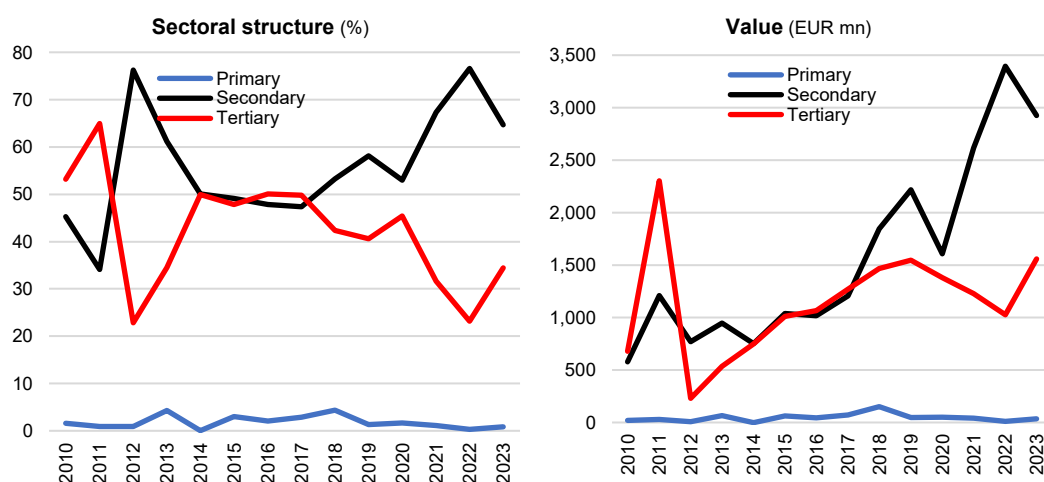
According to the NBS's data,⁷ in the period from 2010 until 2023, China's⁸ share in total FDI inflow stood at 14.3% and was the second highest after that of the Netherlands (14.4%), which is nominally the headquarters of many companies operating in Serbia. In the 2018–2023 period, the share of China increased to 21.4% and is ranked unambiguously first with the annual shares of 31.1% in 2022 and 30.4% in 2023.

When looking more carefully at Chart 8, one can see that FDI inflow since 2018 and deducting China and Russia stabilised at values around USD three billion.

An additional importance of FDI inflow from China stems from the fact that it boosts Serbia's share in the global direct production investments, we will assume by around 0.5% to 1.0% p.a., in the period when they were declining across the globe by 12% since 2020.⁹

In the 2010–2023 period, the total FDI inflow to Serbia stood at EUR 38.8 bn. Investment in the secondary economic sector (industry and construction) measured EUR 22.1 bn, in the services and uncategory sector – EUR 16.1 bn and primary sector – EUR 0.6 bn. The share of the secondary sector in total inflow amounted to 57.0%, tertiary to 41.3% and primary to 1.7%.

Chart 9 FDI inflow to Serbia



Source: NBS.

The enclosed Chart 9 in the first part shows that the secondary sector had the largest share in total investments in almost all years, and in the second part presents absolute values, where the value of the secondary sector increased six (2023) to seven (2022) times relative to the base year 2010.

⁷ https://nbs.rs/sr_RS/drugi-nivo-navigacije/statistika/platni_bilans/

⁸ Including Hong Kong, Taiwan and Macao.

⁹ See: <https://unctad.org/news/global-crises-fracturing-foreign-investment-impacting-developing-economies>.

2.4.2 Cumulative FDI inflow in the 2008–2023 period

The UNCTAD data base contains data for Serbia since 2008 in line with their adjustment to the modern balance of payments methodology. Further overviews of total data present the calculation of cumulative inflows and outflows for all countries in the 2008–2023 period, for the sake of comparison (of data for Serbia with those of other countries).

The total (cumulative) value of FDI inflows is highly concentrated on a small number of countries, of which the USA account for 17.8% of the total value. With China, Hong Kong, Singapore, Brazil, the UK and Ireland, the USA accounts for almost a half (49.3%) of all FDIs in the world from 2008 until 2023. These countries together with Australia, Canada, India, Germany, Spain, Mexico and France make up two thirds of all investments in other countries.

When observing GDP at the current exchange rate in 2023, Serbia was ranked 83rd in the world with 0.072% share. From this perspective, Serbia had three times larger share in the cumulative FDI inflow (0.218%) and the 54th place in the world is a great success.

Table 2 Country ranking by cumulative FDI inflow in 2008-2023 in USD mn and % in the global inflow

		Value (USD mn)	Share (%)
1	USA	4,275,237	17.82
2	China	2,182,397	9.10
3	Hong Kong, China	1,616,125	6.74
4	Singapore	1,203,283	5.01
5	Brazil	964,791	4.02
6	UK	848,962	3.54
7	Ireland	735,246	3.06
8	Australia	710,831	2.96
9	Canada	697,145	2.91
10	India	640,862	2.67
11	Germany	606,972	2.53
12	Spain	509,610	2.12
13	Mexico	502,927	2.10
14	France	477,164	1.99
15	Russian Federation	447,378	1.86
43	Romania	91,512	0.38
52	Hungary	67,993	0.28
54	Serbia	52,208	0.22
63	Bulgaria	40,763	0.17
73	Croatia	29,677	0.12
96	Albania	18,309	0.08
116	Montenegro	10,396	0.04
120	Bosnia and Herzegovina	8,501	0.04
130	North Macedonia	6,459	0.03

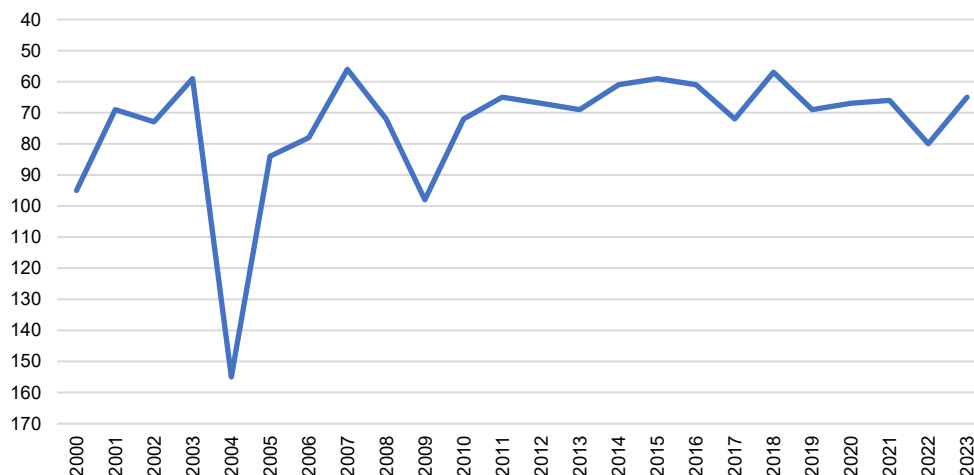
Source: Author's calculations based on UNCTAD database on the total FDI inflow.

Of neighbouring countries, Romania and Hungary had higher cumulative values of inflow, while other countries recorded lower values than Serbia.

2.4.3 Annual FDI outflows

Serbia posted a record value of FDI outflows in 2007 in the amount of USD 946 mn, and it also had a record ranking that year – 56th place in the world, with as many as 55 countries

Chart 10 Serbia's ranking in global FDI outflow

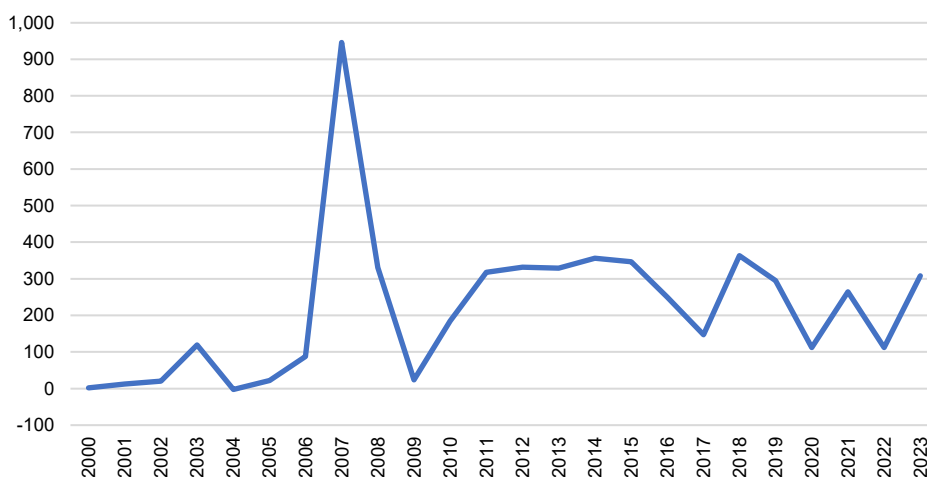


Source: World Investment Report 2024 and author's calculations.

recording more than USD one billion worth of FDI outflows. A record high value of outflows in the world was recorded that year (USD 2,191 bn).

It approached that ranking in 2018 when it was in the 57th place with the outflow of USD 363 mn, while the total global value of outflows amounted to USD 1,015 bn.

Chart 11 Annual values of FDI outflows from Serbia (USD mn)



Source: World Investment Report 2024.

In 2023, Serbia was in the 65th place in the world with FDI outflow of USD 323 mn, which is three times higher than in 2022 (USD 106 mn).

Of neighbouring countries, Hungary, Croatia and Bulgaria recorded higher FDI outflows in 2023.

Table 3 Country ranking by value of FDI outflow in 2023
(USD mn)

1	USA	404,316
2	Japan	184,022
3	China	147,850
4	Switzerland	104,954
5	Hong Kong, China	104,286
6	Germany	101,254
7	Canada	89,583
8	France	72,356
9	Singapore	62,997
10	Sweden	47,498
38	Hungary	3,299
48	Croatia	1,178
56	Bulgaria	598
65	Serbia	323
67	Albania	265
78	North Macedonia	101
89	Montenegro	63
94	Bosnia and Herzegovina	48
97	Romania	40

Source: World Investment Report Database.

2.4.4 Cumulative FDI outflow in the 2008–2023 period

The greatest source of foreign investments are the USA with the share of 18.4% in the total value of direct investments in the world in the 2008–2023 period, followed by Japan, China, Germany and Hong Kong. These five countries and territories account for 48.8% of all FDIs from 2008 until 2023, followed by Canada, France, Singapore, Russia, and the Netherlands. These ten countries and territories together account for almost two thirds of total FDIs from 2008 until 2023.

Serbia was in the 77th place in the world with invested USD 4080 mn in other countries, which is a more favourable indicator relative to the 83rd place by the value of GDP in current dollars.

Higher value of the total FDI outflow was recorded by Hungary, Bulgaria and Croatia, among neighbouring countries.

FDI outflow is an important indicator of the power of local companies.

Table 4 Country ranking by cumulative FDI outflow in 2008-2023, in USD mn and % in the global outflow

		Value (USD mn)	Share (%)
1	USA	4,253,138	18.37
2	Japan	2,244,946	9.70
3	China	1,998,218	8.63
4	Germany	1,458,764	6.30
5	Hong Kong, China	1,339,732	5.79
6	Canada	1,049,063	4.53
7	France	947,667	4.09
8	Singapore	684,691	2.96
9	Russia	601,754	2.60
10	Netherlands	590,947	2.55

Table 4 Country ranking by cumulative FDI outflow in 2008-2023, in USD mn and % in the global outflow

		Value (USD mn)	Share (%)
46	Hungary	27,520	0.12
68	Bulgaria	5,457	0.02
75	Croatia	4,117	0.02
77	Serbia	4,080	0.02
89	Romania	2,078	0.01
100	Albania	1,187	0.01
109	Bosnia and Herzegovina	653	0.00
117	North Macedonia	458	0.00
119	Montenegro	416	0.00

Source: World Investment Report Database.

2.4.5 Net FDI inflow

Of 190 countries and territories for which data are available, in the period from 2008–2023, cumulative net FDI outflow (outflow higher than inflow) was posted by 36 countries and territories, which is 18.9% or almost every fifth country and territory, while the remaining four recorded an inflow higher than outflow.

Serbia was in the 163rd place by this indicator, meaning that only 27 countries and territories recorded a higher FDI inflow, with the net inflow of USD 48.1 bn.

Table 5 Country ranking by total balance of FDI flows (2008-2023)
(USD mn)

	Inflow	Outflow	Balance
World	23,993,774	23,147,951	-845,823
1 Japan	206,516	2,244,946	2,038,430
2 Germany	606,972	1,458,764	851,791
3 France	477,164	947,667	470,502
4 Netherlands	150,659	590,947	440,288
5 Luxembourg	-142,625	257,018	399,643
88 North Macedonia	6,459	458	-6,000
97 Bosnia and Herzegovina	8,501	653	-7,848
102 Montenegro	10,396	416	-9,980
121 Albania	18,309	1,187	-17,122
132 USA	4,275,237	4,253,138	-22,099
139 Croatia	29,677	4,117	-25,559
150 Bulgaria	40,763	5,457	-35,306
157 Hungary	67,993	27,520	-40,472
163 Serbia	52,208	4,080	-48,128
169 Romania	91,512	2,078	-89,434
180 China	2,182,397	1,998,218	-184,179
185 UK	848,962	499,753	-349,209
186 Mexico	502,927	138,029	-364,898
187 India	640,862	192,249	-448,614
188 Australia	710,831	249,734	-461,097
189 Singapore	1,203,283	684,691	-518,592
190 Brazil	964,791	104,577	-860,213

Source: Author's calculation based on World Investment Report Database.

Of neighbouring countries, only Romania had a higher net FDI inflow.

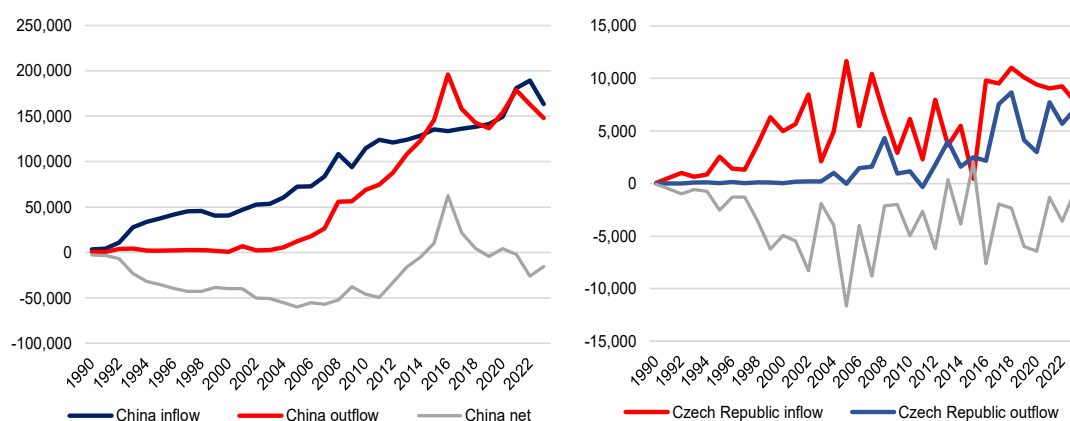
The highest net FDI outflow was recorded by: Japan, Germany, France, the Netherlands and Luxembourg.

The highest net FDI inflow was recorded by: Brazil, Singapore, Australia, India and Mexico.

2.4.6 China and the Czech Republic – examples of FDI net flows' changed dynamics

Chart 12 shows changes in FDI flows as a result of stronger competitiveness of domestic companies in cases of China and the Czech Republic. They both entered economic transition dependent on FDI inflows which were used to transfer knowledge and technologies and initiate development based on export expansion. As the time passed, local companies acquired knowledge and technologies necessary for entering foreign markets by direct investments.

Chart 12 FDI flows in China and the Czech Republic 1990–2022



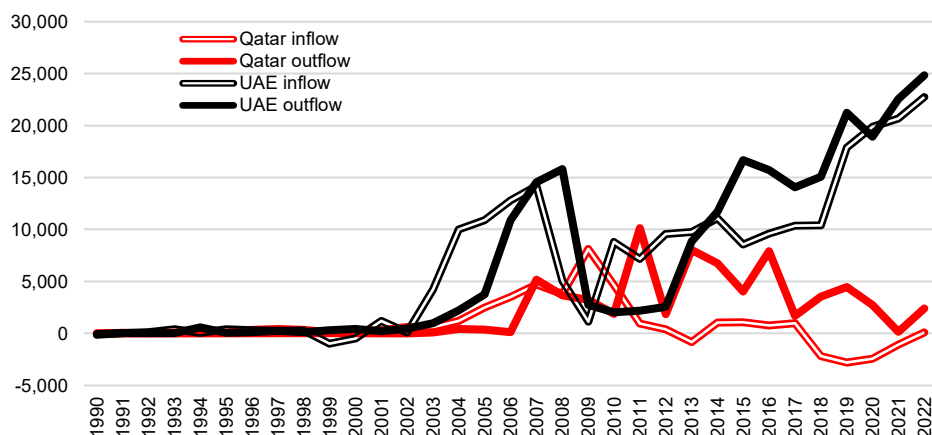
Source: World Investment Report Database.

China has FDI inflow-outflow coverage ratio of 80.3%, which is more favourable than the USA's 73.6%. Still, there are differences in trends: (1) the USA were a dominant direct investor with the maximum share of 39.7% in total direct investments in the world in 1999, which dropped to 21.3% in 2023 – the inflow-outflow coverage ratio was reduced from 135.6% in 1990 to 73.6%; (2) China increased its share in total outflows and inflows and raised the inflow-outflow coverage ratio from 21.5% in 1990 to 80.3% in 2023, and it had higher cumulative outflows than inflows from 2016 until 2020.

China, as a country with huge net savings and a surplus in trade with the world, is moving towards generating net FDI outflows in the coming years.

The Czech Republic had FDI inflow-outflow coverage ratio of below 10% in as many as 12 years in the period of 18 years, i.e. from 1990 to 2007 (the inflow being 10 and more times higher than the outflow). In this period, total FDI inflow amounted to USD 72.2 bn, and the outflow equalled USD 5.4 bn, with the coverage of only 7.4%. In the second period, 2008–2023, the inflow increased to USD 111.4 bn, up by 54%, and the outflow went up to 62.0 bn, which is an increase of over 11 times; the net outflow improved from USD -66.8 bn to USD -49.4 bn. The inflow-outflow coverage ratio went up to 55.7% in the second period and equalled 32.0% (216.6 inflow and 69.2 outflow). Judging by these data, we can anticipate that in the not so near future Czech companies will have greater investments abroad than those of foreign companies in the Czech Republic.

Chart 13 FDI flows of Qatar and UAE



Source: World Investment Report Database.

More obvious examples than China and the Czech Republic are Qatar and the United Arab Emirates. Qatar had a net FDI outflow until 2015, and the United Arab Emirates until 2016, experiencing a high net FDI outflow since then. From investing surplus income from oil sales into foreign currency reserves, they switched to purchasing foreign resources via direct investments.

2.4.7 Announced greenfield projects in 2023 and Serbia's place in the world

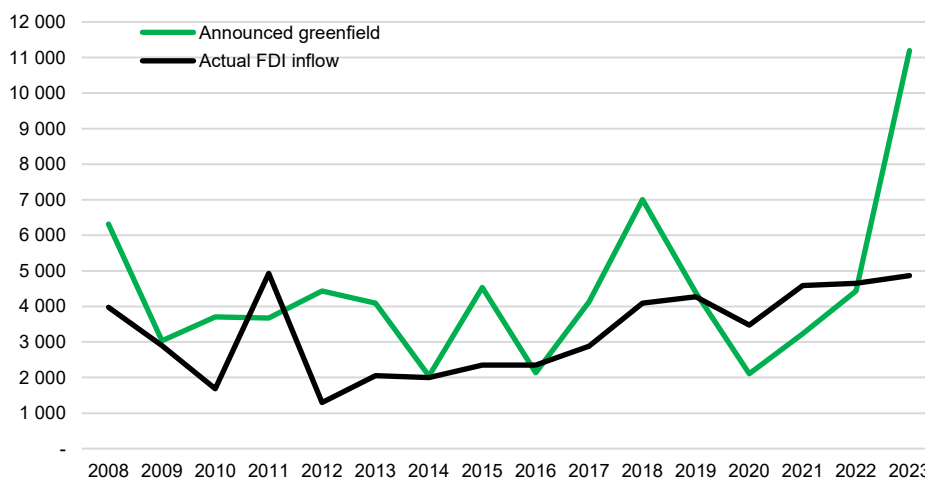
The announced greenfield projects are an indicator of future FDI movements and data pertain to multiannual investment plans. As of 2012, the services sector has accounted for around 50% of all greenfield project announcements, while prior to that year it held a smaller share.

A record value of greenfield investments was announced in 2023 – USD 1.380 bn, which was a 5.4% increase from the previous record in 2022 (earlier record: USD 1,296.9 bn in 2008). The announced value went up by 25.9% in manufacturing, while decreasing by 39.0% in the primary sector and by 1.7% in services relative to 2022 values.

Serbia holds a greater share in total announced greenfield investments than in the global investment inflow. Logically so, because large stock exchange takeovers, common for advanced markets, are not feasible in our country. Rather, existing companies are bought directly or completely new greenfield investments are made.

In 2023, foreign companies announced greenfield investments in Serbia worth USD 11.2 bn, a record annual value (previous record: USD 7 bn, in 2018). Serbia's share in announcements of total global greenfield investments reached record 0.811%, ten times its share in the global population.

Chart 14 **Announced greenfield investments and actual FDI inflow to Serbia**
(USD mn)



Source: World Investment Report Database.

Announcements of such large greenfield investments suggest that in the coming years the annual value of FDI inflow would climb to over six or seven billion dollars.

In 2023, Serbia ranked 31st in the world according to the value of announced greenfield investments, comparable to Turkey, Singapore and Pakistan.

Serbia boasted the highest value of all neighbouring countries, with Romania and Hungary coming closest, at 34th and 37th place, respectively.

If the value of announced greenfield investments is put in relation to the number of inhabitants, we arrive at USD 175.0 per capita globally and USD 1,685.8 for Serbia, which is almost tenfold.

According to this piece of data, Serbia was the sixth in the world, topped only by Mauritania¹⁰, Tonga, Montenegro, Singapore and Ireland.

Table 6 **Country ranking by announced greenfield investments per capita in 2023**

	Greenfield	Population	Greenfield per capita
World	1,380,401	7,888.146	175.0
1 Mauritania	34,000	4.430	7,674.9
2 Tonga	369	0.100	3,690.0
3 Montenegro	1,702	0.633	2,689.2
4 Singapore	11,355	5.918	1,918.8
5 Ireland	9,797	5.234	1,871.8
6 Serbia	11,190	6.638	1,685.8
7 Australia	44,121	26.620	1,657.4
9 UAE	15,589	9.713	1,605.0
18 Hungary	9,237	9.600	962.2
33 Croatia	2,355	3.843	612.8
36 Bulgaria	3,622	6.409	565.1
37 Romania	10,589	19.030	556.4
39 Bosnia and Herzegovina	1,905	3.464	549.9

¹⁰ The green hydrogen project in Mauritania is the largest announced project in the world. See: <https://cwp.global/mauritania-and-cwp-sign-glasgow-joint-declaration-on-aman-green-hydrogen-project-at-cop26/>.

Table 6 Country ranking by announced greenfield investments per capita in 2023

		Greenfield	Population	Greenfield per capita
49	USA	141,793	335.135	423.1
55	Albania	1,049	2.858	367.0
61	North Macedonia	592	1.813	326.5
133	China	37,538	1,411.397	26.6

Source: Author's calculation based on the World Investment Report Database

2.5 Relative indicators of FDI flows relative to the population, GDP and goods exports

2.5.1 Cumulative FDI inflow and outflow in the period 2008–2023 relative to the population

When data on total inflow and outflow are put in relation to the population number, we arrive at one of the relative indicators of intensity of FDI flows in the world.

In the period 2008–2023, the average cumulative FDI inflow per capita in the world measured USD 3,042 and outflow 2,934, so total flows reached USD 5,976.¹¹

A cumulative FDI inflow to Serbia per capita amounted to USD 7,864. According to this indicator, Serbia took the 48th place, with only Montenegro recording a higher inflow per capita. In this period, FDI inflow to Serbia per capita was 159% higher than the global average.

As for FDI outflow, Serbia accounted for only 20.9% of the global average, with USD 614 per capita.

Summing up inflow and outflow, we arrive at USD 8,478 of FDI flows per capita in Serbia, which is 41.9% above the global average flows.

A cumulative FDI inflow per capita amounted to USD 7,240 in France and USD 7,180 in Germany in 2023, so Serbia had 108.6% of France's inflow per capita and 109.5% of Germany's inflow, which is a favourable indicator of its integration in international economic flows.

Table 7 Selected indicators of FDI per capita

		Population number (mn)	Inflow (USD mn)	Outflow (USD mn)	Inflow (USD per capita)	Outflow (USD per capita)	Total flows (USD per capita)
	World	7,888	49,130,846	44,380,560	6,228	5,626	11,854
1	Luxembourg	0.7	1,183,734	1,679,068	1,790,823	2,540,194	4,331,017
2	Malta	1	725,715	695,859	1,338,957	1,283,872	2,622,829
3	Singapore	6	2,632,364	1,792,289	444,806	302,854	747,660
4	Hong Kong SAR	7.5	2,107,038	2,028,532	279,633	269,215	548,848
5	Ireland	5.2	1,410,084	1,336,414	269,409	255,333	524,742
6	Netherlands	18	2,678,218	3,386,269	150,369	190,122	340,491
7	Switzerland	9	1,136,788	1,472,959	128,961	167,097	296,058
8	Cyprus	0.9	90,804	48,338	98,593	52,485	151,078
13	UK	68	3,048,932	2,124,191	44,757	31,182	75,939

¹¹ Discrepancy between inflow and outflow per capita is a consequence of common statistical discrepancies at the global level, not only when it comes to FDI, but also trade in goods data and other indicators.

Table 7 Selected indicators of FDI per capita

		Population number (mn)	Inflow (USD mn)	Outflow (USD mn)	Inflow (USD per capita)	Outflow (USD per capita)	Total flows (USD per capita)
17	USA	335	12,817,063	9,433,926	38,244	28,150	66,394
38	France	65.9	1,012,705	1,635,680	15,366	24,818	40,184
44	Germany	84.5	1,128,259	2,179,240	13,346	25,779	39,125
47	Hungary	9.6	118,983	46,097	12,394	4,802	17,196
49	Croatia	3.8	42,909	8,143	11,166	2,119	13,285
57	Bulgaria	6.4	61,945	4,317	9,665	674	10,339
58	Montenegro	1	6,066	271	9,583	428	10,011
61	Serbia	7	52,208	4,080	7,864	614	8,478
68	Romania	19	125,555	4,902	6,598	258	6,855
83	Albania	2.9	13,985	1,389	4,893	486	5,379
86	North Macedonia	2	8,421	210	4,645	116	4,761
96	Bosnia and Herzegovina	3.5	10,667	814	3,079	235	3,314
101	China	1,411.4	3,659,633	2,939,100	2,593	2,082	4,675
110	Japan	124.6	246,801	2,132,578	1,980	17,113	19,093

Source: IMF, UNCTAD and author's calculations.

2.5.2 Cumulative FDI inflow and outflow in the 2008–2023 period relative to GDP

In the 2008–2023 period, total FDI inflow globally amounted to 23.0% of the global GDP, and cumulative outflow – 22.1%, so these cumulative sums held a 45.1% share in global GDP.

With the total 75.0% share of inflows and outflows in GDP, Serbia held a relatively high 47th place in the world.

In the 2008–2023 period, a higher ratio of cumulative FDI flows than Serbia's was recorded by Montenegro, at 13th, and Albania, at 35th place.

Table 8 Cumulative FDI inflow and outflow in 2008-2023
(% of GDP)

	Inflow	Outflow	Total
World	23.0	22.1	45.1
1 Cyprus	941.0	1180.3	2121.3
2 Malta	831.0	649.0	1480.0
3 Hong Kong SAR	428.7	355.4	784.1
4 Singapore	240.0	136.5	376.5
5 Liberia	183.3	102.7	286.0
13 Montenegro	140.4	5.6	146.0
35 Albania	80.5	5.2	85.7
47 Serbia	69.6	5.4	75.0
61 Japan	4.9	53.3	58.2
97 Bulgaria	40.1	5.4	45.5
98 Hungary	32.0	12.9	44.9
93 North Macedonia	43.7	3.1	46.8
103 Croatia	36.2	5.0	41.2
122 Bosnia and Herzegovina	31.2	2.4	33.6
131 USA	15.6	15.5	31.2
138 Romania	26.5	0.6	27.1
144 China	12.4	11.3	23.7
147 India	17.9	5.4	23.3

Source: IMF, UNCTAD and author's calculation.

2.5.3 Cumulative FDI inflow and outflow in the 2008–2023 period relative to goods exports

Impact of FDI on goods exchange flows should be two-way – encouraging both directions, exports and imports alike. Their impact depends on motivation for investment: utilisation of cheaper resources in the international division of production processes or conquering the market for one's products and services. In the first case, the impact is slightly stronger on exports compared to that on imports, concerning the costs of local labour force, while in the second case, the dominant impact is that on imports growth.

Table 9 Cumulative FDI inflow and outflow in 2008–2023, % of goods exports in 2023

	Inflow	Outflow
World	103.1	99.5
1 Palau	9,525.6	0.0
2 Antigua and Barbuda	7,826.1	382.7
3 Cyprus	5,976.9	7,497.1
4 Malta	5,025.2	3,924.7
5 Grenada	4,918.0	333.0
25 Montenegro	745.7	29.8
37 Albania	464.1	30.1
77 USA	211.7	210.6
86 Serbia	169.6	13.3
108 Croatia	120.3	16.7
123 Bosnia and Herzegovina	92.1	7.1
125 Romania	90.9	2.1
129 Bulgaria	85.1	11.4
138 North Macedonia	71.8	5.1
144 China	64.4	59.0
159 Hungary	43.0	17.4
170 Japan	28.7	311.9

Source: UNCTAD and author's calculation.

Investments into a country may change the direction of influence over time. For example, if a foreign trade chain has led to a rise in imports, it can gradually draw local producers into its network of suppliers and place their products in a foreign market. Thus, the initial imports lead to favourable effect on total exports.

Likewise, in production (resource)-oriented investments, the inclusion of local producers in the supply chain can increase the share of local added value in the unit price of export products, reducing its import component.

The greatest ratio of cumulative FDI inflow to exports is recorded by Palau and Antigua and Barbuda, as well as small European economies Cyprus and Malta, known for their robust service sector (tourism and shipping).

In the 2008–2023 period, Serbia's total FDI inflow was 69.6% above goods exports. When compared to neighbouring countries, Montenegro and Albania posted higher values of this relative indicator. These two countries recorded higher indicators of both FDI inflow and outflow relative to goods exports than those of Serbia.

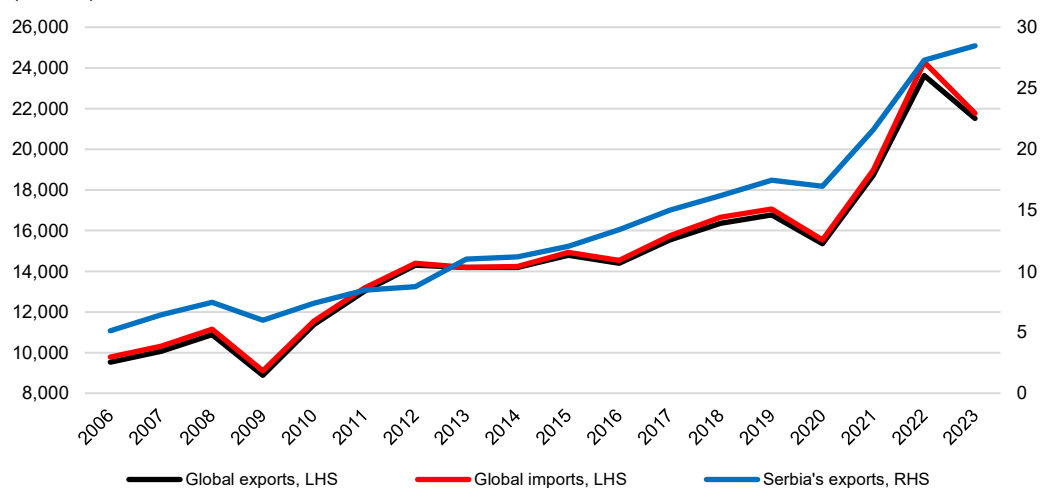
3 Serbia's place in global goods exports

3.1 Overall trends in trade in goods

From 1991 until 2023 global exports of goods gradually lost pace after the initial strong momentum. Expressed in US dollars, global exports of goods increased by 83.5% in 2000 relative to 1991. It then rose by 88.2% in 2006 relative to 2000, only to surge by 95.8% until 2023. In the first nine years, the average geometric exports growth rate was 7.0%, in the next six years 11.1%, and in the last 17 years of this period 4.0%.

Expressed in euros, the global exports of goods rose by 125.7%, and imports by 122.5%, in the period from 2006 to 2023.

Chart 15 Values of global and Serbia's trade in goods (EUR mn)



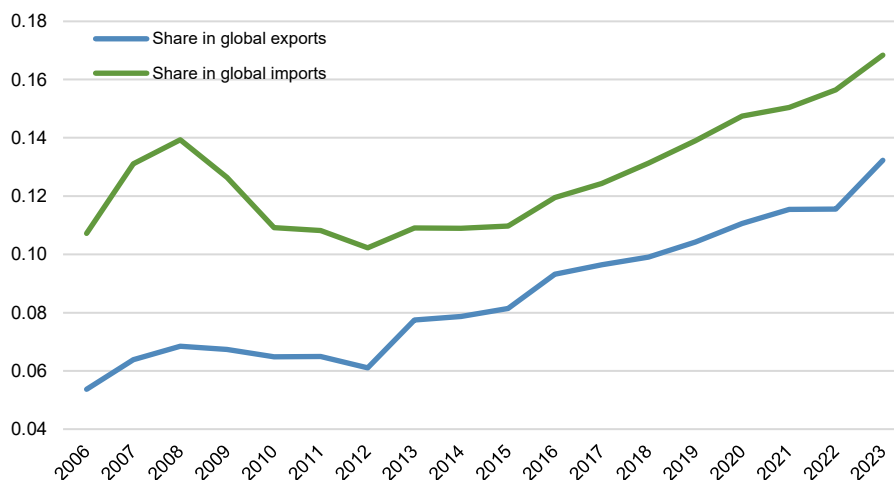
Source: Author's calculations based on UNCTAD.

In the same period, Serbian exports of goods rose 5.6 times, from EUR 5.1 bn to EUR 28.6 bn, and imports 3.5 times, from EUR 10.5 bn to EUR 36.9 bn, so that exports-to-imports ratio increased from 48.8% in 2006 to the record 77.7% in 2023.

Serbia's share in global exports of goods rose from 0.054% in 2006 to the record 0.130% in 2023, while imports climbed from 0.107% to also record 0.164%.

Serbia's share in the global exports was on the rise until 2008, when it reached 0.069%, then turned downward until 2012, declining to 0.061%, only to embark on a steady increase in every year thereafter.

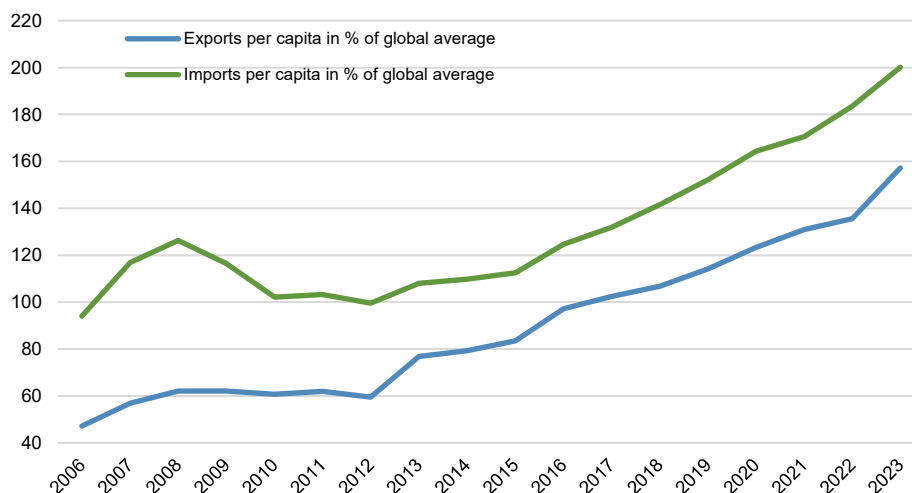
Chart 16 Serbia's shares in global trade in goods (in %)



Source: Author's calculations based on UNCTAD.

Serbia's share in global imports also reached maximum in 2008 (0.139%), while it was at a minimum in 2012 (0.102%). From that year onwards it grew year after year, except in 2014, when a drop in energy prices led to a negligible drop in Serbia's share (from 0.108% in 2013 to 0.106%).

Chart 17 Serbia's trade in goods relative to global average, per capita (in %)



Source: Author's calculations based on UNCTAD.

At the start of this period, in 2006, Serbia held close to 47.0% share of the global average exports per capita, only to reach 158.1 % in 2023.¹²

¹² In this period, Serbia's GDP in current dollars per capita increased from 55.2% of the global average in 2006 to 85.5% in 2023. Like the majority of neighbouring countries, Serbia was downgraded by seven places according to GDP in current dollars, due to faster GDP dynamics outside Europe. In terms of GDP value, Serbia exceeded Belarus, Slovenia, Tunisia and Libya, while it was

Imports per capita was at 94.0% of the global average in 2006, reaching 201.1% in 2023.

This rise in per capita indicators resulted from faster growth in Serbia's exports and imports relative to the global average, as well as from the population decline.

3.2 Comparison with other countries

3.2.1 The rise in the absolute value of exports

Comparing countries and territories with the value of exports above EUR 1 bn in 2023 (138 countries and territories), Serbia ranked 14th in the world according to a relative growth generated after 2006.

Of neighbouring countries, only Albania had a relatively faster growth, ranking 13th, while other countries surrounding Serbia also saw an above-average growth in value relative to the total global exports.

Among these 13 countries with higher relative increase, only Vietnam recorded higher value of exports than Serbia in 2006, and only Azerbaijan had a comparable value. The remaining 11 countries had considerably lower value of exports than Serbia, six of them – below one billion euros.

This means that the low base effect from 2006 had a major effect on the relative growth achieved in this period, in all countries except Vietnam.

Table 10 Ranking of countries and territories according to a relative change in the value of exports (EUR thousand and %)

	2006	2023	Change in ranking
1 Guyana	451,659	9,997,282	2,213
2 Angola	1,692,438	34,639,212	2,047
3 Guinea	613,339	8,276,061	1,349
4 Vietnam	31,703,133	418,364,840	1,320
5 Mongolia	1,227,744	14,040,583	1,144
6 Nicaragua	603,907	6,822,648	1,130
7 Burkina Faso	403,665	4,132,579	1,024
8 Armenia	799,190	7,740,537	969
9 Bahamas	405,517	3,313,300	817
10 Honduras	1,496,279	11,679,408	781
11 Cambodia	2,838,995	21,984,357	774
12 Azerbaijan	5,072,477	31,344,901	618
13 Albania	630,963	3,647,872	578
14 Serbia	5,116,838	29,060,400	556
22 North Macedonia	1,922,557	8,317,255	433
24 India	96,480,125	399,454,284	414
25 China	771,308,255	3,133,436,680	406
34 Bulgaria	12,021,313	44,292,100	368
35 Romania	25,977,742	93,060,840	358
47 Bosnia and Herzegovina	2,728,640	8,533,006	313
55 Montenegro	442,962	1,289,122	291
59 Croatia	8,260,444	22,811,952	276
66 Hungary	58,950,818	146,167,305	248
76 USA	825,513,291	1,867,051,820	226
100 Germany	893,123,583	1,574,119,664	176

Source: Author's calculations based on UNCTAD.

surpassed by: Ethiopia, Kenya, Uzbekistan, Costa Rica, Panama, Ivory Coast, Tanzania, Lithuania, Uruguay, Azerbaijan and Ghana. The data are more favourable when looking at GDP by purchasing power of currencies.

3.2.2 Change in ranking by the absolute value

The consequence of a relatively high growth rate of Serbia's exports is the country's ranking upgrade in global exports by 16 places, from the 84th to the 68th place. None of the countries in the region had such a huge change in ranking and Montenegro was the only country with the ranking downgrade, by seven places.

All 14 countries which recorded a greater change in ranking, except Vietnam, had lower ranking than Serbia in 2006.

Table 11 **Countries according to the change in ranking in global exports in 2006-2023**
(EUR thousand and %)

	2006	2023	Change in ranking
1 Angola	115	63	-52
2 Guyana	142	96	-46
3 Mongolia	121	82	-39
4 Vietnam	49	15	-34
5 Guinea	136	102	-34
6 Honduras	117	88	-29
7 Nicaragua	137	108	-29
8 Cambodia	100	72	-28
9 Armenia	130	104	-26
10 Burkina Faso	145	122	-23
11 Guatemala	106	85	-21
12 Azerbaijan	85	65	-20
13 Ghana	98	79	-19
14 Bahamas	144	126	-18
15 Serbia	84	68	-16
18 Romania	53	40	-13
23 Albania	135	125	-10
25 North Macedonia	110	101	-9
36 Bosnia and Herzegovina	104	98	-6
44 Bulgaria	63	58	-5
54 Croatia	74	71	-3
62 Hungary	36	35	-1
109 Montenegro	143	150	7

Source: Author's calculations based on UNCTAD.

3.2.3 Exports per capita

The average value of goods exports per capita in 2023 was USD 2,950 at the global level. With USD 4,660, Serbia ranked 59th in the world.

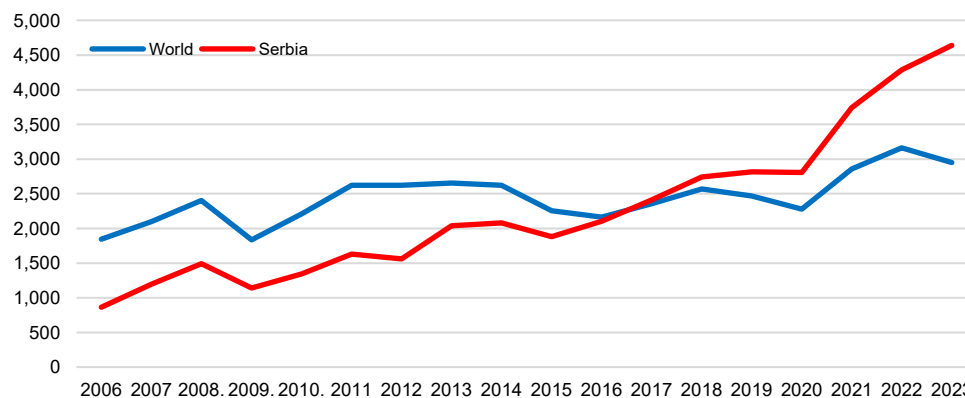
Compared to 2006, the global exports of goods increased by 95.8%, while the population expanded by 21.4%, so exports per capita went up by around 60%.

In Serbia, dollar value of exports was up by 4.81 times, while the population dropped by 10.4%, so exports per capita increased 5.37 times.

From the table below it can be seen that the highest value of exports per capita was recorded by relatively small highly developed countries, from Singapore at the top, to Slovenia at the 10th place.

With USD 4,660, Serbia ranked 59th, comparable to Mexico and Vietnam, as a country with the relatively fastest exports growth in the period observed. Still, both Mexico and Vietnam have population of over 100 million and are not appropriate for comparison in this case.

Chart 18 Value of goods exports in USD per capita



Source: Author's calculations based on UNCTAD.

Of neighbouring countries, Hungary had the highest exports value per capita, followed by Bulgaria, Croatia, Romania and North Macedonia, before Serbia. Only Bosnia and Herzegovina, Montenegro and Albania had lower values of goods exports per capita. Thanks to tourism revenues, the last two countries recorded higher values of services exports per capita than Serbia.

Based on the chart above, Serbia will undoubtedly continue to move away from the global average exports per capita and to approach other countries with relatively small population and higher GDP per capita than its own. It is a necessary condition for the growth of its absolute and relative development.

Table 12 Goods exports per capita in 2023 (USD)

	Population	Exports	Imports per capita
World	7,888	23,266,804,004	2,950
1 Singapore	6	475,472,598	80,343
2 Hong Kong SAR	8	576,144,442	76,462
3 Belgium	12	568,505,277	48,412
4 Switzerland	9	420,656,666	47,721
5 Netherlands	18	741,804,035	41,649
6 Ireland	5	212,869,514	40,671
7 Qatar	3	99,743,002	33,516
8 Norway	6	177,454,635	32,066
9 UAE	10	280,426,064	28,871
10 Slovenia	2	59,506,955	28,109
18 Germany	85	1,702,362,462	20,137
22 Hungary	10	158,075,487	16,466
43 UK	68	519,684,227	7,629
45 Bulgaria	6	47,900,557	7,474
46 Croatia	4	24,670,431	6,420
49 USA	335	2,019,159,665	6,025
53 Romania	19	100,642,463	5,289
56 North Macedonia	2	8,994,858	4,961
59 Serbia	7	30,938,000	4,660
60 Mexico	131	592,997,234	4,522

Table 12 Goods exports per capita in 2023 (USD)

		Population	Exports	Imports per capita
61	Vietnam	100	452,448,829	4,511
74	Bosnia and Herzegovina	3	9,228,186	2,664
77	China	1,411	3,388,716,312	2,401
78	Montenegro	1	1,394,146	2,202
97	Albania	3	3,945,062	1,380

Source: Author's calculations based on UNCTAD.

3.2.4 Exports as a percentage of GDP

At the global level, exports of goods participated with 22.3% in GDP in 2023.

With a 41.1% share, Serbia was almost twice as good as the global average and ranked 47th in the world.

The largest share of goods exports in GDP, if we don't count miniature island countries, was recorded for relatively small but highly developed countries, with Slovenia taking the 7th and the Czech Republic the 10th place.

Of neighbouring countries, Hungary ranked 13th, North Macedonia 18th and Bulgaria 32nd, ahead of Serbia.

Table 13 Goods exports per capita in 2023 (USD)

	Population
World	22
1 Marshall Islands	393
2 Hong Kong SAR	153
3 Vietnam	104
4 Singapore	95
5 Belgium	90
6 Slovak Republic	89
7 Slovenia	87
10 Czech Republic	76
13 Hungary	74
18 North Macedonia	61
32 Bulgaria	47
47 Serbia	41
54 Germany	38
63 Bosnia and Herzegovina	34
69 Croatia	30
76 Romania	29
107 China	19
112 Montenegro	19
114 Albania	17
152 USA	7

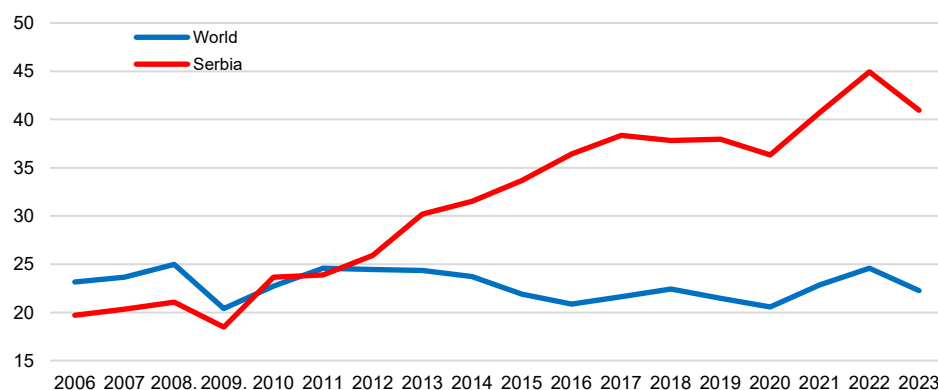
Source: Author's calculations based on IMF and UNCTAD.

While Serbia exceeded Germany according to this indicator, it needs to have a much higher degree of openness than this huge economy which compares itself to China and the USA.

In the period observed, global GDP grew slightly faster than goods exports, so the share of goods exports in global GDP decreased from 23.2% to 22.3%.

In 2010, Serbia exceeded this indicator compared to the global average, and from 2012 it began to move further away from the average.

Chart 19 **Share of goods exports in GDP**
(%)



Source: Author's calculations based on IMF and UNCTAD.

The ratio of goods exports to GDP is also affected by the movement of dollar value of GDP, so its large increase in Serbia in 2023 pushed down the goods exports share in GDP relative to 2022.

3.3 The most important products in Serbian exports

In the period observed, total exports increased 5.6 times or by EUR 23.5 bn.

The exports of agricultural and food products increased 4.7 times or by EUR 3.6 bn, from EUR 996 mn to EUR 4,633 mn, while their share in total exports edged down from 19.5% in 2006 to 16.3% in 2023, providing a 15.6% contribution to total exports growth.

The exports of industrial non-agricultural products went up 5.8 times, gaining EUR 19.7 bn, so their share in total exports increased from 80.5% to 83.7%.

Table 14 shows 30 products with the highest exports value in 2006 and 2023 each, and in both parts of the table there are 13 products that retained their place among the products with the highest exports value from 2006, which means that 17 new ones appeared in the second part of the Table.

The share of 30 products with the highest exports value was 53.2% in 2006 and declined to 33.5% in 2023.

The share of products with the highest exports value in 2023 rose from 31.5% in 2006 to 51.8% in 2023, and their aggregate contribution to total exports value was 56.2% (EUR 13.1 bn out of EUR 23.4 bn increase in total exports value).

The greatest individual contribution to growth in total value came from automobile cables, whose exports increased by almost EUR 2 bn, followed by copper ore and concentrates (1,205 mn) and electrical energy (1,262 mn), where the increase in exports value resulted from the changes in the manner of recording trade in electrical energy.

These three products are followed by electric motors and generators (872), automobile parts (687), new pneumatic tires (673), chairs (413), refined copper (408) and frozen fruit (EUR 352 mn).

In 2006, among 30 products, there were six agricultural and food products, and in 2023 there were five, namely, frozen fruit, animal feed, mineral waters, cigarettes and corn.

Table 14 The most important products in Serbian exports in 2006 and 2023
(EUR thousand)

Top 30 export products in 2006				Top 30 export products in 2023				
HS	All products	2006	2023	HS	All products	2006	2023	Change
		5,116,838	28,470,784			5,116,838	28,470,784	23,353,946
'7208	Flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled, not clad, ...	447,517	384,526	'8544	Insulated "incl. enamelled or anodised" wire, cable "incl. coaxial cable" and other insulated ...	53,010	2,008,479	1,955,469
'4011	New pneumatic tyres, of rubber	155,210	828,238	'2716	Electrical energy	56,793	1,262,442	1,205,649
'1005	Maize or corn	143,057	254,768	'2603	Copper ores and concentrates	970	1,247,173	1,246,203
'7409	Plates, sheets and strip, of copper, of a thickness of > 0,15 mm (excl. expanded sheet and ...	126,474	132,888	'8501	Electric motors and generators (excl. generating sets)	11,078	883,362	872,284
'0811	Fruit and nuts, uncooked or cooked by steaming or boiling in water, frozen, whether or not containing added sugar or other sweetening matter	125,091	477,409	'4011	New pneumatic tyres, of rubber	155,210	828,238	673,028
'1701	Cane or beet sugar and chemically pure sucrose, in solid form	124,011	48,564	'8708	Parts and accessories for tractors, motor vehicles for the transport of ten or more persons, ...	28,580	716,029	687,449
'7210	Flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled or cold-rolled ...	114,867	130,903	'0811	Fruit and nuts, uncooked or cooked by steaming or boiling in water, frozen, whether or not containing added sugar or other sweetening matter	125,091	477,409	352,318
'7606	Plates, sheets and strip, of aluminium, of a thickness of > 0,2 mm (excl. expanded plates, ...	112,420	157,052	'7403	Copper, refined, and copper alloys, unwrought (excl. copper alloys of heading 7405)	62,120	469,761	407,641
'3901	Polymers of ethylene, in primary forms	111,531	120,087	'9401	Seats, whether or not convertible into beds, and parts thereof, n.e.s. (excl. medical, surgical, ...	39,936	452,865	412,929
'3004	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put ...	99,221	402,858	'2710	Petroleum oils and oils obtained from bituminous minerals (excl. crude); preparations containing ...	93,404	419,530	326,126
'7209	Flat-rolled products of iron or non-alloy steel, of a width of >= 600 mm, cold-rolled "cold-reduced", ...	93,742	72,164	'3004	Medicaments consisting of mixed or unmixed products for therapeutic or prophylactic uses, put ...	99,221	402,858	303,637

Table 14 The most important products in Serbian exports in 2006 and 2023
(EUR thousand)

Top 30 export products in 2006				Top 30 export products in 2023				
		2006	2023		2006	2023	Change	
'2710	Petroleum oils and oils obtained from bituminous minerals (excl. crude); preparations containing ...	93,404	419,530	'3402	Organic surface-active agents (excl. soap); surface-active preparations, washing preparations, ...	17,175	395,936	378,761
'3918	Floor coverings of plastics, whether or not self-adhesive, in rolls or in the form of tiles; ...	79,533	53,100	'7208	Flat-rolled products of iron or non-alloy steel, of a width >= 600 mm, hot-rolled, not clad, ...	447,517	384,526	-62,991
'7411	Copper tubes and pipes	77,419	32,038	'8503	Parts suitable for use solely or principally with electric motors and generators, electric ...	45,394	357,239	311,845
'6115	Pantyhose, tights, stockings, socks and other hosiery, incl. graduated compression hosiery ...	75,944	219,480	'8418	Refrigerators, freezers and other refrigerating or freezing equipment, electric or other; heat ...	9,501	339,544	330,043
'7403	Copper, refined, and copper alloys, unwrought (excl. copper alloys of heading 7405)	62,120	469,761	'8536	Electrical apparatus for switching or protecting electrical circuits, or for making connections ...	10,301	323,840	313,539
'6403	Footwear with outer soles of rubber, plastics, leather or composition leather and uppers of ...	58,361	111,891	'8414	Air or vacuum pumps (excl. gas compound elevators and pneumatic elevators and conveyors); air ...	3,546	321,312	317,766
'4811	Paper, paperboard, cellulose wadding and webs of cellulose fibres, coated, impregnated, covered, ...	57,679	220,924	'3917	Tubes, pipes and hoses, and fittings therefor, e.g. joints, elbows, flanges, of plastics	20,426	317,499	297,073
'2901	Acyclic hydrocarbons	57,134	45,368	'2309	Preparations of a kind used in animal feeding	5,799	306,845	301,046
'2716	Electrical energy	56,793	1,262,442	'9999	Commodities not elsewhere specified	1,653	306,109	304,456
'8544	Insulated "incl. enamelled or anodised" wire, cable "incl. coaxial cable" and other insulated ...	53,010	2,008,479	'2202	Waters, incl. mineral waters and aerated waters, containing added sugar or other sweetening ...	19,813	287,374	267,561
'6406	Parts of footwear, incl. uppers whether or not attached to soles other than outer soles; removable ...	51,704	132,583	'9403	Furniture and parts thereof, n.e.s. (excl. seats and medical, surgical, dental or veterinary ...)	44,869	270,679	225,810
'7204	Ferrous waste and scrap; remelting scrap ingots of iron or steel (excl. slag, scale and other ...)	51,091	48,613	'2402	Cigars, cheroots, cigarillos and cigarettes of tobacco or of tobacco substitutes	4,113	266,095	261,982
'1905	Bread, pastry, cakes, biscuits and other bakers' wares, whether or not containing cocoa; communion ...	51,082	190,669	'8411	Turbojets, turbopropellers and other gas turbines	1,423	255,349	253,926
'8503	Parts suitable for use solely or principally with electric motors	45,394	357,239	'1005	Maize or corn	143,057	254,768	111,711

Table 15 **Best-performing Serbia's exports**
(EUR thousand and %)

HS code	Product name	Value	2006	2023	Change	Ranking in global exports
	All products	28,470,784	0.054	0.132	0.079	68
'0811	Fruit and nuts, uncooked or cooked by steaming or boiling in water, frozen, whether or not containing added sugar or other sweetening matter	477,409	6.900	7.347	0.447	4
'6905	Roofing tiles, chimney pots, cowls, chimney liners, architectural ornaments and other ceramic ...	52,471	3.217	7.203	3.986	5
'3601	Propellant powders	34,698	1.510	5.951	4.441	6
'2403	Manufactured tobacco and manufactured tobacco substitutes, "homogenised" or "reconstituted" ...	252,331	0.003	4.331	4.328	8
'4205	Articles of leather or composition leather (excluding saddlery and harness bags; cases and ...)	99,996	0.013	4.068	4.055	9
'3606	Ferro-cerium and other pyrophoric alloys in all forms; metaldehyde, hexamethylenetetramine ...	13,694	0.072	3.919	3.847	9
'8603	Self-propelled railway or tramway coaches, vans and trucks (excl. those of heading 8604)	146,507	0.000	2.871	2.871	12
'3103	Mineral or chemical phosphatic fertilisers (excl. those in tablets or similar forms, or in ...)	60,190	0.028	2.514	2.486	8
'5606	Gimped yarn, gimped strip and the like of heading 5404 or 5405; chenille yarn, incl. flock ...	14,077	0.033	2.498	2.464	11
'0813	Dried apricots, prunes, apples, peaches, pears, papaws "papayas", tamarinds and other edible ...	56,675	0.484	2.049	1.565	12
'4006	Rods, bars, tubes, profiles and other forms of unvulcanised rubber, incl. mixed rubber, and ...	7,866	0.018	1.943	1.925	14
'2716	Electrical energy	1,262,442	0.223	1.922	1.699	19
'4404	Hoopwood; split poles; piles, pickets and stakes of wood, pointed but not sawn lengthwise; ...	3,989	0.039	1.761	1.722	18
'8606	Railway or tramway goods vans and wagons (excl. self-propelled and luggage vans and post office ...)	53,431	0.428	1.753	1.326	11
'5511	Yarn of man-made staple fibres, put up for retail sale (excl. sewing thread)	7,294	0.030	1.633	1.603	10
'7612	Casks, drums, cans, boxes and similar containers, incl. rigid or collapsible tubular containers, ...	99,469	1.088	1.556	0.468	18
'6406	Parts of footwear, incl. uppers whether or not attached to soles other than outer soles; removable ...	132,583	1.025	1.524	0.499	13
'8503	Parts suitable for use solely or principally with electric motors and generators, electric ...	357,239	0.407	1.516	1.109	18
'6115	Pantyhose, tights, stockings, socks and other hosiery, incl. graduated compression hosiery ...	219,480	1.147	1.511	0.364	10
'7409	Plates, sheets and strip, of copper, of a thickness of > 0,15 mm (excl. expanded sheet and ...)	132,888	1.611	1.475	-0.136	12
'2105	Ice cream and other edible ice, whether or not containing cocoa	77,554	0.327	1.433	1.106	14
'2603	Copper ores and concentrates	1,247,173	0.004	1.425	1.421	14
'8501	Electric motors and generators (excl. generating sets)	883,362	0.043	1.376	1.332	16
'5207	Cotton yarn put up for retail sale (excl. sewing thread)	4,451	0.165	1.355	1.190	18
'3602	Prepared explosives (excluding propellant powders)	13,736	0.322	1.318	0.996	19
'2402	Cigars, cheroots, cigarillos and cigarettes of tobacco or of tobacco substitutes	266,095	0.031	1.317	1.286	21
'8544	Insulated "incl. enamelled or anodised" wire, cable "incl. coaxial cable" and other insulated ...	2,008,479	0.092	1.310	1.218	20
'8607	Parts of railway or tramway locomotives or rolling stock, n.e.s.	145,232	0.086	1.217	1.131	17
'3402	Organic surface-active agents (excl. soap); surface-active preparations, washing preparations, ...	395,936	0.120	1.166	1.046	21

Table 15 **Best-performing Serbia's exports**
(EUR thousand and %)

HS code	Product name	Value	2006	2023	Change	Ranking in global exports
'0104	Live sheep and goats	11,660	0.002	1.142	1.140	13
'4811	Paper, paperboard, cellulose wadding and webs of cellulose fibres, coated, impregnated, covered, ...	220,924	0.501	1.119	0.618	24
'0808	Apples, pears and quinces, fresh	97,680	0.194	1.106	0.911	16
'2202	Waters, incl. mineral waters and aerated waters, containing added sugar or other sweetening ...	287,374	0.248	1.077	0.829	22
'6807	Articles of asphalt or of similar materials, e.g. petroleum bitumen or coal tar pitch	23,116	0.137	1.048	0.910	21
'1206	Sunflower seeds, whether or not broken	50,139	0.516	1.043	0.527	16
'3917	Tubes, pipes and hoses, and fittings therefor, e.g. joints, elbows, flanges, of plastics	317,499	0.183	1.030	0.847	20
'5906	Rubberised textile fabrics (excl. tyre cord fabric of high-tenacity yarn of nylon or other ...)	15,974	0.007	1.008	1.001	16

Source: Author's calculations based on UNCTAD.

3.5 Exports of selected products

Since the exports value of products with an above-1.0% share in global exports varies from EUR 4 mn to EUR 2.008 mn, we have singled out only two products here, to showcase their dynamics, the main competitors, the exports value of neighbouring countries and the main exports markets.

3.5.1 Frozen fruit

In the period observed, frozen fruit exports had an above-average rate of growth of exports value in the global trade.

Serbia increased the value of its exports 3.8 times, which is above the global exports growth (3.6 times) ranking as the 4th world's exporter, after Thailand, Poland and Canada. In 2006, it ranked 3rd, while Thailand had five times lower exports value than Serbia.

In 2023, Serbia boasted four times higher exports value of these products compared to the aggregate value of exports of all neighbouring countries.

Table 16 **Major exporters of frozen fruit**
(EUR thousand and %)

		2006	2023	Index	Share in global exports in %
	World	1,812,944	6,497,870	358.4	
1	Thailand	25,050	703,594	2,808.8	10.8
2	Poland	278,122	586,241	210.8	9.0
3	Canada	202,189	484,083	239.4	7.4
4	Serbia	125,091	477,409	381.6	7.3
5	Chile	115,198	383,806	333.2	5.9
32	Bulgaria	17,484	27,999	160.1	0.4
33	Croatia	24	26,862		0.4
34	Hungary	15,286	24,593	160.9	0.4
35	Bosnia and Herzegovina	8,254	24,126	292.3	0.4
46	Romania	10,806	9,299	86.1	0.1
53	North Macedonia	3,600	3,427	95.2	0.1
63	Albania	0	1,207		0.0

Table 16 Major exporters of frozen fruit
(EUR thousand and %)

	2006	2023	Index	Share in global exports in %
64 Montenegro	2,102	1,185	56.4	0.0

Source: Author's calculations based on UNCTAD.

Serbia's frozen fruits exports were registered in 60 countries in 2023.

More than half of the total value was sold in three countries: Germany, France and Belgium.

In the period after 2006, only exports to Austria and Denmark declined.

Table 17 Exports of frozen fruit from Serbia
(EUR thousand and %)

	2006	2023	Index	Share
World	125,091	477,409	381.6	
Germany	36,204	134,707	372.1	28.2
France	21,550	71,924	333.8	15.1
Belgium	9,708	48,404	498.6	10.1
UK	7,285	32,702	448.9	6.8
Netherlands	9,819	27,273	277.8	5.7
Russian Federation	665	20,450	3,075.2	4.3
Sweden	3,159	17,800	563.5	3.7
USA	962	17,739	1,844.0	3.7
Austria	17,469	15,475	88.6	3.2
Poland	1,714	14,524	847.4	3.0
Switzerland	3,134	10,484	334.5	2.2
Italy	3,536	9,135	258.3	1.9
Canada	544	6,518	1,198.2	1.4
Argentina	0	4,585		1.0
Norway	525	4,465	850.5	0.9
Croatia	827	3,312	400.5	0.7
Saudi Arabia	0	3,194		0.7
Hungary	779	3,140	403.1	0.7
Finland	983	2,963	301.4	0.6
Japan	129	2,530	1,961.2	0.5
Turkey	21	2,487		0.5
Australia	193	2,206	1,143.0	0.5
Bosnia and Herzegovina	357	1,960	549.0	0.4
Slovenia	513	1,799	350.7	0.4
Czech Republic	528	1,566	296.6	0.3
Spain	462	1,557	337.0	0.3
Portugal	290	1,540	531.0	0.3
UAE	0	1,420		0.3
Denmark	1,917	1,257	65.6	0.3

Source: Author's calculations based on UNCTAD.

3.5.2 Automobile cables (insulated wire, cables and other insulated electrical conductors)

These products hold a relatively high value in the global trade, so Serbia, with exports worth EUR 2 bn and a share of 1.3% was only at the 20th place in the world in 2023. These are the products whose exports rose at a faster pace than total global exports.

China, Mexico, the USA, Germany, Vietnam and Italy account for a half of total global exports value.

Serbia had the sharpest relative increase in value among 20 largest world exporters, because it increased exports value by 38 times.

Of neighbouring countries, Romania and Hungary recorded higher exports values, ranking 9th and 17th, respectively.

Table 18 Country ranking according TO the value of exports of automobile cables
(EUR thousand and %)

		2006	2,023	Index	Share
		57,328,388	153,268,733	267.35	
1	China	5,765,204	26,208,639	454.6	17.1
2	Mexico	6,345,952	16,274,794	256.5	10.6
3	USA	5,103,057	11,656,211	228.4	7.6
4	Germany	4,678,580	9,471,415	202.4	6.2
5	Vietnam	561,783	7,193,910	1,280.5	4.7
6	Italy	2,164,134	4,656,194	215.2	3.0
7	Morocco	692,526	4,595,473	663.6	3.0
8	Czech Republic	1,609,281	4,150,540	257.9	2.7
9	Romania	1,548,561	4,068,914	262.8	2.7
10	Poland	2,075,020	3,841,688	185.1	2.5
11	Korea	1,597,763	3,570,794	223.5	2.3
12	Turkey	910,990	3,410,453	374.4	2.2
13	France	1,731,246	3,036,668	175.4	2.0
14	Philippines	720,754	2,823,288	391.7	1.8
15	Hong Kong SAR	1,739,893	2,771,314	159.3	1.8
16	Tunisia	462,371	2,769,219	598.9	1.8
17	Hungary	1,429,668	2,766,742	193.5	1.8
18	Spain	1,281,192	2,716,263	212.0	1.8
19	Netherlands	695,458	2,225,698	320.0	1.5
20	Serbia	53,010	2,008,479	3,788.9	1.3
40	Bulgaria	120,324	683,302	567.9	0.4
41	North Macedonia	15,847	639,502	4,035.5	0.4
46	Croatia	110,148	460,975	418.5	0.3
62	Albania	2,389	140,734	5,890.9	0.1
133	Montenegro	42	196	466.7	0.0

Source: Author's calculations based on UNCTAD.

In 2023, Serbia's exports of automobile cables were registered in 79 countries.

The greatest shares in total exports were those of large automobile manufacturing economies, i.e. Germany, Hungary, Slovakia, the Czech Republic, Sweden and Romania.

Table 19 Exports of automobile cables from Serbia by country
(in EUR thousand and %)

	2006	2023	Index	Share
World	53,010	2,008,479	3,788.9	
Germany	5,050	598,705	11,855.5	29.8
Hungary	6,536	295,126	4,515.4	14.7

Table 19 Exports of automobile cables from Serbia by country
(in EUR thousand and %)

	2006	2023	Index	Share
Slovak Republic	842	266,314	31,628.7	13.3
Czech Republic	517	219,100	42,379.1	10.9
Sweden	1,089	142,286	13,065.7	7.1
Romania	451	92,265	20,457.9	4.6
North Macedonia	755	63,195	8,370.2	3.1
Poland	1	61,049		3.0
Italy	3,376	55,680	1,649.3	2.8
UK	133	46,510	34,969.9	2.3
Belgium	0	32,013		1.6
Austria	1,614	23,724	1,469.9	1.2
Slovenia	1,309	18,451	1,409.5	0.9
Turkey	1	17,702		0.9
Albania	0	13,732		0.7
Montenegro	6,645	10,024	150.9	0.5

Source: Author's calculations based on UNCTAD.

4 Conclusion

Due to historical events, throughout the whole final decade of 20th century, Serbia was excluded from the process of business globalisation. In that decade, most of the former socialist countries of Eastern Europe went through the process of transition from labour-intensive exports industries to capital-intensive industries. This process was possible owing to inflow of direct investments from advanced economies into the mechanical, electrical and automobile industry of Eastern European countries.

Serbia made up for the lag in FDI inflows from 2000 to 2023 and had one of the largest cumulative FDI inflows to GDP ratios in Europe at the end of the period observed.

The existing cumulative FDI inflow to Serbia, exceeding USD 60 bn, will also bring about relatively high inflow values in the coming years, through intra-company loans, reinvested earnings and attracting new companies to Serbia.

The announced greenfield investments in 2023, in the amount of USD 11.2 bn, will additionally boost the annual FDI inflows to Serbia.

In order to better understand the position of Serbia in FDI flows, comparative structural analyses are needed, of Serbia and neighbouring and similar countries (by GDP, population...), in terms of sector and geographic distribution of inflows (and outflows) of direct investments.

The new industrial revolution, with artificial intelligence and digitization of supply chains as the main features, will have a challenging effect on the existing system of international production and Serbia's place in it. These changes in operation of large companies need to be taken into account when formulating policies to attract FDIs and incentivising domestic companies to internationalise.

The fragmentation of FDI flows and further build-up of geopolitical tensions will pose serious challenges to a measured conduct of foreign policy and the policy for attracting FDI, in order to minimise damage and maximize the benefits of FDI flows.

The data about trade in goods presented in the second part of the paper show that Serbia recorded extremely fast growth in total exports value, one of the fastest in the world during the period observed.

Thanks to the speed of value growth, it improved its ranking among countries and its share in total global exports.

The export of selected products points to specific market niches, where Serbia's share is large even at low values, as well as important global markets where it has won a visible share and recognition.

In the coming years we can expect continued growth of Serbia's share in global goods exports , as a part of a broader process of its convergence towards advanced countries.

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Appendix

Table 1a. **Selected FDI indicators and international production, 1982–2022**
(current prices, USD bn)

	1982	1990	2005–2007 (pre-crisis average)	2020	2021	2022	2023
FDI inflow	58	205	1,425	985	1,622	1,356	1,332
FDI outflow	27.0	244	1,464	780	1,882	1,575	1,551
Cumulative FDI inflow	789	2,196	14,573	41,893	47,156	44,375	49,131
Cumulative FDI outflow	579	2,255	15,296	40,718	43,386	40,570	44,381
Income from FDI inflow	44.0	82	1,123	2,173	2,883	3,002	2,498
Rate of return of FDI inflows		5.4	9.6	6.8	8.2	8.2	6.0
Income from FDI outflows	46	128	1,235	1,954	2,857	2,923	2,516
Rate of return of FDI outflows		8.4	10.7	5.8	7.7	7.8	6.4
Announced greenfield projects				641	830	1,309	1,380
Cross-border mergers and acquisitions		98	729	475	737	707	378
Sales of foreign branches	2,741.0	4,801	19,798	31,298	33,194		
Gross product of foreign branches	676	1,074	4,662	6,547	7,030		
Total assets of foreign branches	2,206.0	4,649	47,065	97,467	91,386		
Exports of foreign branches	688	1,523					
Employment in foreign branches (thousand)	21,524.0	20,449	49,780	82,405	74,402		
GDP (current prices)	12,083.0	22,612	52,680	84,961	96,488	100,135	104,476
Total fixed investments	2,798	5,838	12,482	22,055	25,270	26,142	27,161
Income from ownership rights and licences	9	31	191	507	615	590	460
Exports of goods and non-factor services	2,395	4,417					
Derived indicators							
Gross product of foreign branches in global GDP	5.6	4.7	8.8	7.7	7.3	0.0	0.0
Exports of foreign branches in % of global exports	28.7	34.5					
FDI inflow in total investments	2.1	3.5	11.4	4.5	6.4	5.2	4.9

Sources: World Investment Report 2008, "Transnational Corporations and the Infrastructure Challenge" (p 10), World Investment Report 2023, "Investing in Sustainable Energy for All" (p 50) and WIR 2024 (p 35).

Table 2a. Selected global indicators and indicators for Serbia

	GDP		Population		Goods exports		Goods imports		FDI Inflow		FDI outflow		Cumulative FDI Inflow		Cumulative FDI outflow	
	\$ bn		mn		\$ bn		\$ bn		\$ mn		\$ mn		\$ mn		\$ mn	
	World	Serbia	World	Serbia	World	Serbia	World	Serbia	World	Serbia	World	Serbia	World	Serbia	World	Serbia
1991	24,191	28	5,035	10	3,517	5	3,638	5	153,959	-	188,857	-	2,471,123	-	2,528,440	-
1992	25,877	27	5,259	10	3,787	-	3,910	-	164,685	-	206,049	-	2,493,699	-	2,540,200	-
1993	26,364	19	5,350	10	3,782	-	3,845	-	222,237	-	237,528	-	2,698,838	-	2,930,285	-
1994	28,216	17	5,438	10	4,321	-	4,382	-	255,894	-	287,275	-	2,963,744	-	3,294,486	-
1995	31,291	21	5,530	10	5,176	1	5,235	2	345,143	-	361,244	-	3,564,455	-	3,993,274	-
1996	31,952	23	5,616	10	5,411	2	5,497	4	392,779	-	394,445	-	4,133,994	-	4,553,581	-
1997	31,801	22	5,705	10	5,600	3	5,686	5	480,628	740	465,285	-	4,719,786	-	5,257,407	-
1998	31,608	20	5,829	10	5,510	3	5,633	4	681,509	113	679,498	-	5,916,607	-	6,246,958	-
1999	32,832	14	5,904	8	5,723	1	5,858	3	1,078,286	112	1,077,162	-	7,086,609	-	7,147,975	-
2000	33,791	10	5,980	8	6,453	2	6,655	3	1,356,685	52	1,162,492	2	7,377,201	-	7,408,902	-
2001	33,614	13	6,058	8	6,195	2	6,412	4	773,131	177	681,550	12	7,470,723	-	7,278,671	-
2002	34,931	17	6,154	8	6,500	2	6,664	6	590,311	491	496,583	20	7,331,947	-	7,332,719	-
2003	39,197	23	6,258	7	7,590	3	7,780	7	549,571	1,467	527,533	119	9,143,363	-	9,239,777	-
2004	44,132	26	6,337	7	9,224	4	9,479	11	699,234	958	908,072	3	10,623,276	-	10,939,968	-
2005	47,817	27	6,417	7	10,522	4	10,799	10	954,073	1,577	838,261	22	11,500,699	-	11,980,584	-
2006	51,809	33	6,496	7	12,146	6	12,380	13	1,400,939	4,256	1,360,910	88	14,188,362	-	15,134,358	-
2007	58,418	43	6,578	7	14,045	9	14,262	19	1,889,474	4,406	2,191,503	946	18,031,310	-	18,774,557	-
2008	64,105	52	6,661	7	16,183	11	16,515	23	1,454,600	3,972	1,713,611	331	15,018,575	18,333	15,515,116	1,726
2009	60,809	45	6,742	7	12,589	8	12,749	16	1,137,385	2,896	1,184,861	24	17,725,379	20,870	18,668,795	1,883
2010	66,634	41	6,825	7	15,297	10	15,425	17	1,369,184	1,686	1,391,195	165	19,842,937	22,299	20,440,527	1,960
2011	74,111	49	6,912	7	18,334	12	18,446	20	1,601,135	4,932	1,627,410	318	20,577,402	24,675	20,902,706	2,090
2012	75,681	43	7,012	7	18,506	11	18,667	19	1,459,066	1,299	1,285,421	331	22,926,396	26,014	22,821,919	2,204
2013	77,850	48	7,099	7	18,945	15	18,975	21	1,455,289	2,087	1,462,426	331	24,942,078	31,490	25,166,178	2,842
2014	79,800	47	7,188	7	19,005	15	19,080	20	1,397,394	2,010	1,378,453	348	25,947,963	29,569	26,079,746	2,828
2015	75,440	40	7,274	7	16,560	13	16,740	18	2,049,899	2,339	1,735,370	342	26,364,734	29,073	26,342,644	2,878
2016	76,683	41	7,362	7	16,042	15	16,209	19	2,019,333	2,349	1,528,679	252	28,061,134	30,369	27,736,090	3,024
2017	81,611	44	7,449	7	17,742	17	17,977	22	1,651,163	2,759	1,598,350	148	32,794,199	37,788	32,883,297	3,597
2018	86,592	51	7,529	7	19,553	19	19,817	26	1,376,139	4,061	1,010,629	356	32,441,526	40,295	31,242,775	3,805
2019	87,741	52	7,608	7	19,018	20	19,343	27	1,729,239	4,277	1,444,809	296	36,160,805	43,826	35,009,321	4,071
2020	85,484	53	7,684	7	17,653	20	17,880	26	984,578	3,501	779,507	116	41,892,770	52,220	40,717,981	4,548
2021	97,329	63	7,753	7	22,319	26	22,594	34	1,621,808	4,581	1,881,922	274	47,156,148	52,223	43,385,944	4,527
2022	100,835	64	7,817	7	24,918	29	25,700	41	1,355,749	4,571	1,574,724	106	44,375,102	53,499	40,569,644	4,511
2023	104,532	75	7,888	7	23,784	31	24,235	40	1,331,813	4,888	1,550,584	323	49,130,846	60,459	44,380,560	4,999
Index 1991=100	432	266	157	68	676	687	666	764	865		780		1988		1755	

Sources: SORS, UNCTAD, IMF, J. Cmomarković.

Note: In 1991, 38% of Yugoslavia's GDP were presumed for Serbia's GDP (based on the 1989 share), and from 1992 until 1999 - data from UNCTAD base in USD from 2015.

Table 3a Indicators for Serbia (percentage share in the global level)

	GDP	Population	Exports	Imports	FDI inflow	FDI outflow	Cumulative inflow	Cumulative outflow
1991	0.117	0.194	0.128	0.143	0.000	0.000		
1992	0.103	0.187	0.000	0.000	0.000	0.000		
1993	0.071	0.185	0.000	0.000	0.000	0.000		
1994	0.059	0.183	0.000	0.000	0.000	0.000		
1995	0.069	0.180	0.026	0.043	0.000	0.000		
1996	0.071	0.178	0.032	0.069	0.000	0.000		
1997	0.069	0.176	0.045	0.079	0.154	0.000		
1998	0.062	0.171	0.049	0.079	0.017	0.000		
1999	0.042	0.128	0.024	0.049	0.010	0.000		
2000	0.029	0.126	0.024	0.050	0.004	0.000		
2001	0.039	0.124	0.028	0.066	0.023	0.002		
2002	0.049	0.122	0.032	0.084	0.083	0.004		
2003	0.057	0.120	0.036	0.096	0.267	0.023		
2004	0.059	0.118	0.038	0.113	0.137	0.000		
2005	0.058	0.116	0.043	0.097	0.165	0.003		
2006	0.063	0.114	0.053	0.106	0.304	0.006		
2007	0.074	0.112	0.063	0.130	0.233	0.043		
2008	0.081	0.110	0.068	0.139	0.273	0.019	0.129	0.011
2009	0.074	0.109	0.066	0.122	0.255	0.002	0.118	0.010
2010	0.062	0.107	0.064	0.108	0.123	0.013	0.112	0.010
2011	0.066	0.105	0.064	0.108	0.308	0.020	0.120	0.010
2012	0.057	0.103	0.061	0.101	0.089	0.026	0.113	0.010
2013	0.062	0.101	0.077	0.108	0.143	0.023	0.126	0.011
2014	0.059	0.099	0.078	0.106	0.144	0.025	0.114	0.011
2015	0.053	0.098	0.081	0.107	0.114	0.020	0.110	0.011
2016	0.053	0.096	0.093	0.117	0.116	0.016	0.108	0.011
2017	0.054	0.094	0.096	0.122	0.167	0.009	0.115	0.011
2018	0.058	0.093	0.099	0.131	0.295	0.035	0.124	0.012
2019	0.059	0.091	0.104	0.139	0.247	0.020	0.121	0.012

Table 3a Indicators for Serbia (percentage share in the global level)

	GDP	Population	Exports	Imports	FDI inflow	FDI outflow	Cumulative inflow	Cumulative outflow
2020	0.062	0.090	0.111	0.148	0.356	0.015	0.125	0.011
2021	0.065	0.088	0.116	0.151	0.282	0.015	0.111	0.010
2022	0.063	0.085	0.117	0.160	0.337	0.007	0.121	0.011
2023	0.072	0.084	0.130	0.164	0.367	0.021	0.123	0.011

Sources: UNCTAD and IMF.

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