Ekonomika preduzeća

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Journal of Business Economics and Management

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The last part of the former decade in Serbia coincided with a successful ending of the fiscal consolidation program. The recession risk is mainly contained, and we do not see any indication that the economy has fallen off a cliff edge yet again. Unemployment drop and growth in positive territory both signaled an opportunity to start over, a chance to be optimistic and make decisions which are good, but hard to swallow. The beginning of 2020 is related to great new challenges. In the surrounding world, powerful Industry 4.0 technologies have been massively infused, in particular as a means of neutralizing the carbon footprint. Following this line of reasoning, this edition of *Ekonomika preduzeća* is dedicated to Industry 4.0 and the related issues as a blueprint for a new growth pattern.

In the *Introductory paper,* a duo of authors, *D. Đuričin* and *D. Lončar,* acknowledged three shifts in the contemporary line of reasoning regarding the growth pattern: from shareholder capitalism to stakeholder capitalism, from linear to circular model of production, and from orthodox to heterodox approach in economic policy platform. Based on econometric analysis results, President of the Fiscal Council *P. Petrović* and his team discussed factors influencing emigration as a major source of concern. The model forecasts that emigration of well-educated youngsters is expected to additionally increase by 20-30% in the following five years. *M. Labus* analyzes inflation-targeting measures, particularly open market operations being used for targeting the informal exchange rate. Governor of the National Bank of Serbia *J. Tabaković,* along with her colleague, *N. Dragašević,* emphasized some of the commonalities in the money markets in the US and Serbia regarding the role of the central bank in liquidity maintenance.

Second part of this edition is mainly focused on intentional (structural or industrial) policies and new policy instruments derived from core policies which could support smooth transition toward Industry 4.0. Former minister of finance *D. Vujović* explained, while offering some details, the emerging contours of the new growth model and economic policy platform. *N. Savić et al.* discussed crucial aspects of vertical industrial policies, education policy and related issues. In addition, *A. Trbovich et al.* pointed out to the second crucial aspect of vertical industrial policies, research and innovation. *G. Pitić* and his team continued with this line of reasoning, promoting the gaming industry as a good candidate for industrial policy. In his contribution to the topic, *S. Ranđelović* emphasized that core policies, in particular the fiscal policy, should be treated in a structural way in the new growth pattern.

Last but not least, *I. Vujačić* made a concluding contribution to this edition. The topic of the paper is the trade war between the US and China as perhaps the most important contingency of the global economy. The conclusion is that this trade war is self-defeating in terms of tenets that were supposed to be attained.

Prof. Dragan Đuričin, Editor in Chief

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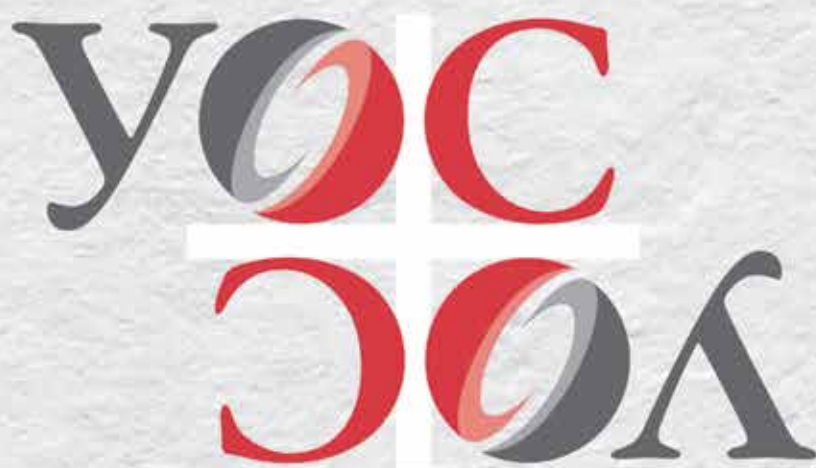
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SHAPING THE FUTURE OF SERBIA'S ECONOMY: THE NEW GROWTH MODEL AND RELATED ECONOMIC POLICY PLATFORM

Oblikovanje buduće privrede Srbije – novi model rasta i povezana platforma za vođenje ekonomskih politika

Abstract

As Serbia's economy enters 2020, we see a high level of risk, fragile growth outlook, and increasing tensions over the evident polarization according to the future growth trajectory. Taking the pulse of Serbia's economy, we see that current challenges are significant. After the 2015-2017 fiscal consolidation program successfully ended, Serbia desperately needs a new platform for shaping the future of the economy and society. It is undeniable that the global economy is in transition. It simultaneously deals with the negative consequences of the last recession and a positive impact of Industry 4.0. Food, transport, energy production and the ways how people produce and consume industrial product/services need to undergo fundamental transformation. The aim of this paper is twofold. First, to present strategic audit of the current economic situation in Serbia. Second, based on the situation analysis, to identify desirable intervention areas and related intentional policies, in accordance to broad based trends of change and their impact on the emerging contours of the new economy. Key idea is to present a conceptual paper without calibration of concreate policy measures.

Keywords: *Serbia, Industry 4.0, circular economy, heterodox model, industrial policies.*

Sažetak

Ulazak privrede Srbije u 2020. godinu prate visoki rizici, fragilna perspektiva rasta i rastuće tenzije u vezi očigledne polarizacije oko buduće trajektorije rasta. Mereći puls privrede Srbije, dobijamo utisak da su izazovi značajni. Pošto je program fiskalne konsolidacije 2014-2018 uspešno završen, Srbiji je potrebna nova koncepcijska platforma koja će omogućiti razvoj nove ekonomije. Činjenica da je globalna privreda izložena radikalnim promenama ne može se negirati. Ona je izložena simultanom dejstvu negativnih posledica poslednje recesije i pozitivnih uticaja Industrije 4.0. Fundamentalnim promenama su izložene proizvodnja hrane i energije, transport kao i načini proizvodnje i potrošnje industrijskih proizvoda i usluga. Ovaj rad ima dvostruki cilj. Prvo, da dâ strategijsku ocenu situacije u ekonomiji Srbije. Drugo, da na bazi prethodnog, zajedno sa analizom gloobalnih trendova promena i nazirućih kontura novog modela rasta i povezanih ekonomskih politika, identifikuje zone potrebne intervencije i intencione politike. Ključna ideja je da se prezentira koncepcijski rad bez kalibriranja konkretnih politika.

Ključne reči: *Srbija, Industrija 4.0, cirkularna ekonomija, heterodoksni model, industrijske politike.*

Introduction

The last part of the former decade has signalized an opportunity for a restart of Serbia's economy, a chance to be optimistic and make decisions which are good for a sustainable and inclusive growth, but hard to swallow. The beginning of this decade has been unfolding in a complex context, and it has not even begun in earnest. It is clear that we are far from unlocking development potentials vis-à-vis toughest challenges related with structural imbalances from the past. For example, in politically fortified energy sector there is an inadequate level of substitution of production based on fossil fuel with renewable sources, despite global climate crisis and local ear pollution. The problem comes from the economic side, the low return of investment in renewable energy production.

Despite fiscal balance, Serbia's economic future is scary and uncertain due to structural imbalances from the past. But, it could be exiting under some conditions. In surrounding world powerful Industry 4.0 technologies are being massively infused. Today information and knowledge travel far faster than ever before. In the last two years more than 90 percent of the data was created empowering big data and cloud computing, 5G network is the reality in 13 countries, quantum computing is able to determine optimal carbon capture materials, artificial intelligence is able to address microbial resistance of corona virus to current antibiotics, etc. In majority of cases new technologies inspired by Industry 4.0 can serve the 17 Sustainable Development Goals (SDGs) adopted by the United Nations [17] as desirable and inevitable guide for future planet Earth development. By offering new technological opportunities, Industry 4.0 can drive sustainable and inclusive growth for all economies, developed and developing, core and peripheral. Only a fraction of this huge potential is being utilized at scale. The reason is an inadequate economic system. If transition to the new economy is not managed well, Industry 4.0 could exacerbate structural imbalances from the past.

Developed economies are already in transition. They are at the end of more than a five-decade long period of "shareholder capitalism" and a four-decade long period of "market fundamentalism" as extreme expressions of the neoliberal capitalism. Despite increasing scientific optimism, backed up by digital transformation in particular, an extreme form of economic liberalism along with deregulation and privatization redirected the model of growth and economic policy platform to an unsustainable path. The liberal model of capitalism was related with relatively egalitarian and balanced growth. The neoliberal model, of course, was not. Following more intellectually arrogant approach, the neoliberal model resulted in two major contingencies: growing wealth inequality and climate crisis. Shift from liberal growth pattern to neoliberal one caused a lot of headache, not only to political leaders and policy makers, but also to society, as a whole. It is not socially sustainable that half of all of the household wealth in the global economy be owned by just 1 percent of the rich. Youngsters like Greta Thunberg are defending the rights of future generations, particularly revolting against current economic (and political) elite because efforts to keep global warming are failing. Without radical changes in the economic system, the new technology development inspired by the last industrial revolution threatens to aggravate mentioned contingencies.

Market efficiency is one of the taken-for-granted propositions of the neoliberal model of capitalism wisdom. Competition is great where it works. Unfortunately, competition fails in emerging industries too often. The bubble burst and winner-takes-all-effects confirm that competition frequently is not meeting sustainability and inclusivity proposals in mature industries. Major fault lines of the neoliberal economic system like ignorance of negative external effects and intention policies are leading to political, social and cultural polarization.

Shareholder capitalism becomes increasingly disconnected from the real economy. Some companies benefited from shift toward the services. But, such structural change we can treat seriously. The reallocation of funds from productive investment to financial speculation is quite visible from the fact that in developed economies less than one-fifth of financial assets are being invested in the real economy. The previous is related with financialization of the economy, or concentration of the financial power. Namely, there is a disproportion between magnitude of the financial sector and its participation in value creation.

Moreover, financialization of the economic system ended with financialization of politics. Lobbying is a bypass between the economy and politics. Last but not least, in such a context, monetary policy measures are bias towards capital and energy-intensive businesses, ignoring the issue of negative external effects. The politics is in tax policy, too. Policy makers in the US continually reducing tax rate showing resistance against income and wealth concentration. By covering up negative external effects and inequality issue, politics actually galvanizes situation full of social and physical imbalances.

Financialization along with outsourcing and offshoring lead to rapid deindustrialization. Also, the workforce was pushed from the real economy to services. Another consequence of financialization is plutonomy. The root of plutonomy is financial speculation based on value release instead of value creation. Paradoxically as it is, high profitability of equity investment is not related with risk taking. Instead of carrying out, risk is being transferred to other players, including the Central Bank. Creditor's bailing out instead debtor's bailing out is typical example of such behavior of the central bank.

The Great Recession of 2008 was a logical consequence of the abovementioned fault lines. The period following the 2008 crisis was a decade of unconventional economic policies. Paradoxically, in-post-crises period almost nothing worked in line with conventional economic rules, in a predictable way and, more importantly, effectively. There were too many unknown unknowns and simulating activism of unconventional policies set including "too-big-to-fail", extremely low or negative interest rates, quantitative easing and their latest alternative, the central bank's balance sheet expansion. The global sluggish growth1 is a self-inflected development of such fault lines and inadequate remedies.

No doubt, after deindustrialization, export-driven growth is not a feasible alternative. Moreover, the shortage of industrial workforce is a real threat to any development trajectory. According to J. Lorre [6], 10 million global manufacturing jobs remain unfilled due to gaps in skills sets.

Indeed, the functionality of nonconventional economic policies is debatable. The main reasons for such skeptical view are continuous sovereign debt increase followed, almost regularly, by budget deficit, as well as low investment sentiment, mostly in the private sector. All these indicators are signaling that the growth is not on a sustainable trajectory. When the growth is almost flat, the geopolitics is situating itself on the market. Trade war, technology war, currency war and related issues are disturbing fundamentally the global trade and investments. In developing economies, along with internal structural imbalances, the external threats mostly impacted the future economic growth and slowing down structural reforms.

In this (dis)order economic goals are in conflict with ecological limits. Unregulated negative external effects lead to growing fractures of the system like pollution, resource depletion, and global warming. Global warming triggers the spiral of negative effects. For example, glacier meltdown triggers methane emission from previously frozen soil producing negative feedback loop to climate change. The shareholder capitalism is divorced from sustainable well-being and not inclusive toward the nature. Such system ignores not only economic (and social) costs of environmental degradation, but also the rules of functioning of physical system and biosphere. Without swift transformation of economic system, chances of keeping Paris Agreement "2° C warming limit" has diminished.

Existential ecological threats cannot be managed by the market mechanism. The Great Recession of 2008 and climate crisis exacerbation have reminded us that adherence to the current economic system represents a betrayal of future generations.

Facts matter, not opinion. In the new economy design we must stick to the facts, not follow ideological propositions, predilections and explanations which are not backed up in reality. The widening fracture between the neoliberal model of growth and related economic policy platform, from one side, and economic reality and human aspirations, from the other, require paradigm change toward intentional policies, from invisible hand of the market to visible hand of the state.

In economy full of fractures and fault lines the risk of new recession is more elevated. There are many

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1 The IMF forecast for 2021 is 3.4 percent for global economy, along with 1.6 for advanced economies and 4.6 percent for emerging markets and developing economies

more signs of panic, for example growing sovereign debt, more tax cuts than infrastructure spending, low yield of defensive fix income bond, or continuation of extremely low (or negative) interest rates policy.

For previous reasons, shareholder capitalism, linear model of production, and related economic policy platform (recently corrected with some unconventional policies) could not be a blueprint for the new model of growth and related economic policy platform. In particular, the orthodox approach is not suitable for economies with delay in economic development like Serbia inspired by catching up of the developed world. Continuation is a prescription for regression. The conventional policy tools like Yield curve, Phillips curve and capacity utilization do not make sense in the time of digital transformation, particularly when the output gap and indebtedness are a legacy of the past fault lines. The question starts with "how" to implement new solutions, not with "if". In the era of universal connectivity and almost endless influx of combinatorial innovations, coordination is equally important as competition. Close relationships between the regulatory bodies, fiscal authority, government, private sector and state sector really matter.

Despite the constituencies of neoliberal capitalism where reaching there acme, climate crises at least signaling that their days are numbered. Climate crisis is a defining issue of the planet Earth surviving.

The alternative for the shareholder capitalism is not an authoritarian capitalism (state capitalism), but less conservative and most balanced model of capitalism, stakeholders capitalism, closely related with circular economy and heterodox economic policy platform. This fundamental ideas are able to annul consequences of the fault lines like ignorance of negative external effects. The global financial system is on the verge of fundamental reallocation of capital toward carbon-neutral technologies. We already discussed the proposals of the heterodox economic policy platform, for example in [1] and [2]. The new platform is based on the idea of reversibility (feedback loop) as a universal principle, not only in physical system, but also in macroeconomics and microeconomics.

Industry 4.0 is opening a new chapter in the economic development. Technology is enabler. New technology roots are universal connectivity and cumulative effect of technological breakthroughs of the previous industrial revolutions in the way that build the fusion of the physical, digital and biological technologies into endless influx of combinatorial innovations. By capitalizing these structural changes, management tools like the Information Value Loop [13], actually transforming transactional data into actionable information. On the other side, connected technologies are co-evolving, driving research and development beyond new frontiers and bringing combinatorial innovations on the market place. In hyper competition the power of actionable information increases.

In addition to many ethical challenges, Industry 4.0 creates both promises and perils for the economic development. The cooperation between different fields will open new frontiers of business development. Key difference between the last wave of industrial revolution and the previous one is a growing integration of research fields due to a fusion of different technologies with a catalyst role of ICT.

Combinatorial innovations help to speed up some science fields by implementing solutions for emerging problems. For example, fusion of quantum computing and machine learning has become a booming research area, particularly important for promotion of disruptive, non-linear technological advances toward zero carbon emission world. We are on the track towards biological transformation of the manufacturing process. Integration of bioinspired principles in advanced manufacturing leads to the physical world converging with the digital world. Convergence revolution is around us. As a consequence, Industry 4.0 is full of humanoid machines.

Unfortunately, many of the new technologies being created have not been widely implemented to better control of negative external effects. The full benefit of Industry 4.0 requires a new type of the socio-economic system, along with related the growth model and economic policy platform. From socio-economic perspective, the stakeholder capitalism is a superior solution than shareholder capitalism form many reasons. Circular economy has reached sustainability proposal better than linear model of production. Heterodox policy platform better serve inclusivity proposal.

To illuminate the economy of the future, architects of the system should look beyond, not behind. Looking beyond means respect toward key drivers of change, or forces that are shaping tomorrow. They contribute to prosperity and they are able to annul problems from the past. In the new social-economic system, inclusiveness should go hand in hand with sustainability proposal. Of course, inclusiveness respects interest of both people and nature. The last stance is exactly what this paper tries to promote while respecting specifics of Serbia's economy. We start with overview of global drivers of growth. After taking the pulse of Serbia's economy, the next content will structure in the way which follows the previous line of reasoning.

Global drivers of growth

Two main forces strongly shaping the new context are: unconventional economic policies as the consequences of the Great Recession of 2008 and Industry 4.0.

The last recession and unconventional post-recession policy measures are replacing the global economy into a spiral of the lost decade. Negative evolution in global trade and investment is quite visible, from multilateralism to bilateralism and economic nationalism. With the exception of high-tech sector, global economy is functioning in an extremely low ROI environment. High-level political lobbying in international trade and investment is a manifestation of the growing power of particular interests almost exclusively connected to the financial sector, fossil fuels and capital intensive sectors. Protectionism in trade and investment almost exclusively impacts decoupling of global value chains. Despite recently signed agreement, trade war between the US and China weighs on global economy. It leads to the growing recession pressure. The threat that combination of unconventional core economic policies (monetary and fiscal) and protectionism will influence a significant contraction of global industrial output is real.

Without an adequate model of growth and economic policy platform, economic policy measures and strategies of business organizations are becoming increasingly reactive to single issues of brinkmanship. Such development has made future actions, both on a macro and micro level, less predictable. Despite the fact that 13 nations already imply solutions, the last example of unproductive rivalry is the escalation of the tech war between the US and China as the two large 5G network producing nations.

Natural catastrophes as a consequence of negative external effects were abnormally high in the last period. Most countries lost potential GDP due to global warming. The sea level rise is destroying hospitality industry potentials in some equatorial countries. Climate change is a key trigger of migration. Due to extreme weather conditions, in Asia Pacific many people flee from their homes. In Africa, people are moving for lack of water. Regarding the climate crisis, situation is extremely alarming and approaching apocalyptic consequences.

No doubt, economic goals are in conflict with ecological limits. The current linear model of production is divorced from sustainable well-being and inclusivity toward the people and nature. It ignores not only economic (and social) consequences of environmental degradation, but also natural constraints from the physical system and biosphere. As a consequence, current economic system is burdened with a twofold divorce, from well-being and ecology. Structural imbalances are maybe manageable by market mechanism. But, it is too late to manage existential ecological threats by market mechanisms. Facts matter, not opinion. The widening fracture between the neoliberal model of growth and related economic policy platform, from one side, and economic reality and urgent needs for sustainable solutions, from the other side, require paradigm change.

Now a key question is: which path we will take in future? It is not controversial one, the new paradigm will create an environment for creative management (macro and micro, both). The main legacy of the Great Recession of 2008 is a double paradigm change, paradigm change in macroeconomics (and macro management) and microeconomics (and micro management). The neoliberal exceptionalism about proficiency of the market (in particular, capital market) is finally over. It is no longer the question of whether and why to change the paradigm, but how to do that. Economists inspired by heterodox approach follow a different approach. Quality of growth, or sustainability without environmental degradation, is

a priority. Industry 4.0 is outpacing the capacity of the economic system to adapt to structural changes. As a consequence, proactivity in business development is rising. Interplay between double paradigm change, both micro and macro, and Industry 4.0 is making the rejuvenation cycle possible. But the window of opportunity won't stay open forever. Particularly keeping in mind that Industry 4.0 leads to a mixed opinion, by offering opportunities and perils simultaneously.

Combinatorial innovations as a hallmark of Industry 4.0 help to speed up some research and development efforts. For example, fusion of quantum computing and machine learning has become a booming technology area, particularly important for promotion of disruptive, non-linear technological breakthroughs toward zero carbon emission world. So, Industry 4.0 is related with disruptive technological advances. It is shifting job roles and skills sets by putting at risk great majority of current jobs. Also, under the impact of Industry 4.0, fundamental concepts of business organization and strategy as we know from M. Porter's framework are being challenged. It is also spurring collaboration instead competition, capitalizing network effects inside business platform as a new level-playing field. When different companies share resources within the same platform, a significant value can be created for all participants. As current business model and strategy are disrupted by combinatorial innovations, employment is being profoundly impacted followed simultaneously by job displacement and job creation. Workforce needs to be repurposed, across industries and with the vision of economic development to the skills sets required for the industries with fastest growing potentials. Last but not least, combinatorial innovations are outpacing regulatory framework. Without some adjustments in the growth model and economic policy platform, Industry 4.0 impact on development could be counterproductive.

The time of buying time and playing the game with unconventional policy measures is over. We are leaving in the time of systemic changes. Rational people love the world, truth and science, as well. They do not like to be manipulated with. They look for solutions. Before we define solutions for Serbia, let's make an update on the current economic situation.

Local inhibitors of growth: Taking the pulse of Serbia's economy

In 2019 the Serbia's economy was in relatively good place, primarily because the government reaffirmed its commitment to fiscal consolidation. The budget is balanced for the third consecutive year. By many indicators macroeconomic situation has been improved. Inflation is under control (below 2 percent target), employment is increasing (unemployment dropped to below the double-digit percent), and growth is in positive territory (4.0 percent). Recession risk is mainly contained and we do not see indication that economy has fallen off the cliff again. Moreover, one can note positivity of the government regarding delicate political issues amid major sources of uncertainty like economically motivated emigration.

By making debt sustainable along with improvement of credit rating (or lowering cost of capital), fiscal consolidation program lost austerity character. Moreover, without a significant inflation pressure, another benefit is that real interest rate is close to the neutral rate. To be honest, temporary factors have also contributed cost of capital to be on a historical minimum, and inflation to run soft.

Despite of previous, prospects of longer-term growth look pretty flat. A deeper analysis of the structure of the economy shows a shiny outside along with a more dangerous inside. Structural imbalances continuously challenging core economic policies and their achievements and, in some cases, making policy measures incompatible. The relationship between policy interest rate and open market operations of the National Bank of Serbia as principal tools of inflationary targeting, is a good example. When the central bank cuts policy rate, currency will be weaker. In Serbia's case, national currency is going to be stronger. This is the consequence of intensive open market operations of the central bank inspired by the aim to keep inflation under control.

In 2019 the growth was a little bit weaker in comparison with the previous year. In general, the growth remains sluggish. But, tonality is positive. So, in 2019 the government has started to use tax cut formula to spur economy toward sustainable growth. Not to be predetermined or prejudged by a pessimistic view, but fiscal policy easing in combination with FDIs expansion could push RSD toward

further appreciation, violating position of exporters and sustainability of macroeconomic balances, as well.

Vulnerability is relatively high even the economy logged in relatively high growt. Important source of vulnerability is the public sector. Data we have been getting are signalizing a painful year in the state-owned companies.

In terms of growth financing, total savings is not enough to fulfill supply of commercial banking funding. The National Bank of Serbia plays a smaller role than the proponents of the monetary theory think regarding the growth issue. When price control is primary focus, development goals are not related with monetary easing and staying behind the liquidity injection on capital market actions.

Unfortunately, macroeconomic indicators do not provide credible signs of the current economic momentum. More than macroeconomic indicators, vulnerability indicators measure economy exposure to the major risk stressors. Despite geopolitics (steel made in Kosovo issue), there are many other factors which are increasing Serbia's vulnerability (see Figure 1). Coronavirus-driven bear market in commodities (agriculture products, livestock, energy and metals) could be a new source of contingency.

Despite temporary factors, permanent factors of complacency are the output gap, composition of the output, and employment structure.

Output gap is not temporary blip on radar screen. Three decades Serbia has faced transitional output gap, which continuously challenges the fiscal balance and prospects for growth. In 3Q 2019 the transitional output gap stayed at the 19 percent level. Impotent J-curve for Serbia does not coincide with the tendency in Central and Eastern Europe (CEE) post-transition economies. Figure 2 really matters.

The structure of the output should also be on the radar. The share of industrial production to the output formation is inadequate. Also, this tendency is in contradiction with the 1960-1990 period when the economy expressed respectable level of industrialization. In this period, the industrial production grew at an average compound rate of 8 percent. Deindustrialization has followed the period after 1990. It coincided with the start of systemic transition and geopolitical crisis.

Figure 1: Vulnerability indicators, 3Q 2019

Operational vulnerability indicators		
Indicators	Value	Reference value
Transitional output gap	19%	0%
Okun index	10.6%	<12%
(inflation + unemployment)		
Gini coefficient	35,6%*	<30%
Current account as % GDP	-5.5%	<5%
Consolidated fiscal result as % GDP	1.2%	>-3%
Dependency ratio	0.52	>1
Youth unemployment	26%	<20%

Financial vulnerability indicators		
Indicators	Value	Reference value
Indebtedness		
• Public debt/GDP	52%	<45%
• External debt/GDP	63.8%	<45%
• External debt/Export	124.4%	<220%
Credit rating		
• S&P	BB+/positive	rank > BB+
• Fitch	BB+/stable	rank > BB+
Fiscal capacity		
• Tex revenue as % GDP	37%	34%
• Shadow economy as % GDP	34%	31%

Competitiveness vulnerability indicators		
Indicators	Value	Reference value
Export (goods)/GDP	35.2%	>50%
Currency change (Nov2019/Nov2018)		
• Nominal appreciation	0.7%	<5%
• Real appreciation	1.2%	<0%
Global Competitiveness Index	72 of 141	65 - SEE average
Corruption Perception Index	91 of 180	59 - SEE average
Ease of Doing Business	44 of 190	60 - SEE average
Economic Freedom Index	69 of 180	62 - SEE average

Source: National Bank of Serbia
*Gini coefficient of equalized disposable income (EU-EILC survey 2018)

Figure 2: Transitional output gap, Serbia vs. CEE economies: period 1990 - 3Q 2019
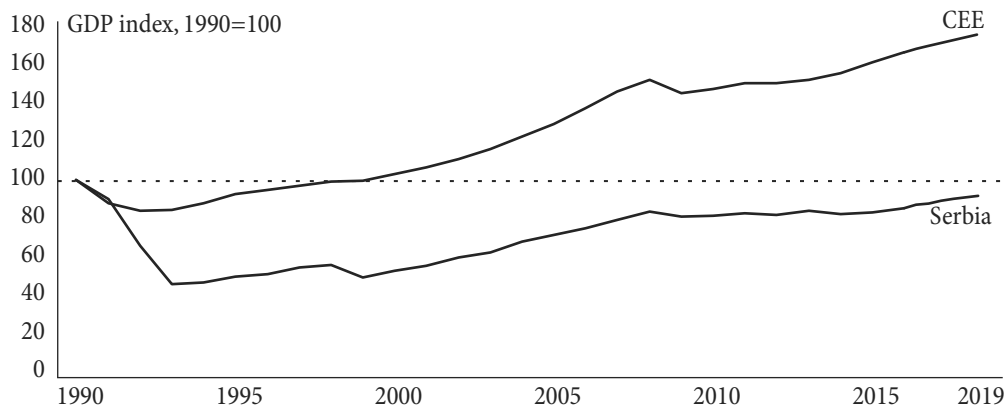
Source: Authors' own editing based on EUROSTAT and Statistical Office of the Republic of Serbia.

In the economy the law of gravitation is functioning, altitude of the output powered by industrial production is easier to be lost than to be recovered again. Figure 3 portrays, with some explanatory details, the industrial production in three sub-periods (1990-2000, 2000-2011 and 2010-2018) regarding dynamism of industrial

Figure 3: Industrial production: period 1960-2018
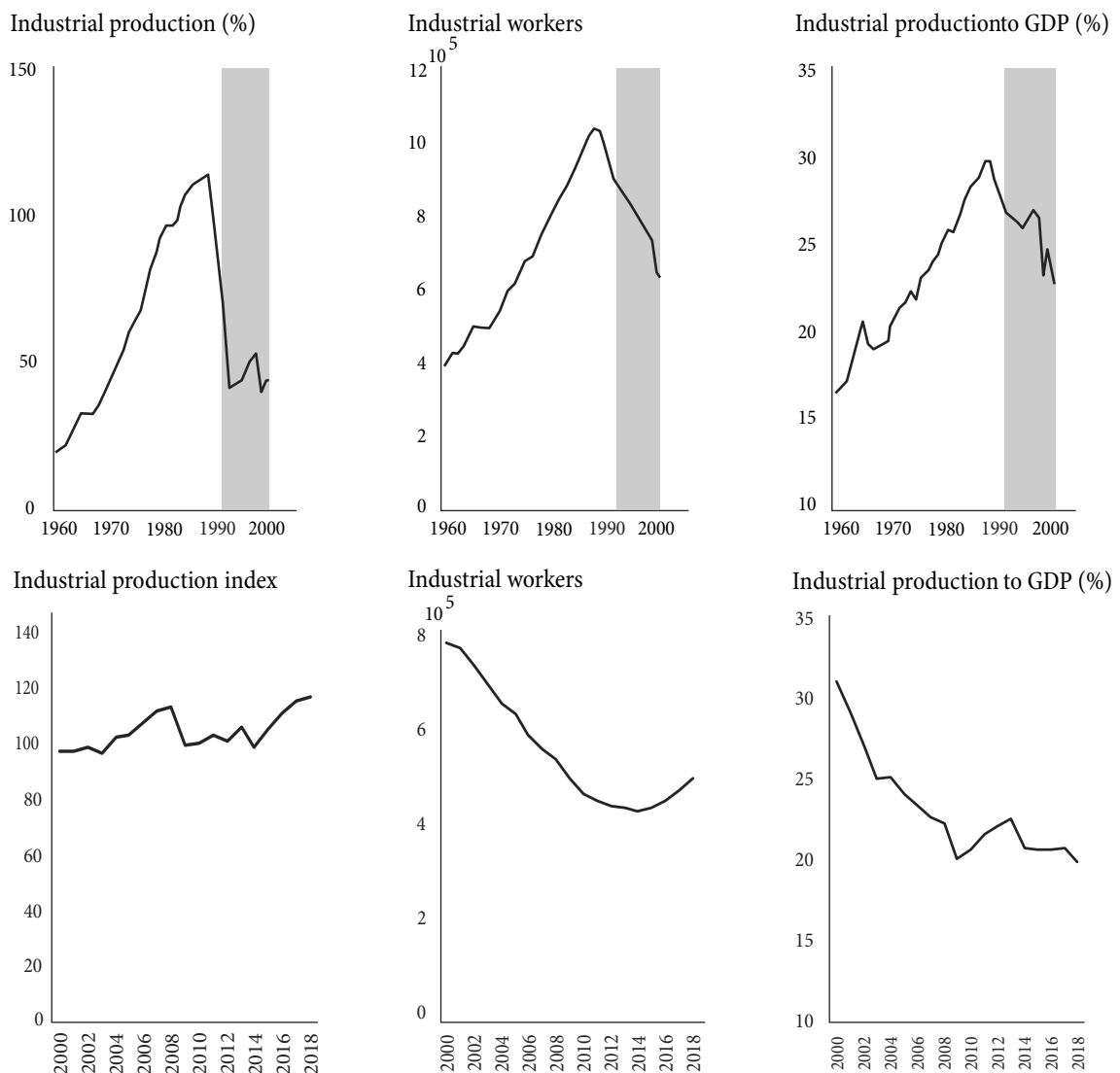
Source: Upper part from [12], and lower part based on authors' own editing of relevant data from Statistical Office of the Republic of Serbia.

production, number of industrial workers and share of industrial production in GDP.

Without the workforce, a realistic assessment of growth potential is not possible. In GDP per capita, "per capita" is equally important as GDP. Unfortunately, population activism is a disadvantage. The fertility rate is below the CEE economies average. Also, in the longer-term period technocrats and well-educated youngsters left the country. Moreover, population is ageing. In 2019, an average Serb is almost 44 years old, standing in the group of the oldest nations in the world. So, Serbia has the problem to generate sufficient workforce to increase the level of output. If this tendency continues, the deficit of human resource, particularly human capital, will be a major development barrier.

In the last period Serbia has demonstrated significant improvement regarding employment indicators, as it can be seen based on unemployment rate from Figure 4 below. Despite the progress in employment level, the workforce still exists as a vulnerability factor.

Government subsidies for FDIs led to employment increase, especially in labor-intensive sectors. However, the share of informal and vulnerable employment remains high, 19.5 percent and 28 percent respectively [14]. A significant cause of such high level of informal and vulnerable employment lies in a relatively high fiscal burden on salaries that does not correspond to the Serbian industry's capacity, presence of unpaid overtime, as well as abuse of part-time employment forms and great number of unemployed people with

no formal or elementary education. There were some measures to address informal employment, but it still remains high. Salaries in the Serbian formal sector have been stagnant in the past several years due to austerity measures. In 2017 and 2018, Serbian population aged 15-64 has been reduced by 55,200 and 59,900 respectively, which represents almost 2.5 percent of this population category [15] due to emigration. Decrease of marginal tax rate and introduction of the program for skills set improvement could result in a greater pool of available workforce needed for Serbia's future industrial development.

Serbian employment parameters are improving. However, emigration, lower birth rates, labor force structure and quality still remain challenges to be addressed. Moreover, these challenges are crucial for future dynamic industrial growth.

In the last period Serbia has performed well in terms of attracting FDIs, as it can be seen from Figure 5.

However, there is still work to be done on shifting the structure of these investments towards the ones with a higher level of added value and also on stimulating the volume of domestic investments, since they are at the level lower than CEE average.

There is a need to shift incentives in such a way to promote investments in industries with a higher level of added value. Moreover, it is important to provide measures aimed at including domestic companies in value chains of multinational companies that invest in Serbia and ensuring better technology and know-how transfer.

Figure 4: Unemployment rate dynamics: period 2010-2018
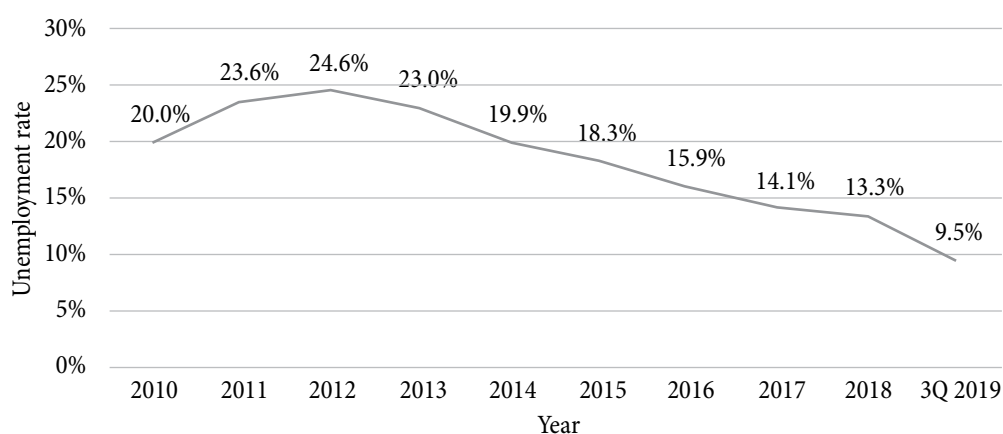
Source: [14].

Figure 5: FDI inflow in million EUR: period 2010-2018
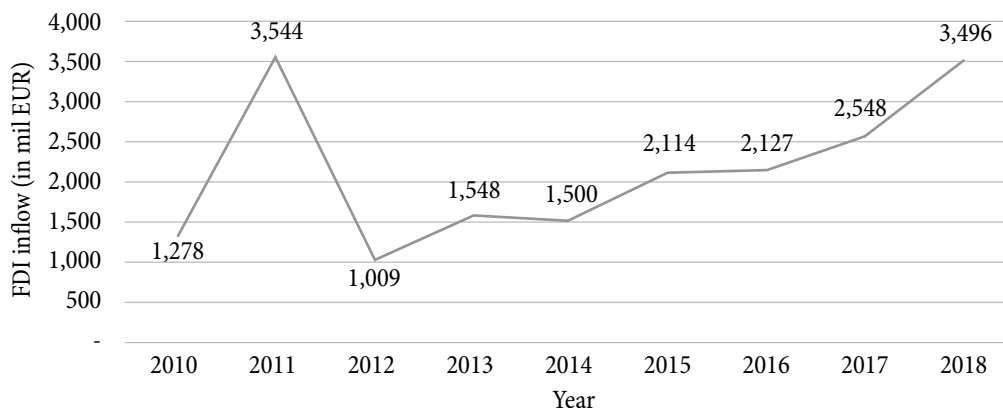
Source: [10].

Number of PPP arrangements has also increased, as well as the value of such projects, as it can be seen based on Figure 6.

Serbian exports followed similar trends as investment trends. According to Statistical Office of the Republic of Serbia [15] exports value has been growing at CAGR of 10.3 percent during the 2010-2018 period, but without significant shift in their structure towards the goods and services of greater level of added value.

According to the National Bank of Serbia, 67 percent of total Serbian exports are directed towards the EU [10]. Exports have tripled in the last decade, from 3.2 billion euros to 10.9 billion euros in 2019. Furthermore, the import-export coverage ratio from Serbia into the EU has increased, from below 50 percent in 2009 to 82 percent in 2018. FDIs from EU in the period from 2010 to 2019 amounted to 13 billion euros, which is around 70 percent of total FDIs in Serbia.

The new factor of complacency is the implicit (or postponed) debt build-up as a consequence of development strategy based on infrastructure development and FDIs as primary channels of investment base expansion. The shrinking monetary and fiscal policy base is an evident consequence of such strategy.

In terms of growth, total savings is not enough to fulfill investment for sustainable development via commercial banking. The National Bank of Serbia plays a smaller role than the proponents of monetary theory think. Development goals were not behind open market transactions, monetary easing and the balance sheet expansion staying behind liquidity injection on capital market. Price control is the primary focus of the central bank.

Anyway, the mix of vulnerability factors does not look challenging. Vulnerability indicators dampen economic outlook. After fiscal consolidation it is time to deploy the countercyclical buffer. To do that, Serbia needs a new growth model and economic policy platform.

Figure 6: PPP in million EUR: period: 2012-2017
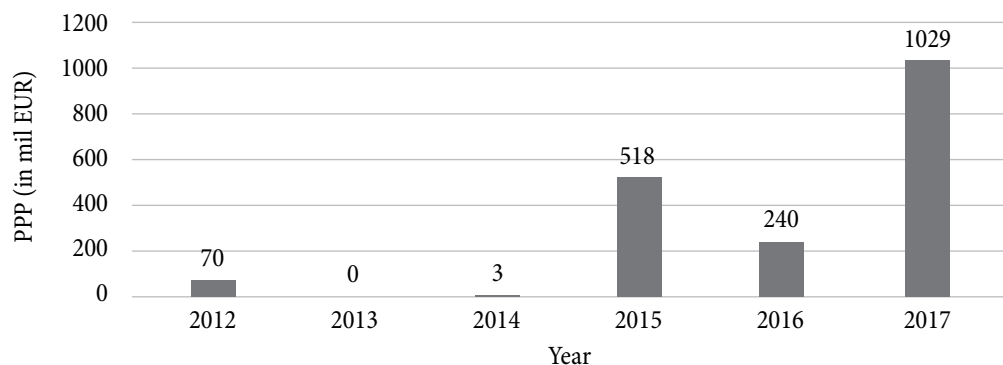
Source: [20].

New growth model and policy agenda

On the global level the Great Recession of 2008 has raised the issue of unsustainable growth based on shareholder capitalism, linear growth model, and maintenance of macroeconomic stability almost exclusively based on inflation targeting. Inherited bubbles in economic structure, particularly growing income concentration and pollutant gas bubble, as well as growing sovereign debt confirm that, following this approach, it is impossible to reach sustainability and inclusivity proposals. The moment of truth is related to the question: What kind of economic system do we want capable to do with structural imbalances from the past in order to deliver a smooth transition to carbon-neutral economy?

As the context relevant for economic activities transforms quickly, the assurance of the new economic paradigm has never been more essential. The new paradigm provides the answers that matter for tomorrow. The key question is how to balance the complexity of emerging business ecosystem with expectations of people?

From a macro perspective, stability comes first. Also, the growth, sustainable and inclusive, has stayed the very essence of macroeconomics. From a micro perspective, digital transformation is in focus because in Industry 4.0 business ecosystem is digitalizing. Companies are in the intersection between the virtual and the physical world. So, the main consequences for the micro paradigm change are virtualization and sharing.

In terms of growth, every country should do a lot by itself. There is no automatic pilot. In conceptualization stage, a double paradigm change and related principles should be followed. In the new setting, a business organization should be structured around the questions as to why it exists and what it aspires to become, shortly its purpose. Drawing upon acceleration of transformation based not on individual interests, but on the entire society, is a viable purpose. At this juncture, combinatorial innovations should be put to work in a responsible way. For this reason, the implementation of the following concepts will be transformational. In the light of this attention, the four things architects of the new economy need to know are as follows:

1. Stakeholder capitalism
2. Circular economy model of growth
3. Heterodox economic policy platform
4. Automatic stabilizers

1. Stakeholder capitalism. In recent times, the conversation about the model of capitalism has intensified. A long held prevailing wisdom about capitalism came from Nobel laureate M. Friedman [5]. His notion that a company's purpose is "just making the value for its shareholders" has had many beneficiaries. After the Great Recession of 2008 this concept is becoming discredited due to unexpected and unintended consequences of the shareholder capitalism like income concentration and irreversible warming of the planet Earth. And, most importantly, due to lack of access for great many economic agents to universal mobility and related technological breakthroughs as ultimate free goods in Industry 4.0. As global economy moves closer to Industry 4.0, the conversation around model of capitalism has accelerated.

The request to balance shareholder's value and company's purpose is being real. New stakeholder is "client Earth". It is not an abstract exercise. The long-term shareholder ROI can increase, as economy is better served. Stakeholder capitalism is gaining momentum of climate crisis by positioning private companies as trustees of society. Stakeholders like investors, regulators, and other are challenging companies to demonstrate systemic and integrated approach in addressing climate related risk. This model annuls short-termism as a result of capital market pressure on short-term valuation. Essence of a purposeful company is to produce solutions for people and planet Earth by doing not philanthropically but inspired by value creation. Namely, company's purpose should be producing solutions for people and planet Earth conservation instead of producing the value for owners by producing the negative external effects for people and planet Earth. Instead of short-termism related with shareholder capitalism, stakeholder capitalism helps to propel economy forward, while acting in a more socially responsible way, particularly in the field of environmental conservation.

The new performance measurement system is giving a concrete meaning to the stakeholder capitalism. In

addition to standard financial metrics, company should also establish new frameworks for measuring company value by measuring their progress towards ESG (environment-society-governance) goals. Thanks to many factors, ESG scorecard, with particular emphasis on "E" metrics, has become increasingly important to investors, financiers and clients. These stakeholders used ESG as a filter (or screening factor) to limit investment in a project with damaging impact on environment.

2. Circular economy model of growth. Linear model of growth is unsustainable because economy can't grow continually within a materially finite context and with the ignorance of negative external effects like pollution. Following the reasoning of J. Forester [4], the planet Earth is system dynamics with three sub-systems: physical system, biosphere and socio-economic system. Structural imbalances and existential threat of anthropogenic climate crisis can't be managed by market mechanism. The economic system can only function in a sustainable and inclusive way if it follows the reversibility principle or circular processes by using analogy from the physical system (energy and matter could not be lost). The main effect of the reversibility principle implementation, both macro and micro, is resource and energy circulated economy. It promotes through intentional industrial policies 3R principle: reduce, reuse, and recycle.

Landmark witch signalizing transition of global economy to circular economy is Paris Agreement ratified by 184 nations [18]. Prevailing idea of this document is to keep global temperature rise bellow 2°C above pre industrial level, along with the limit increase to 1.50C.

Climate crises is a complex and inherently systemic issue. Crafting negative external effect of previous industrialization requires more systemic thinking and integrated approach. Two main categories of climate risk are: transition risk (the risks that rise from policy shift) and physical risk (risks that arise from physical impacts of global warming like extreme weather events). Climate crises is the top macroeconomic risk. At company level, not just in energy sector, it is a source of major financial risk.

The impact of climate crises depends on important external drivers such as emergence of renewable energy technologies and carbon-neutral and mainly disruptive technologies. However these risks are difficult to manage, because they extend beyond consideration of business cycle.

3. Heterodox economic policy platform. Promoting circular economy new deal we actually follow the imperative of Industry 4.0 "to do more, better and faster with less resources and energy and more knowledge". In new circumstances, the traditional policy mechanism has become less reliable, in particular, core elements of monetary, fiscal and competition policy. Core policy tools that are traditionally used to smooth over negative shocks or create positive economic momentum have lost much firepower as interest rates in major currency areas remain close to zero and fiscal policy goes to austerity area. The new economic dynamism inspired by Industry 4.0 has also left competition authorities with an outdated set of measures.

No doubt, the solution for structural recession and anthropogenic climate crisis did not come from core economic policies, but from the other side of the equation, structural (or intentional) policies side. Hard macro policy regime is only a part of the solution. It is not a full solution. Industrial policies are an explanatory element of the so-called "heterodox approach". In this concept automatic stabilizers enable the strengthening of policy toolkits as well as help in harmonization of industrial policies with core policies (monetary and fiscal). In heterodox approach government's intention change behavior of economic agents, including climate related risks when material. The links between climate-related risks and behavior of companies (or strategy) is inextricable.

So, heterodox policy platform is functioning through two parallel processes: verticalization of science, research and development and education along with horizontalization of technological breakthroughs. As a consequence, the new model is based on two institutional choices: "visible hand" of the state (industrial policies, state sector and regulation encouraging the concept of stakeholder capitalism), and "invisible hand" of the market encouraging quick and massive diffusion of innovative solutions throughout the marketplace.

In heterodox approach we must think about core policies in a structural way. Climate crises will have in

inevitable impacts on carbon-neutral investments not only as a factor of mitigation of climate risks, but also as a new investment opportunity. Climate related risk adaption (and mitigation) are also predicted to generate new investment opportunities of $26 trillion up to 2030 [11].

There are three types of industrial policies: horizontal, vertical and environmental. Horizontal (or industry neutral) policies tackle education, research and development, competition policy, etc. Vertical policies are dedicated to tradable sectors (export expansion and/or import substitution). Thanks to automatic stabilizers, all policies function based on the reversibility (or feedback loop) principle (see Figure 7).

4. Automatic stabilizers. It is not possible to implement intention policies without automatic stabilizers in core policy areas. It is an example of applicability of reversibility principle in macro management. Along with the fiscal automatic stabilizers, there is significant progress in other automatic stabilizers from core policy areas, monetary in particular.

The fiscal automatic stabilizer is a very old idea, actually very Keynesian idea, of countercyclical measure defined as the intertemporal reallocation of fiscal burden with the aim to reduce the negative economic consequences in bad times by using surpluses from the good times. In low-income developing economies with output gap like Serbia, the budget balance is a prerequisite for implementation of these instruments.

Tax exemption for research and innovation costs from taxable earnings or exemption of profit tax in

Figure 7: Heterodox policy platform
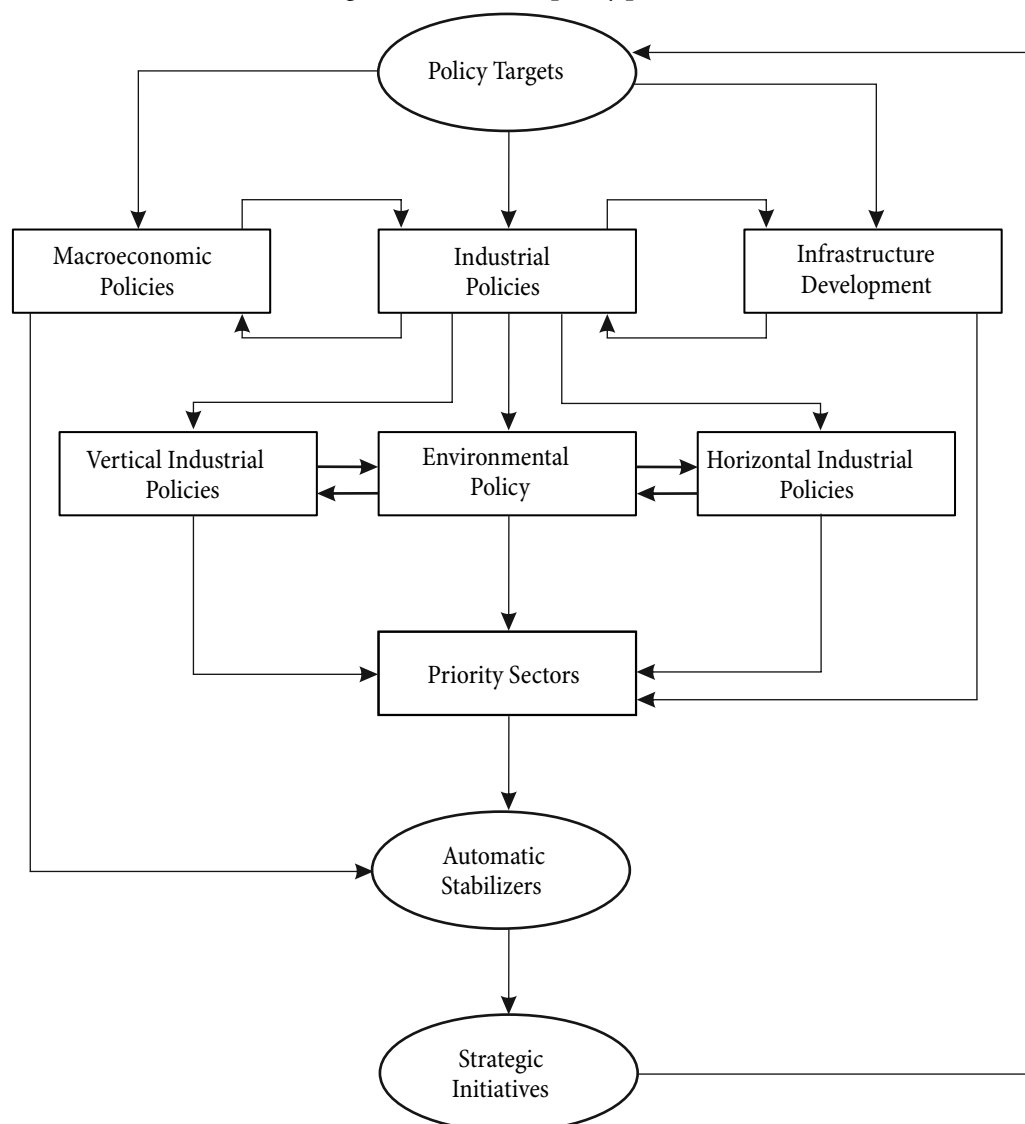
the tradable sectors plays the role of a fiscal automatic stabilizers supporting development priorities. Subsidies for FDI in carbon-neutral production also make sense. Or, a neutral interest rate and stable and competitive FX rate play the role of monetary automatic stabilizers. Furthermore, regulatory costs inspired by environmental conservation should impact the auditing standards in financial industry and cost calculation in cost and tax accounting in real economy.

Coordination is particularly important in process of setting automatic economic stabilizers. On one hand, low policy rates lead to potentially excessive risk taking in financial sector. On the other hand, if automatic fiscal stabilizers are too tight, they could affect aggregate demand and its structure in wrong way.

In the age of combinatorial innovations, it is not possible to innovate in isolation. Coordination is needed more than ever before. For example, lifelong learning needs coordination input through horizontal industrial policy. The new dimension of competition is competing in the speed of learning. Learning is not only part of the job (or learning by doing), as the job is also to unlearn and relearn (or learning by learning). It is the same at both the individual and organizational level. Access to knowledge of new technologies and roll-outs requires a more inclusive manufacturing environment. Broader ecosystem includes research labs, university, special purpose financial institutions, other companies, etc.

The previous four concepts work in synergy. Combining the previous concepts in one approach we get the purpose of a business organization as developing, designing, producing and selling product/services in the most environmentally sustainable way possible, and by building value chain and business platform around reversibility principle of repairing, reusing and recycling. The "as-is business" is no longer adequate for challenges related with Industry 4.0. Only purposeful "to-be business" is capable to deliver solutions for climate crisis, improving well-being and achieving sustainable and inclusive growth.

While there is a range of challenges on the horizon, at the dawn of the new decade there are also promising pathways to the circular and greener economy. In following part we briefly present snapshots of the present moment

in Serbia based on the views of economists supporting the heterodox approach. How the future unfolds depends on window of opportunity today to mobilize people and technology to move toward more sustainable and inclusive outcomes. Again, there is no automatic pilot.

New industrialization as a vision for growth

In Serbia a balanced-budget is enabling some fiscal space and should be leveraged more to support investments. In 2019 government is moving in this direction through intensification of fiscal stimulus, including tax cuts and increased share of local government spending. But it is not enough for staying on a long-term growth trajectory and keeping further transition from consumption-driven to investment-driven economy. The level of fiscal space available for state investment will also depend on government's ability to collect taxes. In the fiscal sphere, in Industry 4.0 there is a paradoxical state of affairs. From one side, the digital transformation is making tax collection harder because non-material assets are becoming more important. From the other side, tax collection could become easier as more transactions become traceable.

The new balance between monetary and fiscal policy will have to be found to compensate for depletion of traditional monetary policy tools. Also, additional fiscal flexibility will be needed in order to restart growth and to facilitate the transition to the new economy on a number of fronts. While fiscal space exists, it is to some extent conditional on the accommodative monetary policy going forward. In case of Serbia, the fiscal space could be shrinking as demand for government debt has been waning.

In monetary sphere, cutting interest rates to bust the growth is an old stereotype. Also, if the central bank is committed to a strong local currency policy, exporters are penalized, importers are subsidized. From development perspective, in circumstances of climate crisis, emergence of the new asset classes like "green bonds" is critical. Last but not least, ESG standards and metrics are proliferated. Better quantification of associated financial risks of climate change has led central banks to stress-test banks and

brought investors on board in insisting on environmental performance and on climate risk.

In facilitating the green transition, competition policy has an important role to play. The transition will necessary involve greater constraints on consumption, and resulting costs to both consumers and producers on the goods in question must not be swept aside but need to be acknowledged and addressed. While the transition to a greener economy is full of opportunities, complementary policy action will matter enormously for benefits to be widely felt and losses to be mitigated.

In new circumstances primary obligation of the government inspired by heterodox approach is define adequate infrastructure for tradable sectors in terms of protocols in education, research and development and competition policy in order to access the world class technology. The core idea is promote technological entrepreneurship from the inside of the socio-economic system.

Regarding imperative of climate crisis resolution, leading trends and specifics of the local economy, the new vision of economic development for Serbia should be based on circular economy new deal. This vision could be specified in the following way: "based on new industrialization respecting circular processes in energy, industrial production, agriculture and transport, develop open, regionally and globally competitive, investment-driven, high-skilled, and digitally transformed economy that contributes to sustainable economic growth and inclusivity both toward the people and nature". This model of growth is able to produce sustainable economic growth and well-being. Investments in such growth are pro-people and not against nature.

In Serbia, circular economy as a concept is not understood and promoted enough. This is reflected in the fact that environment preservation expenses account only for 0.3 percent of GDP. There is an evident need to follow the principles of this concept having in mind that strategic goal of Serbia is becoming an EU member.

Today energy, industrial and agricultural production is dominantly based on linear, mainly outdated, technologies with significant negative external effects. These technologies create more waste per produced unit. If we add the fact that only 5-7 percent of total waste is being recycled [9, p.

21], situation regarding conservation of nature does not look promising. Overall, according to World Bank [23], [24], production of a unit of GDP in Serbia requires more energy (0.37kg of oil equivalent per 1$ of GDP PPP) and creates more CO_2 emission (0.38kg per 1$ of GDP PPP) compared to most of the countries in the region, as well as EU average (0.09 kg of oil equivalent and 0.17kg of CO_2 per 1$ of GDP PPP). In addition, the share of industrial producers in final energy consumption is also greater than in surrounding countries.

When it comes to the use of renewable energy in industry, situation is not that much better, since only 21 percent of total energy was produced from sources of renewable energy [9, p. 21]. The main reason for this is the fact that the use of renewables requires additional investment, which makes it more expensive than traditional energy that is also very cheap in Serbia.

Serbian businesses are not very aware of the importance of preserving the environment, especially regarding waste management, since very few industry players use waste as an input in their production process. According to [9, p. 21], Serbia is lagging significantly in waste management and its recycling. The main reasons for this lie in the absence of the necessary infrastructure for waste management (systems for collecting, sorting, storing and processing waste), as well as that for treatment of polluted water. There are currently 3,500 wild landfills in Serbia, while there are only 8 regional sanitary landfills [9, p. 14]. It is therefore necessary to develop the basic infrastructure as soon as possible and to provide incentives for individual industry players in order to make waste management profitable for them.

Such situation is the consequence of the lack of intention policies. The first step in providing such incentives would be the alignment of domestic legislation with the EU legislation in this area. Preservation of natural resources, improvement of energy efficiency particularly in electrical grids and industrial processes and full adoption of circular economy principles require regulation that is in line with the one in the EU.

To implement this vision, architects of the system should follow the EU orientation [3] having in mind the strategic orientation of Serbia towards accession to the

EU. The portfolio of industrial policies includes priority sectors like processing, utility, mining, and construction materials and excludes the services and the construction. In new industrialization we will use this strategic framework as a blueprint (see Figure 8).

The ultimate goal of the new industrialization is to raise competitiveness of Serbian real economy, particularly manufacturing. Specifically, a competitive Serbian industry (along with agriculture and logistics) significantly contributes to a sustainable economic growth, measured not only by GDP, but also by performance measures of well-being like ESG metrics.

The new growth model and economic policy platform will address key strategic areas identified in the EU framework. The expected outcomes are accelerated growth of industrial production with greater share of combinatorial innovation in its formation, sustainable growth of industrial employment along with improvement of its quality, increase and improvement of structure of industrial investment, and increase of industrial exports

based on high-value added products/services. Intention areas foster vicious circle of adoption where better policies create imperatives for others to adopt. Intention areas are also related with major strategic challenges already identified as sources of vulnerability.

Main intervention areas (or areas of intention) are as follows:

1.   Empowering people
2.   Digital transformation
3.   Research and development
4.   Investment and infrastructure

1. Empowering people. Two main areas of improvement are education and corporate governance.

Apart from the size of the pool of available workforce, the new industrialization will also depend on improvement of its skills set. This is especially important since investors are already having troubles finding employees, particularly workforce with high skills set. In Industry 4.0 education could be the greatest gift and a key ingredient for career development. If skills set is

Figure 8: New industrialization in Serbia
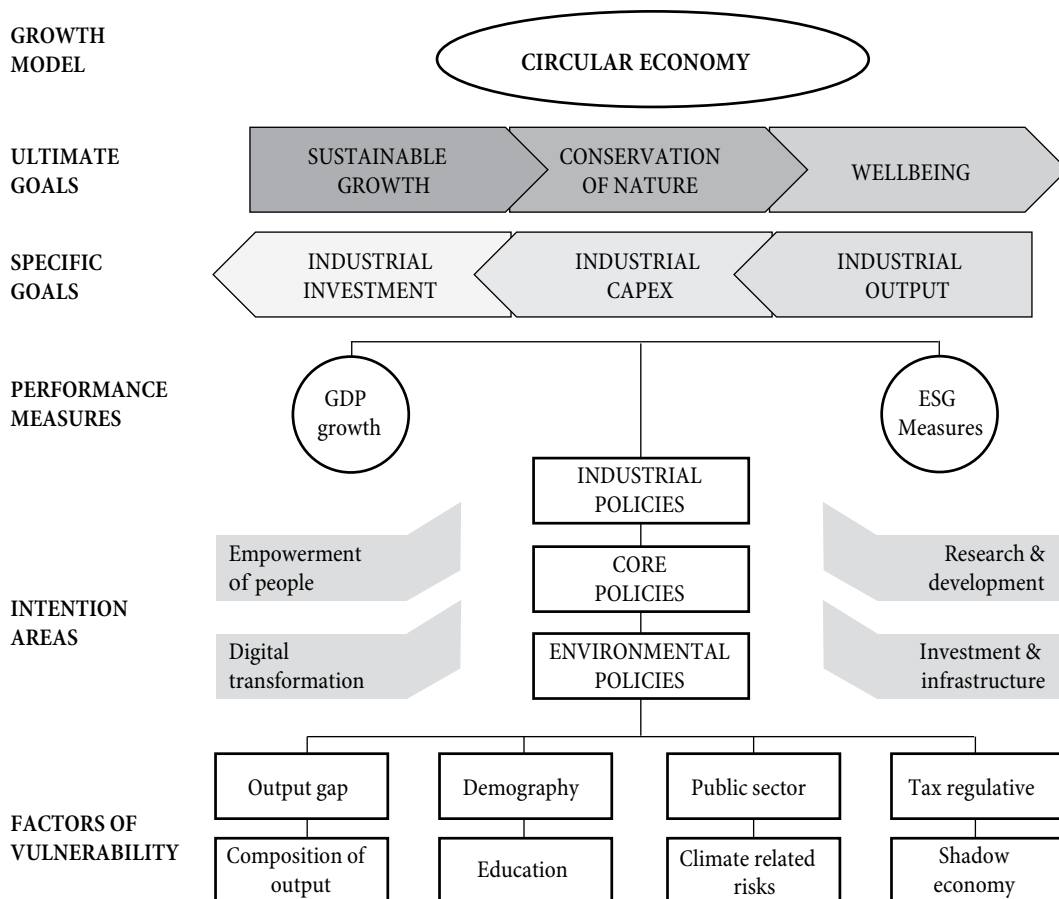
power, the government through education policy should power it up.

Increasing access rate in regular education as well as in training and refreshment of knowledge to keep the relevance of skills set remains a key question when workforce is being reduced each year due to lower birth rates and growing emigration. Digital skills improvement should be in focus.

If top line is digital skills set improvement, the bottom line is formal education. The previous is related with increasing funds, since Serbia spends only 3.8 percent of GDP on education, which is less compared to the EU, as well as compared to the CEE countries [16]. Moreover, it is also important to improve the component costs structure, since currently more than 80 percent of education costs represent salaries of employees in the sector [22].

It is also important to make secondary education mandatory. The quality of secondary education varies a lot and quotas are mostly determined by schools themselves with no consideration of demand from the labor market. Introduction of digital skills in secondary education program would also result in greater ability to enter the job market, due to the fact that such skills are not being developed at the moment (although this is expected to change due to the introduction of dual education).

Access to tertiary education is good enough. However, its structure is inadequate in terms of current market demand and quotas [19, p. 32]. One way to ensure greater weight of STEM competence would be to improve the cooperation between university and industry sector. This would include measures such as involvement of industry in curriculum design, greater share of classes held by industry experts, field classes, introduction of trainee program for students by companies, introduction of more practically oriented master and PhD programs, etc.

Lifelong education has the capacity to close the gap between skills acquired through secondary and tertiary education and those demanded on the labor market. Also, this would lead to faster transition from school to work, which is very slow at the moment, since it takes 11.7 months for youngsters with tertiary education and 24.3 months for youngsters with secondary education to find a job [7, p. 2]. Also, informal education through knowledge

transfer methods would lead to greater development and adoption of soft skills and algorithm thinking that were recognized as increasingly important in Industry 4.0.

In upcoming times, the segment of the workforce that is expected to perform the best is the segment of telemigrants. This segment includes individual experts as well as micro businesses and SMEs that are based in Serbia but do majority of their work for their clients abroad. In this segment policies aimed at increasing the flexibility of work arrangements could be beneficial for industrial growth. For this segment, there are three pillars that constitute a modern education system. First, academic excellence. Second, a well-organized recruitment and talent management. Third, free financing and fund-raising for regular and permanent education. People need to develop themselves for themselves. So, learning by learning is combined with learning by doing.

Constraints related to human resources development also represent a significant barrier for greater efficiency and effectiveness of research and innovation. In order to ensure its sustainable and significant contribution to the industry, it is important to provide not only greater financial support for young scientists, but also develop world class skills in technological entrepreneurship.

The government must encourage the workforce for technological entrepreneurship and technology related jobs through some initiatives. The fundamental shift that must be made in this direction is lifelong learning. Previous generations, when they were growing up, made a linear progression in skills set from learning at schools and academia to working in industry. Today lifelong learning is reality, which means that the workforce has to be a lifelong learner. It is a big switch in the learning curve that people have to learn to learn, learn to unlearn, and learn to relearn.

Material climate related risks are correlated with focus and ambitions of corporate governance bodies. Corporate governance is fundamental building block of effective risk management. Until now smooth transition towards carbon-neutral economy remains voluntary obligation of corporate governance bodies. Corporate directors must act with care, skill and diligence, so, corporate governance bodies, should be accountable for decisions which respect

climate risk acceptance and mitigation. To boost green finance regulators require disclosure from corporate directors of material climate-related financial risks.

Boards should be composed, particular of non-executive, independent board members who have awareness and understanding how climate-related risks affect the business. Also, climate-related targets should be key for compensations scheme for board members.

2. Digital transformation. In the digital age, demand for ICT solutions is lagging behind supply. To address this gap, it is important to provide various incentives for traditional industry players with the aim to incentivize them to improve their connectivity with digital infrastructure. In addition to this, it is important to define a spectrum of allocation parameters (spectrum width, price etc.) to ensure easier access for lead-edge ICT infrastructure like 5G network, public cloud, etc.

Serbian ICT sector is the largest exporter. However, most of this export is based on outsourced services from global leaders. One of the main problems for ICT sector is the low domestic demand, due to relatively low level of digitalization. Therefore, incentives aimed at stimulating development of solutions to be adopted in domestic industry should be provided. Another type of incentives should be aimed at attracting leading global ICT companies to come in Serbia.

Technology transfer is one of the areas which Serbian industry has most to work on. Traditional industry is not well connected with ICT sector and does not adopt its solutions significantly. According to [8, p. 43], Serbian companies invest five times less in ICT solutions compared to world average. When it comes to adoption of standard modern business solutions, less than 10 percent of Serbian companies apply cloud services, 18.1 percent use ERP software and only 12.8 percent of companies use CRM solutions. Therefore, it is not surprising to notice that automation level in traditional industry is at a lower level. In order to ensure greater adoption of modern solutions in traditional industry, it is important to ensure its greater connection and integration with ICT sector (e.g., through formation of clusters and digital platforms), to provide fiscal stimulus for those companies that invest in ICT solutions, to promote and provide incentives for creation of

excellence centers, corporate accelerators, to ensure effective implementation of measures outlined in new artificial intelligence strategy, to promote additive production, robotics, digital modelling and smart manufacturing, to provide incentives for creation of spin-off companies. One measure that the government introduced last year and is expected to have a solid impact is the introduction of tax incentives for investment in research and development and start-ups.

In financial infrastructure segment there is still room to work on introduction of alternative financial instruments and providing finance in the early stage of company's development, mostly when it comes to institutional measures since regulatory measures are expected to be introduced soon. The greatest problem of Serbian start-up ecosystem is reflected in scaling-up or access to finance in the early stage of development. In order to solve this, government should work on introduction of alternative financial instruments (e.g., peer-to-peer lending), introduction of a state-owned investment fund that would allocate money on a matching principle, increasing the capacity of existing Innovation Fund, attracting foreign venture capital funds, provide tax incentives for business angels willing to invest in tech start-ups and stimulate creation of corporate accelerators. The last measure is especially important since it also provides business mentoring for start-ups that are mainly technically well equipped, but with lack of soft skills. This can also be achieved through greater integration of start-up community and facilitation of knowledge from successful founders to those who are only starting their start-up journey.

3. Research and development. Research and development is another intervention area related with the previous one. In modern age, technology is moving by itself. Keeping up with the trends of tomorrow is crucial to keep evolutionary competence. To combat the risk of not being up-to-date for economy as a whole and companies as well, development of a self-made lead-edge technology is crucial. Solutions must be most innovative, most connected and most shared.

Serbia invests in research and development less than EU peers which follow the level prescribed by the Lisbon convention. This is especially true due to low private investment. However, these figures are expected to improve

due to newly introduced tax incentives for companies that invest in research and innovation. Results of this measure should be tracked and such incentive should be provided for self-made entrepreneurs as well. Also, cooperation with industry should be institutionalized through introduction of science-industry cooperation centers, through improvement of mobility of scientists towards industry and greater practical focus of scientific papers.

New technology could not save old jobs, but it can create new ones. Education particularly matters in substitution of older workers with new ones. Opportunity gap is always a consequence of skills set gap, or inadequate education.

4. Investment and infrastructure. If in an economy with the output gap investment is slowing down, structural inflation could return easily. In the previous period, the two pillars of investment were infrastructure development and FDIs. The new priorities are public-private-partnership (PPP) circular economy and combinatorial innovations. Regulatory framework has been improved and now allows for PPP to be used more, but there is still room to use such model of project structuring in large infrastructural projects, since up to now it has been more used in projects of smaller value. Therefore, the use of PPP model should be promoted for future investment in physical infrastructure.

In addition to this, future investment efforts should be designed in such a way as to promote closing of regional discrepancies. Currently, infrastructure development and subsidies for FDIs are designed in such a way to promote balanced regional development. In spite of this, differences still persist, and additional efforts are needed. One way to reduce these discrepancies would be to stimulate domestic private investment in less developed regions. Also, it is important to formulate a strategy for a balanced regional development.

Another important aspect of attracting high quality investments are solid competition practices. Serbia has achieved a lot of progress in this area through the work of the Commission for protection of competition. However, there is still work to be done regarding fine tuning of competition regulatory framework in order to align it with the EU framework and increase the Commission's capacity in terms of human resources and technology used.

Infrastructure deficit, both physical and digital, is a growing concern phenomenon. Both components of infrastructure are mutually interdependent. Poor physical infrastructure in terms of unreliable power supply, inadequate networks of roads and railways, low level of postal digitalization, etc. constrain digital infrastructure development. It is particularly important in the financial sector, whose core business has a digital context. So, fiscal infrastructure could not operate without the digital one.

Lack of access to digital infrastructure, both hard like telecom networks, sensors etc., and soft including software, human capital and tax regulation is one of the most important challenges. Sharing digital infrastructure means public access to solutions and lowering cost of capital in digital transformation. Connectivity based on access to internet must reach 50 percent global benchmark of penetration.

New industrialization could not be based on the "white sheet of paper" approach. There are many limitations. The key challenges of intentional policy will be calibration and harmonization.

Conclusion

Continuation of neoliberal conceptual framework will prevent recovery of Serbia's economy and retards the speed of current improvement. We hope that ideas we have presented will have transformational power, particularly because they afform universal values. However, ideas have power if they are implemented in the concrete policy measures. The neoliberal economic policy platform requires recollection, particularly because heterodox approach we promoted has gained greater momentum in recent years.

By integrating micro and macro view in this paper, we are thinking about economic reality and leading forces of change, not in big boxes and simplified optimization models. We promote systemic thinking in macro management and micro management based on a simple principle well known in physical system, reversibility principle.

These days there is a pressing disconnect between economic orthodoxies and public expectations. Strategists and policy makers have responsibility to take the lead on one of the greatest challenges the economy has ever known,

sustainable and inclusive development in circumstances of multiple bubbles, particularly abnormal carbon footprint. Business leaders need to drive towards sustainability proposal, sharing risk and returns with stakeholders. To do that, they need a new framework. Encouragingly, they are walking up to the concerns of the architects of the economic system. Along the latest the World Economic Forum initiative, good example of broadened responsibility of economy beyond value creation for shareholders with the aim to incorporate all stakeholders impacted in global commons is the European Commission Green Deal to realize a carbon-neutral Europe by 2050.

As a country in the accession process to EU and diligent member of international community, Serbia must follow these initiatives. With Industry 4.0 the change is not just happening, the change can be shaped. We can harness Industry 4.0 for a sustainable and inclusive growth, both toward the people and nature. Exponential growth potentials of combinatorial innovations and universal connectivity inspired the government to provide intention policies to deliver climate change solutions. In the emerging context, micro management is a shareholder's trustee. Macro management is a stakeholder's trustee. Along shareholder's value, it must assume the role of a trustee of the physical system and biosphere for future generation.

There are signs of government's agility that may lead to sustainable and inclusive achievements, but this momentum needs strengthening. Physical and digital infrastructure development is a cost of staying in the competitive race. But, digital leapfrog models could not deliver the same achievements for a low-income country like Serbia as manufacturing-led development model. Without implementation of ICT breakthroughs in industrial production, a new release of the "middle-income trap" is possible. In addition, while digitalization in developing economies initially opened opportunities for development of SMEs based on digital platforms, the reality is that the winner-take-all effects in ICT industry actually prevents further development of early entrants. So, what Serbia desperately needs is technological entrepreneurship, or implementation of ICT breakthroughs in real economy (manufacturing, agriculture, energy and logistics). It should be the bases for a rebound of the real economy.

The role of domestic investors (both private and public) in this transition is unavoidable. With FDIs expansion, tax base erosion will accelerate. Profit shifting is unstoppable because of the growing presence of FDIs in investment structure. Only domestic investment may contribute in a sustainable way to a greater fiscal space. Also, new mechanisms are needed to ensure that digital companies contribute a fair share. This in turn should give more flexibility to governments to facilitate transition to the new economy by expanding their spending on education, workforce skilling and stronger social safety nets among other urgent spending needs. All solutions we have presented in this paper are related with this purpose. The time for action is now.

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7,000

TAXES AND CONTRIBUTIONS PAID
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TOTAL INVESTMENTS
€ 1,000,000,000

ANNUAL EXPORT VALUE
€ 300,000,000

NUMBER OF BUSINESS PARTNERS
30,000

NUMBER OF LOCAL COMMUNITIES IN WHICH WE OPERATE
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IN THE LAST **5** YEARS
€ 5,000,000
FOR CORPORATE SOCIAL RESPONSIBILITY

TOTAL REVENUE
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U svetu savremenih poslovnih sistema
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uz potpunu bezbednost podataka je IMPERATIV

NetCast
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Miroljub Labus
University of Belgrade
Faculty of Law
Professor of Economics, retired

EXCHANGE RATE TARGETING

Ciljanje deviznog kursa

Abstract

The NBS pursues a policy of exchange rate targeting, contrary to its official Memorandum on monetary policy. The NBS informally modified the Memorandum in two ways: it restricted the supply of securities under reverse open market operations and targeted informal exchange rate levels by frequent foreign exchange interventions. In this paper, we have provided empirical and econometric evidence for the second statement based on daily data for 11 years and Vector Error Correction models, while we did not address the first statement because it is evident if one compares market and repo interest rates.

Targeting the level of the exchange rate is not a problem in itself, but rather a non-transparent process that leads to an unrealistic level of the exchange rate. If monetary policy is to support a new development strategy in the context of the fourth technological revolution, it is not enough just to maintain a stable price level but also to support the realistic dinar exchange rate. The real appreciation of the dinar, which has been going on for some time, is not conducive to economic development. The first step in formulating a synchronised macroeconomic and development policy is to acknowledge these facts and then find appropriate solutions.

Keywords: *exchange rate, monetary policy, forex interventions, National Bank of Serbia.*

Sažetak

NBS vodi politiku ciljanja deviznog kursa, iako to nije predviđeno u njenom zvaničnom Memorandumu o monetarnoj politici. To znači da ona ograničava ponudu svojih hartija od vrednosti u okviru reverznih operacija na otvorenom tržištu i ima neformalni cilj deviznog kursa koji postiže čestim deviznim intervencijama. U ovom radu dali smo empirijske i ekonometrijske dokaze za ovu poslednju tvrdnju na bazi dnevnih podataka za 11 godina, dok se prvom tvrdnjom nismo ni bavili jer je ona očigledna kada se uporede tržišna i oficijelna repo kamata.

Ciljanje nivoa deviznog kursa nije samo po sebi problem, nego je problem što je to netransparentan proces koji dovodi do nerealne visine deviznog kursa. Ako monetarna politika želi da podrži novu strategiju razvoja u okviru IV tehnološke revolucije, nije dovoljno da samo održava stabilan nivo cena, nego mora i da podstiče realni kurs dinara. Realna apresijacija kursa, koja traje već neko vreme, ne pogoduje privrednom razvoju. Prvi korak u formiranju sinhronizovane makroekonomske i razvojne politike jeste da se priznaju činjenice, a onda da se nađu odgovarajuća rešenja.

Ključne reči: *devizni kurs, monetarna politika, devizne intervencije, Narodna banka Srbije.*

Introduction

For many years, the dilemma has been whether the National Bank of Serbia (NBS) is targeting or not targeting the dinar exchange rate, as the latter was stated in the Memorandum on Inflation Targeting as Monetary Strategy [3]. After eleven years of targeting inflation, an impressive database has been formed to help us address this dilemma. In this paper, we will use daily data from January 2, 2009, to October 31, 2019. That gives 2,825 observation points which, by the law of large numbers, must indicate what form of regularity existed in the NBS behaviour.

The NBS acknowledges that there is a significant impact of the dinar exchange rate on prices in Serbia; that is, there is a high pass-through effect. However, it considers the foreign exchange transaction channel as being secondary for managing inflation expectations. It can only be used if the primary impact of the repo interest rate cannot sustain inflation in the targeted corridor. Therefore, the NBS refuses to target the exchange rate but justifies its interventions in the foreign exchange market by excessive exchange rate fluctuations, the need to maintain the stability of the financial system or a secure level of foreign exchange reserves.

The data, however, are persistent, and they point out to another conclusion. If all the transitory effects of daily changes were eliminated, there would emerge an informal level of the exchange rate that the NBS wanted to achieve by its foreign exchange interventions. We will capture that information in this paper and explain it in detail. They speak convincingly enough for themselves. However, we will go one step further and offer an econometric analysis that separates the long-term from the short-term changes in the foreign exchange market. For these purposes, we will use VEC (Vector Error Correction) models because the original time series are non-stationary.

Targeting the exchange rate is against the current monetary strategy on inflation targeting in Serbia, although it is not in itself a problem. When there is a high pass-through effect of the exchange rate on domestic prices, exchange rate management can be one of the monetary means for stabilising prices. Some central banks do target the exchange rate, and there are many models in

the economic literature about that. The problem is if the exchange rate target is not known to the public, and the NBS does not feel responsible for explaining what level of the dinar exchange rate it is targeting.

Hence, the level of the exchange rate is the problem. We judge that the current nominal foreign exchange rate is too low and is detrimental to the economic development based on investment and export-led strategy. Our goal is to use data to show that there is an informal exchange rate target, which either needs to be abandoned or formalised in line with the development strategy.

In the second part of this paper, we will explain the fundamental dilemma of monetary policy relating to monetary transmission channels. In the third part, we will analyse the pass-through effect of the exchange rate on prices and identify our first VEC model. In the fourth part, we will prepare the ground for a reverse analysis in which the exchange rate is a dependent variable, and other factors form a set of explanatory variables. In that section, we will analyse in detail the data on NBS foreign exchange interventions. In the fifth part of the paper, we introduce NBS foreign exchange interventions as an additional factor, which governs the exchange rate. The initial VEC model will be further developed and checked both against the monthly and daily data sets. Finally, in the sixth part, we will conclude by answering the initial question of whether or not the NBS is targeting the exchange rate.

Monetary policy rules

According to the NBS, the repo rate is the main monetary policy instrument in the inflation targeting regime. Other monetary policy instruments, including interventions in the foreign exchange market, only have supporting roles. The key policy rate is the interest rate applied in the conduct of main monetary policy operations (currently, one-week open market operations). It is an operational objective for short-term money market interest rates. Its role as an operational objective will be supported by a corridor of interest rates on lending and deposit facilities and other open market operations. Adjustments in the key policy rate will be based on the assessment of the current economic situation, inflation developments and their projections.

The size and timing of such adjustments will be aligned with the mechanism of monetary transmission, respecting its lags and "the currently dominant role of the foreign exchange channel" [3].

Foreign exchange interventions are an infrequent secondary instrument used to support the achievement of the inflation target only if the impact of the key policy rate is exhausted. When evaluating such an effect, it is crucial to monitor movements in the foreign exchange market as the exchange rate channel remains by far the most robust means of influencing inflation. However, no numerical objectives for the exchange rate will be set.

As the NBS claims, it will resort to foreign exchange interventions to limit excessive daily oscillations in the exchange rate for the dinar, contain threats to financial stability, and safeguard an adequate level of foreign exchange reserves.

At the end of 2012, the NBS introduced two substantive modifications that convert the inflation targeting system into a dirty inflation targeting[1]: (i) the sale of NBS treasury bills in open market operations was restricted, with the consequence that the market repo rate was permanently below the official repo rate, and (ii) regular interventions in the foreign exchange market were conducted, targeting

a certain level of the exchange rate without transparent announcement. The last change has never been acknowledged by the NBS, while the previous move has been already embodied in the data published by the NBS.

In this paper, we will not deal with modifications on the side of open market operations (OMOs), but only with foreign exchange interventions. We have shown this schematically in Figure 1. We are not interested in the monetary policy channel denoted by number ① but instead whether channel ② has been informally transformed into channel ③. We will find the answer to this question by evaluating the data presented in this paper. We have been collecting daily data on foreign exchange interventions and exchange rates for quite some time (11 years). We will now use them. What do the data show?

The pass-through effect

Let's start our analysis from the pass-through effect of the dinar exchange rate on the price level. If there is such an effect, then the probability that the NBS pursues an exchange rate targeting is increasing. If such a result does not exist or is not strong, then there is no reason to believe that the NBS is targeting any level of the exchange rate, since such a policy would be irrelevant.

Prices and nominal exchange rates are time series represented by their levels. We will logarithmise these

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1 We called this form of inflation targeting after the dirty float manipulation of a currency. A dirty float is a floating exchange rate where a country›s central bank intervenes to change the direction or the pace of change of a country›s currency value.

Figure 1: Channels of monetary policy instruments

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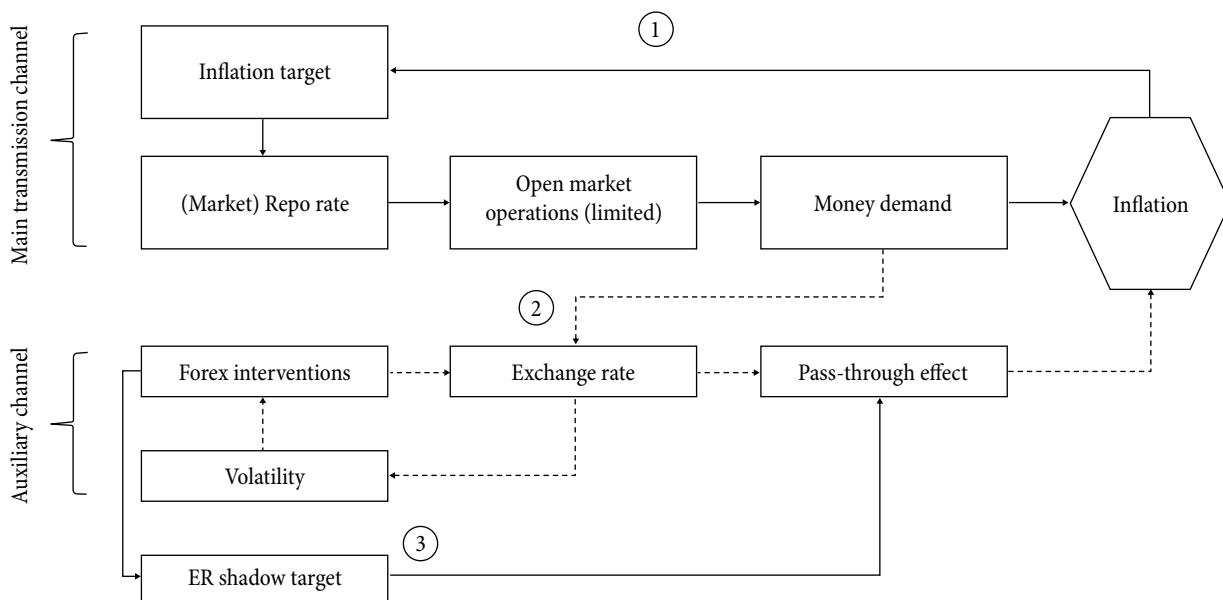
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Figure 1: Channels of monetary policy instruments

Main transmission channel

Inflation target → (Market) Repo rate → Open market operations (limited) → Money demand → Inflation

① Inflation target ← Inflation

Auxiliary channel

Forex interventions ⇢ Exchange rate ⇢ Pass-through effect

Volatility

ER shadow target

② ③

levels to exclude the linear trend initially. Even after this operation, these variables are not stationary. The price level is the ~ I (2) process, and the nominal exchange rate is the ~ I (1) process. That means we have to differentiate prices twice to get stationary rates of inflation acceleration or deceleration (which are the first difference of the price level logarithm). On the other hand, the nominal exchange rate is a stationary series after the first differentiation of its data, which means that rates of change of exchange rate are a stationary series.

Prices, of course, depend not only on the nominal dinar exchange rate against the euro but also on the relationship between the euro and the dollar. The reason for this claim is quite understandable if we know that Serbia imports energy significantly and that energy prices are expressed in dollars. Since Serbia imports a lot of other goods and services from the EU, its market is also sensitive to price movements in the EU. We show this through HICP (Harmonized Indices of Consumer Prices)[2].

That is why we have included in the analysis two new time series: the dollar-euro exchange rate and the price level in the EU. The price level in the EU is a ~ I (2) time series stationary only after twice differentiating its logarithmic value. The dollar-euro exchange rate is a ~ I (1) process that becomes stationary after the first differentiation of its logarithmic values. We have shown all the time series in Figure 1. We have normalised the price level to the average value 1 for 2010.

So from a stationarity standpoint, we have two time series ~ I (2) and two time series ~ I (1). Cross-regression does not give correct estimates of the coefficients, because behind all series there is a common stochastic trend that pushes them in a particular direction. Also, there was high heteroscedasticity up to 2015, which means that the variance of data over time was changing rapidly in the first half of the analysed period.

That is why we designed the VEC model (Vector Error Correction) with four lags. It is well known that

a VAR model (Vector Auto Regression) can be specified in the VEC form that includes cointegration relations[3]:

$$\Delta \widetilde{y}_t = \alpha \cdot \beta' \cdot \widetilde{y}_{t-1} + \sum_{i=1}^{n-1} \Gamma_i \cdot \Delta \widetilde{y}_{t-i} + B \cdot x_t + \varepsilon_t \quad (1)$$

Cointegration vectors are contained in matrix β that describes long-run equilibrium relations, while matrix α contains adjustment coefficients that define the mechanism for correcting long-run disequilibrium[4]. The vector

$$\widetilde{y}'_t = [p_t^{RS}, ER_t^{\frac{RSD}{EUR}}, ER_t^{\frac{USD}{EUR}}, p_t^{EU}]$$ contains logarithmic values of time series of the price level in Serbia, the dinar exchange rate, the dollar exchange rate against the euro and the price level in the EU. Vector x_t is a vector of exogenous variables, including the intercept and trend, while vector ε_t contains random errors with a mean of zero, normally distributed and uncorrelated.

According to Johansen's trace test, there is one cointegration equation that is stationary[5]. It describes the long-term relationship between prices in Serbia and the explanatory variables. We have estimated its parameters in equation (2). The long-term impact of the exchange rate on prices in Serbia is significant. If the dinar exchange rate rises by 1%, the price level increases by 0.76%. The price elasticity of the exchange rate is positive, but less

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3 The VEC model restricts the long run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the *error correction* term since the deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. See [1]. The initial model of autocorrelation equations with n time lags and stochastic errors ε_t is:

$$\widetilde{y}_t = A_1 \cdot \widetilde{y}_{t-1} + \cdots + A_n \cdot \widetilde{y}_{t-n} + B \cdot x_t + \varepsilon_t$$
$$\varepsilon_t \sim N_k(0,\Omega) \quad t = 1,...,T$$

It can be rearranged until it takes the form:

$$\Delta \widetilde{y}_t = \Pi \cdot \widetilde{y}_{t-1} + \sum_{i=1}^{n-1} \Gamma_i \cdot \Delta \widetilde{y}_{t-i} + B \cdot x_t + \varepsilon_t$$

where matrices are . If there is a reduced rank of the matrix Π, so taht r<k, then it exists kxr matrices α and β each of the rank r, while Π = αβ' and $\beta'\widetilde{y}_{t-i}$ are stationary linear combinations ~I(0). In this way, we obtain the error correction model in the vector form of equation (1).

4 In the case of only one cointegration relation, the matrix α becomes vector because there is only one row.

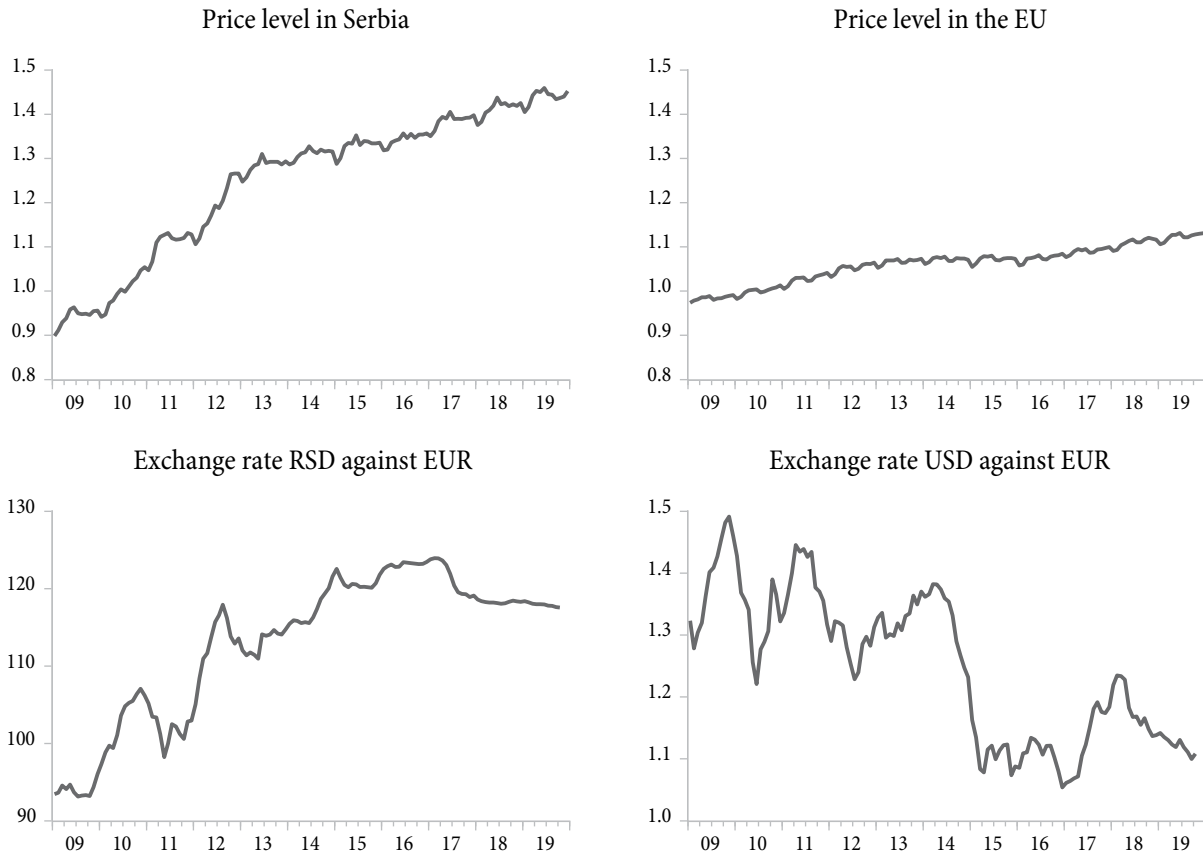5 The test results are shown in the table below:

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized	Trace		0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.220124	52.72617	47.85613	0.0163
At most 1	0.113966	21.6486	29.79707	0.3185
At most 2	0.04158	6.523616	15.49471	0.6336
At most 3	0.009672	1.214914	3.841466	0.2704

Trace test indicates 1 cointegrating equation at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

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2 The HICPs are Laspeyres-type price indices and are computed as annual chain-indices allowing for weights changing each year. We have embodied those indices into the price level with the starting average value one in 2010.

Figure 2: Selected time series

Price level in Serbia

Price level in the EU

Exchange rate RSD against EUR



Exchange rate USD against EUR

than one. It is also positive, but much smaller in the case of the dollar-euro exchange rate. If it rises by 1%, the price level in Serbia will increase by 0.16%. Prices in Serbia, however, are much more sensitive to the HICP in the EU. If these prices rise by 1%, prices in Serbia will increase by 2.09% in the long run.

$$\log(P_{t-1}^{RS}) = 0.7635 \cdot \log(ER_{t-1}^{\overline{RSD}{EUR}}) + 0.1624 \cdot \log(ER_{t-1}^{\overline{USD}{EUR}})$$
$$[13.0928] \qquad\qquad [4.4203]$$
$$+ 2.0928 \cdot \log(P_{t-1}^{EU}) - 0.1276 \qquad (2)$$
$$[18.8527]$$

Equation (2) is so normalised that the coefficient with the domestic price level variable is fixed to unit level: $\log(P_{t-1}^{RS}) = 1$. Nothing changed in the relationship between cointegrated variables if the normalisation is modified, and the exchange rate coefficient is fixed to one unit: $\log(ER_{t-1}^{\overline{RSD}{EUR}})$. Then we get equation (3), which shows the long-term relations between the dinar exchange rate against the euro, on the one hand, and domestic and foreign prices, as well as the dollar exchange rate against the euro, on the other.

Figure 3: Cointegration relation
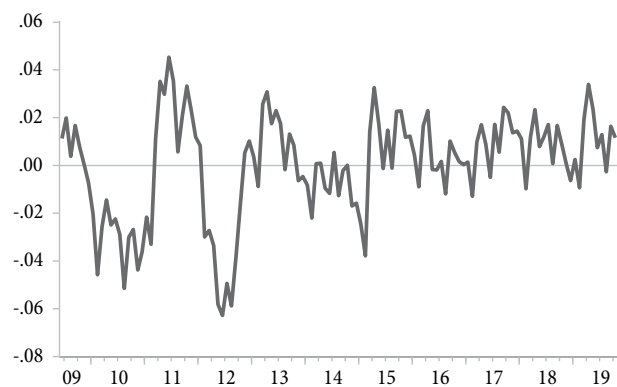
$$\log(ER_{t-1}^{\overline{RSD}{EUR}}) = 1.3097 \cdot \log(P_{t-1}^{RS}) - 0.2127 \cdot \log(ER_{t-1}^{\overline{USD}{EUR}})$$
$$[11.9477] \qquad\qquad [5.1400]$$
$$- 2.2710 \cdot \log(P_{t-1}^{EU}) + 0.1672 \qquad (3)$$
$$[7.5271]$$

In Figure 3, we show a graph of cointegration relation. Oscillations around the long-run equilibrium were much larger in the 2009-12 sub-period than later by the end of 2019.

Vector α contains coefficients of adjustment of the cointegration relation to the long-run equilibrium:

$$\alpha = \begin{bmatrix} \Delta\log(P_t^{RS}) & \Delta\log(ER_t^{\frac{RSD}{EUR}}) & \Delta\log(ER_t^{\frac{USD}{EUR}}) & \Delta\log(P_t^{EU}) \\ -0.2163 & 0.0577 & 0.1643 & -0.0139 \\ [-3.0869] & [0.9360] & [1.1211] & [-0.3708] \end{bmatrix}$$

About 21 % of disequilibrium are corrected each month by changes in the price level in Serbia, while that correction is much lower for the price level in the EU (1%). About 6% is corrected by the dinar exchange rate against the euro and 16% by the exchange rate of the dollar against the euro.

On the other hand, the graph of IRFs in Figure 4 is so instructive. It contains mutual responses of the dinar exchange rate and price level in Serbia to one unit innovation. Both series are, of course, cointegrated, but the impact of the exchange rate is dominant. The one unit impulse to the exchange rate change accelerates price growth, but not immediately. There is a delay of three months. Its effect is manifested after the third month and grows until the end of the first year. Later its impact on the price level declines. However, this impact is permanent. On the other hand, the impact of prices on the exchange rate is much smaller, but transitory. It is negative in the first year, and it is only in the second year that price increases cause some positive adjustment of the exchange rate. In the long-run, this influence disappears, which is consistent with the deed of the PPP theory.

Such an outcome should not surprise us. Purchasing power parity is not known to affect the exchange rate in the short-run 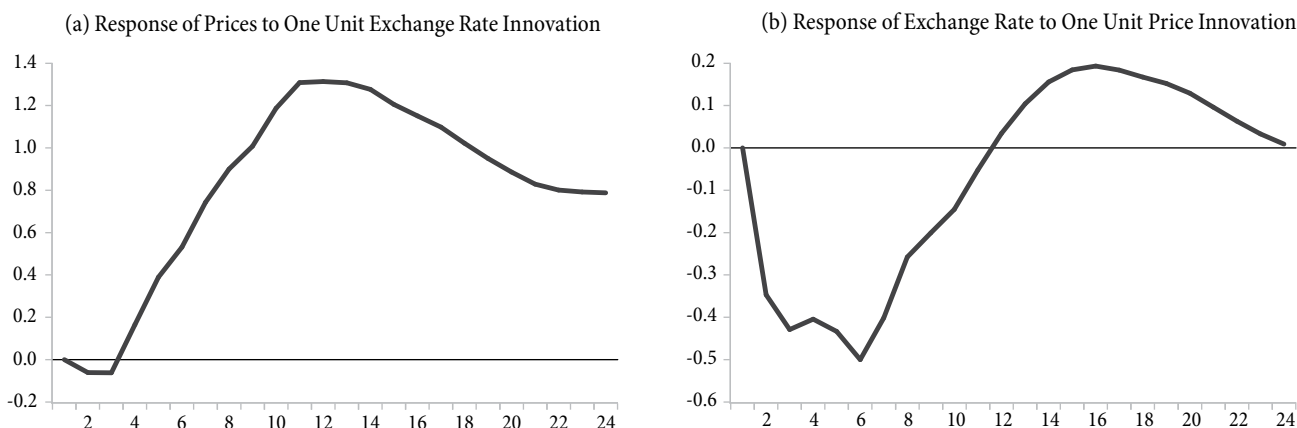[2]. Other factors, not price increases, change the exchange rate and determine its movement much more than the general price level. In this respect, it becomes an interesting question of how much foreign exchange interventions affect the dinar exchange rate in the long-run.

Foreign exchange interventions

We measured foreign exchange interventions and exchange rate fluctuations daily from January 2, 2009, to October 31, 2019. It is a period of almost eleven years[6]. Since the workweeks are five days long, that means we had 2,825 daily data. The upper part of Figure 5 on the left shows the sale and purchase of the NBS foreign exchange to manage the exchange rate. According to the NBS convention, foreign currency sales are shown in positive numbers, and foreign currency purchases are shown in negative numbers. Data are expressed in millions of euro (right scale). The chart includes daily data on exchange rate changes throughout the entire period both when the NBS intervened as well as when it did not. During this period, the NBS intervened 734 times, of which 387 times by selling foreign currency and 347 times by buying foreign currency. We have shown these statistics in Table 1.

6　The NBS does not explicitly publish data series on foreign exchange interventions. However, these series can be found on the NBS website as Statistics from the Inflation Report, IV.1. Determinants of Inflation - Financial Market, Table G.IV.1.14. Positive data are foreign currency sales, negative data are foreign currency purchases. Currently, only data from 2011 onwards are available.

Figure 4: Impulse response functions to one unit innovation

(a) Response of Prices to One Unit Exchange Rate Innovation

(b) Response of Exchange Rate to One Unit Price Innovation

The NBS claims that it did not affect the level of the exchange rate because its interventions were intended to mitigate the exchange rate volatility. There are two ways to measure exchange rate volatility. The first method is straightforward, and it represents the daily changes in exchange rates expressed as a percentage. The other way is to calculate the standard deviation of the exchange rate over, say, a week. Both measures very similarly show the dinar exchange rate volatility.

In Figure 5 (on the left and above), we have given daily exchange rate changes (left scale) with a marked corridor of +/- 0.3%. Namely, there was an informal explanation by the NBS that the trigger for foreign exchange interventions was a daily change in the exchange rate of more than 0.3%. All foreign exchange interventions based on exchange rates outside this corridor should endorse the NBS policy, while interventions within the corridor would challenge it.

Visual inspection of Figure 5 does not confirm that there was any rule for foreign exchange interventions based on exchange rate volatility. By 2013, there were numerous situations where there were high exchange rate volatility and no foreign exchange interventions. If

such a rule existed, it did not apply after 2015 at all. The daily exchange rate fluctuations were mostly within the informal corridor of its target change, with numbers of foreign exchange purchases and sales, as shown in Table 1.

We divided the whole observation period into two parts. The first part covers four years from the beginning of 2009 to the end of 2012. The monetary policy changed at the end of 2012, but these changes have only come into force as of January 2013. Therefore, the second period covers seven years from the beginning of 2013 to the end of October 2019.

In terms of foreign currency sales, these interventions were almost identical by values in both sub-periods, although the number of cases was higher in the second period. In the first period, 4,664.9 million euro was sold in 162 cases, while slightly more 4,880.0 million euro was sold at 225 interventions in the second period. On the other hand, only 286.5 million euro were purchased in the first period in 16 interventions and 8,445.0 million euro in 331 interventions in the second period. Thus, in the second period, foreign currency purchases dominate, while the relative importance of foreign currency sales is present in the first period. The net effect over the entire

Table 1: Foreign exchange intervention statistics

Period	Forex sale total		Forex sale if ΔER>0.3%		Forex purchase total		Forex purchase if ΔER>0.3%	
	Value (EUR mil.)	Number of cases	Value (EUR mil.)	Number of cases	Value (EUR mil.)	Number of cases	Value (EUR mil.)	Number of cases
2009-12	4,664.9	162	1,692.9	48	-286.5	16	-195.5	11
2013-19	4,880.0	225	385.0	14	-8,445.0	331	-90.0	5
Total	9,544.9	387	2,077.9	62	-8,731.5	347	-285.5	16

Figure 5: Volatility and forex interventions
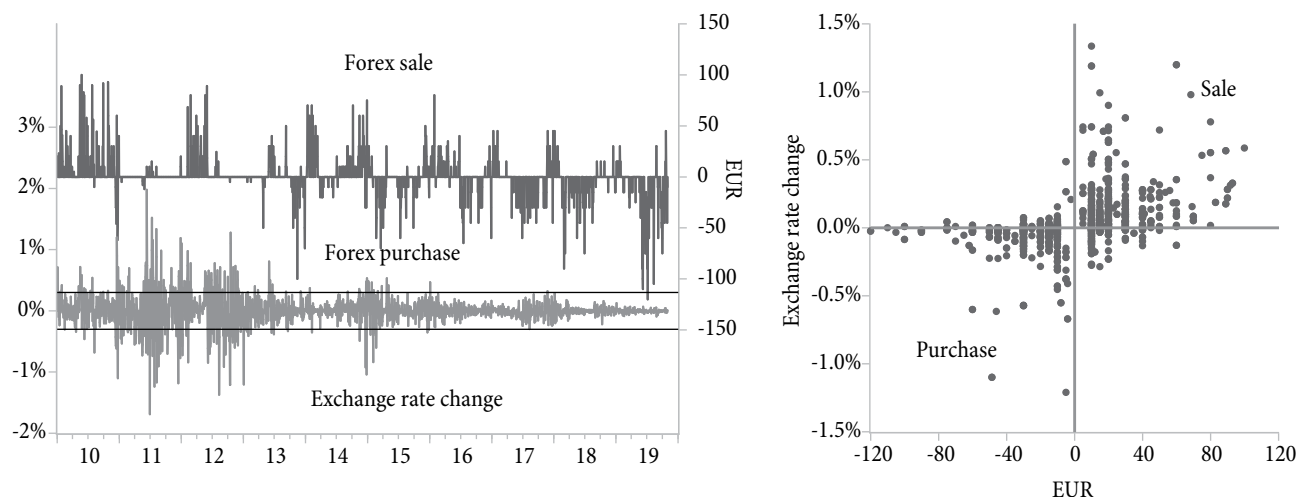
period of eleven years is that more foreign currency has been sold than purchased. The difference amounted to 813.4 million euro.

The right-hand side of Figure 5 is much more informative, although it is based on the same data as the left part of Figure 5. It shows a scatter diagram of foreign exchange interventions against exchange rate changes. There is one remarkable regularity here. As a rule, foreign currency funds were sold when the exchange rate was rising, that is, in 78% of all cases of the exchange rate growth. Only 20% of all cases occurred when the exchange rate declined, and 2% when there was no change in the exchange rate. On the other hand, foreign funds were purchased in 67% of cases when the exchange rate fell. That happened in 21% of all cases when the exchange rate increased, and in 12% of cases when there was no change in the exchange rate.

The second part of the information in Table 1 is of particular interest. Here, we singled out cases of foreign exchange interventions when the daily exchange rate change exceeded 0.3%. We marked them as excessive fluctuations. It is striking that there were only 78 foreign exchange interventions in such cases (59 in the first period and only 19 in the second period). The NBS sold 2,077.9 million euros (1,692.9 million euros in the first period and only 385.0 million euros in the second period) and purchased only 286.5 million euro (195.5 million euros

in the first period and 90.0 million euros in the second period) during these excessive fluctuations.

Additionally, there are 52 cases when the NBS intervened in the foreign exchange market while there was no change in the dinar exchange rate. These cases directly refute the claim that foreign exchange market interventions are exclusively performed to mitigate exchange rate volatility. The NBS claims that foreign exchange interventions may also be due to contain threats to financial stability or to safeguard an adequate level of foreign exchange reserves. However, a careful analysis of all cases pointed out that none of those cases were present.

Therefore, the only logical explanation is that the NBS was targeting a level of the exchange rate and wanted to achieve it independently of its daily fluctuations. In Figure 6, we have provided histograms for all six possible types of interventions. We see that interventions without reliance on exchange rate fluctuations were restricted to small foreign fund transactions (around 50% of all cases). They were aiming to provide an additional incentive for the market to sustain the already achieved level of the exchange rate.

In Table 2, we have provided summary statistics of the number of interventions for all their types. In typical cases - the sale of foreign exchange if the exchange rate rises and the purchase of foreign exchange when the exchange rate falls - the variability is much higher than in

Figure 6: Histograms with relative frequencies
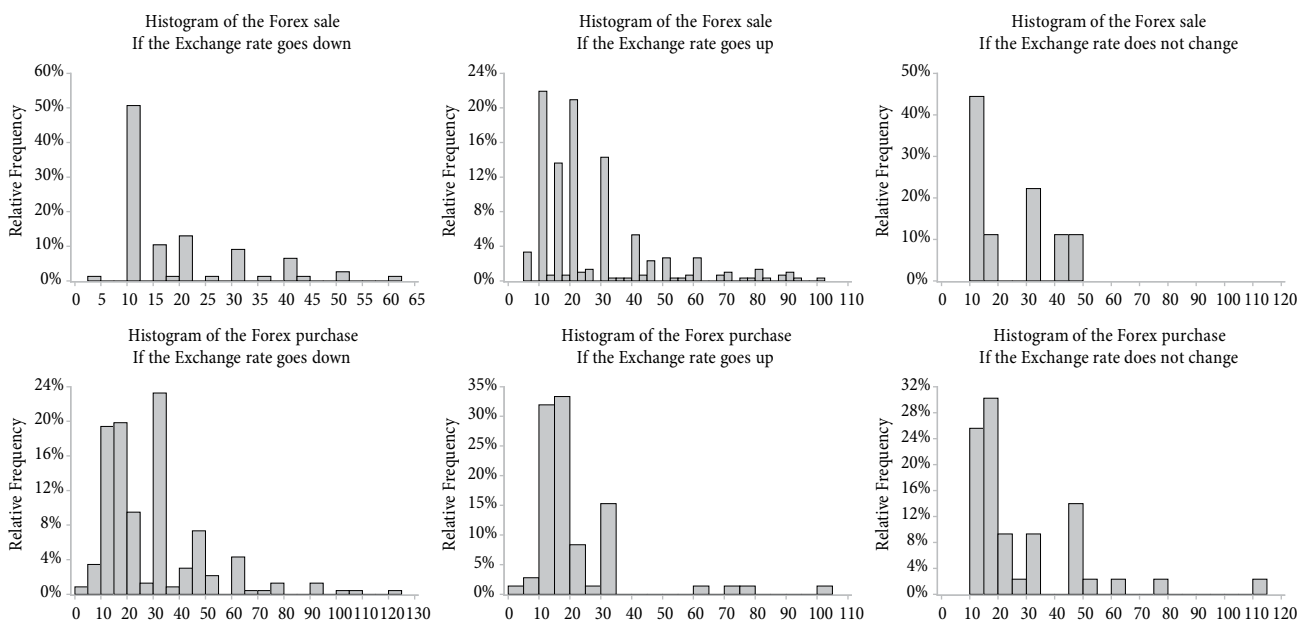
the non-standard cases. The maximum amount of foreign exchange sales or purchases are also incomparably higher. Interestingly, the average values and the medians are almost identical, whether they are buying foreign exchange or selling foreign currency. If it were two unrelated random data generation processes, such an identity would not exist.

Table 2: Foreign exchange intervention cases

Exchange rate movement	Number of cases	Mean	Median	Max	Min	St.dev.
Forex sale						
Up	301	26	20	100	5	19
Down	77	18	12	60	4	12
No move	9	22	15	45	10	14
Forex purchase						
Up	72	19	15	100	2	16
Down	232	27	20	120	4	20
No move	43	26	15	110	10	21

Daily data are instrumental, but they contain the impact of many unique shocks, from daily news that affect the change in expectations regarding oil and gas prices, the emission of money, war events, the imposition of sanctions and customs, and the like. However, the law of large numbers neutralises these shocks and shows long-term regularity. Based on the reading of the data, this fact is very clearly outlined: the NBS sells foreign exchange funds when the exchange rate rises and purchases them when the exchange rate falls. For us, that is a sure sign that a certain level of the exchange rate has been targeted. Foreign exchange interventions are an instrument, though not the only one, to achieve the desired exchange rate. That was the rule in 533 out of 734 NBS interventions. Thus, this represented 73% of all interventions. In 20% of cases, there were exceptions, half of which can be explained by the inertia of the interventionist policy, while in 7% of all cases, there was a direct refutation of the rules.

The long-term effect of foreign exchange interventions

What are the long-term effects of foreign exchange interventions? From an econometric point of view, we can go in two directions. One is to continue to work with the daily data of 2,825 observations and to generate the remaining missing daily data by benchmarking the monthly series. Monthly data refer to prices in Serbia and the EU,

and daily data to exchange rates in Serbia and the EU. Alternatively, we can aggregate daily data into monthly aggregates and do econometrics with 130 observation points[7]. We will apply both procedures.

Before we proceed on, we must mention that we had expanded vector $\widetilde{y}'_t$ by another item, foreign exchange intervention in Serbia Q_t^{RS}:

$$\widetilde{y}'_t = [p_t^{RS}, ER_t^{\frac{RSD}{EUR}}, ER_t^{\frac{USD}{EUR}}, p_t^{EU}, Q_t^{RS}].$$

According to the Johansen trace test, there are now two cointegration equations in which linear combinations of variables become stationary[8]. The question is how to identify those cointegrating equations. We stick to the previous cointegration analysis of the prices and exchange rates in Serbia and the EU and keep the already identified cointegrating equation (3). Further, we add another rate-determining equation that is independent of the previous variables. That is a cointegration relation between the dinar exchange rate and NBS foreign exchange interventions. We assume that foreign exchange interventions are entirely independent of the other explanatory variables. Therefore, we had to test the following constraints for β vector:

$$\beta' = \begin{bmatrix} 1 & \beta_{12} & \beta_{13} & \beta_{14} & 0 & \beta_{16} \\ 1 & 0 & 0 & 0 & \beta_{25} & \beta_{26} \end{bmatrix} \quad (5)$$

In Table 3, we show the results of the test for constraints on the parameters of cointegration equations (5). The two cointegration equations are unambiguously identified. The likelihood that restrictions can be accepted

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7 The third way is to work with data of different time frequencies and to apply the MIDAS regression estimation technique (Mixed Data Sampling). We have not opted for that approach, because the time series have different properties with respect to stationarity. There are two series ~I(2), the other two series are ~I(1), while the foreign exchange intervention series is a stationary time series ~I(0).

8 The results of the trace test concerning the number of cointegration relations are shown in the table below:

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized	Trace		0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical value	Prob.**
None *	0.366996	108.6709	69.81889	0
At most 1 *	0.203644	51.5111	47.85613	0.0218
At most 2	0.12168	23.04741	29.79707	0.2437
At most 3	0.046393	6.829409	15.49471	0.5976
At most 4	0.007106	0.891472	3.841466	0.3451

Trace test indicates 2 cointegrating equations at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

is high enough to support the hypothesis that the data supports theoretical constraints. So, in reality, there are two separate processes, independent of each other, that affect the exchange rate. One process goes through the purchasing power parity channel (PPP) of domestic and foreign prices, and the pass-through effect of the dollar exchange rate against the euro. The second process channels the impact of foreign exchange interventions on the dinar exchange rate. We repeat, by definition, these are two mutually independent processes.

Equation (6) shows the long-term relationship in both cointegration processes estimated on monthly data, while equation (7) shows the same by using daily data. The graphs of cointegrating equations are presented in Figure 7.

$$\log\left(ER^{\frac{RSD}{EUR}}_{t-1}\right) = 1.0190 \cdot \log\left(P^{RS}_{t-1}\right) - 0.2499 \cdot \log\left(ER^{\frac{EUR}{USD}}_{t-1}\right)$$
$$[8.5343] \qquad\qquad [-5.5843]$$
$$- 1.7955 \cdot \log\left(P^{EU}_{t-1}\right) + 0.2027$$
$$[-4.5000]$$

$$\log\left(ER^{\frac{RSD}{EUR}}_{t-1}\right) = -0.0366 \cdot Q^{RS}_{t-1} + 0.1014 \qquad\qquad (6)$$
$$[-6.6027]$$

$$\log\left(ER^{\frac{RSD}{EUR}}_{t-1}\right) = 1.1763 \cdot \log\left(P^{RS}_{t-1}\right) - 0.1852 \cdot \log\left(ER^{\frac{EUR}{USD}}_{t-1}\right)$$
$$[8.6743] \qquad\qquad [-3.6238]$$
$$- 2.1276 \cdot \log\left(P^{EU}_{t-1}\right) + 0.1389$$
$$[-4.4462]$$

$$\log\left(ER^{\frac{RSD}{EUR}}_{t-1}\right) = -0.1078 \cdot Q^{RS}_{t-1} + 0.2175 \qquad\qquad (7)$$
$$[-17.5382]$$

The estimated coefficients are very similar. Of course, we are primarily interested in the second cointegration equation, which links foreign exchange interventions and exchange rates. It has a negative sign, as expected. That means that in the long-run, increased foreign currency sales reduce the exchange rate, but that increased foreign currency purchases (with a negative sign) increase the exchange rate.

We couldn't log the series of foreign exchange interventions (because foreign currency purchases are with a minus sign), so we can't talk about elasticities in this case. In contrast, the first cointegration equation shows other long-term elasticity coefficients. Although in the short-term PPP does not work, in the long-run it does, because the coefficients of elasticity are very close to the unit in both cases. The strengthening of the dollar against the euro has the effect of reducing the dinar nominal dinar exchange rate. The similar outcome would happen if the EU raised inflation. All estimated coefficients of elasticity are statistically significant.

Conclusion

Data show that excessive daily fluctuations in the dinar exchange rate were not the main reason for NBS interventions in the foreign exchange market. These fluctuations were neither launched to defend the stability of the financial system nor to achieve a safe level of foreign exchange reserves. Combining this conclusion with data describing how foreign exchange interventions were performed, we note the much more important finding that the NBS in the last eleven years has always had some levels of the exchange rate as informal targets.

Targeting the exchange rate is against the current monetary strategy on inflation targeting in Serbia, although it is not in itself a problem. When there is a high pass-through effect of the exchange rate on domestic prices, exchange rate management can be one of the

Table 3: Tests of cointegrating restrictions

Restrictions: b(1,1)=1, b(1,5)=0, b(2,1)=1, b(2,2)=0, b(2,3)=0, b(2,4)=0							
	Daily data				**Monthly data**		
Hypothesized No. of CE(s)	Convergence achieved after 322 iterations. Restrictions identify all cointegrating vectors				Convergence achieved after 101 iterations. Restrictions identify all cointegrating vectors		
	Restricted Log-likelihood	LR Statistic	Degrees of freedom	Probability	Restricted Log-likelihood	LR Statistic	Degrees of freedom	Probability
2	39353.66	5.147822	2	0.076237	1417.054	4.282733	2	0.117494
3	39364.59	1.436699	1	0.230674	1426.003	1.96092	1	0.161415
4	39368.32	NA	NA	NA	1428.941	NA	NA	NA

NA indicates restriction not binding.

monetary means for establishing price stability. Some central banks are targeting the exchange rate, and there are many models in the economic literature about this. The problem is if the exchange rate target is not known to the public, and the NBS does not feel responsible for explaining what level of the dinar exchange rate it was targeting.

We judge that the current foreign exchange rate target is too low and is detrimental to the economic growth and investment and export-led development strategy. However, that was not the theme of this paper. Our goal was to use data to show that there is an informal exchange rate target, which either needs to be abandoned or formalised in lines with the development strategy.

In this paper, we have used econometric analysis based on VEC models, which were estimated using daily and monthly data for eleven years, from the beginning of January 2009 to the end of October 2019. First, we

showed the pass-through effect of the exchange rate on prices, and afterwards, we turned the analysis around and asked which causing factors had been determining the level of the exchange rate over the past eleven years. We have identified two cointegrating relations which are, by definition, independent of one another. One relation describes the long-term realisation of PPPs and the impact of the dollar exchange rate against the euro. The second relation shows how foreign exchange interventions have managed the dinar exchange rate. As a rule, foreign exchange funds were sold by the NBS to lower the dinar exchange rate and were purchased by the NBS to raise it when needed.

The data speak for themselves. In the last three years, price growth in Serbia has been much faster than in the EU, but the nominal value of the dinar exchange rate has been steadily declining. It follows that there was a real appreciation of the dinar exchange rate, which was

Figure 7: Two cointegrating relations: for monthly data (upper graph) and daily data (lower graph)

Monthly data

Daily data
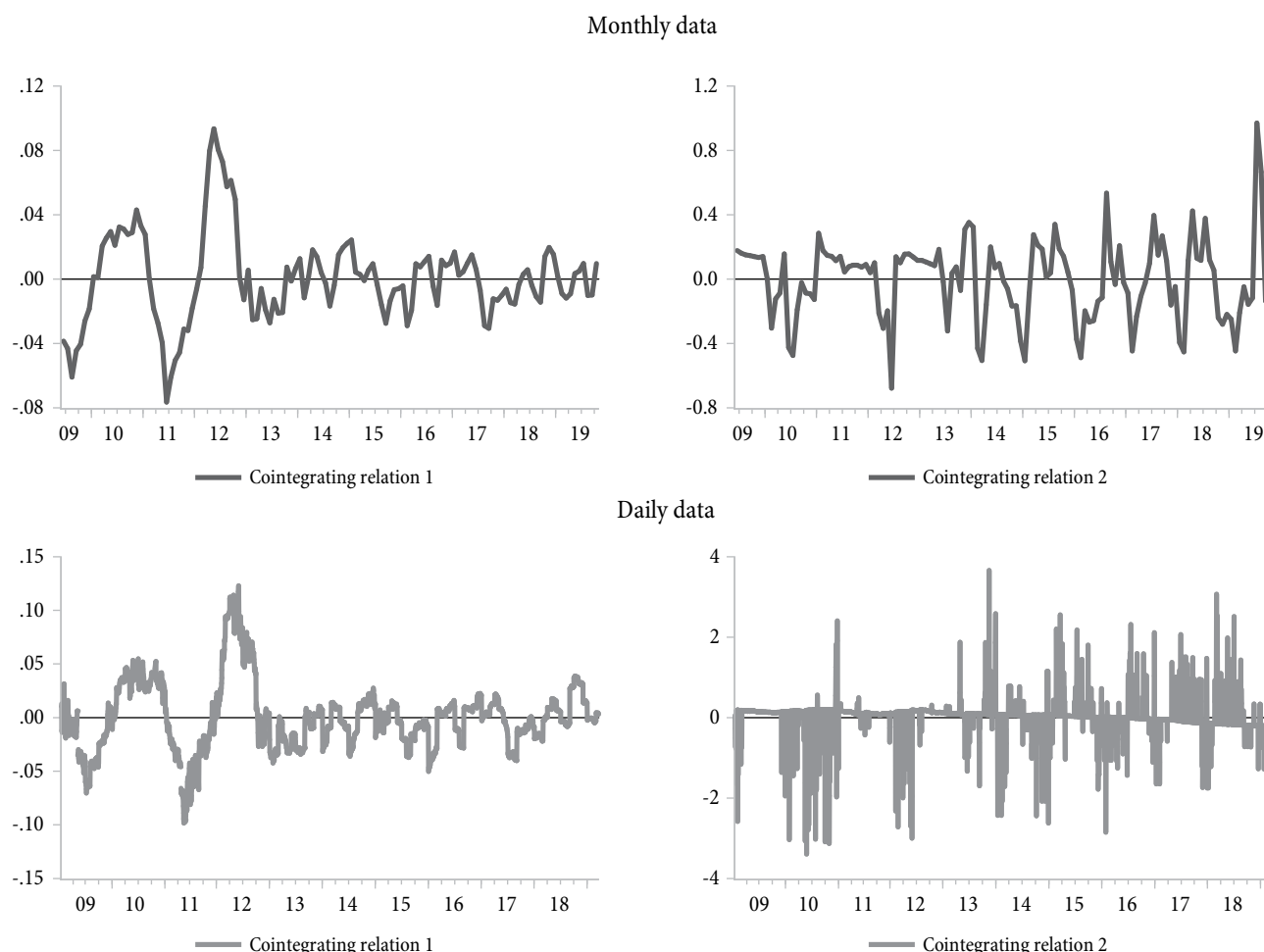
not supported by the corresponding productivity growth and improved competitiveness of the Serbian economy. An export-based development strategy can hardly be sustained in such circumstances. That is the main finding of this paper, which suggests that monetary, foreign exchange and development policies need to be synchronised. The first necessary step is that the NBS admits it has been pursuing a dirty inflation targeting policy and now wants to adjust it to the development strategy.

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EAST-WEST MIGRATION IN EUROPE: CAN SERBIA WITHSTAND THE WIND GUSTS?

Migracije s istoka na zapad Evrope – da li Srbija može da odoli naletima vetra?

Abstract

Rising demand for skilled workers in Western Europe absorbs the most valuable human capital from CEE, thus endangering their economic prospects. The estimated econometric model indicates that the poorly governed countries– the ones characterized by a high level of corruption, weak rule of law, as well as low-quality public services (healthcare, education, etc.) – are most affected by emigration. Moreover, emigration is higher in the CEE countries that have easier access to the European labour market, better-educated population and lower living standards. According to the model, the migration of the young and qualified people from Serbia is expected to additionally increase in the next five years, by 20-30%, despite the relatively high GDP growth forecast of 4%. However, if in the following years Serbia undertakes necessary reforms and reaches the institutional standards that are common in CEE, the growing trend could be reversed, lowering emigrations by 10-15% compared to the current level. Wage increase, even an extreme one, does not play a key role in containing migration from Serbia.

Keywords: *emigration, institutions, convergence, wages, education, demographics, Serbia.*

Sažetak

Rastuća tražnja Zapadne Evrope za obučenom radnom snagom usisava najvrednije ljudske resurse zemalja CEE i tako ugrožava njihovu ekonomsku perspektivu. Ocenjeni ekonometrijski model pokazuje da su emigracijama najviše pogođene zemlje CEE koje imaju najlošije uređenu državu: visoku korupciju, nizak nivo vladavine prava i loš kvalitet javnih usluga (zdravstvo, prosveta i drugo). Iseljavanje je veće i iz onih zemalja CEE koje imaju olakšan pristup evropskom tržištu rada, bolje obrazovano stanovništvo i nizak životni standard. Model pokazuje da će emigracija mladog i kvalifikovanog stanovništva Srbije dodatno da poraste u narednih pet godina za 20-30% čak i uz relativno visok rast BDP-a od 4%. Međutim, ukoliko Srbija u narednim godinama dostigne institucionalne standarde koji su uobičajeni u CEE, trend rasta emigracija bi se preokrenuo i smanjio za 10-15% u odnosu na sadašnji nivo. Povećanje zarada, čak i ukoliko bi bilo ekstremno snažno, ne može da ima presudnu ulogu u smanjenju emigracija iz Srbije.

Ključne reči: *emigracija, institucije, konvergencija, plate, obrazovanje, demografija, Srbija.*

Introduction and main findings

Intense migration of the young and educated people to Western Europe will perhaps be the greatest economic and fiscal issue of most CEE countries (Serbia included) in the upcoming decade. Although unfavourable emigration from Serbia cannot be completely stopped, its growing trend could be reversed if the Government undertakes effective and comprehensive measures based on meticulous analyses. The problem is, however, that instead of such measures, only partial, expensive and unproven solutions are being announced, which will probably prove inefficient.

The empirical research we have conducted shows that by far the most effective measures that could reverse the growing trend of migration from Serbia to Western Europe are: improvement in the quality of institutions (suppression of corruption, improvement in the rule of law) and better public services (reforms in healthcare, education, etc.). Other measures, including even the hypothetical increase of the average salary to 900 EUR by the end of 2025, cannot play a key role in containing migration from Serbia.

There are currently about 11 million immigrants from the CEE countries living in Western Europe and their number has increased manifold in the last twenty years (in 2000 slightly more than 4 million migrants from CEE lived in Western Europe). This means that as much as 10% of the overall CEE population is currently living in Western Europe. The annual records show, even more concretely, a strong acceleration in migration since the beginning of 2000s. In early 2000s, about 0.2% of CEE population annually emigrated to Western Europe, while this percentage already grew to about 1% in 2017.

Increased emigration has severe negative effects on the CEE economies. First, they are, in large part, permanent – about a half of the migrants return to their country of origin, while populations of the CEE countries are declining, even without accounting for migrations, due to negative population growth rates. Second, the migrants that do return are mostly older, while those that are leaving CEE countries belong to mostly younger, working-age population. About 75% of the CEE migrants living in Western Europe are of working age (20-64), whereas the average share of

the working-age population in the overall CEE population is about 60%. Third, emigrants are mostly more qualified and better-educated than the population in their country of origin – on average, the education of migrants is almost twice as good as the average in the countries of origin. Fourth, the possibility of substituting the workforce leaving CEE by hiring unemployed workers from the domestic labour market is small. The unemployment rate in CEE11 (EU member countries) has already dropped to only 4.2% in 2019 on average, which is significantly lower than the average unemployment rate in the Western European countries (5.3%).

The IMF study [1] quantifies the negative effects of emigration on the CEE economies. This study estimated that in 2014, GDP per capita in the CEE countries would have been on average 5% higher, had there not been large migrations from these countries in the 1995-2012 period. However, the negative economic effects are now certainly even larger. In the last four years (since the study was published), there has been a marked deterioration in the migration trends (increased emigration, even higher level of the educated among migrants, etc.), which is why we estimate that the negative contribution of outward migrations to the growth of GDP per capita in the CEE countries would approach 0.5 p.p. per year, with a tendency of further deterioration. Hence, the main goal of our research was to determine the major factors defining the extent of emigration from individual CEE countries (including Serbia) and to show, in line with the results, what would be the best measures for lowering emigration.

The first question we address in this paper is why a substantial increase in migrations from the CEE countries to Western Europe has occurred since the beginning of 2000s. CEE countries have been converging relatively strongly to Western Europe in the last twenty years in terms of living standards. Namely, at the beginning of 2000s, GDP per capita in CEE was, on average, only 38% of the GDP in the Western European countries, whereas in 2018 it reached over 60%. With the decreasing difference in living standards, i.e. in CEE salaries compared to Western Europe, we should be seeing ever fewer people from CEE deciding to emigrate to Western Europe – while the opposite is actually taking place. Migrations are now

several times higher than they were in 2000. This indicates that there are other factors that have been a driving force of the acceleration of migrations, such that it overpowers the mitigating effect of economic convergence.

We have identified two such factors that had a decisive effect on the upward trend in emigrations: the first is the accession of 11 CEE countries to the European Union, which facilitated access to the Western European labour markets, while the second, far more important, is the growing demand for skilled workers from the CEE countries.

The Western European countries have had a negative population growth for many years; in mid 2000s, this started to have a very strong negative effect on their labour market. Namely, that was when the part of the population entering the labour market (18-22 years of age) was, for the first time, smaller than the segment leaving it (60-64 age bracket). In simple terms, this means that for each 100 elderly employees (doctors, nurses, drivers, engineers) leaving the Western European labour market, there are fewer than 100 young people applying to take their place on the domestic labour market – and these trends are deteriorating year after year.

Even though the Western European countries are currently experiencing an increase in the arrival of migrants from the Middle East and Africa, this has almost no bearing on the increasing demand for workforce from the CEE countries. In other words, migrations from CEE have not slowed down with the increased number of migrants coming in from other parts of the world, but have instead increased, over the last twenty years, in almost perfect proportion with the widening of the demographic gap in the working-age population in the Western European countries. This is because migrants from CEE (which are mostly highly skilled) can respond to the demand for labour in the highly competitive economies in Western Europe – which does not apply, to the same extent, to the migrants from the rest of the world. Hence, even with the large number of migrants arriving from the Middle East and Africa, Western Europe keeps absorbing skilled workers from the CEE countries.

Individual CEE countries will react differently to the demand for skilled labour in Western Europe. In relative terms, more people migrate from countries with lower living standards, i.e. where the pay gap compared to Western Europe is the widest. However, the pay gap is not the only – nor, indeed, does it seem to be the most important – reason why the CEE population is migrating to Western Europe in such large numbers. More important than this is the quality of governance in the CEE countries. Namely, the countries with undeveloped institutions (high corruption, weak rule of law) and those that do not provide high quality of public services to their citizens (healthcare, education, administration, etc.) experience, as a rule, large emigration. This seems to be the main reason why annual emigrations from Latvia and Lithuania are half the emigration from Croatia, even though the average salary in Croatia (just below 900 EUR) is somewhat higher than the average salary in the two Baltic states (between 800 and 850 EUR).

In order to estimate the impact of individual factors on the extent of migrations from CEE to Western Europe more precisely, we designed an econometric model on a panel of 14 CEE countries[1] for the 2006-2017 period (168 observations). The estimated regression equation (Equation 1 in the section addressing the empirical model of migration from CEE to Western Europe) explains the level of emigration from individual CEE countries with the demand for skilled workforce in Western Europe (where there is a shortage of qualified working-age population) and specific characteristics of the CEE countries: level of economic development, quality of institutions, quality of education and access to the EU labour market.

The results of the model confirm that migrations from CEE are growing proportionally to the demographic decrease in the working-age population in the countries of Western Europe. Furthermore, membership in the EU and a better educational system increase migrations from individual CEE countries, while higher living standards and better institutions decrease them. All estimated coefficients are of the expected sign and are statistically significant, while the explanatory power of the model is high (coefficient of determination R2 is 60.3%). We assessed

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1   In addition to CEE11, this panel also includes the three Western Balkan countries for which the necessary data was available (Albania, North Macedonia and Serbia).

the robustness of the obtained results by estimating the same model in different time periods and the value of the coefficients proved quite stable, while the explanatory power of the model remained undiminished.

Based on the estimated model, we have forecast the rate of emigration from Serbia in the upcoming five years and considered the measures that would be most effective in mitigating it. The results show that Serbia will probably face further increase in emigration, even with a relatively high GDP growth rate of about 4% – unless the Government undertakes effective measures to prevent this. Under this baseline scenario, the model shows that in the next five years (2021-2025) Serbia could be faced with an annual outward migration in the range 1.2-1.3% of the working-age population (compared to the current level of about 1%). This estimate could easily turn out to be conservative, as many EU countries are putting in place measures that would open labour markets for skilled workers from the non-EU member countries.

The forecasted growth in emigration can be halted and even reversed in the upcoming five years, provided that the Government successfully implements comprehensive reforms which it has practically been failing to even initiate for years. Namely, under the improved institutions scenario, the model shows that the strengthening of institutions (lowering corruption, improving the rule of law) and increasing the quality of public services (reform of healthcare, education, etc.) could bring further growth of emigration to a standstill, and even reduce emigration in the upcoming five years by 10 to 15% compared to their current level (i.e. annual emigration level of working-age population could be brought down from 1% to 0.85-0.90%).

The expectation that a steep rise in salaries in Serbia will have a significant effect on halting or even reversing the growing emigration trend is not empirically supported. The estimated model shows that even the hypothetical increase of the average salary to 900 EUR by the end of 2025 (the 900 EUR wage scenario) could not prevent further increase of emigration from Serbia in the upcoming years – it could only slow it down. This result should not be so surprising, since countries that had a similar growth in salaries in the past (Romania) have not managed to resolve the problem of emigration – in fact, emigration grew ever

larger over the years. We have summarized the results of the three simulations in Table 1.

Table 1: Annual emigration projections for Serbia in the next five years

	% of working-age population
Current emigration	1.00
Average yearly emigration in 2021-2025	
Scenario 1 (Baseline)	1.2-1.3
Scenario 2 (Improved institutions)	0.85-0.90
Scenario 3 (900 EUR wage)	1.05-1.10

Source: Authors' calculations.

Finally, it is commendable that the Government has recognized the major issue of large emigration from Serbia and has founded the Coordination Team for Economic Migration Monitoring in the Republic of Serbia in 2019. However, the measures that have been made public thus far are insufficient to resolve the issue. The financial and tax incentives that were hinted at, together with some other stimulating measures (subsidised dwellings) could very well serve to persuade some of the individuals who are thinking about leaving the country to stay, but they will not be able to slow down, to any significant extent, the forecasted cumulative departure of over 200,000 of Serbian citizens in the upcoming five years. Such measures (if they are meticulously designed) could be a good addition, but far from a substitute for the necessary improvement in the quality of institutions and comprehensive reform of the public sector (education, healthcare, etc.).

Impact of emigration on the CEE economies

Emigration of the working-age population has severe negative effects on the CEE economies, which is why slowing down and even decreasing outward migration becomes a task of critical importance for the economic perspective of these countries (Serbia included).[2] East-

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2   CEE countries encompass all CEE11 countries (Bulgaria, Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) and three Western Balkan countries (Albania, North Macedonia, Serbia) for which the most comprehensive set of data, needed for the analysis, is available. Incomplete records have made it impossible to include Bosnia and Herzegovina and Montenegro in the analysis. Similarly, developed countries of Western Europe receiving migrations from CEE include Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Italy, Luxembourg, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom.

west migrations in Europe have numerous detrimental economic effects on the CEE countries that exhibit strong outward migration of the working-age population: they are extremely long in duration, extensive and persistent compared to migration experiences elsewhere. Another characteristic trait is that migrations from CEE to Western Europe have a strong trend growth over the years, even though there has been a significant improvement in the living standards within CEE and strong convergence towards Western Europe. Average GDP per capita in CEE was at mere 38% of that in Western Europe in 2000, but migration rates were three times lower compared to 2017 (when GDP per capita reached 60% of that in Western Europe). Together with magnitude and duration, another economically unfavourable trait of migration from the CEE countries is that young and highly educated people show a much greater tendency to emigrate compared to the remainder of the population.

Economic theory does not offer a single answer to the question of economic and fiscal impacts of rising migrations on the country of origin. Neoclassical growth model ascribes more positive impacts in general, while endogenous growth models emphasize the negative implications. Specific characteristics of migration from the CEE countries indicate that endogenous models should provide a better description, as is convincingly corroborated by empirical research [1]. The IMF study estimates that in 2014 GDP per capita of the CEE[3] countries

would have been on average 5% higher, had there not been large migrations from these countries in the 1995-2012 period. Since migrations accelerated steeply after 2012, it is to be expected that the negative impacts on the CEE economies are now far greater than the ones found in this study. A recent study [3] indirectly confirms this, indicating that negative demographic trends in the CEE countries (including further emigration and expected aging of the population) will probably be the main impediment to further economic convergence of CEE to Western Europe.

The neoclassical growth model starts from the position that emigration has a negative effect on the overall GDP growth due to a decrease in the total number of inhabitants, but that it leads to the growth of GDP per capita, fostering economic convergence. Namely, emigration eliminates surplus workforce, which, eventually, decreases the unemployment rate – meaning that production per capita is larger. At that, emigration also leads to an increase in remittances sent from abroad, which additionally increases citizens' income. This model, however, has limitations when applied to the CEE countries. First, unemployment in these countries is at its historical minimum and it is difficult to expect it could decrease any further (Figure 1). Unemployment rate in CEE dropped to 4.2% in 2019, which is already much lower than the average unemployment rate in the Western European countries (5.3%), and, in certain countries (Czechia) it has dropped to below 2%.[4] In

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3   The group of countries analysed in this study is somewhat different to our group, but the result should hold true for our analysis, too.

4   In Serbia, the unemployment rate also dropped to its minimum in 2019 (below 10%), but due to a lack of a data series that would be long enough, Serbia is excluded from Figure 1.

Figure 1: CEE and Western Europe: unemployment rate period averages
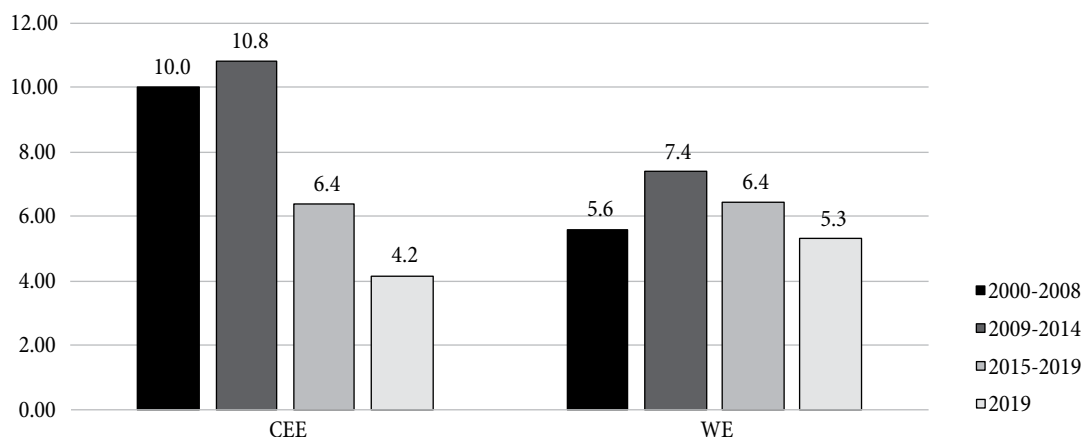
Source: Authors' calculations based on the Eurostat data.
Note: Due to a lack of a long-enough data series for Serbia, Albania and North Macedonia, the figure shows only the data for the CEE11 countries.

addition, remittances cannot be a reliable source of income in the long term, as their long-term trend is to decrease as emigrants integrate into their new environments and slowly weaken their ties to their country of origin. Still, the largest issue of the neoclassical model is the fact that it fails to consider the age and educational attainment level of migrants.

Endogenous models of growth that deal with migration start exactly from the characteristics of migrants. According to these models, skilled and more productive workers are not easily substituted once they leave the economy [9]. In other words, if the most productive parts of the population (the young and skilled labour) are leaving the country, the possibility of their efficient replacement from the remaining population pool is limited. This is why such migrations lead to a drop, not only in the overall GDP of countries with high outward migration (which is not disputed in the neoclassical growth model either), but also in per capita GDP (due to a drop in the overall productivity of the economy). In addition, shortage of skilled labour (caused by increased emigration of the workforce) stipulates the increase in wages, greater than the growth of productivity which, in turn, lowers the competitiveness of countries, thus slowing down economic growth even further. Finally, emigration of the younger population skews the population pyramid towards a higher share of the elderly in the overall population, thus increasing the pressure on public expenditures (pensions, healthcare, etc.).

As mentioned, the IMF study [1] quantifies in more detail the negative effects of outward migration on the CEE economies. Thus, endogenous growth models provide a more reasonable framework for studying and estimating the negative impacts of outward migration on the CEE countries – particularly as emigration has led to a relatively large shortage of skilled workers in these countries. Namely, the countries that saw the greatest outward migration from 1995 to 2012 also have the largest shortage of skilled labour.

It is important to emphasize that in the four years since the study was published, the negative trends of migrations from CEE to Western Europe continued to deteriorate, in a manner that has particularly negative consequences for the CEE economies: 1) average annual

migrations are over twice as high in the 2013-2017 period as in the period analysed in the study (1995-2012); 2) unemployment rate in the CEE countries dropped to its record low (Figure 1), which is why now it is even harder to replace the emigrating workforce; 3) the effect of wage growth outpacing productivity, which decreases the competitiveness of the economy (which had only been hinted at in the IMF study), is now a common occurrence in CEE; 4) the share of the highly skilled migrants is most probably even higher now than before 2012 (see Equation 2). Taking all this into consideration, we estimate that the current negative effects of migrations have probably doubled compared to the effects noted in the IMF study, i.e. that outward migration is already starting to lower the per capita GDP growth in the CEE countries up to about 0.5 p.p. per year, with a tendency of further deterioration.

Negative economic consequences of migrations in Serbia are still somewhat subdued compared to other CEE countries, but they will probably become more prominent in the upcoming years. First of all, outward migrations from Serbia are large (OECD data suggests that about 1% of the working-age population emigrates from Serbia to Western Europe every year), but still far lower than in other countries in the region that are in the EU (Croatia, Romania, Bulgaria). However, this could easily change in the next few years. Germany (which receives about a half of the migrants from CEE) announced the adoption of the new law on immigration of skilled workers, opening its labour market for workers from the non-EU member states, which will probably stimulate even more outward migration from those countries. Second, Serbia was also able to partly offset the negative economic effects of outward migration by decreasing the unemployment rate (as the neoclassical model envisages) – since the unemployment rate in Serbia was far higher than in other CEE countries.[5] The latest data shows, however, that the unemployment rate in Serbia dropped below 10% at the end of 2019, leaving increasingly fewer opportunities for such compensation in

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5   An additional issue with the analysis of economic effects of migrations on Serbian economy is the fact that the labour market statistics (Labour Market Survey) for the 2008-2017 period is remarkably unreliable (see [13]). However, it is indisputable that the unemployment rate in Serbia was far greater than that in the comparable CEE countries in the previous ten years.

the future. Finally, the economically unsustainable salary increases that outpace productivity growth in the private sector (seen in many of the CEE countries for several years now) has also been observed for the first time in Serbia in 2019, indicating that the large outward migrations are starting to leave their mark on the economic activity. Therefore, efficient measures aimed at slowing down or even reducing outward migrations from Serbia are key to the country's future economic development. Thus, the main goal of this paper is the attempt to estimate their future direction.

Magnitude, structure and trends of migrations from CEE to Western Europe

Western Europe is the most common destination for CEE migrants. According to the UN data, about 11 million migrants from the CEE countries lived in the developed countries of Western Europe in 2019.[6] This is two thirds of the total number of people from CEE who live abroad. The number of migrants from CEE living in Western Europe more than doubled after 2000 – in 2000, a total of 4.1 million migrants from CEE were registered, whereas their number increased 2.7 times in 2019, to 10.9 million (Figure 2). No similar trend can be seen in migrations from CEE to other parts of the world (USA, Canada, Australia, etc.) as the number of migrants leaving CEE for these countries remained almost the same in 2019 as it had been in 2000. It is interesting to note that, until the

year 2000, majority of migrants from CEE lived outside of Western Europe, while in 2019 CEE migrants in Western Europe were twice as numerous as those living in the rest of the world (Figure 2). Data on migrants from Serbia are somewhat less reliable than those for other CEE countries,[7] but we estimate that there are currently between 600,000 and 650,000 Serbian citizens living in Western Europe (out of a total of 900 to 950 thousand currently living abroad in general).

The number of CEE citizens currently living in Western Europe is extremely high relative to the overall population of the CEE countries. In 2019, about 9.5% of the overall population of the CEE countries were living as immigrants in Western Europe. The situation is even more dramatic when only the working-age population is observed (20-64). Namely, migrants are distinctly younger than the CEE average. Almost 75% of migrants from CEE who live in Western Europe are of working age, while the share of the 20-64 population in the overall population of the CEE countries is just over 60%. This means that about 12% of the CEE working-age population is currently living in the Western European countries.

Migrants moving from CEE to Western Europe after 2000 are far more skilled compared to the CEE average. In the period prior to 2000, it was mostly the less educated workers that migrated to Western Europe. Less than 10% of CEE migrants who lived in Western Europe in 1990 had

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6   For the list of countries included in WE and CEE, see footnote 2.

7   The total number of migrants originating from Serbia is not completely precise because of the different treatment of Kosovo and Metohija in countries registering migrant origin; historical data are difficult to follow because Serbia gained independence in 2006.

Figure 2: Number of migrants from CEE in Western Europe and in the rest of the world (in millions)
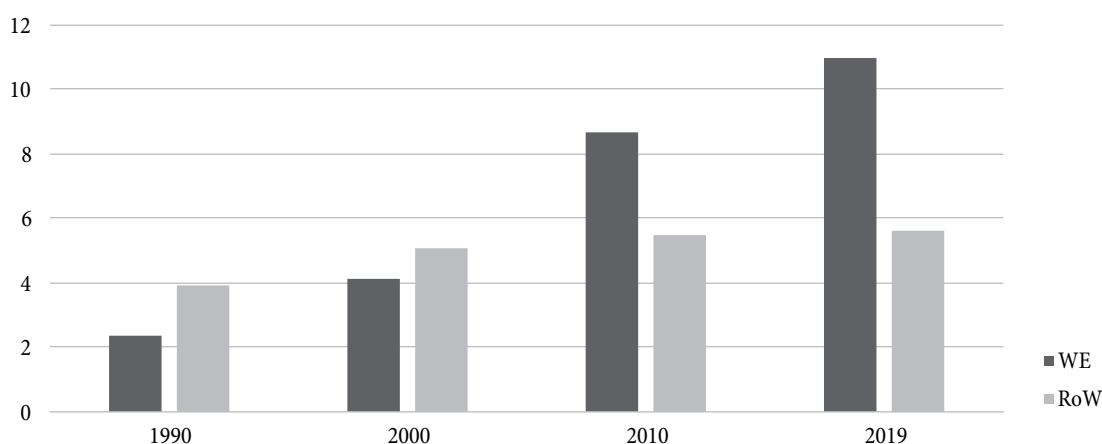
Source: Authors' calculations based on the UN migration data.

tertiary education [5]. In 2000, this percentage increased to about 15%, whereas in 2010, almost 25% of migrants who lived in Western Europe had tertiary education.[8] This fast change in the structure of the educational attainment levels of CEE migrants could occur only if the new arrivals after 2000 were, for a large part, highly educated. Based on the changes in education levels of the migrant stock between 2010 and 2000, we estimate that over 35% of the new CEE migrants who settled in Western Europe were highly educated. At that time, fewer than 20% of the working-age population in the CEE countries had tertiary education. Thus, CEE migrants were significantly better-educated compared to the workforce in home countries. Similar trends of emigrants being better-educated, almost certainly, continued after 2010.

The UN database is the most comprehensive data source on the number, structure and origin of migrants by countries of destination, but it is not a perfect source for monitoring and estimating annual emigration trends from CEE to Western Europe. Namely, the UN data are given as a stock of registered migrants in the host country for every five years. Hence, it is impossible to reliably reconstruct the changes in migrations at an annual level. Also, there are some other changes in the stock of migrants occurring in the five-year period, which are independent of inflows of new migrants (naturalization of foreigners who have been living for a long time in the host country, deaths, etc.).

A more reliable source of data on the annual migration trends from CEE to Western Europe can be found in the OECD database. Namely, the OECD publishes, for each of its member countries[9], detailed records on the number of foreigners who have moved to or from that country in the previous year. Based on this data, we reconstructed the net migration trends of the CEE population to the Western European countries by year, in the 1996-2017 period (Figure 3).[10] These records, similar to the UN records, show the trend increase of migration from CEE to Western Europe over the years.

A detailed analysis, however, shows that the records on net migrations mitigate the extent of loss of the CEE working-age population. The issue, as we have already stated, is the fact that migrants from Western Europe return to the CEE countries as their working career draws to a close, while younger population, those fit to work, are moving into Western Europe. Only a few countries of Western Europe publish data on the age of migrants, which is why, as an illustration for the previous claim, we have shown the data on the age of migrants in Germany (the most popular destination country for CEE migrants) in Figure 4. As can be seen from Figure 4, in 2010 Germany has seen a major net inflow of younger working-age population (20-53 age bracket) and a net outflow of the older working-age population (54+ age group), with the

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8 Unfortunately, the latest available data on the educational structure of migrants [5] is for 2010, but the trends of constant and intense increase of the share of the highly educated among them over the years are quite obvious.

9 All countries of Western Europe from our sample are members of the OECD, which means we have complete records for this analysis.

10 Due to the wars in former Yugoslavia, the records prior to 1996 are less indicative. In addition, with the expansion of the time horizon, the number of missing records for individual countries increases.

Figure 3: Net migration of citizens from CEE to developed European countries (in thousands)
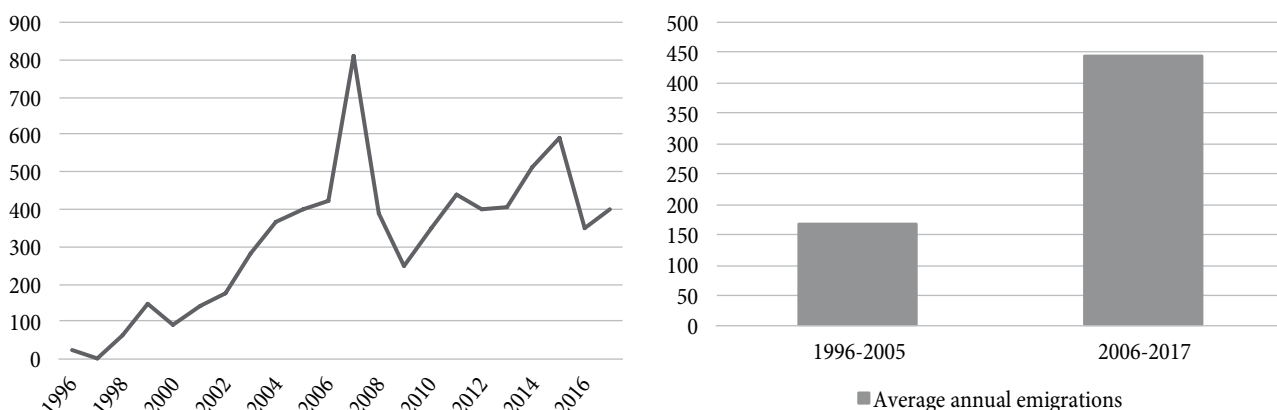
Source: Authors' calculations based on the OECD data.

Figure 4: Germany – net migration of foreigners by migrant age, 2010
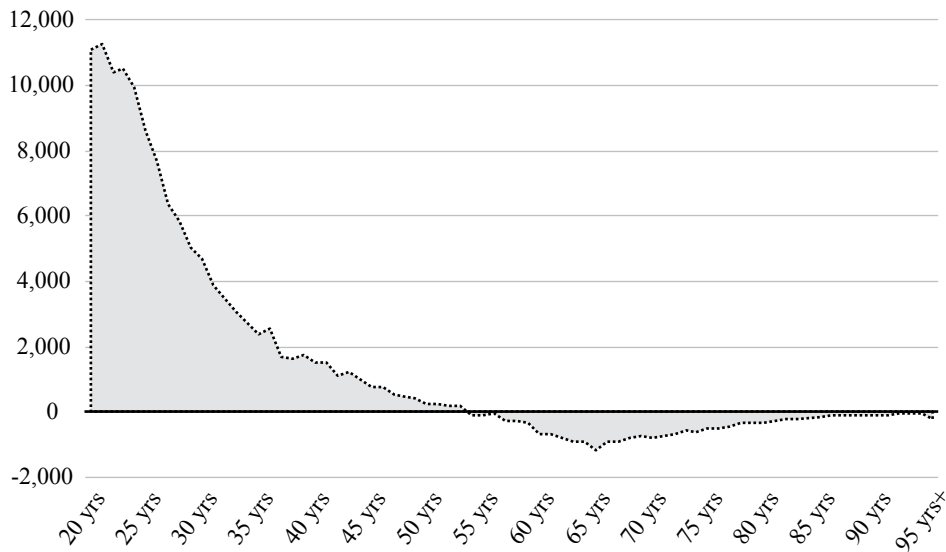
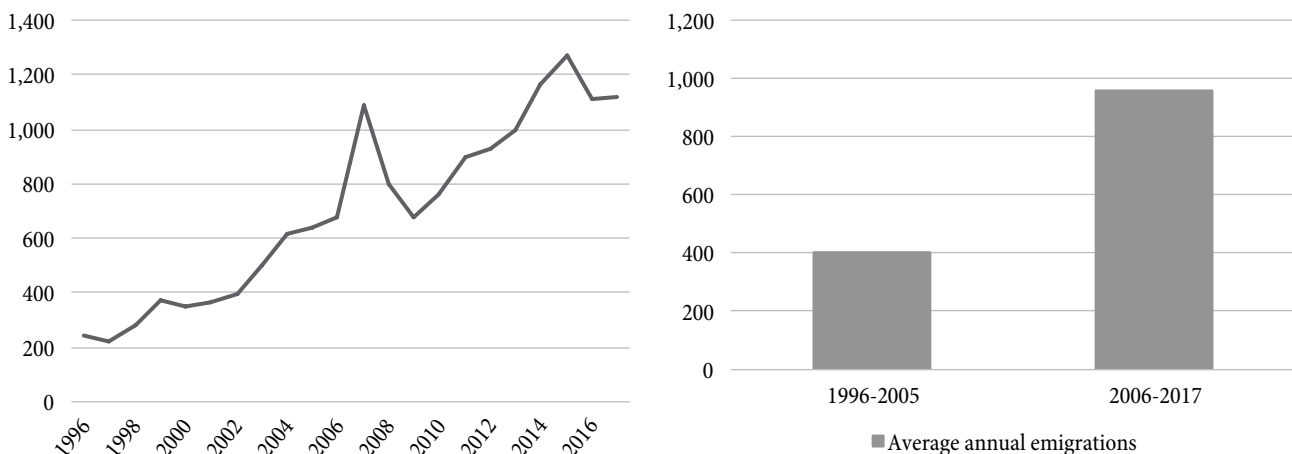Source: Authors' calculations based on the Destatis data.

net inflows of the younger generation outweighing the net outflows of the older population.

Since the OECD data on net migrations strongly underestimate the number of working-age migrants going from CEE to Western Europe (which is the population of great economic importance), we have relied on a third data set for our analysis. Figure 5 shows the OECD data on annual emigration from CEE to Western Europe (without the returnees). Unlike the previous data sets, these records overestimate the total number of migrants from CEE who have settled into Western Europe. However, subsequent statistical analysis has shown that these records come by far the closest to the actual growing trend of migrating workforce from CEE to Western Europe, whereas the

records on net migrations can be misleading about the actual magnitude of the problem due to a large number of older returnees.

Based on the available data and the analysis presented in this section, we can conclude the following: 1) the CEE countries have annually lost at least 1% of their working-age population to migrations to Western Europe (this, too, is probably a conservative estimate); 2) the number of migrants leaving CEE is strongly increasing year-on-year, with an average annual growth rate of about 10% (Figure 5); 3) migrants are significantly younger than the average CEE population and 4) migrants are better-educated compared to the working-age population in their home countries.

Figure 5: Emigration of citizens from CEE to developed European countries (in thousands)

Source: Authors' calculations based on the OECD data.

Driving forces behind rising migrations from CEE to Western Europe

As we have shown in the previous section, migration from CEE has been surging for over two decades, with no signs of slowing down – and such a loss of skilled workforce, if continues, threatens to jeopardize the economic perspective of the CEE countries. However, it is still unclear why this is happening – i.e. why there is an increase in outward migration when the CEE countries are relatively strongly converging, in terms of living standards, towards the Western European countries. With the decreasing wage gap between CEE and Western Europe, we should be seeing ever fewer people from CEE deciding to migrate to Western Europe, while the opposite is taking place. Migrations from the CEE countries have tripled since 2000, even though in 2000 the CEE countries were at 38% of the development level of Western Europe, while in 2018 they have reached over 60%. Therefore, it is indisputable that there are additional factors affecting the increase of migrations from these countries to Western Europe, surpassing the effect of economic convergence of CEE to Western Europe.

A part of the explanation could be that 11 CEE countries that joined the EU after 2000 had an easier access to the Western European labour markets. We hence analysed the impact of the EU accession of the CEE countries on their emigration levels (Table 2). Immediately after accession, there really was a significant increase in outward migration from the newly joined EU member states (Index 1). However, the number of migrants continued to rise even a decade after accession (Index 2). Had the EU accession effect been the only factor affecting the increase of emigration from CEE, it would have been a one-off, i.e. as the standards

of living continued to catch up to the Western European levels, migrations would have decreased; however, the data show the opposite to be true (Index 2).

The main factor driving the rise in outward migrations from CEE to Western Europe (despite the economic convergence) is the growing demand for skilled workforce in Western Europe. Namely, the countries in Western Europe have been experiencing unfavourable demographic trends for quite some time – the number of young people is dwindling compared to the older population. From mid-2000s, the number of people in the 60-64 age group for the first time exceeded that of the 18-22-year-olds. This led to the shortfall in domestic workforce in Western Europe, since there is an insufficient number of young people to replace the retiring population as they leave the labour force. In simple terms, for each 100 elderly workers (doctors, nurses, drivers, engineers) leaving the Western European labour market, there is fewer than 100 young people applying to take their place, and these trends are deteriorating year after year.

The increasing number of vacant, well-paid positions in Western Europe attracts citizens of CEE. The rise of outward migrations from CEE to Western Europe matches, almost perfectly, with the demographic decrease of the domestic working-age population in Western Europe. Figure 6 clearly shows that the number of migrants from CEE increased proportionally with the widening of the demographic gap[11] in Western Europe. This correlation,

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11 The demographic gap is the quantification of the decrease in the domestic working-age population in Western Europe. It was derived as the difference between the population in the 60-64 age bracket, which is leaving the labour market, and the population from the 18-22 age bracket, entering it (corrected for the mortality rate of the working-age population).

Table 2: Yearly emigration from CEE11 countries before and after the EU accession, period averages

	Before the EU accession	After the EU accession	Latest data	Index (1)	Index (2)
	1	2	3	2/1	3/2
	2002-2003	2005-2006	2017		
CEE8 (CZ, SK, SL, HU, EE, LT, LU, PL)	171,365	342,188	415,402	199.7	121.4
	2005-2006	2008-2009	2017		
CEE2 (BG, RO)	230,272	331,514	530,449	144.0	160.0
	2011-2012	2014-2015	2017		
Croatia	16,239	65,378	69,594	402.6	106.4

Source: Authors' calculations based on the OECD data.

Figure 6: Demographic trends in Western Europe and emigration from the CEE countries, 1996-2017
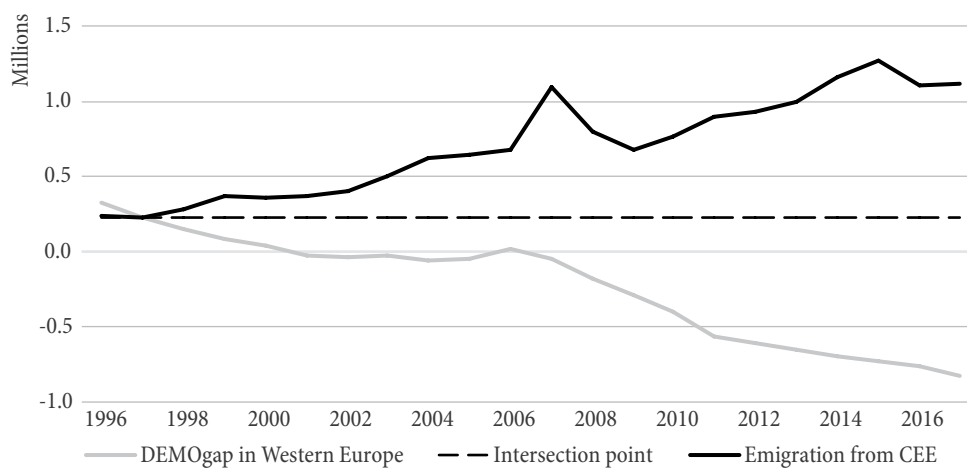
Source: Authors' calculations based on the Eurostat and OECD data.

however, does not apply to migrations to Western Europe from other parts of the world (mainly the Middle East and Africa). The number of migrants from those regions has also increased starkly in the previous years; however, it does not coincide with the demographic trends in Western Europe, but rather increases independently of them, usually as the result of crises in different parts of the world (the Arab Spring, war in Syria, etc.).

The important question is why the significant increase in the number of migrants coming from Asia and Africa in the previous decade failed to compensate the shortages in the Western European labour markets, while migrations from CEE increased in parallel to it. In simple terms, Western Europe has, on the one hand, a "surplus of migrants", while, on the other, it keeps absorbing the workforce from the CEE countries. The answer to the question lies in different skill levels of CEE migrants compared to those from the rest of the world, i.e. in the compatibility of the CEE workers with the needs of the Western European labour markets. As we have already shown, the migrants from CEE are mostly well-educated. This means that they can respond, in terms of their skill level, to the demands for human resources in the highly competitive economies of Western Europe, which does not apply, to the same extent, to the migrants from the rest of the world.

Individual CEE countries will respond differently to the demand for skilled labour in Western Europe. In Figure 7, we have shown two factors affecting emigration from individual CEE countries. The first is the difference

in the living standards compared to Western Europe (pay gap). As a rule, more people migrate from those CEE countries which are less economically developed, i.e. where the difference in salaries compared to Western Europe is the greatest (left panel in Figure 7). The pay gap is not, however, the only, nor, indeed, most probably the deciding factor behind the level of migration from the CEE countries. In Figure 7 (right panel), we show that outward migration is the lowest from the countries that have better governance (low corruption, strong rule of law) and provide public services of better quality (healthcare, education, administration, etc.).

Empirical model of migration from the CEE countries to Western Europe

Building upon the considerations from the previous section, we put forward a model that explains the magnitude of migration from individual CEE countries[12] to Western Europe[13] by the demand for labour in Western Europe and specific characteristics of the analysed CEE countries: level of economic development, quality of institutions, quality of education, and the EU labour market access.

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12 CEE countries: Slovenia, Croatia, Czechia, Slovakia, Hungary, Poland, Estonia, Latvia, Lithuania, Bulgaria, Romania, Albania, North Macedonia and Serbia. Due to data limitations we were not able to include Montenegro and Bosnia and Herzegovina in the sample.

13 Western Europe: Germany, Austria, Belgium, the Netherlands, Luxembourg, the United Kingdom, Norway, Denmark, Finland, Sweden, Spain, France, Italy, Iceland and Switzerland. Portugal and Ireland were left out due to data limitations.

Figure 7: CEE: Emigration vs. GDP and Quality of Governance, 2006-2017 average
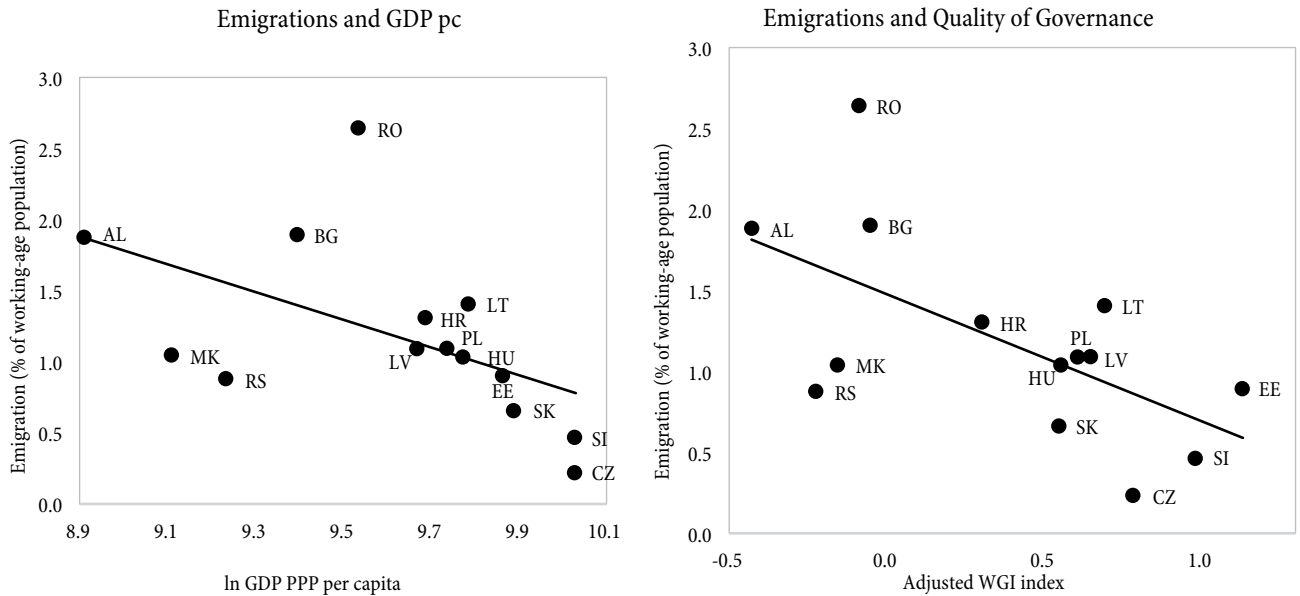
Source: Authors' calculations.
Note: i) GDP PPP per capita, EUROSTAT ii) Adjusted WGI index calculated as a simple average of Control of Corruption, Government Effectiveness and Rule of Law indicators, World Governance Indicators, World Bank.

The model can be represented by the following equation (Equation 1):

$$Emig_{i,t} = \gamma_0 + \gamma_1 DEMOgap_t + \gamma_2 GDPgap_{i,t} + \gamma_3 Institutions_{i,t} + \gamma_4 Education_{i,t} + \gamma_5 Dummy\_EU_{i,t} + \epsilon_{i,t}$$

Where:

i) $Emig_{i,t}$ represents the yearly emigration from a given CEE country as a percentage of the working-age population; OECD International Migration Database[14].

ii) $DEMOgap_t$ is the demographic decline in the labour force in Western Europe,[15] given in % of the total working-age population; EUROSTAT.

iii) $GDPgap_{i,t}$ refers to the difference between (ln) GDP PPP per capita of a given CEE country and average (ln) GDP PPP per capita of developed European countries; EUROSTAT.

iv) $Institutions_{i,t}$ represents the yearly average of World Governance Indicators for Control of Corruption, Rule of Law and Government Effectiveness; World Bank.

v) $Education_{i,t}$ refers to the yearly average of Global Competitiveness Sub-Indices: Quality of Education and Quantity of Education; World Economic Forum.

vi) $Dummy\_EU_{i,t}$ is dummy variable that takes the value of 1 if a country is in the EU in a given year and 0 otherwise.

We estimated the model on a set of 14 CEE countries for the 2006-2017 period. The choice of the period was determined by the appearance of a significant demographic decline in the domestic working-age population of Western Europe from 2006 onwards (Figure 6).[16]

The estimated equation (Equation 2) is given by:

$$Emig_{i,t} = -3.277^{**} + 2.118^{***}DEMOgap_t$$
$$(1.396) \quad (0.579)$$
$$-1.273^{**}GDPgap_{i,t} - 1.328^{***} \ Institutions_{i,t}$$
$$(0.603) \qquad (0.486)$$
$$+ 0.518^{**}Education_{i,t} + 1.288^{***}DummyEU_{i,t}$$
$$(0.253) \qquad (0.238)$$

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14 We decided to use migration data from the OECD International Migration Database because it allows us to construct yearly time series of emigration from CEE countries to Western Europe. Other data sources, the UN and EUROSTAT were not suitable for our econometric analysis. The UN data on migration is given in five-year intervals, while the EUROSTAT data, although annual, does not have long enough time series and for Germany and France it was not possible to discern the country of origin of migrants.

15 Demographic decline in labour force calculated as the difference between the number of people assumed to be entering the labour force (the average number of people aged 18-22) and the number of people assumed to be leaving the labour force (the average number of people aged 60-64), corrected for the number of people aged 20-62 that died during the previous year.

16 The choice of the period was also influenced by the availability of data for other variables (WEF education data) and somewhat lower reliability of older migration data.

N = 14 countries, T = 12 years, NT = 168 observations, R² = 60.3%

Notes:

i)   Model estimated using the Prais-Winsten method (see [2],[4],[6],[9])[17]

ii) Corrected standard errors are given in parenthesis.

iii) *** and ** represent 1% and 5% significance levels, respectively.

The model results can be summarized as follows:

(1) The demographic decline in domestic workforce in Western Europe created a labour shortfall in these countries (large number of well-paid jobs) generating the demand for the CEE workforce (DEMOgap). (2) The CEE countries respond to this demand, depending on the skill and education level of the workforce, where countries with a more educated workforce that better addresses the needs of the Western European labour markets respond more strongly (Education). (3) As expected, more people will decide to emigrate from less developed CEE countries where the difference in wages and living standards relative to Western Europe is greater (GDPgap). However, income is not the only factor. (4) More people will leave the countries where the quality of institutions is worse (Institutions). Finally, (5) facilitated access to the Western European labour markets further stimulates emigration from the analysed countries, i.e. the accession of the CEE countries to the EU was accompanied by an increase in emigration to Western Europe (DummyEU).

All estimated coefficients are significant at 5% and some at 1% (DEMOgap, Institutions, DummyEU). The model passes statistical tests and addresses the problems of serial correlation, heteroskedasticity and cross-sectional dependence in the data. The explanatory power of the model is high – the proposed model explains nearly two-thirds of the variation in emigration between the CEE countries (coefficient of determination, R^2 of 60.3%). Thus, the estimated model represents a sound framework for analysing migration from the CEE countries to Western Europe. In the following paragraphs, we elaborate the meaning behind each of the coefficients in more detail.

The coefficient on the variable describing demographic trends in Western Europe (DEMOgap) is positive and

statistically significant at 1%, indicating a strong link between adverse demographic trends in Western Europe (decline of the working-age population) and migration from the CEE countries. The result supports the view that the demand for labour in developed European countries has been a major driver of growth in outward migration from CEE in the last fifteen years. The coefficient value of about 2 implies that a loss of 1% of the working-age population in Western Europe (about 2.3 million in total in 2017) is "compensated" with 2% of the working-age population in CEE countries (about 1.4 million in total in 2017). This indicates that, on average, almost two-thirds of the labour shortfall in Western Europe is mitigated by immigrant workers from the CEE countries.

The level of economic development (GDPgap) and the quality of institutions (Institutions) are negatively correlated with emigration from the CEE countries. High wages in Western Europe incentivize outward migration from CEE and relatively more people will emigrate from less developed CEE countries where the difference in the average wage compared to Western Europe is larger. However, as we have already pointed out, the pay gap alone is not the only factor that motivates the emigration of the CEE population. An important driving factor is the quality of institutions. The negative sign of the estimated coefficient on the Institutions variable (average of selected WGI indicators) indicates that people will more likely emigrate from countries where the quality of institutions and the quality of public services (healthcare, education, etc.) are lower. It is interesting to note that the magnitudes of the coefficients on Institutions and GDPgap suggest that poor institutions (high corruption, low level of rule of law and poor quality of public services) have a stronger (negative) effect on migration than the difference in living standards relative to Western Europe.

The positive sign of the coefficient describing how emigration varies with education indicates that outward migration will be higher in those CEE countries that have a higher-quality education system and a better-educated population. This indicates that the demand for the CEE workforce in Western Europe is largely driven by a shortage of skilled workers (doctors, nurses, engineers, etc.). Educated CEE workers can meet such demand (which

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17 The model estimation was executed in Stata using the xtpcse command.

other expatriates from the rest of the world generally fail to do). Therefore, relatively higher emigration will be recorded by those CEE countries whose workforce better meets the needs of the Western European labour market.

Unrestricted access to the Western European labour market accelerates outward migration from the CEE countries as indicated by the positive coefficient on the dummy variable. EU membership allows for free movement of workers between the Member States, making it easier for the workforce of the CEE countries that are in the EU to migrate to Western Europe compared to those still subject to restrictions on work and stay in the EU. Data shows that all the CEE countries that joined the EU during the analysed 2006-2017 period (Romania, Bulgaria, Croatia) had seen a strong additional rise in emigrations in the post-accession period (adding around 1 p.p. of the working-age population aged 20-64). On the other hand, the non-EU sample countries (Serbia, Albania and North Macedonia) still have a relatively lower emigration than the CEE EU member countries. However, some important EU members (Germany for example) are putting policies in place that will open the labour market for the people of other, non-EU member states. That could, in the future, reduce the difference in access to the Western European labour markets between the CEE EU and candidate countries, i.e. it could further spur outward migration from Serbia, Albania and North Macedonia.[18]

We checked the robustness of the obtained results by evaluating the same model (Equation 1) over different periods. The results are presented in Table 3. Most of the coefficients are relatively stable with reasonable oscillations

in both directions, which confirms the quality of the estimated model. The only exception is the coefficient on Education, which systematically increases in value as the analysed time horizon shortens towards 2017 (the increase in the absolute value of the coefficient from 0.4 in 2006-2017 to 0.9 in 2010-2017). We interpret this as additional evidence in support of the claim that the acceleration of emigration from CEE during the observed period was defined by the increased demand for skilled labour in Western Europe. In other words, with the increase in negative demographic effects in Western Europe, the importance of the level of education in the CEE countries rises. Finally, the estimated models explain about two-thirds of the variations in emigration by country (value of the coefficient of determination, R2 in the range of 59.4 to 67.6), which strongly supports the soundness of the presented empirical model as a framework for analysing emigration from the CEE countries (including Serbia) towards Western Europe.

How to mitigate emigration from Serbia?

Based on the model results, in this section we estimate the rate of emigration from Serbia in the upcoming five years and consider the measures which, if implemented, could mitigate or reverse these trends. The model shows that even with a relatively high GDP growth rate of about 4%, Serbia will almost certainly face a 20-30% increase in yearly emigration rates in the upcoming five years. Namely, demographic trends in Western Europe imply the growing demand for skilled labour which will additionally fuel emigration from the CEE countries (including Serbia) in the future. However, not only could Serbia offset this

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18 On the other hand, it could somewhat ease the pressure on emigrations from CEE11.

Table 3: Robustness checks: estimation results for different time periods

	2004-2017	2005-2017	2006-2017	2007-2017	2008-2017	2009-2017	2010-2017
DEMOgap	2.501***	2.295***	2.118***	1.946***	2.333***	2.743***	3.270***
GDPgap	-1.296***	-1.232**	-1.273**	-1.210**	-1.249**	-1.055*	-1.170**
Institutions	-1.130***	-1.300***	-1.328***	-1.504***	-1.170***	-1.239***	-1.283***
Education	0.287	0.442*	0.518**	0.574**	0.591**	0.736**	0.915***
Dummy_EU	1.180***	1.234***	1.288***	1.407***	1.064***	0.964***	1.049***
Constant	-2.282*	-2.918**	-3.277**	-3.441**	-3.592**	-4.182***	-5.382***
Number of obs.	196	182	168	154	140	126	112
R²	60.9	60.9	60.3	62.1	59.4	62.8	67.6

Source: Authors' calculations.
Note: ***, ** and * represent 0.01, 0.05 and 0.10 significance levels, respectively.

growth, but could also decrease the current levels of emigration, provided the quality of institutions and the quality of public services significantly improve in the upcoming five years.

The first, baseline scenario for forecasting emigration from Serbia to Western Europe in the upcoming five-year period is founded on the following assumptions. We started from the average annual growth rate of Serbian GDP of 4%, which is in line with the somewhat optimistic Government forecasts. We also assumed that there would not be any changes in curtailing corruption, strengthening the rule of law or improving public services. There are grounds for such an assumption as these WGI indicators have practically been stagnating since 2014 in the case of Serbia. Finally, based on the forecast demographic trends in Western Europe, we estimated the demand for skilled labour in these countries. With these assumptions, the model shows that the growing labour demand in Western Europe will drive the increase of annual emigration of the Serbian population by about 20-30% compared to the current level (of about 1% of the population of working age).[19] In other words, the model shows that a similar scenario to the one that has unfolded in the majority of other CEE countries over the previous twenty years is in store for Serbia – despite a larger GDP growth than in Western Europe, i.e. despite the convergence in the living standards, the emigration will continue to grow.

However, if Serbia was to show strong progress in the quality of governance in the upcoming five years, it could completely offset the effect of growing demand for skilled labour in Western Europe, and even reduce future emigration. Therefore, we created the second scenario by assuming that Serbia will catch up to the current CEE average in the indicators of corruption, rule of law and quality of public services by 2025.[20] The econometric model shows that, in that case, not only could annual emigration from Serbia to Western Europe stop growing, but could even drop by 10-15% in relation to its current level.

Finally, we considered a hypothetical case in which the average salary in Serbia would reach the announced 900 EUR at the end of 2025, with the quality of governance (institutions and public services) remaining at the current level. The model shows that, without better governance, even (the economically doubtful) increase in salaries would not prevent the future growth of emigration. Namely, the growth of salaries to the level of 900 EUR could partially compensate for the effects of growing workforce demand from the West, but the level of emigration would still be higher in 2025 than it is now, by about 5-10%. The results of the model for all three scenarios are shown in Table 4.

Table 4: Forecast emigration from Serbia to the Western European countries in the 2021-2025 period

	% of working-age population
Current emigration	1.00
Average yearly emigration in 2021-2025	
Scenario 1 (Baseline)	1.2-1.3
Scenario 2 (Improved institutions)	0.85-0.90
Scenario 3 (900 EUR wage)	1.05-1.10

Source: Authors' calculations.

The results of the model showing that better institutions and the increased quality of the provided public services are superior in slowing down emigration from Serbia to Western Europe is not that surprising. This, for example, is in line with the results of the recent EBRD research that showed that suppression of corruption in Albania would have the same effect on the reduction of its emigration as the doubling of the average salary [7]. The EBRD arrived at this result by applying an alternative methodology, estimating, based on the survey data, the impact of different factors on the intentions of the population to emigrate.

Additional arguments that the institutions play a decisive role in defining the emigration rate are supported by empirical evidence from particular CEE countries. For example, Croatia has a somewhat higher average salary than the Baltic states of Latvia and Lithuania (average salary in Croatia is currently at 870 EUR, and in Latvia and Lithuania about 820 EUR), but twice their emigration. The explanation for the difference in emigration rates, thus, lies in the fact that the quality of institutions and public services is far higher in Latvia and Lithuania than in Croatia. The effect on immigration can also been seen in

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19 Increase in emigration from Serbia to Western Europe will depend on the degree of free access to the Western European labour markets for Serbian citizens.

20 Other assumptions pertaining to the growth of GDP and the trends of workforce demand in Western Europe remain the same as in the baseline model.

the case of Romania where in the last five years the country has seen an unusually high increase in average salaries, without any effect on decreasing the emigration. Namely, salaries in Romania grew by almost 40% in the 2014-2017 period (from about 380 EUR to about 520 EUR), while emigration, instead of slowing down, increased by 15%.

Therefore, the results of the estimated model, other empirical research, as well as concrete examples of the CEE countries unambiguously show that the increase in wages has inferior impact on mitigating emigration compared to improvement in governance. Furthermore, an increase in salaries that outpaces productivity growth has a negative effect on competitiveness and, thus, slows down economic growth. On the other hand, improvement of institutions and providing higher quality of public services is politically and professionally more challenging, but it is far more effective. Not only does it directly contribute to the quality of life of the population and have the strongest effect on lowering emigration, it also plays an important role in raising the rate of economic growth in CEE (see [12]). This means that better institutions would further decrease emigration rates indirectly, through fostering faster convergence of Serbia to the West in terms of living standards.

Thus, we conclude as follows: (1) The model shows that Serbia will face growing emigration pressures in the upcoming five years, caused by the shortfall in the working-age population in Western Europe, even if economic growth averages 4% per year. (2) The key to offsetting the expected surge in emigration, and even reversing this trend, lies in the improvement of institutions – fighting corruption, increasing the rule of law, improving public services. (3) A strong wage increase cannot counterbalance the effects of growing demand for skilled workforce in Western Europe, i.e. emigration will continue to increase. Moreover, if the growth of salaries were to outpace the productivity growth, it would adversely affect macroeconomic stability and slow down economic growth and the convergence of the Serbian economy to that of Western Europe.

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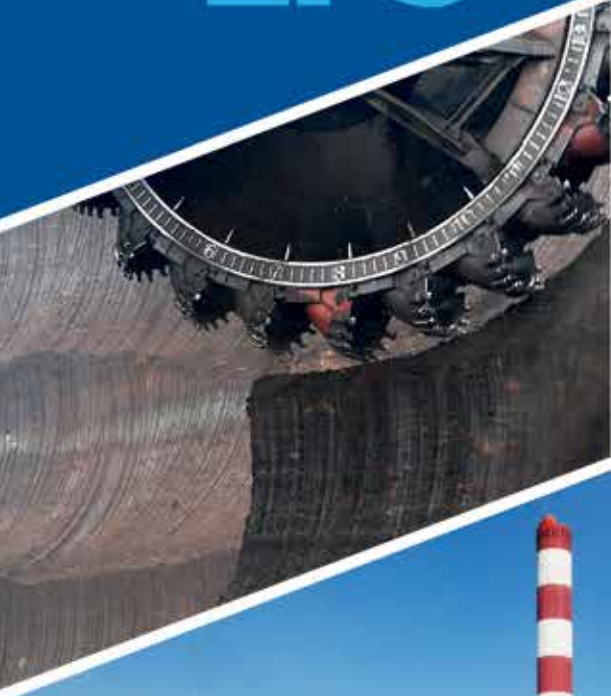
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MONEY MARKET TURBULENCES: TIMELINESS AND CREDIBILITY PROVED TO BE OF CRUCIAL IMPORTANCE

Turbulencije na tržištu novca – blagovremenost i kredibilitet od presudne važnosti

Abstract

Now that the global financial markets are highly volatile and vulnerable, and the world faces the Fourth Industrial Revolution that ushers in new technologies and potentially, with the growth of productivity, extends the period of low inflation and ultra-low interest rates, stability of the financial system is more important than ever. Technological innovation brings new uncertainty and the markets are extremely sensitive to sudden changes in the business environment, yet more so as they grew accustomed to ample liquidity in the prior period. Two episodes of similar characteristics in the money markets in two different countries, Serbia and the USA, have proven numerous patterns and demonstrated many commonalities. And yet, a somewhat different ambience, monetary measures applied to stabilise interest rates, the increase of which was driven by intensive withdrawals of liquidity from the banking system, as well as the initial signal sent to market participants, whose perception is what matters the most – proved that credibility, timeliness of response and proper choice of instruments are of crucial importance for success.

Keywords: *repo, short-term interest rates, uncertainty, Fed, NBS, FX swap auctions, liquidity, credibility, timeliness.*

Sažetak

U zamahu četvrte industrijske revolucije, koja sa sobom nosi uvođenje novih tehnologija i potencijalno, s rastom produktivnosti, produžava period niske inflacije i ultraniskih kamatnih stopa, u ambijentu pojačane volatilnosti i ranjivosti globalnih finansijskih tržišta – stabilnost finansijskog sistema postaje važnija nego ikada do sada. Tehnološke novine donose i novu neizvesnost, a tržišta su postala osetljivija na iznenadne promene poslovnog ambijenta, naročito ako se uzme u obzir da su u prethodnom periodu bila naviknuta na obimnu likvidnost. Dve slične epizode na novčanom tržištu u dve različite zemlje, u Srbiji i SAD, pokazale su brojne zakonitosti i zajedničke karakteristike. Ipak, nešto drugačiji ambijent, upotrebljene monetarne mere za smirivanje kamatnih stopa, čiji je rast izazvan izraženijim povlačenjem likvidnosti iz bankarskog sistema, kao i inicijalni signal poslat tržišnim učesnicima, čija je percepcija najrelevantnija, ukazali su na to da su kredibilitet, blagovremenost reakcije i pravilan odabir instrumenata od ključne važnosti za postizanje uspeha.

Ključne reči: *repo, kratkoročne kamatne stope, neizvesnost, Fed, NBS, devizne svop aukcije, likvidnost, kredibilitet, blagovremenost.*

Introduction

There are no final victories in monetary policy, as it needs to be constantly adjusted to the conditions in which economic agents operate. Global economic trends create or have a significant impact on the financial and economic environment and the business conditions in developing countries. As a result of the interplay of different factors – excessive reliance on central bank instruments and policies to ensure a recovery from the economic crisis in the absence of a more decisive and coordinated fiscal response and the volatility of global capital flows, we are faced with sluggish global growth, even though interest rates are negative or extremely low.

In advanced economies, inflation is not recovering as planned, remaining very low with wage inflation failing to provide a more significant contribution. The environment in which we operate is shaped by economic, but also (geo) political flows. Instant messages via social media (mainly Twitter) have made capital flows in recent years much more volatile than before. Cutting-edge technologies and fast transfer of information in the new technological era have greatly reduced the explanatory power of economic theories that are based on macroeconomic data and trends. Even decisions of the largest monetary institutions are to a significant degree conditioned by these phenomena and labelled as market-driven or news-driven, and stand as a significant addition (sometimes even being the decisive factor) to exact, verifiable and relevant data, i.e. to data-driven/dependent decisions.

The openness of economies has led to a fast spillover from advanced to developing and third world countries in almost all aspects. As Canadian Governor Stephen Poloz stressed repeatedly, the past three revolutions shaped the economic landscape and had implications for economic development and central bank activities – "Technological change represents a source of deep uncertainty for policy-making in an already-uncertain world" [20, p. 1]. In all three revolutions, technological advances produced similar effects – workers were replaced by machines (while some new types of jobs were created), increased productivity and rising aggregate supply led to a drop in prices and inflation, but also to higher borrowing (due to lower interest

rate, as a response to low inflation), and financial bubbles were created (notably in the stock market), which burst more often than not.

A question arising logically in this context is that of the consequences of the Fourth Industrial Revolution for the monetary environment, monetary policy making, and money market in which short-term interest rates are determined. Poloz argues that technological change "also poses a very difficult problem for central banks, because it is very hard to measure, yet it affects output, labour markets, wages and inflation" [20, p. 1].

Having all of this in mind, it becomes clear that the Fourth Industrial Revolution brings many benefits, but at the same time urges caution. Technological progress makes peoples' lives easier, and yet it diminishes the need for their presence at workplaces, particularly in the process of production (becoming more and more automated) or even trade in global financial markets which increasingly boils down to algorithm and high frequency trading carried out by machines, not people.

However, this should by no means dishearten central monetary institutions. Continuous re-examining of the advantages and disadvantages of the said processes and a proactive approach by the regulatory authorities and economic policy makers have become a must. It is up to economic policy makers to demonstrate responsibility and to carefully weigh up the direction, speed and implications of new technologies and the fruits of Industry 4.0.

In the domestic economic environment, focus is placed on digitalisation and accelerated adoption of new technologies as the pillar of future economic development. With its activities and regulatory alignment, the NBS is at the forefront among Serbian institutions in applying tested and secure innovations and in developing new technologies, and to the greatest extent so when it comes to payments and payment services. Numerous projects paving the way for a new business paradigm were initiated in 2018 and 2019.

However, delivering stability – monetary and financial, remains the primary task and objective of the NBS. A prudent, measured and cautious approach of the central monetary authority is a prerequisite for any change in the economic environment, any new idea, method of business

or innovation to find fertile ground and to be sustainable in the long run. No matter how unlikely this may seem, the Fourth Industrial Revolution can have significant implications for monetary policy making and the level and dynamics of inflation, interest rates and the exchange rate. Even before Industry 4.0, stepped-up technological development contributed to higher productivity which, in the view of many theoreticians and economic experts, is one of the main reasons behind the extended period of low inflation and the low-for-long interest rate environment. Further accelerated technological advances and the use of machines might contribute to making this environment the new normal, although there are many arguing this is already the case.

On the other hand, the not-so-long-ago hard and painful crisis stirred up acute caution in financial system regulators, resulting in revised requirements for higher capitalisation, liquidity and overall soundness of global financial institutions. Quite a number of studies and research papers suggest that these requirements, even though they were not intended to do so initially, had an impact on the functioning of certain segments of the financial market, notably the money market, and resulted in increased volatility and a sudden rise in interest rates. Even in an environment of low interest rates, tightened regulatory requirements, which coincide with fiscal measures implemented by responsible countries so as to put their finances in order (which have a restrictive monetary effect on banking system liquidity) may lead to sudden disruptions in the money market and short-term interest rates that central banks are trying to keep stable and predictable with a view to ensuring effective implementation of their monetary policy.

In early 2019, the Serbian banking system was faced with reduced excess liquidity and potential money market segmentation (the existing excess liquidity distributed among merely a few banks). This had the potential to spark protracted instability in the money market – a rise in short-term interest rates, segmentation of cash flows in the market and dented efficiency of monetary policy implementation. Having in mind the optimality of the solution which had to accommodate the specificities of the local money market, as well as the importance of

market psychology and the clarity of the signal that each monetary policy measure should send to market players, the NBS decided to implement FX swap auctions as a liquidity management instrument.

Similar to the abovementioned situation, the most influential central bank in the world, the Fed, faced a repo market shock in September 2019, when it needed to respond in order to quell a sharp spike in the short-term interest rates in the market it regulates. The rates, which up until that point fluctuated around 2% and were on a downward path due to slackening global economic growth, suddenly soared in certain transactions to over 10%, thus revealing irregularities in the functioning of the US money market. The Fed had to respond more intensively and with instruments guaranteeing a longer lasting effect compared to the NBS. First, it conducted overnight and then also longer-term repo operations through which it pumped in liquidity, and continued with more structural measures of liquidity injection through the purchase of securities – called by many people the new quantitative easing (QE 4 or QE-lite).

Are the causes of these problems similar, could the responses have been the same and is it possible to measure which of the central bank interventions was more efficient – these are some of the topics our paper seeks to explore. Besides the analysis presented in the December 2019 BIS Quarterly Review, to the authors' best knowledge, this is the first paper investigating the US repo market shock in September 2019. At the same time, this is the first paper comparing the situation in the US with similar ones in other countries, in this particular case – in Serbia.

Money market – A brief general overview

The money market is a vital part of a country's financial market. Financial institutions face liquidity needs on a daily basis, for its own sake as well as for the purpose of performing their clients' transactions. To meet their needs, banks which lack operational liquidity borrow funds from other banks (or other financial institutions) in the interbank money market.

The circulation of short-term liquidity takes place primarily in the form of repo transactions, which imply

granting collateralised loans (most often government securities), with the obligation of the borrowing party to return the funds within the agreed period of time, along with paying the agreed interest.

Some loans can also be unsecured, such as overnight and one-week loans in the Serbian money market. This usually implies the payment of a premium for credit or counterparty risk. After the global financial crisis, when these risks were greatly pronounced, unsecured loans in developed markets are losing significance, with the major portion of transactions performed in the repo market, notably in the overnight segment.

The money market is in the constant focus of central banks. Interest rates in the overnight money market are usually the operational objective of monetary policy, and move in line with the key (reference) interest rate of the central bank. The expectations of market participants regarding future movement in rates in the overnight money market (forward rates) are also an indicator of expectations of the movement in the key policy rate of the central bank, which has an important informational value in applying monetary policy.

Money market interest rates are benchmark rates for other instruments in the financial market, such as securities and financial derivatives. Given all of the above, it is exceptionally important that the money market functions efficiently and that interest rates are representative and credible. Over the last years, many central banks, together with other relevant institutions and market participants, have been involved in the reform of benchmark rates, taking special care of defining proper and detailed rules for their calculation and establishing precise supervision functions.

Money market in Serbia

Serbian money market can be equated with the interbank money market, as there are practically no transactions of banks with other economic agents or between other market participants.

In the past years, there were almost no repo transactions in the Serbian money market. The most active segment of the interbank money market are overnight unsecured transactions based on which BEONIA (Belgrade OverNight Index Average), as one of the basic interest rates, is calculated. There is also an increasingly active market of one-week loans (Figure 1).

In the past year and a half (June 2018 – December 2019),[1] overnight transactions made up over three-quarters of total turnover on average (77%). With the exception of

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1 In June 2018, the NBS began with the regular daily collection of data on money market transactions with maturities longer than overnight.

Figure 1: Turnover in the money market in the Republic of Serbia
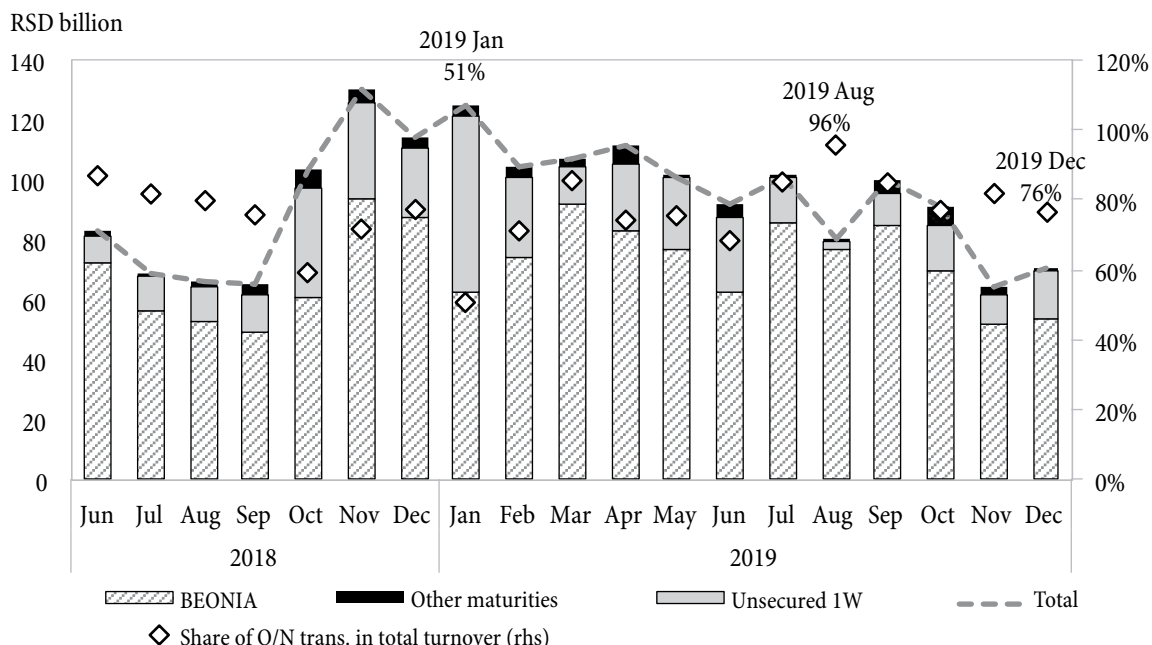
Source: NBS.

October 2018 and January 2019, the share of overnight transactions was over 60% in each month. However, compared to earlier periods (when the NBS was collecting data on a monthly basis), the share of slightly longer-term transactions (mainly one-week) increased.

Just like similar interest rates in the world (formerly EONIA, now €STR in the euro area), BEONIA is the main interest rate through which monetary policy decisions are passed on first to the money market and then, through the transmission mechanism, to other segments of the financial market, loans and the real economy. That is why efficient functioning of the interbank money market is of crucial importance.

The main NBS monetary policy instrument is the key policy rate (KPR) applied in main open market operations – one-week reverse repo transactions (absorbing excess dinar liquidity from the banking sector). The interest rate applied in these operations (the weighted average repo rate) is the main interest rate that governs other interest rates in the interbank money market. Through main operations and other monetary policy instruments, such as FX swap auctions, the NBS influences the dynamics of interest rates in the interbank money market and enables its stable and efficient functioning.

With the entry into force of the Law on Financial Collateral in early 2019, adopted upon the NBS's proposal, the legal regulations for the performance of repo transactions were complemented. For the first time in Serbia, this Law regulates the matter of contracted financial collateral in a systemic way, by ensuring higher legal certainty and protection in the settlement of receivables, primarily of qualified market participants, which are the main entities in financial market turnover.

Among other things, the Law on Financial Collateral eliminated the last obstacles for the conclusion of interbank repo transactions, given that the Master Repo Agreement, which was actively developed by the NBS and other relevant institutions, was adopted back in late 2014. As a result of these regulatory activities, several interbank repo transactions were concluded in 2019, where government securities were used as collateral.

Relevant regulation for the performance of repo transactions is exceptionally important for the stability and normal functioning of the domestic money market. The experience of the latest global financial crisis has shown that repo transactions were the main method of short-term interbank financing, because due to enhanced risk and mistrust, market participants practically refrained from unsecured lending. Apart from this, as they are collateral-based, repo transactions also contribute to the development of other financial market segments.

Additional NBS FX swap auctions (January–June 2019)[2]

In early 2019, against the backdrop of reduced excess liquidity in the Serbian banking system, primarily reflecting the restrictive monetary effect of the fiscal policy[3], the main interest rates in the interbank money market went up.

The period of enhanced volatility of short-term interest rates (primarily BEONIA, which is the most active segment of the interbank money market) began in the last quarter of 2018. From an average of 2%, where it stood from August to mid-October 2018, BEONIA increased to over 2.50% in a short period of time. This was partly a result of an already established effect which was a characteristic of the start of the required reserve maintenance period,[4] but largely due to the vigorous liquidity withdrawal based on government activities, where the state withdrew RSD 257.2

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2   FX swap auctions used for the said purposes are called "additional" so as to differentiate them from regular FX swap auctions organised by the NBS each Tuesday (three-month maturity) and Friday (two-week maturity) with the aim of encouraging the development of the interbank swap market.

3   Since 2015, government activities have mainly had withdrawing effect on banking sector liquidity. This has been particularly pronounced as of 2017, when the fiscal surplus was first recorded. In 2018 and 2019, liquidity withdrawal from the banking system based on government activities equalled RSD 226.5 bn and RSD 241.1 bn respectively. This effect is the result of positive fiscal trends, i.e. it was achieved due to two basic factors – higher public revenues in comparison to dinar public expenditures (accounting for between 80% and 90% of the effect) and the amount of issues exceeding the maturity of dinar government securities (between 10% and 20%).

4   The required reserve maintenance period starts on the 18th day each month in the year and ends on the 17th day in the following month. At the start of the required reserve maintenance period, banks apply the front-loading principle, i.e. higher allocation of dinar required reserves in their current accounts in the first days of the maintenance period, so as to timely ensure the fulfilment of obligations towards the regulator. For this reason, in the first days of the maintenance period, banks step up their borrowing in the interbank money market, which leads to a rise in short-term interest rates.

bn from the banking system in the first three quarters of 2019. However, fiscal policy cannot be blamed because two key factors which had a restrictive monetary influence – the balancing of the fiscal result, i.e. achievement of the surplus (higher revenue relative to expenditure) and the efforts to increase the dinar share in public debt (with the aim of reducing public debt and improving its currency structure, i.e. reducing exposure to the FX risk)[5] – resulted in overall positive effects on the Serbian economy.

It turned out, as explained hereinafter in more detail, that government activity was one of the key reasons for the significant liquidity contraction in the US banking system as well, which triggered a shock (a vigorous rise in interest rates) in the repo market in mid-September 2019. However, unlike the Serbian case and the above-explained positive effect, the liquidity in the US was affected by the government activities whose effect on the US economy was not favourable in the long run. These activities included liquidity withdrawal through intensive additional borrowing. Additionally, monetary and fiscal policies in Serbia acted complementary from the aspect of liquidity analysis, forecasting and management[6], as well. This was not the case with the US market having in mind that until the materialisation of the shock on the repo market, both the Fed and the Department of the Treasury impacted liquidity withdrawal from the market – the former through the normalisation of its balance sheet, the latter through the suspension of borrowing limits.

In the above-described domestic environment, banks' excess liquidity was gradually reduced and interest rates in the interbank money market fluctuated with stronger intensity – from October 2018 to 28 January 2019 BEONIA moved in the range of 1.89–2.54%, oscillating somewhat more than ±13% around the average range value, while

the rate on one-week unsecured loans was somewhere in the range of 2.15–2.80% in December 2018 alone, oscillating almost ±15% relative to the average (Figure 2). These trends continued until mid-February 2019, when higher amounts of government dinar bonds fell due (on 22 February 2019, over RSD 90 billion worth of three-year dinar bonds fell due).

A potential risk has arisen for a further increase in short-term interest rates due to potential undesired market segmentation). In an environment where only several banks have excess liquidity, while the majority has to borrow liquidity in the interbank money market, banks with excess liquidity would be encouraged to require abnormally high interest rates on funds they lend.

Acting proactively and with the aim to ensure smooth functioning of the money market, on 28 January 2019, the NBS used an instrument that was already at its disposal, but this time – to regulate dinar and FX liquidity of the banking sector – FX swap auctions, where in the first leg the NBS took FX in exchange for dinars that it sold to banks – on a two-week term.

The use of this instrument proved to be optimal in the situation assessed by the NBS as a temporary reduction in excess dinar liquidity. It was of essential importance that the NBS's communication with all participants in the domestic financial market had been at a high level for several years already, which the NBS had publicly reiterated several times.

The main objective of the above-mentioned operations was a proactive approach of the NBS with the aim of maintaining a stable liquidity situation in the banking sector and continued unimpeded functioning of the interbank money market.

Of course, the NBS had at its disposal other instruments for pumping liquidity into the banking system. However, against the backdrop of the continued structural dinar excess liquidity in the banking sector, reverse repo auctions (withdrawing excess liquidity) remained the main instrument for the regulation of bank liquidity, as well as signalling the monetary policy stance and the movement of short-term interest rates in the market.

Therefore, changing the direction of repo operations or simultaneously introducing active repo operations to

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5   At end-November 2019, the share of dinar debt in Serbia's total public debt was 27.9%, up by 7 pp compared to end-2016. In the same period, the share of dollar debt declined by 14 pp, from 33.9% to 19.9%. This largely reduces the exposure of public debt to the FX risk, particularly towards the dollar as the currency whose movement against the dinar cannot be influenced by the NBS (or its influence is only in regard to the dinar exchange rate against the euro – by maintaining its relative stability, while the EUR/USD exchange rate is rather volatile).

6   Monetary policy factors (primarily NBS interventions in the form of net FX purchases in the domestic FX market) acted with the aim of increase in dinar liquidity, i.e. as "a compensating factor" in terms of balancing banks' reserves.

Figure 2: BEONIA and excess liquidity in the banking system
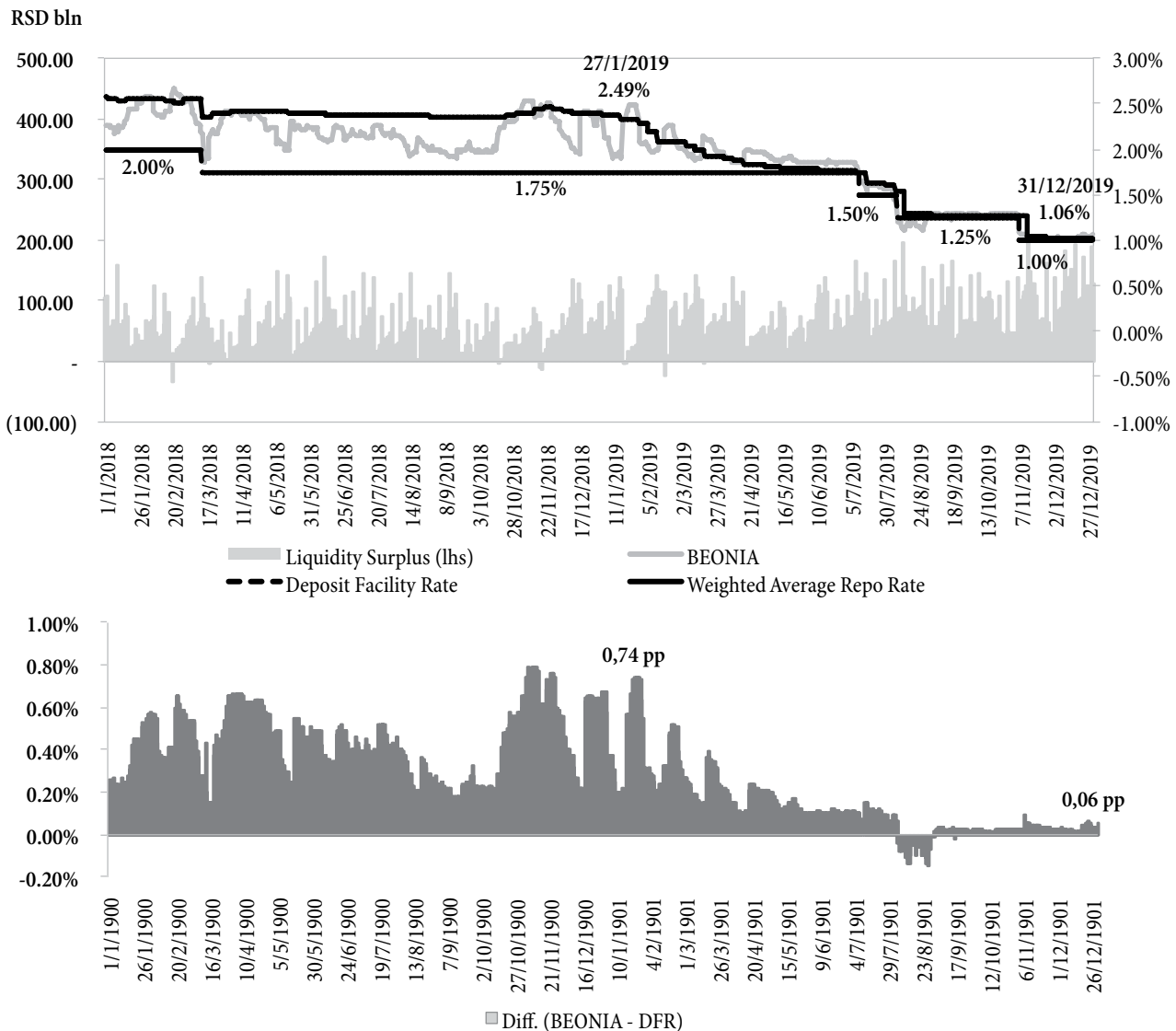
Source: NBS.

provide liquidity to banks was not the optimal solution along with the already existing reverse repo operations, as this could have sent an entirely unclear signal to money market participants about monetary policy, i.e. about what the NBS wishes to achieve with its repo operations.

The NBS reacted promptly to the first hints of such developments.

The very first additional swap auction, held on 28 January 2019, had a significant positive effect. Banks were provided with dinar liquidity for a period of two weeks, in the amount of RSD 22.5 billion (while EUR 190 million was withdrawn from banks as a form of financial collateral). BEONIA rate was lowered to around 2%, i.e. by almost 50 bp. Interest rate fluctuations in the interbank money market continued even after the first additional

swap auction, meaning that liquidity in the banking sector was not yet fully balanced. Due to these reasons, the NBS organised six more additional FX swap auctions to enable the banking sector to gradually adjust to the improved liquidity in the money market. This resulted in considerably lower level and volatility of interest rates in the interbank money market (BEONIA, rate on one-week interbank transactions, average repo rate).

In addition to trimming interest rates, additional FX swap auctions enabled the NBS to achieve yet another goal – to reduce the oscillations in these rates, which were up until that point present in periods before the beginning of the new required reserves maintenance period. By organising a series of additional FX swap auctions, interest rates in the interbank money market were fully balanced, as was

Figure 3: Dynamics of the main money market rates in 2019
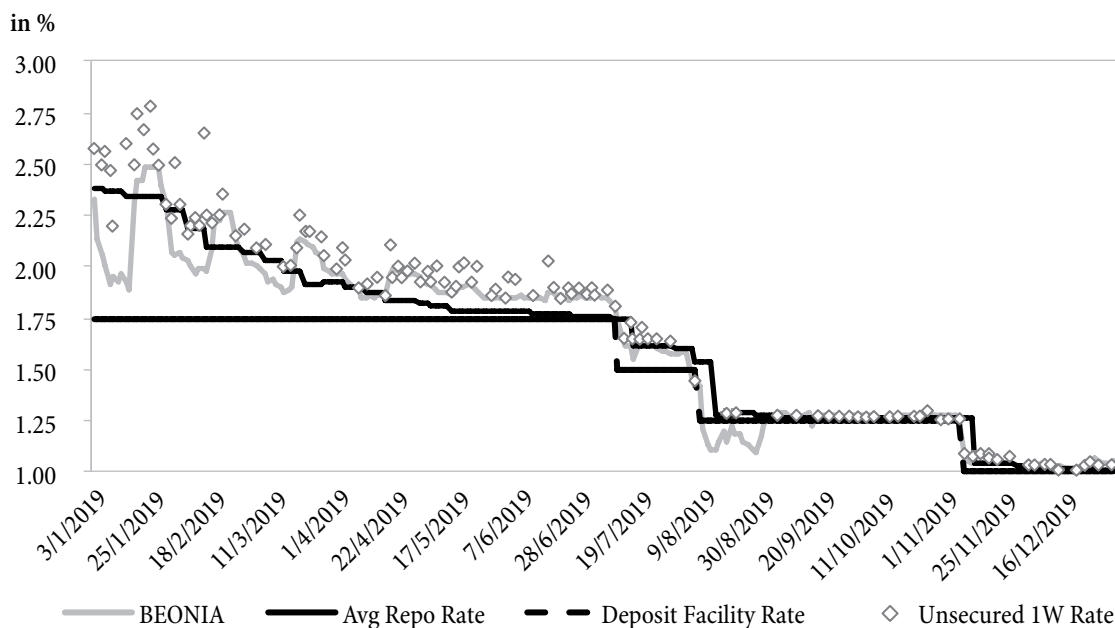
Source: NBS.

the banking sector liquidity, which allowed for a gradual mitigation of BEONIA volatility. A key contribution came from the NBS's decision to implement these operations, as well as from the clear and credible signal that was sent to market participants – that there is no alternative to stability.

Figures 2 and 3 clearly show the reduction of volatility of the market interest rates and their convergence to the deposit facility rate (considered a theoretical lower bound of money market interest rates), which is the result of improved liquidity in the banking sector owing to activities and measures taken by the NBS.

Concurrently with organising additional FX swap auctions, another important measure that contributed to the reduction of interest rates in the money market was the NBS's strategic decision to decrease the percentage of dinar liquidity it withdraws via reverse repo operations (relative to bank bids on repo auctions). This enabled the relaxation of monetary conditions without changing the main instrument (the weighted average rate was lowered, while the key policy rate remained unchanged). This specificity of the NBS's approach proved very efficient in making the implementation of monetary policy more flexible. At the onset of the situation with lower liquidity surplus, early in 2019, the NBS decided to decrease the volume of liquidity it withdraws through reverse repo auctions (Figure 4) in order to keep a somewhat larger

amount of disposable reserves in the market (among banks), i.e. at the disposal of banks for their everyday operations, without threatening the normal functioning of the interbank money market.

Figure 4 shows that in 2018, the NBS accepted almost all bank bids in reverse repo auctions (95% on average). However, with a decrease of banks' excess liquidity and the need to pump dinar liquidity into the banking system through FX swap auctions, the NBS decided not to withdraw the entire bid of the banks in reverse repo auctions. On average, 73% of the offered amount was withdrawn in 2019. The difference is also noticeable when we compare the first and the second half of 2019 – in the first six months, the percentage of the withdrawn bidding amounts was 64%, while in the second half of 2019, when the liquidity of banks improved, the percentage also increased – to 82% on average.

These monetary policy measures, i.e. measures to regulate the banking sector liquidity, had an important effect on lowering market interest rates along the entire short-term yield curve (overnight lending and one-week loans, as well as BELIBOR interest rates[7]). From

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7 BELIBOR (Belgrade Interbank Offered Rate) interest rates of certain maturities are benchmark interest rates for dinar assets offered by banks – participants in the BELIBOR Panel, in the Serbian interbank market. BELIBOR rates are banks' quotations and are not based on conducted transactions.

Figure 4: Percentage of bank bids accepted in reverse repo auctions (2018–2019)
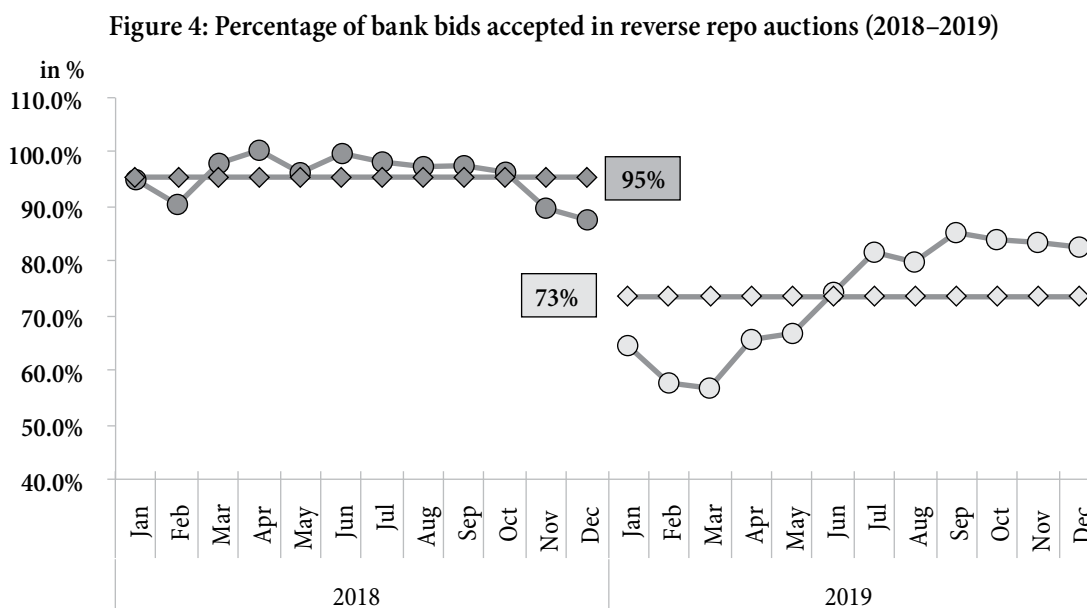
25 January (right before additional FX swap auctions were organised) until 11 July (before the first decrease of the NBS key policy rate and rates on deposit and credit facilities, i.e. interest rate corridor in 2019), based only on the organised additional FX swap auctions and the decision to withdraw, via reverse repo operations, a somewhat lower amount of liquidity than the banks were willing to put in repo – interest rates along the short-term yield curve were lowered by 46 bp on average. At the same time, the largest effect was exhibited in market interest rates, i.e. rates based on real transactions (BEONIA, average repo rate and one-week (1W) interbank loans), which decreased during the respective period by 59 to 77 bp, on average by 70 bp (Figure 5, left panel). Quite expectedly, the effect on BELIBOR rates, which are based on bank quotations and are therefore more sensitive to changes in the main interest rates corridor, was much softer, and they were lowered by 24–37 bp, on average by 28 bp, in the said period.

These interest rate cuts illustrate the efficiency of monetary policy measures which the NBS implemented in the first half of 2019 and which spilled over entirely onto the financial market.

Afterwards, in the second half of the year, the NBS lowered the main interest rates corridor in three instances – in July, August and November, each time by 25 bp. These measures spilled over entirely onto the market interest rates. The average decrease in rates along the entire short-term yield curve was almost 1 pp (more precisely, 99 bp), i.e. it was higher than the cumulative narrowing in the main interest rates corridor (which narrowed by 75 bp). However, the reactions here were structurally different than in the first subperiod – market interest rates were lowered by 73 bp on average, i.e. they fully reflected the narrowing of the interest rates corridor, while the quoted BELIBOR rates reacted with a sharper fall – by 118 bp on average. Taking both subperiods into consideration (from the additional swap auctions that were organised to the first narrowing of the interest rates corridor, and from the first lowering of main rates until the end of the year) – interest rates along the entire short-term yield curve dropped in cumulative terms virtually at the same intensity (by 145 bp on average).

Consequently, as a result of the NBS's monetary policy measures, short-term dinar rates declined to their all-time low levels around 1% – BEONIA, average repo rate and the 1W rate hovered slightly above 1% at the end of 2019. Additionally, not only did the monetary policy measures spill over entirely onto interest rates in the money market, but their movements were almost fully consistent, even when we take into account the implied interest rates in the overnight FX swaps transactions between banks and their clients[8] (Figure 5, right panel).

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8   Non-residents borrow dinars through swaps and create dinar liabilities.

Figure 5: Movements in short-term interest rates in 2019 – impact of NBS measures
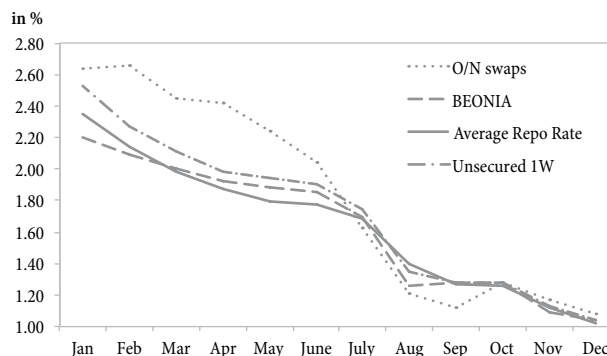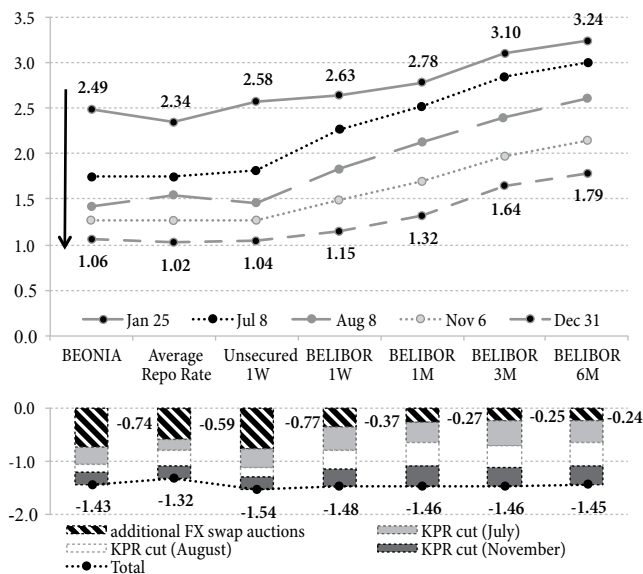
Source: NBS.

US money market – General overview

As recently reiterated by John Williams, President of the Federal Reserve Bank of New York – by controlling short-term market rates, the Fed seeks to achieve its main objectives – price stability and maximum employment. At the same time, the Fed determines its key policy rate (Federal Funds Rate – FFR), as the corridor (range) within which the rate on unsecured overnight loans between banks (EFFR – Effective Fed Funds Rate, such as the Serbian BEONIA rate) should oscillate. The current FFR target range is 1.50-1.75%, and during 2019 it was trimmed on three occasions,[9] each time by 25 bp. Like other central banks, the Fed strives to influence the interest rates in the money market by maintaining an optimal level of liquidity in the system,[10] through repo operations (repo/reverse repo) and by setting remuneration rates[11] and rates on overnight reverse repo operations.

A key segment of the US money market is the repo market, which provides liquidity and the basis for pricing transactions and instruments in other segments of the financial market (such as the financial derivatives market). Repo transactions, where securities are traded (for cash funds) with the obligation to be repurchased after an agreed period of time and at the agreed price (borrowed money plus agreed interest), regardless of its modality (bilateral or tri-party repo) – stands as the main source of liquidity for many market participants (banks, companies, insurance undertakings, hedge funds, money market funds). For the most part, repo transactions are of the shortest – overnight – maturity, but they are almost always rolled over, and US Treasuries and agency securities are most often used as financial collateral.

An analysis in the latest BIS Quarterly Review in December 2019 [1] indicates heavy reliance of the US repo market on four (unnamed) large banks which stand apart as net lenders. The review continues to point out a very important factor that led to growth in interest rates in the repo market, namely an indication of strong concentration of liquidity reserves in the market – although four big banks have been marginal net lenders since 2011, during 2018 and in particular during 2019 the amount of net loans from these banks to the repo market doubled to almost USD 300 billion around mid-year (June 2019). Concurrently, the non-banking financial sector's demand for monetary assets increased, and these institutions (such as hedge funds) financed it through repo transactions where US Treasuries were the collateral.

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9   In August, September and October 2019.

10 When the system is in a state of optimal level of excess liquidity, interest rates are within the limits of the target range. When there is a deficit or an insufficient level of excess liquidity, an increase in market interest rates ensues.

11 The rate that the Fed pays to the banks for reserve liquidity kept with the Fed – on required reserves (IORR) and excess reserves (IOER).

Figure 6: Fed's balance sheet (August 2007 – January 2020)
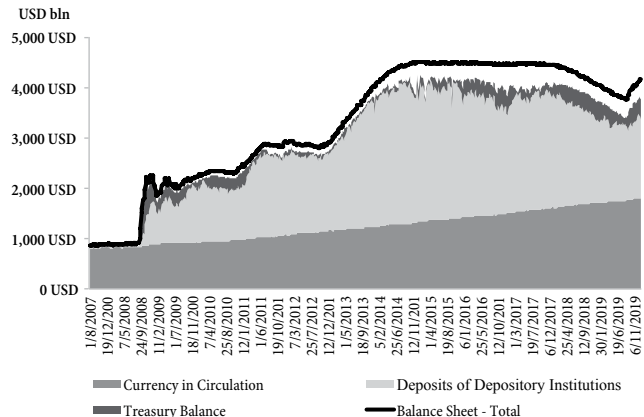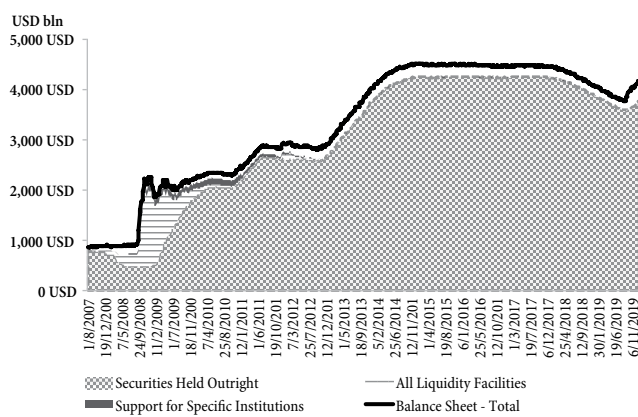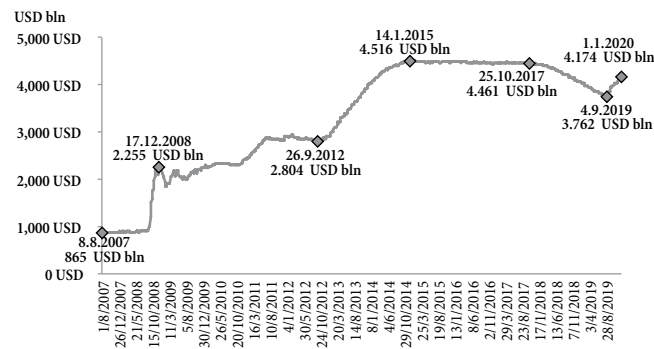
Source: Fed, USA.

In response to the great financial crisis, after lowering the rates to zero level[12], the Fed launched a strong process via (so far) three official rounds of quantitative easing[13] (Figure 6). By purchasing US Treasuries and Agencies' securities, the Fed made room for the reduction in interest rates along the entire yield curve, as well as for a robust increase in its balance sheet, while banks accumulated a significant part of the reserves with the Fed. As of the escalation of the global economic crisis and until 2015, the Fed's balance sheet increased almost constantly (from USD 870 billion in August 2007 to USD 4.5 trillion in early 2015). This was followed by a period of refinancing of matured US Treasuries, and from October 2017 to September 2019, in accordance with the programme of balance sheet normalisation, the Fed's total assets went below USD 3,800 billion. After the latest shock in the repo market in September 2019, and as a result of the reaction to the Fed's measures implemented in order to stabilise the interest rates in the interbank money market, the Fed's financial assets again started to increase.

As the size of the Fed's balance sheet changed, so did its structure to a certain extent. Although the securities portfolio accounted for more than 90% of total Fed assets even before the global economic crisis, as it does now, its share was not constant, and it changed depending on monetary policy measures of the most influential central bank in the world. At the beginning of the global economic crisis, the level of securities dropped sharply, as did their share in total assets (to only 20%), because the Fed used the proceeds from their sale to finance loans approved through liquidity funds. As liquidity instruments decreased, the total amount and the share of the portfolio of securities began to increase again during 2009, and as of 2011 they again accounted for almost all of the Fed's assets (more than 90%). This was the result of a series of large asset purchase programmes within quantitative easing. The winding down of the Fed's balance sheet within monetary policy normalisation was accompanied by an identical reduction in the portfolio of securities whose maturity

12 On 16 September 2008, the target range for the federal funds rate was lowered to an all-time-low (0.00–0.25%).

13 QE – Quantitative easing programmes, began in December 2008 and, with occasional breaks, lasted until October 2014 in three stages – QE 1 (December 2008 – March 2010), QE 2 (November 2010 – June 2011) and QE 3 (September 2012 – October 2014).

was not rolled over. Hence their share remained above 90%, with the reduction of the total amount (Figure 7, left panel).

As for the other side of the balance sheet, i.e. liabilities, changes were somewhat different. Cash in circulation recorded gradual but constant growth. However, reserves (deposits) of deposit institutions with the Fed rose dramatically relative to the pre-crisis period, which is a result of the Fed's major liquidity injection in the system. Before the crisis, the reserves accounted for only 2–3% of the total balance sheet, whereas after the first monetary measures, i.e. the injection of liquidity as the crisis escalated, their share hiked to 40% and then gradually increased to more than 60% (Figure 7, right panel). At the onset of the crisis, a more important role was that of increased liquidity withdrawal by the Government, reflected through the higher share of the Treasury's account in total liabilities.

A very symptomatic and useful conclusion is derived from the analysis of data on the dynamics, i.e. change in the Fed's balance sheet composition. Banks' reserves with the Fed almost doubled from October 2012 (from a little more than USD 1,400 billion) to August 2014 (to around USD 2,800 billion). The main reason for this increase can be found in Fed asset purchases under the QE programme. However, in the last two years (from September 2017 to September 2019), bank reserves decreased considerably, by almost a trillion dollars – from around USD 2,400 billion to around USD 1,400 billion, which, according to some economists and analysts, is at or below the critical level of bank reserves [11]. This was one of the underlying reasons for the spike in repo market rates, as banks refrained from lending their liquidity. However, it

was government activities that landed the final blow to banking sector liquidity. During the month preceding the spike in interest rates, bank reserves dropped by USD 166 billion, which is almost fully attributable to government's liquidity withdrawals – the Treasury account balance at Fed (TGA – Treasury General Account) went up by USD 170 bn (Figure 8).

Given the time span of the Fed's monetary easing measures in the post-crisis period, banks became largely accustomed to the abundant liquidity situation (hysteresis effect). This significantly aggravated market functioning once the Fed, after being the main source of liquidity for a number of years, decided to cut down its balance sheet. Banks got used to the high level of liquidity in the system and based their own and their clients' operations on such assumptions. Blake Gwinn, the NatWest Markets analyst, observantly noted: "The longer they go on as the major source of liquidity, the harder it's going to be to extricate themselves" [11].

As the Fed started to wind down its balance sheet in October 2017, there was a more durable decline in banks' reserves with the Fed. Given that the US is constantly increasing its public debt (Figure 9) through issues of US Treasuries[14], the rise in supply (coupled with the Fed's shrinking demand) pushed repo interest rates above the rate paid by the Fed on excess reserves (IOER) in mid-2018.

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14 The US, in what is already a customary practice, raises the limit (ceiling) of its public debt, and occasionally even suspends the previously defined limit. The latest debt limit suspension was passed in August 2019 and was planned to stay in effect until end-July 2021. Since August until year-end, the US public debt rose by around USD 1,200 bn (by over 5%), increasing by two and a half times relative to the pre-crisis level.

Figure 7: The share of certain items in the Fed's balance sheet
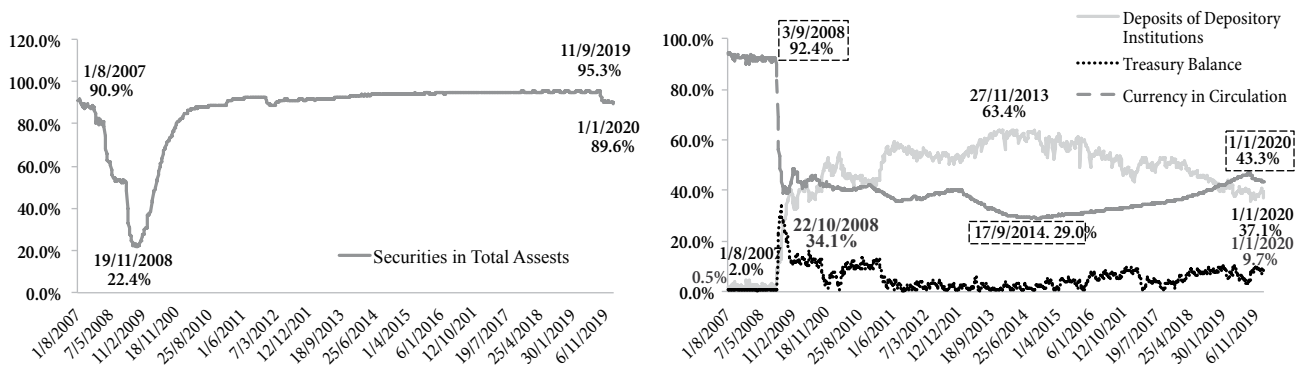
Sources: Fed, USA and authors' calculations.

The US banking sector, which had up to that point been the net borrower in the repo market, now became the net lender, with two coinciding trends in place – the four largest banks which in the past acted as lenders for almost 10 years, doubled their loans in the repo market in the past two years, while the demand of other banks for financial resources in the repo market declined [1].

As lending in the repo market gained ground, the portfolio of US Treasuries in US banks increased, especially in the four largest banks, whose share of Treasuries in disposable liquid reserves[15] rose from around 25% to over 40% in just two years, while all other US banks experienced a slower rise in this share (from around 16% to around 24%). In mid-2019, the four largest banks held over one half of the total portfolio of US Treasuries in the banking sector, while the aggregate contribution of the following 26 banks was 40%. At the same time, according to data

from the BIS analysis, these four banks accounted for merely one quarter of reserves, i.e. funds they could lend in the repo market; it therefore became clear that their ability to supply funding to borrowers at short notice in the repo market was diminished, which turned out to be one of the structural reasons behind the interest rate hike in mid-September [1].

The other structural reason was the increased withdrawal of bank reserves through government activities (similarly as in the case of Serbia), reflected through increased balances in the TGA, especially after 2015. A very important event that took place in early August 2019 was the debt ceiling suspension, allowing for additional government borrowing, i.e. withdrawal of liquidity from the banking system. This additionally reduced the banks' capacity to respond to the repo market demand. Once the reserves dropped below the level considered as optimal (or the minimum below which liquidity reserves in the US banking system should not fall), banks were no longer

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15 Disposable reserves = cash + Fed funds + reserves (account balances) + Treasury securities.

Figure 8: Impact of changes in individual Fed balance sheet items on changes in bank deposits with the Fed
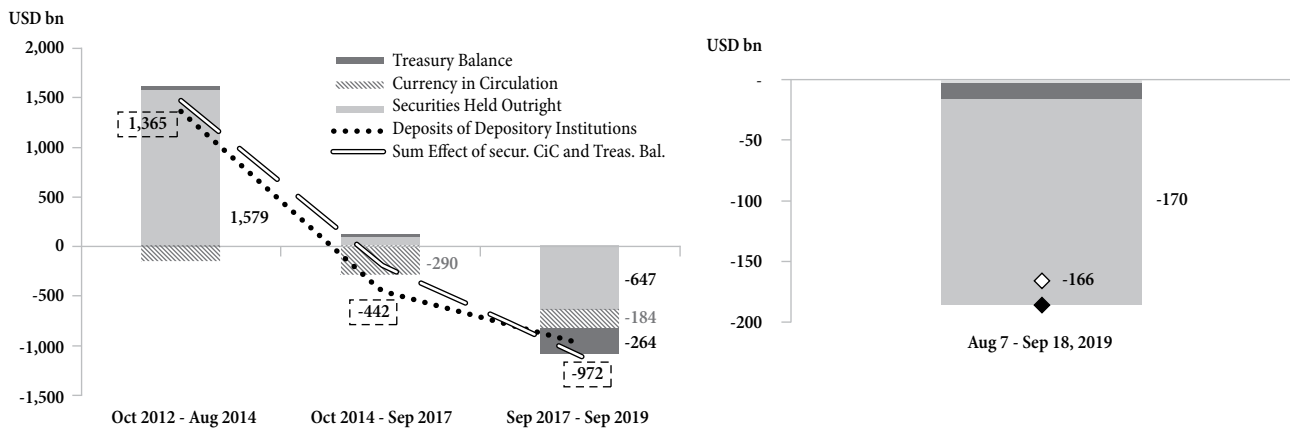
Source: Fed, USA and authors' calculations.

Figure 9: US public debt (2005-2019 and during 2019, in US bn)
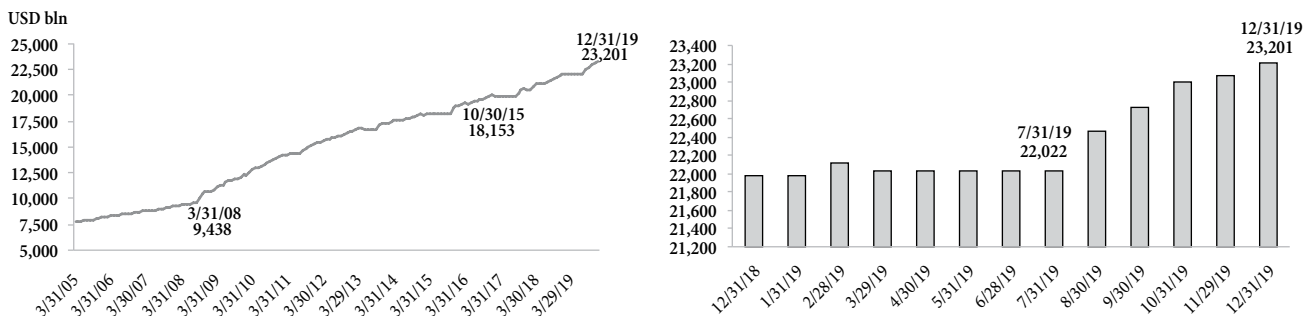
Source: Bloomberg.

ready to lend, which inevitably triggered an abnormal rise in repo market rates.

The importance of public debt increase, as a structural factor, is evidenced in the fact that over USD 120 billion of reserves were withdrawn from the banking sector in only one month, almost solely as a result of government activities (i.e. increased TGA balances). Surely, this factor cannot be viewed in isolation. Since the Fed started to wind down its balance sheet (by reducing the portfolio of US Treasuries and agency securities), bank reserves went down significantly (from 25 September 2017 until 14 August 2019, bank reserves declined by over USD 600 bn, almost entirely as a result of the above factor (reduced balances in the Fed's SOMA – Single Open Market Account) – Figure 10.

Hence, the conclusion is clear: the high level of liquidity reserves to which the banks were accustomed was initially reduced through the Fed's actions to cut down its balance sheet, whereas, once the level of reserves reached a critical limit, the decision on the suspension of public debt and the resulting greater liquidity withdrawals through government activities ultimately led to banks' aversion to lend in the repo market, which triggered a short-term cessation of its normal operation and a sudden hike in interest rates.

This should be viewed in combination with certain other factors that pushed up the banks' reserves floor, i.e. the reserves limit below which banks are reluctant to lend in the repo market. Many discussions of economists and market participants mention regulatory, i.e. supervisory requirements resulting from the global economic crisis, aimed at boosting financial system stability. One of such indicators is the LCR (Liquidity Coverage Ratio) which requires the holding of sufficient HQLA (High Quality Liquid Assets) to cover bank liabilities due in the next 30 days.

As also stated in the BIS study, although regulations stipulate that both account balances (bank reserves) and the portfolio of US Treasuries belong to the HQLA class, in practice, banks prefer to hold a somewhat higher reserve buffer, both for everyday operations and to ensure faster marketability in the event of disturbances in the secondary securities' market or the repo market, through which they can raise cash.

That the mid-September spike in interest rates was fuelled not only by liquidity supply factors, but also by increased liquidity demand in the repo market, is evident from the fact that hedge funds and other borrowers in the money market stepped up their demand in order to cover their arbitrage transactions. In an environment of limited money supply, where, in addition to banks, money market funds (MMFs) also cut down their role of liquidity distributors (which they had played since 2017, owing to good earning opportunities), the increased demand by hedge funds caused an indisputable halt in repo market operations [1].

The Fed had to respond to prevent a crisis spillover to other segments of the financial market which, to reiterate, largely depend on this lifeline and the main source of short-term liquidity. The combination of factors that led

Figure 10: SOMA account balance – Composition
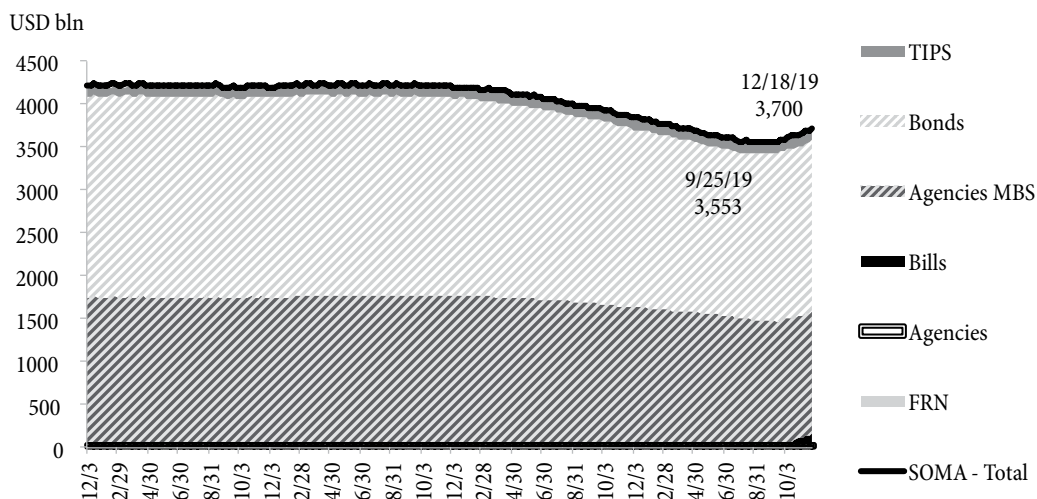
Source: Federal Reserve System, US.

to the above described shock in the US repo market, also required a combination of measures to put interest rates under control.

The section below focuses in more detail on short-term and longer-term measures taken by the Fed to stabilise the repo market. The short-term measures included prompt initial response to put out the fire. Already after a few overnight repo auctions, it became clear that a more decisive response of monetary authorities was needed in order to convey the key message – one that emphasises the credibility of the applied measures as well as central bank's commitment to fix the new situation at its root. The demand at overnight auctions was, thus, swiftly replaced by demand in longer-maturity repo auctions (two weeks), after which the Fed adopted a series of structural liquidity-boosting measures, the most important of which was definitely the renewed buyback of US Treasuries, whereby at least two complementary objectives were met: direct increase in bank reserves and lowering of money market interest rates (directly and indirectly, through increased demand for US Treasuries).

US repo market crisis (September–December 2019)

On Tuesday, 17 September 2019, the US banking system saw a marked excess liquidity squeeze, sending shockwaves through the world's most liquid and most active repo market and triggering a surge in short-term interest rates.

Money market rates, which had previously hovered around 2%, increased dramatically to over 5% on average (Figure 11, left panel), while in some transactions they reached as much as 10%.

Analysts, economic experts and officials put forward different theories and opinions to explain the cause of such repo market developments in the US, but questions mostly boiled down to the following: Was this an incident or a problem that was more durable in nature? Was the response of monetary authorities well-calibrated? Can monetary policy resolve the issues causing such reaction in a market that is the basis of short-term liquidity, if they are not monetary in character but refer rather to fiscal and/or regulatory issues and requirements?

Two things are certain:

- First, monetary policy is not a panacea, and
- Second, the same monetary policy instruments produce different effects in different countries, even when applied to the same monetary phenomena. The specificities at the root of a problem determine the optimality of an approach and its success.

The factors behind the dip in liquidity are numerous and may even be said to represent a "confluence of events" [25]. Some of them were short-term, momentary and had the initiating effect of a "straw that broke the camel's back". However, a deeper analysis of causes which led to a situation where a momentary event was capable of setting off such a shock in the money market, reveals that there are structural, longer-term and more substantial reasons behind the problem at hand.

The following momentary events which led to liquidity withdrawal from the banking system in mid-September stand out in particular:

- Collection of quarterly taxes from the corporate sector;
- Settlement of a new issue of US Treasuries amounting to close to USD 80 bn.

Figure 11: Dynamics of short-term interest rates (SOFR, EFFR, IORR/IOER)
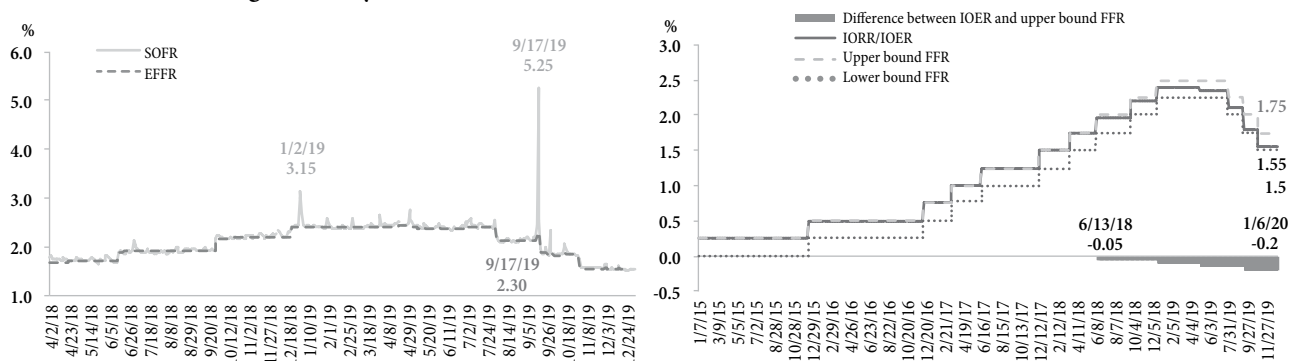
Source: Bloomberg.

Naturally, the question arises as to how it is possible that the two events, even if they coincided, could have triggered such a dramatic surge in market interest rates. Is something bigger at the root of the problem? Many economists rightly note that the factors behind reserves' drop below the "optimal level"[16] included a rise in the US public debt and a heavier issue of US Treasuries, which mop up liquidity from the system, all against a backdrop of the Fed's balance sheet decline. Another factor mentioned in a number of discussions relating to this topic, reflecting the structural character of the liquidity squeeze and the interest rate rise, are regulatory requirements, mostly relating to the LCR[17] which requires banks to hold a certain level of HQLA (High Quality Liquid Assets), resulting in a higher threshold for liquidity reserves which banks are required to hold as additional security (that is, capital requirement) against sudden outflows over 30 days.

In October 2019, Jamie Dimon, the chairman of JPMorgan Chase & Co., pointed out that one of the reasons why banks couldn't put their spare cash (reserves) to a "more profitable use" is that the rules adopted since the financial crisis stake too many regulatory requirements for banks. He said that bank deposits with the Fed were earmarked for "resolution and recovery, and liquidity stress testing" and that they could not be lent in the repo market although the banks "would have been happy to do it" [3].

Another post-crisis liquidity-related regulatory measure, which banks often cite as a factor limiting the liquidity available for investment in the repo market (whether justifiably so or out of a wish to seize upon this moment to blame the regulator), has to do with intraday loans which banks were able to take from the Fed before the global economic crisis. Goldman Sachs Group Inc. is one of the most vocal advocates of a more flexible approach by the Fed on this issue (reintroduction of these loans) [3].

Also interesting was the way officials responded to such banks' remarks. The US Treasury Secretary Steven Mnuchin supported these views by saying it was a reasonable question whether the US has "gone too far in the other direction in requiring the banks to maintain this excess liquidity for intra-day operations" [3]. The Fed did not remain indifferent either and expressed willingness to consider changing some of liquidity-related regulatory measures[18], thereby implying banks were right to complain.

Finally, another factor, among many others, dampening banks' readiness to lend in the repo market is the fact that the interest rate the Fed pays on required reserves (and excess reserves, IOER – Interest on Excess Reserves) was at similar level as repo market interest rates. Only after mid-June 2018 did the rate paid by the Fed on excess reserves and bank deposits drop below the upper bound of the FFR (Federal Funds Rate). Hence, this did not provide enough incentive for banks to lend to other participants in the money market, in view of declining total reserves and regulatory requirements calling for these reserves to be higher (Figure 11, right panel).

In the first half of September 2019, just before the shock in the repo market, the IOER rate was on average only 3–4 bp lower than the money market interest rates (SOFR and EFFR), which was not enough to make banks relinquish their security with the Fed for riskier transactions in the money market. By contrast to the US, the remuneration rate for required reserves in Serbia is at all times at least 25 bp lower than the lower bound of the deposit facility rate, while no interest is paid on excess liquidity in current

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16 This is put at somewhere between USD 1,300 and 1,500 bn. It is considered that the Fed's goal is to create a more voluminous buffer in the form of excess liquidity in the banking system. Excess liquidity in the US banking system in mid-October, when additional measures were introduced by the Fed, came at around USD 1.3 trillion (USD 1.5 trillion of liquidity – USD 0.2 trillion of required reserves). However, regulatory tightening after the outbreak of the 2008 crisis calls for banks to hold much higher liquidity levels. Numerous financial and economic analysts believe that the required minimum reserve level is "not economically correct," as market structure and regulations together (including minimum RR, LCR – the requirement to hold a high share of liquid assets with financial institutions, and other regulations) pushed up liquidity requirements to around USD 1.5 trillion, which was their level during September. Analysts therefore believe that it is this amount (USD 1.5 trillion) which is the "realistic", i.e. economically relevant level for US banks' reserves at Fed.

17 LCR – Liquidity Coverage Ratio – ratio indicating banking sector's short-term resilience, particularly to the liquidity risk. This is the ratio of high-quality liquid assets (HQLA) and liabilities coming due in the next 30 days. It is the product of the Basel III standard, and came as a response to the liquidity crisis which emerged during the peak of the global economic crisis when even banks with sufficient capital adequacy found themselves short of short-term liquidity as liquidity demand increased. The minimum level of this ratio is 1 (or 100%).

18 In his press conference on 30 October, Jerome Powell highlighted the possibility of allowing "daylight overdrafts" (intraday loans), though pointing out that liquidity in the market is ample and that a rewrite of capital or liquidity requirements was unlikely.

accounts (deposit facility rate is currently 1%, while the remuneration rate is 0.75%).

The excess liquidity crunch early in the week before 17 September led to an increase in banks' financing needs in the overnight (O/N) repo market, which was followed by a sharp rise in money market interest rates.

• The SOFR[19] (Secured Overnight Financing Rate – formed on the basis of overnight secured loans) first edged up slightly on Monday, 16 September, from 2.2% to 2.43%, only to rise to 5.25% on 17 September, when volatility in the US money market reached its peak, which was as much as 300 bp above the upper bound of the FFR (Figure 11, left panel), while rates on a number of repo transactions performed on that day equalled as much as 10.00%[20].

• The EFFR (Effective Federal Funds Rate – formed on the basis of overnight unsecured loans) breached the upper bound of the FFR on 17 September for the first time since 2008. However, it rose much less than the SOFR, which could be attributed to the fact that the EFFR is much less representative than the SOFR, given the volume of transactions in their underlying markets (e.g. on 17 September, the volume of trading based on which the EFFR is formed was almost 20 times lower than the SOFR-related turnover).

In the face of heightened market volatility, the Fed had to intervene immediately to prevent jeopardising other financial market segments that rely on the money market, more specifically – the repo market. The initial reaction of the Fed was to organise overnight repo operation of supplying liquidity on 17 September (with USD 75 billion limit), and the objective was to keep the EFFR within the benchmark federal funds rate range (2.00–2.25% at that moment). This was the Fed's first overnight repo operation of supplying liquidity in the previous ten years.

The Fed continued with overnight repo operations in identical amounts in the remainder of the week (18, 19 and 20 September), announcing on 20 September a series of daily overnight repo operations from 23 September through 10 October 2019. On that occasion, the Fed stressed that in addition to the said operations it would also carry out operations of longer maturity (two-week).

The Fed's interventions produced the intended effect – the SOFR declined, but rose again just a few days later. A possible explanation might lie in the oversubscribed auctions held on 24 and 25 September 2019, where bank financing needs amounted to around USD 234 billion, while the Fed accepted bids in the amount of USD 180 billion[21], somewhat more than 75% of the total bids.

However, at the overnight repo auction held on 26 September, demand amounted to just around USD 50.1 billion (significantly below the offered USD 100.0 billion), while at the two-week repo auction (around USD 72.8 billion) it exceeded the Fed's supply (USD 60.0 billion). Already then this suggested a more durable liquidity problem, i.e. that the market needs for liquidity were of a longer-term character and that for the same reason banks focused on repo operations with extended maturity once the two-week auctions had been announced as additional.

It became clear thereafter that the Fed would have to implement liquidity-injecting repo operations, held for the first time in ten years, over a longer time horizon. A series of announcements ensued until the end of 2019, concerning repo operations where the amounts of overnight and term transactions were changed, but new instruments were also introduced, such as the repurchase of US Treasuries and agency securities. Though Fed officials noted that these high liquidity injections did not amount to a new round of quantitative easing (QE 4), but that they were reserve management transactions[22], it was obvious that the Fed

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19 In 2017, the Alternative Reference Rates Committee (ARRC) identified SOFR as the benchmark rate that could replace, i.e. take over the function of USD LIBOR rates in the money market, as the SOFR is aligned with IOSCO principles. The ARRC finds the SOFR more resilient than the LIBOR, mostly because of the way in which it is formed; the transition from USD LIBOR to SOFR has been planned to be completed by end-2021.

20 Data sources: Bloomberg and the Fed, USA.

21 Ibid.

22 Fed Chairman Jerome Powell and other representatives of this institution repeatedly insisted that such balance sheet enlargements should not be confused with the previous QE programme. Namely, unlike the asset purchase in the wake of the 2008 crisis (QE programme), the new programme should not be observed as a monetary stimulus – in its announcements the Fed pointed out that these actions are purely technical measures to support the effective monetary policy implementation. However, many call the new purchase of US Treasuries "QE-lite".

would shortly have to go back to the previous balance sheet level which provided ample reserves.

On 11 October, the Fed decided on the purchase of US Treasuries in the coming period[23], to sustain the high liquidity level in the US banking system. The underlying logic was to prevent a new interest rate spike in the money market, such as the one recorded in September. In parallel with these additional measures, the Fed continued with overnight and term liquidity-supplying operations.

Finally, on 12 December, the Fed announced it would carry out repo operations (overnight and longer maturities) with greater intensity and inject around USD 500 billion of liquidity in the system, to ensure that the supply of reserves remains ample and to mitigate the risk of money market pressures around year-end that could adversely affect policy implementation.

Economists and analysts note that the SOFR rose by as much as 282 bp on 17 September, while the overnight USD LIBOR rate increased on the same day by only 5 bp, which is why they think that the Fed cannot claim with certainty that the SOFR is an adequate substitute for the USD LIBOR rate, bearing in mind a huge discrepancy in their trends in the previous days. They add that the SOFR credibility depends directly on the credibility of the Fed's measures and the capacity of this institution to mitigate volatility in the overnight repo market.

It is the credibility of signals that constitutes a major difference between the initial responses of the NBS and the Fed in two similar situations faced in 2019. The NBS responded instantly with operations with somewhat longer (two-week) maturity, showing that it is aware that liquidity is needed for a longer period than overnight. It was clearly communicated to market participants that there is no alternative to stability, and that liquidity will be monitored in the coming period as well in order to be able to respond timely. It took only seven additional FX

swap auctions (in the period of six months – from January to June) for the market to entirely accept a new operating model providing sufficient liquidity, and for the NBS to make sure there is no volatility in short-term interest rates even at the beginning of the required reserve maintenance periods, which was common in the prior years.

In contrast to the NBS's approach, the Fed, though also responding promptly by conducting repo operations to stabilise market interest rates initially, introduced two critical differences which required the use of longer-term measures later on:

- First, overnight repo auctions were conducted, i.e. market participants did not know whether and for how long they would have the needed new liquidity, but they depended on the daily amounts injected by the Fed. The first signal was not sufficiently strong.

- Second, the Fed did not clearly communicate the causes that led to a rise in interest rates, i.e. liquidity shortages. Even when repo operations with maturities longer than two weeks were introduced, the markets and the public still did not know the root cause of the shock. This indicated that not even the Fed was fully assured what the reasons for the repo market shock were and that the future measures would depend on how accurately they assess the true causes. It was only in December, after the mentioned BIS study, i.e. more than a month after the shock, that the underlying causes were more clearly defined even though everyone assumed it was not only about the coinciding of tax payment and a large settlement of US Treasuries, but about longer-term, structural issues. Clear and doubtless communication lacked.

Some market participants, along with certain analysts, held the view that unless it did not wish to continue regular interventions via repo operations, the Fed needed to significantly reduce the IOER rate (Interest on Excess Reserves) to make holding reserves less attractive for banks. In the Fed's meeting on 18 September, the IOER rate was reduced by 30 bp, from 2.10% to 1.80%, which had been the sharpest decline in this rate so far. On 30 October, as part of additional Fed measures, this rate was brought further down to 1.55% (whereby it approached the lower end of the Fed funds rate target range of 1.50%).

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23 On 15 October, the Fed started purchasing US Treasuries (shorter-term government securities) and will continue to do so at least into Q2 2020 with a view to maintaining a high level of reserves in the system, i.e. the level recorded in early September (before the heightened volatility in the repo market) or even higher (around USD 1,500 billion). Initial pace of US Treasuries purchases amounted to USD 60 billion per month starting with the period from mid-October to mid-November. After that, both timing and the quantity of purchases were adjusted to keep operating under a system of "ample reserves" (new pace of purchases is published on the 9th working day in a month).

Already at that time, ideas and suggestions emerged that in such circumstances the Fed should start buying US Treasuries before the end of the year in order to scale up its balance sheet and maintain a high level of reserves in the system. The question asked even then was the appropriate amount of reserves necessary for the smooth functioning of the money market. One gets the impression that the Fed itself had to explore and learn how to respond, which weakened the credibility of the implemented activities.

It seemed that the adopted measures were used to feel the pulse of the market. Overnight operations and then, after a while, two-week repo operations were followed by the introduction of the new-old instruments – purchase of securities. Even then the Fed was defending something that was difficult to defend (saying it was not a new round of quantitative easing, but a reserve management operation), which only enhanced the insecurity of market participants.

Positive experience of additional swap auctions – Potentially a basis for further activities?

The NBS constantly analyses trends in the domestic financial market with a view to maintaining relative stability in both money and the FX market. A good preparation for the potential occurrence of a negative scenario strengthens the response should the need for such response arise.

Having in mind the success of the additional two-week FX swap auctions conducted by the NBS in early 2019, it makes sense to analyse potential further steps. Given the somewhat steeper slope of the BELIBOR interest rates for maturities longer than two weeks (Figure 12, left panel), it is reasonable to analyse the possibility to support the flattening of the longer part of the BELIBOR

curve at some point in the coming period (when liquidity and other factors allow it) by organising new additional swap auctions of supplying dinar liquidity (with somewhat longer maturities of three and/or six months).

It can be seen that the average yield curve changed its slope in 2019, as well – the shorter-term part of the curve became flatter and the longer-term steeper (Figure 12, right panel). At the beginning of the year, the spread between 2W BELIBOR and BEONIA equalled 32 bp, only to drop to 13 bp at end-2019 (by more than two times). At the same time, the spread between 6M and 2W BELIBOR widened (from 54 bp to 60 bp), indicating an increased slope in the segment of longer maturities (2W–6M).

The said activities could significantly weaken the incentive for market participants to potentially compete in attracting greater amounts of deposits by offering unreasonably high interest rates, i.e. it would discourage potential formation of a parallel yield curve which could occur in that case. Furthermore, reducing the slope of the interest rate curve would also have a positive impact on cutting the costs of corporate and household borrowing, i.e. it would additionally contribute to the transmission of monetary policy effects onto the real sector.

Conclusion

All the past industrial revolutions had a significant impact on the macroeconomic environment. As a result of technological progress, they all brought about greater productivity and aggregate supply and, consequently, lower inflation and interest rates, as well as a stronger incentive to borrow. It is certain that the Fourth Industrial Revolution will produce similar repercussions, and this

Figure 12: Short-term yield curve slope (BEONIA and BELIBOR rates)
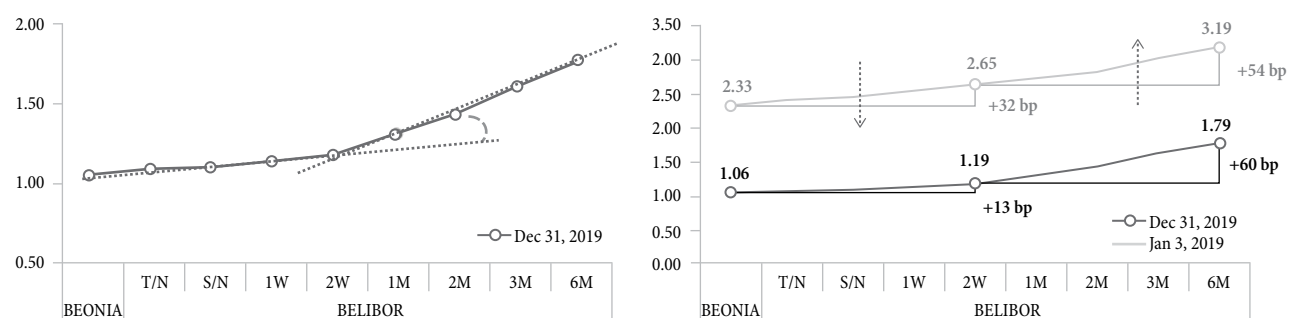
Source: NBS.

is what responsible monetary policy makers must be prepared for. As tempting and productive as it may seem to keep abreast of new tendencies and to be at the forefront of innovative solutions which facilitate business and life, we must consider all the advantages and disadvantages of the proposed changes.

Central banks have to keep in mind what their primary objective is, i.e. the preservation of monetary and financial stability. In a world of uncertainty where technological advances are changing the economic environment at an accelerated pace, decision-makers have to focus on ensuring the key conditions for the smooth functioning of the financial system. Recent crisis in the US repo market, as well as increased volatility of short-term interest rates in the Serbian money market, are examples that should not go unnoticed. We have to draw lessons from them and integrate normal market functioning in the oncoming system of innovation which can extend the current period of ultra-low interest rates and very low inflation. And one must not forget that there is a greater possibility for instability in the event of an even minor market shock on account of the hysteresis effect, but other factors, as well. As noted by Claudio Borio, this situation may compare to muscle atrophy [4]. Old habits die hard, and even the tiniest spark disrupting regular environment may lead to a major undesirable reaction.

The globalisation of financial flows facilitated the spillover effect from major central banks to developing countries. It transpired, however, that similar trends in different economies may be handled in different ways, taking into account the specific features of the local financial environment.

At the beginning of 2019, increase, as well as more volatile movements in the interbank money market interest rates were recorded, primarily amid reduced excess dinar liquidity on account of the restrictive monetary effect of fiscal policy, but also due to a certain level of excess liquidity concentration within a smaller number of banks. It was at that time, and especially at the start of RR maintenance periods, that somewhat stronger liquidity needs of other market participants were recorded as well, which increased the demand for dinar assets in the interbank money market and pushed BEONIA up.

Being proactive in such circumstances, the NBS soon stabilised the market conditions with its timely and appropriate measures and instruments, signalling to market participants that there is no alternative to stability. This prevented a potential segmentation of the domestic money market and indirectly, a longer-term and a more significant rise in interest rates. Additional FX swap auctions supplying the needed liquidity to banks, as well as the complementary measure of not withdrawing the entire liquidity surplus on offer in reverse repo auctions resulted in a decline in the interbank money market interest rates.

The central bank's timely and proactive response produced, first and foremost, a strong calming signal effect, and it helped interest rates settle at the desired lower level on a durable basis, without giving rise to major volatility that was typical for the start of the required reserve maintenance period before. The NBS used the "old-new" monetary policy instrument, i.e. instrument that was available, but was never before used for the purpose of regulating dinar liquidity. The instrument applied was appropriate to the needs and specificities of the local market and banking system that featured a sufficiently high level of disposable FX assets.

On the other side of the Atlantic, just a couple of months later (September 2019), the largest world economy faced a shock in the repo market, when interest rates rose multiple times in a single day (as many as five times in some transactions). This shock required the Fed to respond with much greater intensity than the NBS, as well as with the mix of measures, since those initially conducted did not produce the desired results.

When taking into account all of the above factors which produced a similar effect in both countries (interest rate increase due to liquidity shortage), it becomes clear that the credibility of institutions and adopted measures played the key role.

Just like the Fed in September, the NBS could have responded early in the year with some other measures, i.e. other than additional FX swap auctions (such as liquidity-supplying repo auctions, though reverse repo auctions are the main operations). But in that case, market participants would not have had a clear signal as to which monetary policy instrument is principal – reverse repo or repo

operations, and this would have only fuelled volatility in the interbank money market.

The introduced additional FX swap auctions turned out to be a significantly more efficient instrument in the described environment which, owing to its characteristics, remedied the defects without producing any negative side effects. Already the first swap auction was efficient in terms of both the effect and the signal, while others served to make the gradual transition of rates to more stable levels. In the run-up to the event, the NBS had kept a close eye on all relevant factors, their movement and impact, and sent a timely and credible signal that it would not relinquish its role of a regulator and a catalyst of market movements.

Some of the investors consider the Fed's response to dollar supply and demand mismatch slow in the period of tax payments and around quarter's-end. However, even though total liquidity of the banking sector was ample, creating the expectation that the interbank loan market would function well, a problem occurred because significant excess liquidity was concentrated in a few large banks, which in this case, failed to provide the necessary supply in the market.

Even though the decline in the US banking sector liquidity does not signal threat of a financial crisis, at one point the market expressed suspicion that the Fed might lose control over the market segment of short-term loans, which is an important monetary policy objective. Equally disconcerting was the fact that the events cited as the direct cause of interest rate spikes, i.e. as the "straw that broke the camel's back" (higher quarterly tax payments and securities settlement) were quite ordinary and predictable, i.e. they were not an unexpected shock, but something that takes place in regular time intervals. This only indicated that there were deeper and longer-term reasons behind the problem at hand which needed to be addressed.

In view of the experience in the domestic environment early in the year, but also by drawing lessons from the global financial market, it can be unequivocally concluded that timeliness and proper choice of instruments are key for success in implementing monetary policy measures. "It is all about credibility. Even if you announce some fancy new trains, you also have to make sure they run on time" [4].

According to a survey, small businesses in the US are not concerned about interest rates. "What they need is more customers and predictable government policies. In a world of trade wars and potential currency wars brought on by central bank manipulation, predictable is not a word that comes to mind" [16].

"Past performance is not indicative of future results. That has never been more true than for the coming decade." [16]. We have to view all events through a complex prism and be as proactive and forward-looking as possible. By doing so, we will be able to shape them to a certain degree. Our own actions are the only thing we can control.

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Misli iza uspešnog poslovanja stoji niz dobrih Odluka.

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NURTURING AND RETAINING TALENTS IN SERBIA*

Negovanje i zadržavanje talenata u Srbiji

Abstract

The Fourth Industrial Revolution and the creation of a future based on innovation and knowledge are transforming demand and putting pressure on the supply-side adaptation of human capital, which under these circumstances is crucial for value creation in companies and society. Because talents play a crucial role in creating value, there is an ongoing "war for talents", but also a so-called "talent paradox" that explains that despite the excess supply in the labor market, companies are failing to find the talents they need. By conducting a questionnaire-based survey among companies and students in their final years of study, this paper is trying to address this particular topic. The analysis shows that companies face a paradox considering youth employment, and due to the war for talents, they are developing an internal environment and strategies that are dedicated to attracting and retaining the much-needed talents. Most companies find that the present higher education system does not meet the current needs for necessary skills, especially those necessary for performing creative and complex activities. This need exists among students, as well, given that 60% believe that educational programs should be improved in terms of development of critical thinking, creativity and research skills. The results also indicate that the war for talents is transcending local boundaries and becoming global, given that companies find it harder to recruit young people because of the better opportunities they have abroad. At the same time, most of the students want to develop their careers in Western Europe in order to improve their standard of living.

Keywords: *talent paradox, war for talents, innovations, creativity, skills, youth, competitiveness, Serbia.*

Sažetak

Četvrta industrijska revolucija i kreiranje budućnosti koja je zasnovana na inovacijama i znanju transformišu tražnju i vrše pritisak na prilagođavanje ponude ljudskog kapitala koji je u ovim uslovima ključan za kreiranje vrednosti u kompanijama i društvu. Upravo zbog ključne uloge koju talenti imaju u stvaranju vrednosti, na tržištu dolazi do rata za talente, ali i do takozvanog „paradoksa talenata" koji objašnjava da i pored viška ponude na tržištu rada, kompanije ne uspevaju da pronađu talente koji su im potrebni u procesu stvaranja vrednosti. U radu se upravo bavimo ovim temama na osnovu upitnika koji je sproveden među kompanijama i studentima završnih godina studija. Analiza pokazuje da se kompanije suočavaju sa pomenutim paradoksom kada je u pitanju zapošljavanje mladih, i da upravo zbog postojanja takozvanog rata za talente razvijaju interno okruženje i strategije koje su posvećene njihovom privlačenju i zadržavanju. Većina kompanija smatra da trenutni sistem visokog obrazovanja ne zadovoljava postojeće potrebe za neophodnim veštinama, naročito za onim veštinama neophodnim za obavljanje kreativnih i kompleksnih aktivnosti. Ova potreba postoji i među studentima, uzimajući u obzir to da 60% anketiranih studenata smatra da obrazovne programe treba unaprediti tako da više razvijaju kritičko mišljenje, kreativnost i istraživačke veštine. Rezultati ukazuju i na to da rat za talente prevazilazi lokalne granice i postaje globalan, imajući u vidu da kompanije smatraju da teže zapošljavaju mlade ljude zbog boljih mogućnosti koje oni imaju na stranim tržištima. Istovremeno, većina anketiranih studenata želi da svoju karijeru razvije u nekoj od zemalja Zapadne Evrope sa ciljem unapređenja životnog standarda.

Ključne reči: *paradoks talenata, rat za talente, inovacije, kreativnost, veštine, mladi, konkurentnost, Srbija.*

Introduction

In the modern, dynamic world of rapid technological changes and the emergence of new business models that ensure the survival and prosperity of the Fourth Industrial Revolution and the digital age, talents play a huge, perhaps even crucial, role.

From the availability of key factors of production (labor and capital), the modern world is characterized by a relatively higher availability of capital, but also the reduction in its use (growth in savings through underinvestment, especially for young emerging innovative firms and start-ups) and a relatively poorer availability of high-quality workforce (labor supply is increasing, but there is the problem of whether this factor of production meets the needs posed by the modern labor market of the Fourth Industrial Revolution).

Under such circumstances, global competition has become tremendous, especially when it comes to talent. Countries have undertaken extensive programs to nurture and retain talents. At the same time, they seek to attract talent from other countries. The war for talents is very intense on a global level, bearing in mind that talent is scarce but, at the same time, an essential resource.

Therefore, there is a close link between the labor market and education system, which should ensure the highest possible supply of human resources that are aligned with the needs of the labor market. Today's labor market, in which demand for human resources is being formed, puts human resources under pressure to possess advanced knowledge and skills required by the modern businesses of the Fourth Industrial Revolution. Of particular importance in these processes is the development of specific skills, such as creative thinking, problem-solving, creativity and teamwork as the most important ones in fostering innovation.

In this paper, we have addressed the challenges Serbia faces in the global fight for talent. We conducted a survey among both employers (57 respondents in the sample) and students (314 respondents).

The changing nature of work and labor market

The real great displacement

Baldwin [1, pp. 115-147] points out that two forces, globalization and robots, are a severe threat to many white-collar jobs. Historically, there had been three waves of technological change that would crucially affect the labor market: developments and job creation. The first wave was the Great Transformation that emerged with the Industrial Revolution by shifting workers from agriculture and rural areas to manufacturing and the urban regions. The second wave is related to the IT revolution, during which workers moved into the service sector. Finally, the globotics period is related to globalization and automation, during which workers are shifting to service and professional occupations that do not compete with telemigrants and robots.

Globalization in the form of telemigration (or remote intelligence) has enabled companies in rich countries to hire workers from low-wage countries to do specific tasks through online platforms, sometimes with the help of augmented or virtual reality. These workers can be IT professionals, copyeditors or workers in similar white-collar fields. Their key selling point for companies is that they will work for far lower salaries than their counterparts in rich countries, usually on a freelance basis.

Telemigration has, therefore, made it easier for businesses in rich countries to lay off full-time workers. The main drivers of this trend include improved machine translation (allowing many workers to perform functions for companies in a language other than their native language), better internet connectivity, and an increasing number of graduates from universities in low-wage countries. The consequence is that workers in rich countries no longer have a monopoly on the use of advanced technology produced by companies based in their place of residence.

According to Baldwin [1, pp. 265-277], the fact that robots are increasingly taking over jobs is yet another threat. Artificial intelligence (AI) is already employed in all routine jobs. Therefore, in the first case, the force of telemigration replaces rich-country workers with workers from lower-income countries (through outsourcing). In contrast, in the second case, AI will reduce the total number of jobs,

especially when it comes to routine jobs. Baldwin [1, pp. 265-277] is committed to a holistic approach to address these two forces, telemigration and AI, according to the Danish model, which comprises three parts: easy hiring and firing, unemployment insurance and active policies to help unemployed workers secure new jobs.

Rodrik [25] has indicated that automation has already diminished the growth potential of manufacturing export of developing counties, leading to a phenomenon called premature deindustrialization. One should recall that British manufacturing industry's share of employment peaked at around 45% before World War I and then dropped to just above 30% in early the 1970s, but today it amounts to less than 10% of the workforce. A similar situation is observed in other advanced countries. In the United States, the manufacturing industry employed less than 3% of the labor force in the early 19th century. After reaching 25-27% in the middle third of the 20th century, deindustrialization set in, with manufacturing absorbing less than 10% of the labor force in recent years. However, for the developing countries, it will be challenging to follow a similar trajectory. The deindustrialization starts earlier in these countries, even before manufacturing reaches the levels that existed in the advanced countries. For example, in Brazil, the growth of employee share in the industry from 1950 to 1980 ranged from 12% to 15%, with deindustrialization already set in motion. The key implication of such structural changes is that developing countries are turning into service economies at substantially lower levels of income (advanced countries began to deindustrialize with per capita incomes at $9,000-11,000 (at 1990 price level). However, the deindustrialization in developing countries starts at $5,000 in Brazil, at $3,000 in China, and at $2,000 in India.

The consequences of early deindustrialization impede growth and delay convergence with advanced economies. Rodrik [25] called the manufacturing industries "escalator industries": labor productivity in manufacturing has a tendency to converge to the frontier, even in economies where policies, institutions, and geography conspire to retard progress in other sectors of the economy. He concluded that rapid growth has historically always been associated with industrialization (except for the handful of small countries with abundant natural resource endowments).

Pointing to the fundamental changes brought about by the Fourth Industrial Revolution and digitization, the World Bank [31, pp. 5-6] points out that the potential offered by new technologies requires a new social contract aimed at maximizing investment in human capital with universal social protection. Human capital consists of knowledge, skills and health and is accumulated during the lives of people, enabling them to reach their potential as productive members of society.

The key effects created by modern technological advances are related to:

(1)   changes in skills required by the labor market under new circumstances, and

(2)   creating new business models.

Under these circumstances, each country must adapt to the innovations introduced by the Fourth Industrial Revolution in the labor market by implementing the following three public policies:

(1)   intensify investment in human capital,

(2)   strengthen social protection, and

(3)   mobilize revenue.

The World Bank [31, pp. 6-9] places particular emphasis on investing in human capital, emphasizing that companies and countries, in addition to the people themselves, must deal with it. In new conditions, all types of jobs require more advanced cognitive skills (ability to perform various mental activities most closely associated with learning and problem-solving, such as perception, attention, memories, motor skills, language, visual and spatial processing, executive functions…). However, in the present conditions, human capital should also possess socio-behavioral skills (good character, friendliness, maturity, common sense, asking questions, conceptual thinking, persuasion, customer service, diplomacy, improvisation, initiative, problem-solving…). Smart people do not always possess behavioral skills. These are skills that must be learned and practiced. The good news is that it is possible to develop these behavioral skills and personally use them for career enhancement. Both of these dimensions of human capital are of the utmost importance in the newly emerging labor market. Technological changes have dictated changes in the structure of labor market needs, both in routine and nonroutine jobs.

Describing the changes taking place in the nature of work in the modern world, the World Bank points out that the process in which robots replace humans is decades-long and spans over more than a century. During this process, new technologies have created more levels of jobs than they have closed. Besides, technological advances have had two effects [31, pp. 17-34]:

(1) they have made unprecedented improvements in labor productivity and other factors of production by reducing the demand for workers on routine tasks, and

(2) they have opened up space for the emergence and development of entirely new sectors that were mostly part of science fiction.

On the supply side, firms adapting to new technological advancements included not only new methods of production and expansion into new markets, but also new business models that introduced better use of capital, overcame information barriers, and that helped them outsource and innovate. It enabled the companies to operate more efficiently, expanding their business to new locations, and thus increasing their competitiveness. On the demand side, consumers are able to use a more extensive range of products at lower prices, dramatically improving utility and well-being.

It is quite sure that technology has caused deep disruptions in the labor market, setting entirely new standards in terms of required skills. Despite the significant expansion of skilled labor supply, educational returns are still high (about 9% annually). Returns to education (about 9% a year) remain high despite the significant expansion in skilled labor supply. When it comes to higher education yields, they are almost 15%, indicating that with technological advancements, the labor market has recognized the importance of higher education for standard of living and well-being of people. Returns to tertiary education are almost 15% annually, which means that individuals with more advanced skills are taking better advantage of new technologies to adapt to the changing nature of work.

Analyzing developments in the labor market from 1999 to 2016 in Europe, Terry, Salomons and Zierahn [22, pp. 16-53] argue that robots are replacing workers on routine jobs. These labor market developments generated more than 23 million jobs across Europe or almost half of the total increase in employment over the same period.

Searching for the answer to the question of how technology shapes the demand for skills and how working conditions are changing, the World Bank [31, pp. 23-27] concludes that the premium is rising for skills that cannot be replaced by robots, and these are the following two sets of skills:

(1) general cognitive skills, such as critical thinking, and

(2) socio-behavioral skills, such as managing and recognizing emotions that enhance teamwork.

The main characteristic of workers with these skills is that they adapt much more easily to the profound changes in the labor market, as well as to the changes that disruptions have brought into the production processes. This also applies to the expanded boundaries of firms, expanding global value chains, and changing the geography of jobs.

Despite the technological improvements and innovations, the most demanding and valuable skills are facing pressure of changes in business models. For example, the sharing economy (also known as crowd-based capitalism, collaborative economy, gig economy, peer economy (P2P), on-demand economy...) has gained special prominence in this decade and is providing independent workers for short-term engagements. As one of the most significant disruptive technologies, the sharing economy has made tremendous changes in the labor market (and not just there), enabling the emergence of, e.g., Airbnb, the dominance of P2P exchanges, with the crowd replacing the role of corporations... These new business models have activated the use of hitherto non-performing assets (e.g., Uber in the world or CarGo in Serbia), linking in one business model those that form factor supply (non-performing assets) with those who need services based on those factors required to connect parties through a technology platform. This combination of business and technology is key to the contemporary labor market trends [27, pp. 112-130].

Explaining the changes happening within the sharing economy, Riffkin [24, pp. 50-57] points to the

emergence of an entirely new economic system dominated by collaborative commons, and a paradox arising from the invisible hand of Adam Smith market. The paradox is that no one has predicted that technological advances can lead to near-zero marginal costs in the value chain, making products virtually free. In modern economic theory, this is known as the zero marginal cost paradigm.

To assess the effects of the sharing (gig) economy on GDP and employment, it would be beneficial if national statistics introduced monitoring of these economic activities.

The disruptions introduced by the Fourth Industrial Revolution have profoundly changed the structure of demand for skills in the labor market as follows:

(1) an increase in demand for nonroutine cognitive and socio-behavioral skills,

(2) the demand for routine job-specific skills is declining, and

(3) the earnings of those with combinations of different skill types appear to be increasing, not only in newly hired but also in existing jobs.

The World Bank [31, pp. 28-29] argues that the battle between automation and innovation will determine the future of work. Automation will cause a decline in employment in traditional sectors of the economy, and innovation will cause it in the new sectors. Therefore, the whole future of labor market developments will be conditioned by the outcome of the battle between automation and innovation. However, it will also depend on the intensity of work and skills of the emerging sectors.

Blanchflower [4, p. 25] has expressed doubts that under newly emerging circumstances, the unemployment rate reflects a slack in the labor market. The first problem stems from the fact that many potential workers, discouraged by low salaries and poor working conditions, have dropped out of active labor force and are no longer looking for a job. One group of (non-)workers may be observed as individuals unable to work as a result of age or disability. In contrast, the younger age group may prolong their education, while the third group, consisting of those whose unemployment benefits are exhausted, will resort to the informal sector, working for under-the-table wages. The second problem in the labor market is related to those who want to move from part-time to full-time work, or who otherwise want to work longer hours or more days. The third problem is related to retirees, who may be tempted back into work. In any case, Blanchflower [4, p. 25] contends that many of these unemployed, underemployed or non-working people could go back to work if decent jobs were available. He asked why there had been no rise in wages in the face of decline in unemployment (as the logic of the Phillips curve established in the 1970s implies). The declining unemployment signals were assumed to be an exhaustion of slack in the labor market (predicting inflation). According to Blanchflower, the real level of slack in the labor market far exceeds what the unemployment rate suggests – so the Phillips curve has broken down.

In his latest book, Frey [8, p. 15] examines the social, political and economic context of employment transitions, indicating that much of the change that is happening is related to the invention and introduction of new technologies. New R&D-related technologies are at the heart of innovative processes. Innovation creates winners and losers in the labor market, determines which jobs will disappear (even if they required painstaking skills acquisition) or which ones will emerge.

The role of talents in the new digital world

Already in the late 1700s, the importance of human capital was recognized by the father of economics, Adam Smith [26. p. 191], when he wrote that acquiring talents during one's education, study or apprenticeship, always costs a real expense and that it is a significant capital possessed by a person. Hence, talent represents wealth for individuals, as well as for the country of their residence.

In his famous work, William Baumol [3, p. 898] explains that talents were often a wasted resource, suffering from massive misallocation: many entrepreneurial talents would end up working in inefficient structures so that their potential contributions to innovation and growth were neglected.

Psacharopoulos and Patrinos [21, p. 449] indicate that despite the increase in the supply of educated workers, there has been an increase in the return on investment in education since 2000. These returns are especially increasing when technological change is taking place, which is the

situation today, meaning that people with higher human capital adapt more quickly to change. Socio-behavioral skills such as teamwork, empathy, conflict resolution and relationship management became very important since they significantly enhance the quality of human capital.

Hsieh and Klenow [9, pp. 219-222] point out that in addition to the returns that individuals with their human capital earn, benefits for the economy should be included, and argue that the country is richer if it accumulates more human capital, especially if its quality is high. This is especially important because human capital complements physical capital and is crucial for innovation and long-term growth. They found that between 10 and 30% of GDP per capita differences among countries could be attributed to cross-country differences in human capital.

Debane, Defossez and McMillan [6, pp. 5-6] emphasize that in modern conditions of digitalization and changing business models, firms should make maximum use of available talent and work to attract as much talent as possible.

Leopold, Ratcheva and Zahid [15, p. 16] clarify that technological breakthroughs are rapidly shifting the frontier between work tasks performed by humans and those performed by machines and algorithms, and that global labor markets are undergoing significant transformations. In this process, key drivers of change are the following technological advances: (i) ubiquitous high-speed mobile Internet, (ii) artificial intelligence, (iii) widespread adoption of big data analytics, and (iv) cloud technology. They explain that the changing geography of production, distribution and value chains are very important; 74% of respondents in their survey prioritized the availability of skilled local talent as the most important factor; additional relevant factors (the flexibility of local labor laws, industry agglomeration effects, or the proximity of raw materials…) were considered to be of lower importance.

What is around the corner – Talent paradox

Lanvin and Monteiro at GTCI [13, pp. 1-4; 9] point out the paradox that talents are, on one hand, a scarce resource, but on the other, they are widely distributed around the world. There are two problems: the first, which reduces entrepreneurial talent to entrepreneurial traits, is focusing on the psyche and character of entrepreneurs, and the second is conflating entrepreneurial traits with traits of successful entrepreneurs. While the second confusion neglects the fact that many entrepreneurs will not necessarily achieve immediate success, the first confusion leads to overlooking the ways in which entrepreneurial talent can be grown, attracted and nurtured.

Because the role of talent is a critical component of competitiveness and innovation, the GTCI model refers to the set of policies and practices that enable a country to develop, attract and empower the human capital that contributes to productivity and prosperity. GTCI is an input-output model that combines an assessment of how countries produce and acquire talents (input) and the kind of skills that are available to them as a result (output).

Figure 1 shows the GTCI score for the selected countries. Switzerland has the best score in the world (81.82), whereas in Central and Eastern Europe Estonia

Figure 1: GTCI scores
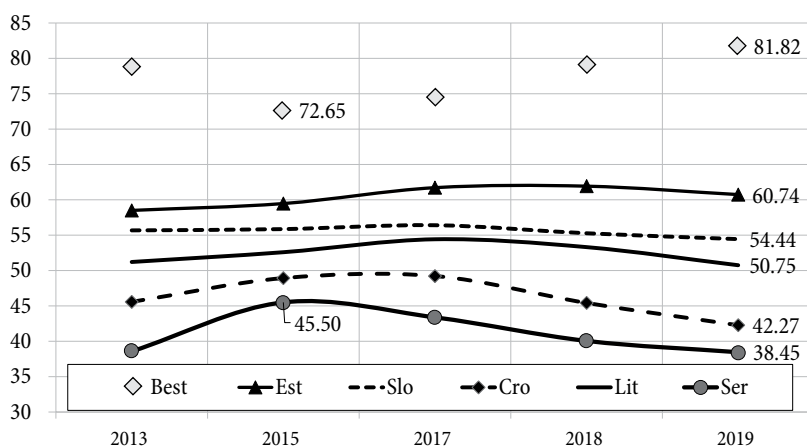
is at the forefront (60.74). The score achieved by Serbia in 2019 (38.45) had been on a downward trajectory since 2015 (45.50). It is noticeable that in this group of countries, there is a decline or stagnation of the score, which is a very important warning signal to all these countries. In contrast, the best performers are continually improving their score.

Figure 2 shows that in recent years Serbia's GTCI score has dropped from 45.50 (2015) to 38.45 (2019). At the same time, there has been a change in the structure of GTCI Serbia. On the other hand, when it comes to rank, Serbia ranked 79th in 2013, 60th in 2017, and 68th in 2019. This comparative analysis indicates that other countries have also faced problems with talent, in large part because the decline in scores did not cause a more dramatic drop in ranks. This indicates that much more attention must be paid to advancing working with talents than it has been the case so far.

Within the GTCI, a particular problem for Serbia was the significant difference between the two components of this index, which is diminishing over time. When it comes to the input component (which reflects the conditions for growth and talent retention), Serbia improved its ranking from 84th place (2013) to 73rd (2019), and when it comes to the output component (which reflects the labor and vocational skills and knowledge), Serbia's ranking dropped from 49th place (2013) to 58th place (2019).

We can conclude that the level of competitiveness strongly depends on talents, especially the entrepreneurial one.

Erickson, Schwartz and Ensell [7, pp. 79-89] indicate that a talent paradox has emerged while there is a surplus of job seekers – meaning that companies cannot rely on the fact that there is an excess supply. Kwan et al. [12, pp.

Figure 2: GTCI scores for Serbia (2019)

3-5, 9] point to the importance of "turnover red zones"; turnover intentions appear to be concentrated among specific groups of employees at certain points in their careers - creating "turnover red zones" or employee segments at high risk of departure. For companies, it is very important to prepare appropriate retention strategies, especially when they belong to groups with a high risk of turnover. Now, effectively, there are four generations in the workplace. They explain that while turnover intentions among employees surveyed were fairly stable across generations, the millennials appear most likely to test the job market, with 26% planning to leave their current employers over the next year, compared to 21% of Generation X employees (aged 32-47) and 17% of baby boomers. This is a significant shift from 2011, when Generation X employees appeared to be the most aggressive in testing the job market.

Cotteleer and Murphy [5] raise the question of why one chooses to work in one job or another, What is the reason for anyone to choose to stay and work in any company? Given the talent paradox, many companies need to answer this if they hope to attract and retain critical, scarce and highly skilled talent. Companies can no longer assume that they can easily acquire the critical talent and skills they need or which talent will work in their organizations simply because of the economic conditions. To build a strong employer brand, companies should identify their critical employees and determine what they really want, and combine their talent experience with their customer experience and the overall corporate mission. Finally, there is a good reach of science emerging in what was once mostly art. Analytics and predictive models can highlight which employees are the most at risk of leaving and suggest what actions might get them to stay. Analytical tools and capabilities are now an attractive investment for business leaders whose plans rest on having critical talent in the organization.

Analyzing what should be done, Parilla and Liu [20, p. 5] defined priorities for talent-based economic development as follows: (i) the government should invest in proven training solutions, such as customized job training grants and community college partnerships, (ii) target economic development incentives toward opportunity-rich business practices that help build local talent pipelines,
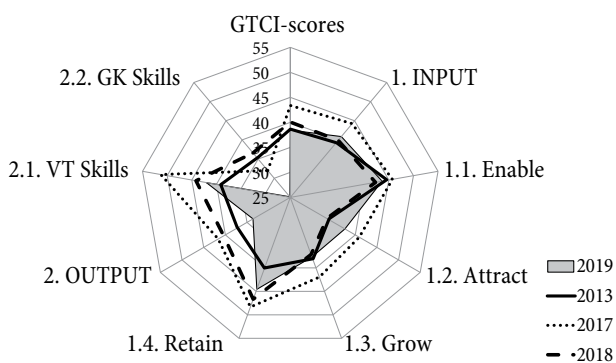
(iii) develop and disseminate new skill-based hiring tools that promote more efficient and equitable hiring practices, (iv) test new local talent financing solutions, such as revolving learning funds, that target training toward high-demand jobs, and (v) experimenting with new regional talent exchange intermediaries that connect middle schools, colleges, community colleges, higher education institutions and in-demand skill providers with businesses in key growth sectors.

Serbian talents and labor market – Preliminary research

For the purpose of this paper, we conducted two surveys. The first, among businesses, to identify employers' needs in terms of young talents and what they expect to receive from the job market, and the second, among students,

to determine their opinions on the direction of their expectations and career perspectives.

The survey was conducted among 57 companies. Micro firms dominated in terms of revenues, and medium-sized companies regarding the number of employees.

The average R&D investment as a share of revenues is about 5%. Small firms and within them, foreign companies (FC) exporting products and services to the European and world markets, allocated the most funds for that purpose.

The surveyed companies mostly came from the IT and technology sectors, professional and consulting services, construction, manufacturing and commerce, respectively. Every second company exports its products and services, and 63% of them create products and services independently.
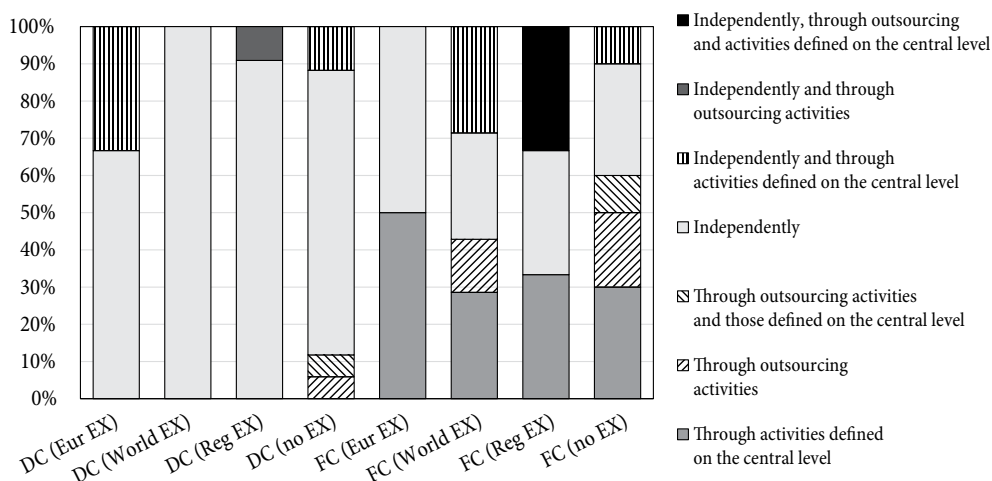
Surveyed companies have difficulties in employing high-quality staff and have the highest need for creative

Figure 3: Labor market survey structure
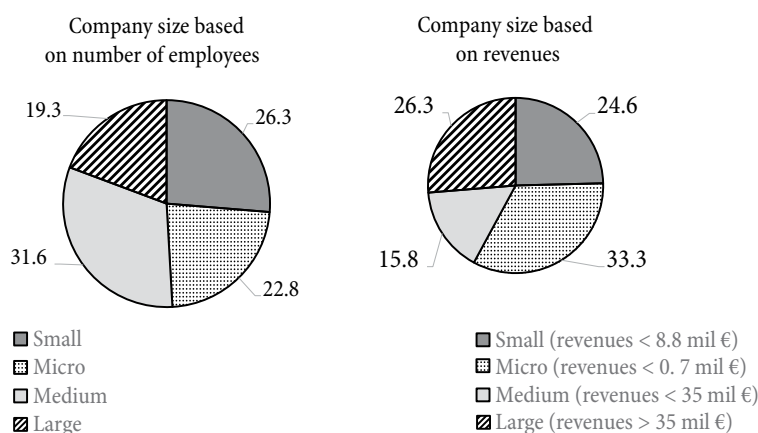
Figure 4: The way the company creates its products and services

Source: Authors' calculation.

rather than routine jobs, 61% and 39%, respectively. In addition to this, almost 60% of the companies face the greatest challenges in finding staff for high or very high complexity activities in the value chain.

Importance of research and development for long-term competitiveness

According to the global competitiveness index report, Serbia is in the stage of an investment-driven economy. In order to develop further and to achieve a higher stage of development, i.e., innovation-driven economy, there is a need for higher investment in R&D and higher share of advanced-skilled staff in order to create unique products and services. If we observe the presented data more closely, we will notice that, when it comes to R&D expenditures as a share of GDP, Serbia is ranked well above the neighboring countries except for Slovenia, but still far below the EU average.

R&D is one of the most complex and most human and capital-intensive activities in the companies' value chain. In innovation theory, Freeman [18, p. 287] refers to: "investment in innovation as the main growth factor, considering that competitiveness is achieved through investment in R&D and other intangibles." According to our survey results, 56% of the companies consider their business as innovative and unique compared to their competitors.

However, this competition is conditioned by the market where the company mainly exports its products and services. In this regard, in order to develop a further baseline for competitiveness, or to stay long-term competitive in the existing niche or market, companies in Serbia need to have higher investments in R&D as a precondition for long-term competitiveness in developing unique products and services.

Apart from capital investment in R&D, in order to create innovative products and services, companies need staff with advanced skills and knowledge. According to the McKinsey report [11]: "reallocating talent to the highest-value initiatives and most critical strategies priorities is as important as reallocating capital." According to the surveyed companies, every second company rates its managers with a grade of 4 or 5 when it comes to their success to employ highly qualified staff and recognize those with high and low performances. In addition to this, almost all of the companies are dedicated to staff development through constantly innovating in the field of production of products and services. However, only every fifth company participates in research and development projects which encourage innovativeness.

Research and development are essential for being innovative and unique, and innovations for social welfare are one of the most appreciating factors when it comes to new talent acquisition. According to the Global

Figure 5: The level of innovation relative to the status of the company in the market
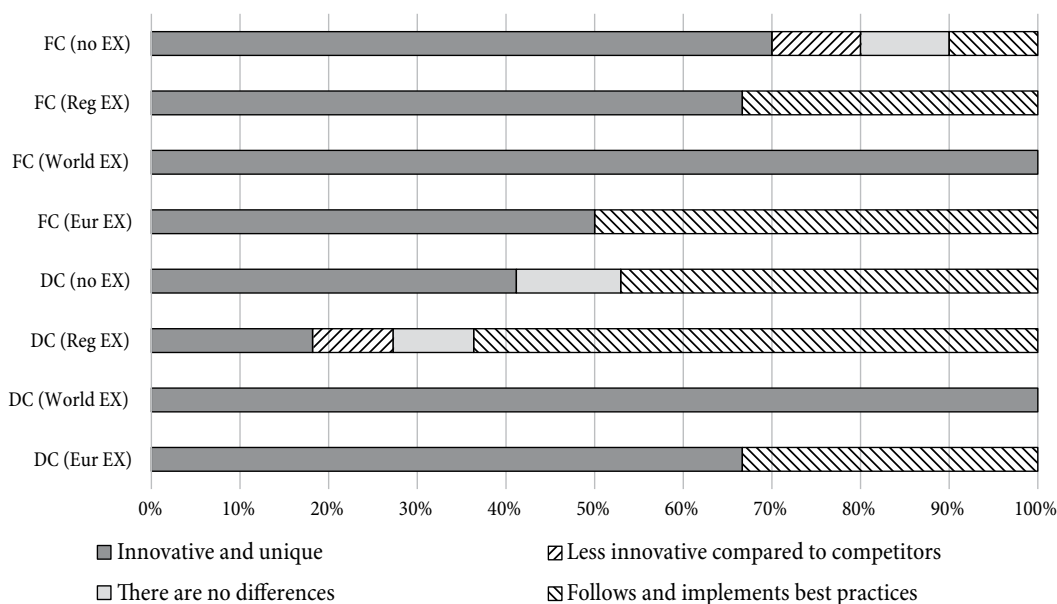
Source: Authors' calculation.

Millennial Survey [28]: "Societal impact and ethics are the most common reasons why millennials change their relationships with businesses." For new generations, it is not just important to innovate in order to improve business results and expand the market opportunities, but to have a positive impact on society, as well.

Also, Deloitte's report [28] emphasizes that: "Employees value meaningful work over other retention initiatives." Our survey results support those statements, given that nearly half of the surveyed companies consider the exceptional job (one that is interesting, has a positive impact on society and offers development opportunities) as the most important thing that staff appreciate when it comes to their career development, rather than financial benefits, supportive leaders and company reputation.

The talent paradox and Serbia

The most valuable resources in knowledge and innovation-driven economy are talents; however, companies are facing a talent paradox. In Deloitte's report [28], this situation is defined as follows: "While there is a surplus of job seekers, some companies are facing shortages in critical areas where they most need to attract and keep highly skilled talent." Back in 1997, McKinsey defined war for talents as: "increasingly fierce competition to attract and retain employees" [11].

The talent paradox is also present among the surveyed companies, and despite the fact that the unemployment rate in Serbia is 12.7%, two-thirds of the surveyed companies state that they have long-term difficulties in employing high-quality staff. Also, regardless of the high unemployment rate among the youth in Serbia which approximates to 30%, more than half of the surveyed companies have difficulties in employing young staff because of the better opportunities they have in foreign markets.

This talent paradox has only intensified the war for talents. In other words, although unemployment rates are high, companies need to focus on developing strategies and policies for attracting and retaining talents. Making an environment that will offer the employees the opportunity to work on meaningful projects has become one of the most important factors for talent retention. This is why the surveyed companies are aware of the importance of developing their internal environment and strategies in order to attract and retain staff. As many as 94% of the companies that have difficulties in employing young people rate their environment as highly dedicated to developing employee skills, and more than 60% of them are involved in projects that aim to have a positive impact on the wider community.

Another cause of the talent paradox and field where there is plenty of room for improvement is the supply side of available staff. Foreign companies are more successful in employing high-quality staff than the domestic ones; however, both state that the present education system does not meet the recruitment needs.

Technology quickly changes the way we learn, work and live, and as the companies need to be flexible in adapting their strategies and business models in order to stay competitive, the education system needs to do the same.

Figure 6: Success in employing high-quality staff per type of ownership (1-5)
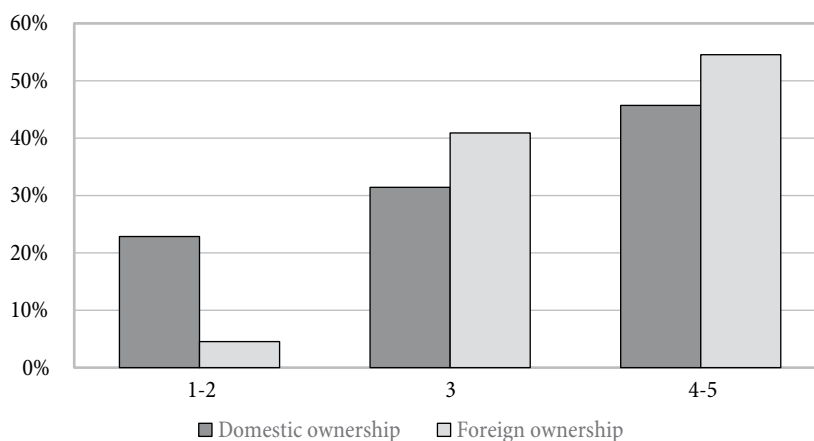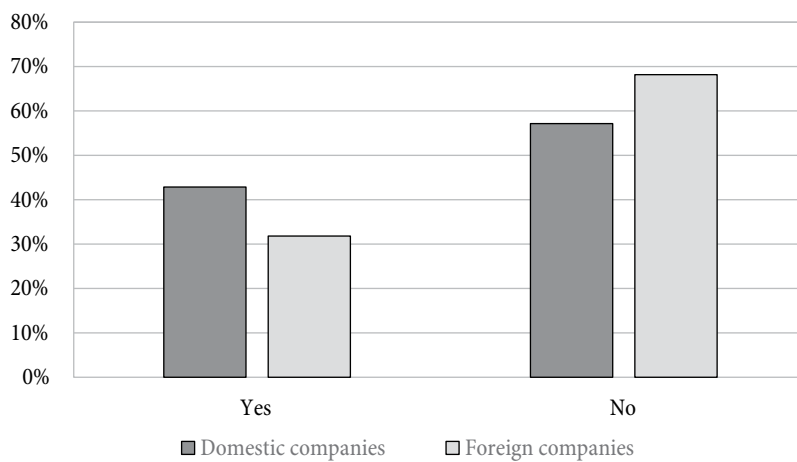

Source: Authors' calculation.

According to the survey results, almost every single company that considers that the present higher education system does not meet the recruitment needs also finds creativity and research skills as crucial ones to be improved while educating future generations. The high demand for creativity and research skills is related to the highest demand for creative and complex activities. The surveyed companies are mainly looking for staff to do creative jobs, and almost 60% of them face the greatest challenges in finding staff for high or very high-complexity activities in the value chain.

The tasks and projects in innovation-driven companies are complex, and in order to be competitive in such a labor market, the labor force needs to possess advanced knowledge and skills. Otherwise, both companies and employees will face difficulties stemming from the talent paradox.

Apart from the talent paradox among the younger population, companies have difficulties in employing high-quality staff in general. Almost half of the respondents believe that this is due to a lack of available staff and a lack of competencies for a particular job, especially sales and IT skills. Companies also state that this has the greatest impact on reducing creativity, competitiveness and market expansion. However, for companies that operate a web shop, the impact of hiring high-quality staff on market expansion is smaller than for companies that face the same difficulties but do not have a web shop. Although more than 90% of the surveyed companies have a website, less than one third have a web shop.

Using the new platforms and technologies as an integral part of the value chain while creating and placing products and services in the market is a necessary and essential condition to stay competitive in the 21st century.

Figure 7: Does the higher education system meet company needs?

Source: Authors' calculation.

Figure 8: Web shop impact on market expansion (for companies that face difficulties in hiring high-quality staff)
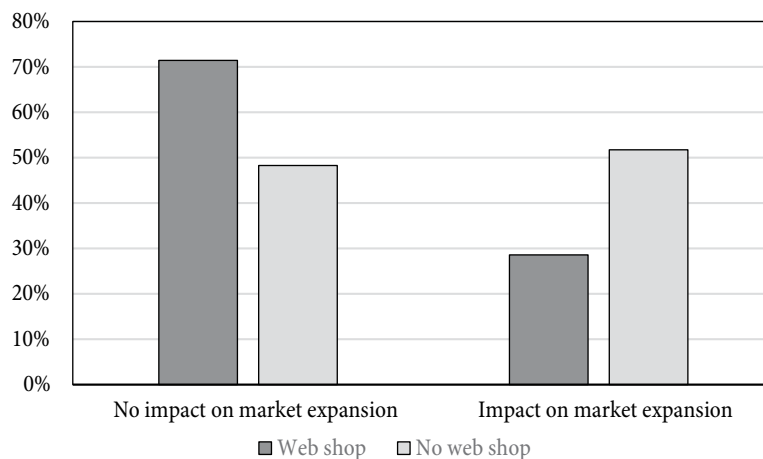
Source: Authors' calculation.

It is necessary, but not sufficient, and is inseparable from employees' advanced skills and knowledge that need to be developed further and enhanced through improvements in the education system.

Serbian talents and the education system

The survey was conducted by applying an online questionnaire during December 2019 to a sample of 314 students. The questionnaire was completed by students in their final years of private and public faculties in Serbia, namely 76.4% were students of the Faculty of Electrical Engineering, University of Belgrade, and 22.2% study at the Metropolitan University (FEFA, FIT, FDA). At the time of the survey, 59.1% of the respondents were in their third year of undergraduate studies, while 40.9% of them were in the fourth year of their undergraduate academic studies. Out of the total number of respondents, 44.1% are women, while 56.9% are men.

Education for Industry 4.0 requires the creation of new curricula

Encouraging classroom innovations that provide access to scientific knowledge and enhance students' digital competencies is crucial in adapting the education systems to the needs of Industry 4.0. However, curriculum enhancement does not only relate to academic knowledge and digital literacy, but also implies the development of creativity, innovation, entrepreneurship and social and emotional intelligence. The education system must prepare young people to be agile and open to all the challenges of accelerated technological development, in which change is the only constant.

By researching into companies, we concluded that both domestic and foreign companies face difficulties in hiring high-quality staff. This is especially true when it comes to jobs that require creative skills and performance of the most complex activities in the value chain, where one of the reasons is that the present higher education system does not sufficiently encourage the development of creativity and research skills. Globally, Generation Z (born between 1995 and 2015) think that educational

institutions are the ones that should prepare young people for the changes brought by the Fourth Industrial Revolution when it comes to the skills development [28]. However, in Europe, 74% of educational institutions believe that their graduates are well prepared for the job market whereas merely 38% of young people and 35% of companies feel the same [19]. When it comes to the perception of the education system in Serbia, only 9.9% of the respondents are completely satisfied with the selected study program. Also, 59.6% think that educational programs abroad are better than the programs that are offered in Serbia, and the main reason is that current students think that their peers aboard are gaining more hands-on knowledge (77%).

If we add the fact that there is a strong demand for creative jobs in the surveyed companies, it is quite clear why 60% of the students believe that educational programs need to be promoted in a way that encourages the development of critical thinking, creativity, research skills, information and digital literacy while aligning study programs with the labor market needs.

In this fast-changing world, talent is a key lever of success. It has the power to drive innovation and prosperity and to increase competitiveness for companies and individuals. However, talent is an increasingly scarce resource. At the same time, it is no longer sufficient to possess competencies for just one type of talent or to follow a lonely career path.

The education system in Serbia is burdened with internal challenges, such as hesitant or insufficient reforms, or lack of resources (personnel, money). Therefore, the education system has found itself in a somewhat paradoxical situation: although it has not modernized itself sufficiently, it should be an instrument of further modernization of society [16, pp. 91-94].
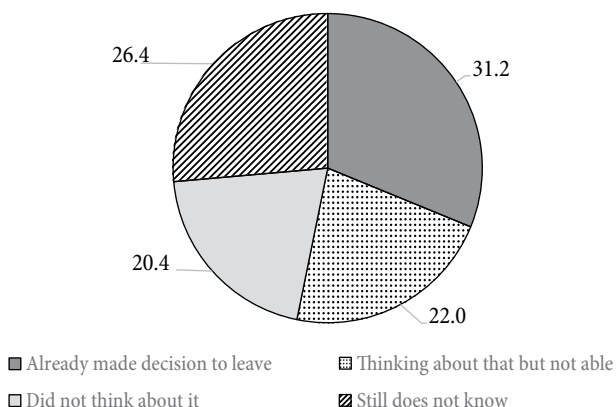
Migration of the youth population

Out of the 247 million migrants in 2016, 90% left their countries for economic reasons, and half of them migrated from developing countries to developed countries [19]. Developed countries also face labor migration. For instance, Switzerland is a tempting country for migrants from developed countries such as Germany. In Central Europe,

18 million people have fled their countries since the fall of Communism, graduates among them. This trend still exists and is increasing, while graduates are staying out of their homeland for a more extended period of time [29]. When it comes to Serbia, in a survey conducted by the Ministry of Education and Technological Development on a sample of 11,000 students, 25% said they wanted to leave the country, while in our survey, 31% of students decided to leave [23]. The most attractive destinations for living and working are Western European countries (54.8%).

According to the Global Millennial Survey [28], the economic optimism of millennials and the Generation Z is at an all-time low, and only 26% of the respondents said they expected the economic situation in their country to improve over the following year. The results of our survey rely on this research because the key motives for young people leaving Serbia are: (1) improving the standard of living – 85.7%, (2) higher wages – 77.1%, (3) better job opportunities – 71.3%, and (4) escape from socially and economically difficult situation – 58.9%. In addition, 62.4% of the respondents believe that a higher economic standard would mitigate the departure of young people from the country.

Figure 9: Thinking about going abroad

■ Already made decision to leave   ▦ Thinking about that but not able
▢ Did not think about it   ▨ Still does not know

Source: Authors' calculation.

Conclusion

The conclusions of this paper are mostly based on the results from the survey conducted among 57 companies and 314 students. In this fast-changing world, talents are crucial for developing innovative products and services, considering that these are based on implementing both cutting-edge technologies and advanced knowledge and skills in its development. However, the surveyed companies are facing a talent paradox. Despite the surplus of available job seekers in the labor market, companies are still facing difficulties in recruiting high-quality staff. Therefore, there is a so-called war for talents that increases competitiveness in attracting and retaining high-quality staff, and this competition is local, but becoming global as well. About one half of the surveyed companies face difficulties in employing staff because of the better opportunities they are offered in foreign markets. In this regard, the surveyed companies are developing strategies and policies committed to attracting and retaining talents, and are involved in projects that have a positive impact on the wider community. According to the survey results, more than half of domestic and foreign companies state that the present education system does not meet the companies' needs. Also, companies found creativity and research skills as crucial ones to be improved while educating future generations. In order to develop further, toward innovation-driven economy with innovative companies, the labor force needs to be transformed through education and new skills development. Otherwise, both companies and employees will face difficulties stemming from the talent paradox.

Moreover, students are facing difficulties regarding the education system and the labor market, as well. Apparently, there is a gap between the skills students obtained during their higher education and skills the companies find to be the most valuable. The skills that the surveyed students find to be the most important ones to be improved during studies, such as critical thinking, creativity and research skills, are almost the same as the skills that companies consider to be valued the most. When it comes to youth migration, both developing and developed countries are facing a brain drain, and this is a global trend existing for various reasons. However, in Serbia, it is still connected to the standard of living, and students state that an improvement of the economic conditions would slow down the pace of this trend. Having this in mind, we can confirm that developing and nurturing human capital is crucial both for companies and countries in achieving long-term productivity, that is, competitiveness, especially in the wake of the Fourth Industrial Revolution.

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GAMING INDUSTRY IN SERBIA: A CHANCE FOR A NEW INDUSTRIAL POLICY

Industrija video igara u Srbiji – šansa za novu industrijsku politiku

Abstract

As a fast-growing sector of the entertainment industry, with almost 2.5 billion gamers around the world and the revenue of over $150 billion in 2019, the gaming industry significantly surpasses the results of the traditionally popular film and music industries combined. New technologies, massive use of smartphones and global hyperconnectivity (internet expansion) contribute to the expansion of the industry's potential, providing room for new and/or hybrid business models. Many countries recognized the multifaceted significance of the development of this industry (ranging from financial and educational benefits and the impact on other industries and various social spheres to the promotion of innovation and creativity at all levels) and provided various financial and nonfinancial incentives, expecting to see multiple returns. Relying on the comparative analysis of the relevant countries and the survey conducted in Serbia, this paper confirms the multifarious potential of the Serbian gaming industry and encourages economic policymakers (also based on the survey) to support the development of this fast-growing industry by introducing primarily nonfinancial, but also minimum financial incentives.

Keywords: *gaming industry, creative industries, digital business models, digital economy, education, industrial policy.*

Sažetak

Industrija video igara, kao brzorastuća grana industrije zabave, sa skoro 2,5 milijarde korisnika širom sveta i prihodom od preko 150 milijardi dolara u 2019. godini, značajno nadmašuje rezultate tradicionalno popularne filmske i muzičke industrije zajedno. Nove tehnologije, masovnija upotreba pametnih telefona i hiperkonektivnost sveta, utiču na širenje potencijala ove industrije, otvarajući prostor i za nove i/ili hibridne poslovne modele. Mnoge zemlje sveta prepoznale su višestruki značaj razvoja ove industrije (od finansijskih, obrazovnih, uticaja na druge industrije i različite sfere društva, do podsticanja inovativnosti i kreativnosti na svim nivoima) i raznovrsnim finansijskim i nefinansijskim podsticajima podržavaju njen dalji razvoj, očekujući multiplikatorske povraćaje. Ovaj rad, koristeći komparativnu analizu relevantnih zemalja, kao i anketu sprovedenu u Srbiji, potvrđuje višestruki potencijal industrije video igara u Srbiji i sugeriše kreatorima ekonomske politike (zasnovano i na anketi) da, pre svega nefinansijskim podsticajima, a potom i minimalnim finansijskim, podrže razvoj ove brzorastuće industrije.

Ključne reči: *industrija video igara, kreativna industrija, digitalni poslovni modeli, digitalna ekonomija, obrazovanje, industrijska politika.*

Introduction

Thanks to the Fourth Industrial Revolution and new technologies, the gaming industry, like many others, faced a wave of innovations, disruptions and new business models. Hyperconnectivity, new technologies and expansion of smartphones connected all parts of the world, while the gaming industry "captured" more than two billion gamers and recorded extraordinary growth (higher than the film and music industries combined) and it is projected that the current trends will continue. Continuing to apply the reverse razor-and-blades model, Apple invested $500 million in its game subscription service Apple Arcade, while Google launched the Stadia streaming platform, a cloud gaming service, as a competitive challenge. Bearing in mind the number of users and forecasts showing further growth of the gaming industry, it is no wonder that the world's retail giants such as Amazon and Walmart also joined the game. We can now expect new business models, innovations, application of artificial intelligence and other technologies, as well as a gaming "breakthrough" in other industries in which "game" and simulation have a major role, including important spheres in life such as education, healthcare and the like. Many countries recognized the importance of the gaming industry and support its development by providing both financial and nonfinancial incentives, expecting to see multiple returns in many economic and social spheres. The basic question that arises is how and whether Serbian economic policymakers should support the development of this new and growing industry, bearing in mind its solid autochthonous development and potential. After an overview of literature about various issues relating to the gaming industry, this paper will offer ideas/proposals concerning the posed question, using empirical research (including the relevant survey).

Literature review (trends, role of the state, new technologies and digital business models)

Available literature treats the importance and value of the gaming industry in different ways. However, what is common to almost all sources is that they recognize it as a new industry. The relevant statistical data unambiguously show that the gaming industry is recording continued growth. However, due to the fact that the gaming industry is relatively young, available literature is less focused on theoretical strongholds, often analysing it more phenomenologically. Thus, it also often provides the reader with a futuristic view of this industry. Analysis of the historical overview of the development of the gaming industry clearly shows that the adoption of new technologies (technological innovation, i.e. technological leadership) played a key role in attaining the leadership position in the industry, since technology enabled gamers to gain new game experience. Traditionally, the gaming industry was analysed from the viewpoint of the so-called "console war" involving three biggest producers – Microsoft, Nintendo and Sony. O'Donnel [21, p. 205] points to the aggravated working conditions, high risk and volatility in the console segment in the United States. The diminishing importance of consoles as a gaming platform is the result of the strengthening of the globalization process, which is accompanied by the development of internet infrastructure. All of this brings about a change in the traditional value chain by introducing digital distribution game model, which connects gamers directly with producers. According to De Prato et al. [21, p. 205], digital distribution has a direct impact on the value chain structure and results in the convergence of the roles of distributors and sellers into the publisher's activity. This reduces distribution costs, increases gamer satisfaction and improves industry's efficiency and effectiveness. On the other hand, an increasing number of smartphone users contribute to strong growth of mobile gaming platforms which, for the first time, claimed precedence over the other two platforms (gaming console and PC) in 2018, accounting for 51% of global revenues in the gaming industry [19, p. 14]. The development of such a distribution model, accompanied by a high growth rate of mobile gaming platforms and stable increase in smartphone sales, brought about an increase in the number of gamers to more than 2.3 billion today, thus making the gaming industry the leader in the global entertainment industry, bigger than the film and music industries [19, p. 7].

On the basis of an overview of the relevant literature, we have recognized the dynamic dimension of controversy

over the government's role in or, in other words, the question of whether and to what extent the government can have a positive influence on the development of the gaming industry (with accelerated strengthening of the potential of this industry, the number of its supporters was also increasing). A special dimension to this topic has been given by the Startup Genome's research, according to which there is no direct connection between industrial policies implemented by governments with the aim of strengthening the start-up ecosystem, including the gaming industry, and the ecosystem's performance [30, p. 24]. Some authors had a dilemma about the government's influence, such as Sandqvist, stating that the gaming industry is problematic because it requires a significant amount of capital, labour with specific knowledge and other resources. Moreover, it is very risky when the level of potential earnings is in question [21, p. 205]. On the other hand, Mazzucato concludes that for an innovative ecosystem to be successful the interaction between public and private investments should be dynamic, which implies that the public sector is ready to invest considerable amounts of money into education and R&D in the emerging areas in which the private sector does not invest due to high technological and market risks [16]. These risks are also recognized by Jaffit who points out that it has never been so easy to initiate video game development thanks to markets being easily accessible through digital distribution and very accessible technologies for video game development. He adds that government support can provide a "safety net" which will enable video game producers to have additional time to gain experience that will help them to survive and succeed in the relevant market [22, p. 35]. As a further confirmation of a positive view, we can cite the conclusion of the committee dealing with the development of the gaming industry in Australia: "To maintain economic growth, prosperity and international competitiveness, advanced economies such as Australia need to embrace innovation and transition to a knowledge economy that relies on technology and highly skilled jobs. Many other countries appear to have already reached this conclusion with respect to their domestic video game development industries" [22, p. 71.] After studying national publications on the gaming industry in 40 countries, Wolf [21, p. 204] stated that all countries acknowledged the great potential of this industry.

The Fourth Industrial Revolution, accompanied by large global investments in the expansion of online infrastructure, development of advanced devices and accelerated development of smartphone usage, enabled video games to reach a huge part of the world's population. One of the game changers is certainly the big data revolution as a driver of competitive strategies used by companies in this and other industries, as well as the basis of artificial intelligence and machine learning, which improved the quality of user experience and the games themselves.

By applying new technologies, such as virtual and augmented reality, which can integrate the physical and digital worlds, as is the case in context-aware games, various industries will be able to increase efficiency and reduce costs. As is known, for years now the automotive industry has been using simulators originating from the gaming industry for testing the designs of new car models in order to save money that would otherwise be spent on testing new models in the real world [33].

The digitalization of distribution also provided room for the emergence of various digital business models in the gaming industry, ranging from pay-to-play (P2P) to advertisement to free-to-play (F2P), as well as various variations of hybrid models. The comparison of these models usually includes comparing the three main components: content, user experience and the character of the platform through which a game is delivered [6, p. 84]. The success of a P2P model depends on the creation of collective demand for a game. Its economic logic is Development-Monetization-Acquisition-Retention (D-M-A-R). F2P logic is more complex (A-R-M-D) and based on the micromanagement of gamers, putting emphasis on experience before monetization. In the F2P model, a game may not be profitable and still be popular, while in the P2P model this is simply impossible.

Today's entertainment industry is dominated by the subscription-based model. This business model is now most commonly used for the consumption of film and musical contents, and the gaming industry is also using it on an increasing scale. According to the Newzoo CEO Peter Warman, gamers will continue to consider the gaming

experience and content to be highly important, whereby content creation will remain crucial, since it represents the heart of a successful subscription-based service [20, p. 2]. Creating quality content requires creativity. Thus, Yoshimatsu believes that the development of creative industries is crucial for the prosperity of a country because they have the potential to create jobs through generating and exploiting intellectual property [38, p. 136]. On the other hand, the current gaming experience in the physical or digital world is expected to be surpassed through the application of new paradigms created by context-aware games (e.g. Pokemon GO) and continuation of successful incorporation of new technologies, such as virtual and augmented reality, artificial intelligence and machine learning. All of this, coupled with increasingly faster internet, forthcoming 5G network and the growth of cloud gaming, is the driver of future development of the gaming industry, which is projected to keep growing until 2022 and reach $196 bn with a CAGR of +9% for the period from 2018 to 2022 [29, p. 12]. According to Cai et al., cloud gaming overcame its teething problems and it is now a crucial moment to have it in all homes [4, p. 689]. The advantage of cloud gaming lies in the ability of gamers to play games without the need to have serious hardware or gaming consoles as was previously required. In order to make this optimistic forecast come true, it is necessary to deal with outstanding issues concerning network (internet) security and time delay when accessing cloud, which are expected to be successfully resolved in the near future.

Apart from technological changes, which accompany the development of the gaming industry from the very beginning, the method for inclusion of consumers in the gaming industry has also changed during the past ten or so years. These changes provided room for the so-called professional gamers who use games for business, in addition to introducing observers. According to forecasts, the mentioned changes will also contribute to the growth of the new version of a free business model, which is closest to the model of Amazon-owned Twitch [4, p. 691]. It is a popular live game streaming platform, which enables gamers to stream their games and be in constant interaction with other platform users – other gamers and observers.

Methodology

The analytics of this paper is based on empirical data from a number of sources. The first is the Global Startup Ecosystem Report 2019 for the purpose of which, over the past ten years, relevant data have been collected and processed on over one million companies in more than 150 cities, thus mapping the emergence, growth and development of start-up ecosystems across the world. The data on the significance of the gaming industry were obtained by a comparative analysis of the countries which are all significant for the development of this industry in Serbia (Germany, Finland, Romania, Poland and Croatia) with a view to showing the development level of the video games market and the best practice in organizing the sector, as well as giving an overview of the activities carried out within government support to the development of the video gaming industry. In this part of the paper, the two most successful countries in the area of video games, China and the United States, will be presented in greater detail. The third source, which is most relevant for understanding the current development of the gaming industry in Serbia, is the survey conducted by the Serbian Games Association[1].

The aim of the collated data is above all to clarify which indicators are significant for assessing the development stage of a start-up ecosystem and its subsectors, to provide a short overview of the video games markets in Europe and the rest of the world, to show how the gaming industry was developed in the countries of the European continent, which government policies and market practices in successful countries are good, what the video games market in Serbia looks like and what should be done to use the potential of the growing gaming industry.

Relying on understanding the local strengths and potentials, as well as on insight into policies of different countries, this paper aims to point out the strength and possible directions of support to the development of this industry.

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1   We express our gratitude to the Serbian Games Association for allowing us to see the results of its survey and use them in our research.

Startup Genome

The 2019 report for the first time presented the data on the Serbian start-up ecosystem, including Belgrade and Novi Sad's start-ups, assessing our start-up ecosystem as being in the first stage of development, that is, the activation stage [30, p. 86]. Some characteristics of the activation stage are limited start-up experience and low start-up output. On the basis of its experience in tracking the growth and development of various ecosystems around the world, Startup Genome's recommendation is as follows: it is necessary to increase the number of start-ups and the opportunities for early-stage funding [30, p. 82]. The report also points out that it is especially important to focus attention on one or two start-up subsectors that can be developed using the existing local strengths and opportunities, and to develop specialized support programmes for selected subsectors. Two strong Serbian start-up subsectors mapped in the report are blockchain and gaming. As for the strengths of the ecosystem, it singles out the accessibility of affordable high-quality talent [30, p. 95].

Video gaming industry overview

It is estimated that there are 2.5 billion video game players across the world and that in 2019, at the global level, the video gaming industry generated the revenue of $152.1 bn, recording a 9.6% increase compared to the previous year [20, p. 11]. It is expected that, at the global level, by 2022 the video gaming industry will be worth $196 bn [20, p. 12]. When we observe the share of different video game segments in 2019, we can conclude that the highest revenue was generated by mobile games – $68.5 bn (45%); followed by console games – $47.5 bn (32%) and computer games– $35.7 bn (23%) [20, p. 15]. In 2018, in addition to these segments, the key players, such as Google, Sony, Apple and Microsoft, embarked on the development of cloud gaming platforms [20, p. 19]. Cloud gaming promises gamers that they will be able to play games regardless of hardware restrictions.

If we observe the distribution of video game revenues by region, it can be seen that the Asia-Pacific region holds the leading position with its share of 47% ($72.2 bn) in the global revenues of this industry, while the North American region is the second with the share of 26% ($39.6 bn), followed by the EMEA region with the share of 23% ($34.7 bn) and Latin America with the share of 4% ($5.6 bn) [20, p. 13]. The dominance of this part of the world in the video gaming industry is also confirmed by the fact that the two most successful gaming companies, Tencent and Sony, belong to the Asian continent and, to be more specific, come from China and Japan [20, p. 19].

It is interesting to note that in 2018, the world's biggest gaming company Tencent recorded growth of only 9% (versus 51% in 2017), which was the result of China's game licensing freeze [20, p. 13]. The Chinese Government's decision to suspend the approval of game licences reflects its complex attitude towards video games. At the same

Figure 1: Segment breakdown of global game revenues
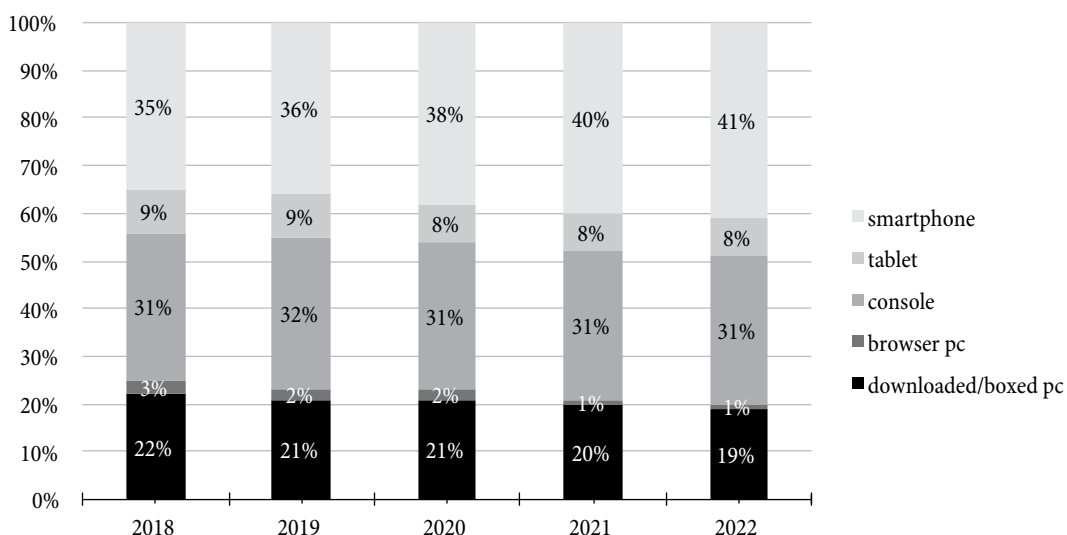
time, Beijing welcomes the economic benefits from video games, especially e-sports [9]. The Chinese Government also points to the harmful impact of video games on the health of players [29, p. 4].

The country that replaced China in the leading position in 2019 was the United States where this industry emerged as early as in 1958 [1] and which is known for its advanced music and film entertainment industries. It is interesting to note that in 2017 the video gaming industry was proclaimed the fastest-growing entertainment industry, generating more revenue that the music and film industries [24] and consisting of more than 2,457 companies that support more than 220,000 jobs [8].

Germany is the top-ranked European country in terms of size of its video games market. This country is also interesting because of the extent of self-organization of this industry at the country level and governmental financial and nonfinancial incentives for the development of the said sector. Finland is also interesting for analysis, since the current level of development of the Serbian gaming industry can be compared to the development

of the gaming industry in this country in 2010 when this sector consisted of 70 companies with about 1,100 employees [5]. The Serbian gaming industry today consists of 60+ companies with more than 1,200 employees [28, p. 5]. Romania is a neighbouring country in which the government's nonfinancial support to the development of this sector can already be presented.

Comparative analysis Finland, Germany, Slovakia, Romania and Croatia

Comparative analysis of the selected countries shows that Germany has the largest video games market (€3.3 bn) [32, p. 14], followed by Finland (€2.1 bn) [18, p. 27]. This ratio almost matches the number of gaming studios in these countries, with the exception of Romania. It is also interesting that these countries most often have "star" companies in this sector. Thus, the Finnish company Supercell accounts for 65% of the total industry turnover [18, p. 26]. In Romania, the top five companies account for 79.2% of its revenues [27, p. 3].

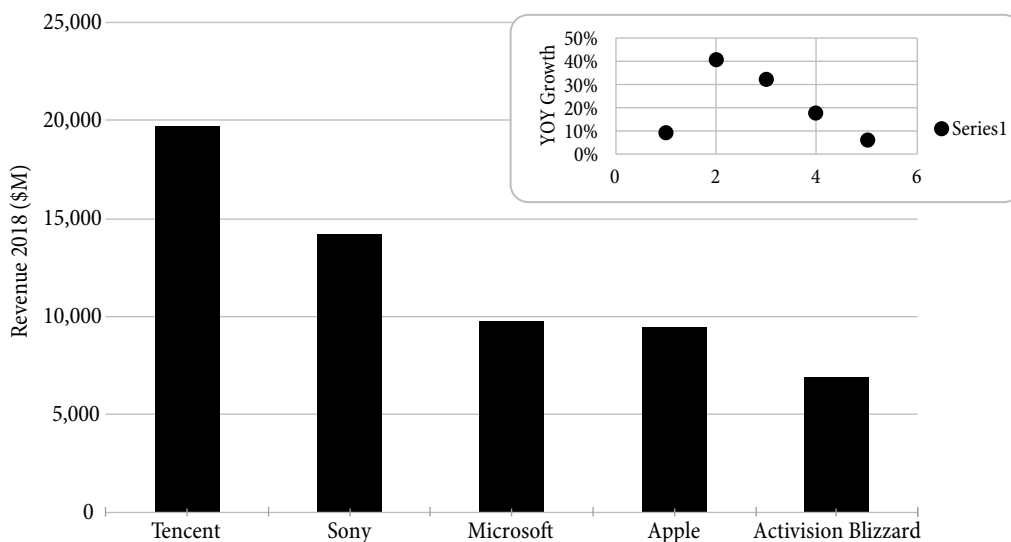Figure 2: Revenue of gaming companies in 2018 (in $M) and year-over-year growth (%)

Table 1: A comparative overview of the most important quantitative indicators of the gaming industry in the selected countries

	Finland [18] (2018)	Germany [32] (2017)	Romania [27] (2018)	Poland [3] (2017)	Croatia (est.) (2019)	Serbia [28] (2018)
GDP (US$) (2018) [37]	276.74 bn	3,947 tn	239.55 bn	585.66 bn	60.97 bn	50.6 bn
Size of the gaming market ($M)	2,315	3,638	186.37	486.32	~55	~55-110
Number of studios	220	524	103+	N/A	45	60+
Number of employees	3,200	11,705	6,000+	N/A	1,000+	1,281

Almost as a rule, the top-rated countries in terms of the size of their video games market, Finland and Germany, provide excellent education so as to satisfy the video gaming industry needs for quality and specifically educated personnel. Finland educates such personnel from secondary school to university. In the past years, its university education has undergone reform which made the strict curriculum more flexible, while students have an opportunity to work on the development of video games at the beginning of their studies [18, p. 50]. The aim of this method of education is to bridge a gap between formal and informal education, and respond to actual employer needs. Like Finland, Germany also aspires towards adjusting education to fit the industry needs. Over 50 state colleges and universities in Germany (as well as private educational institutions) offer various study programmes specialized for the video gaming industry, while their curricula cover versatile knowledge and skills, ranging from computer science to video game design, art, 3D animations and the like [32, p. 49].

Apart from government support to strategic modernization of education in these two countries, their video gaming ecosystem is organized in such a way that it provides regional support to studios in project development. In Finland, there are regional clusters and hubs which provide support to smaller start-ups and foreign companies in terms of their establishment and funding, as well as finding suitable locations for their business in any region of this country [18, pp. 18-19]. On 8 November 2018, the German Government took an additional step forward in supporting the video gaming industry by earmarking €50 million in the budget of the Federal Ministry of Transport and Digital Infrastructure "for support to the production of computer and video games" [32, p. 12]. Apart from financial support, Germany also provides significant non-financial support to industry development by forming business development bodies in all of its 16 regions. These bodies support both local and international companies in finding an appropriate location, provide information about the market and business environment, offer advice on taxes and financing, and provide a connection with their network of various experts. The information and communication technology industry in Romania enjoyed strong support from its Government: "the exemption of the income tax for developers (2004), the state aid scheme for large investments in IT (2012), the Startup Nation program (2016)" [27, p. 41].

These programmes resulted in the opening of representative offices of the world's largest companies operating in this industry just in Romania (Ubisoft, Electronic Arts), which brought about an increase in the number of employees in the gaming industry (6,000 people in 103 studios) [27, p. 3]. For comparison purposes, the Finnish gaming industry consists of 230 studios and has about 3,200 employees [18, p. 11], while in Germany 554 studios employ 1,705 people [32, p. 20].

Educational reforms in Romania do not satisfy the needs of this young and fast-growing industry. Therefore, the lack of options for formal education of personnel for the video gaming industry is offset by the private sector taking various employee training initiatives. The Romanian Game Developers Association recorded the existence of several private academies, which were most often established with the support of industry actors and which offer certified courses for those interested in specialization in one of the relevant areas.

Survey of the Serbian gaming industry

The research was based on a closed internet survey and was intended for the members of the Serbian Games Association. It was created by relying on the practice of foreign gaming associations, adjusted to the current development level of the Serbian video games market.

An invitation to take this survey was accepted by 40 out of 70 members of the Association (57%). They answered 54 questions divided into 6 groups: basic information, projects, capital, employee-related information and ecosystem.

The first mapping of the video gaming industry in Serbia shows that this industry generates revenue of approximately €50-100 M [5] and employs approximately 1,500 highly qualified workers [28, p. 3]. Assessing the real value of the Serbian video games market is challenging due to the fact that Serbia has no support for doing business on some of the biggest platforms for

publishing video games, such as Apple and Sony (as well as Google Merchant until recently), so that companies register the total revenue generated from the video games published on these platforms abroad. Due to this restriction, companies publishing video games on the mentioned platforms must do this through their daughter companies founded abroad. Domestic gaming companies are focused on the development of mobile games. Therefore, the highest revenue is generated just from mobile games. In 2018, mobile gaming platforms took the lead for the first time [18, p. 15], thus indicating that our companies follow global trends and respond to gamers' habits.

Like studios from the countries covered by the comparative analysis, Serbian studios mostly rely on self-publishing (71%), while almost one-fourth of studios (24%) [28, p. 6] publish video games via publishers, which has certain advantages, such as the increased visibility of video games at the very beginning of their launching and more modest focus on marketing and user acquisition. At the same time, however, it implies more moderate revenues from video games.
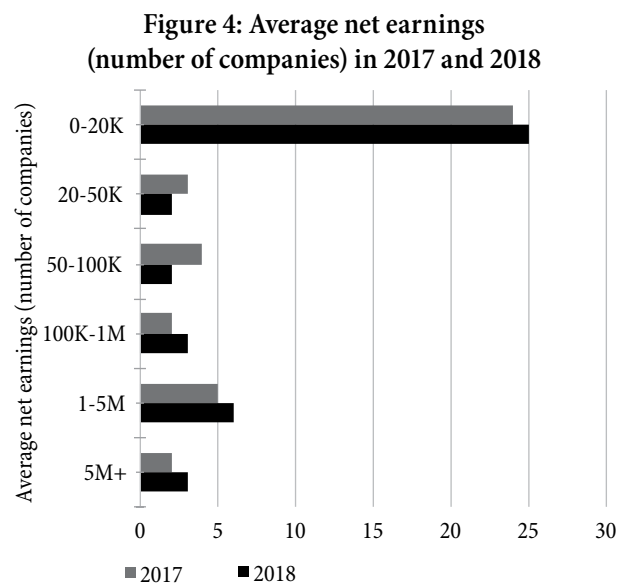
When considered in terms of average net earnings, the shift in the number of companies from lower to higher earnings rankings becomes evident – the number of companies generating revenue from 20 to 50K and 50-100K in 2018 declined by 1 and 2 (respectively) when compared to the 2017 data, while the thresholds 100K-1M, 1-5M, 5M+ obtained one more company [28, p. 8].
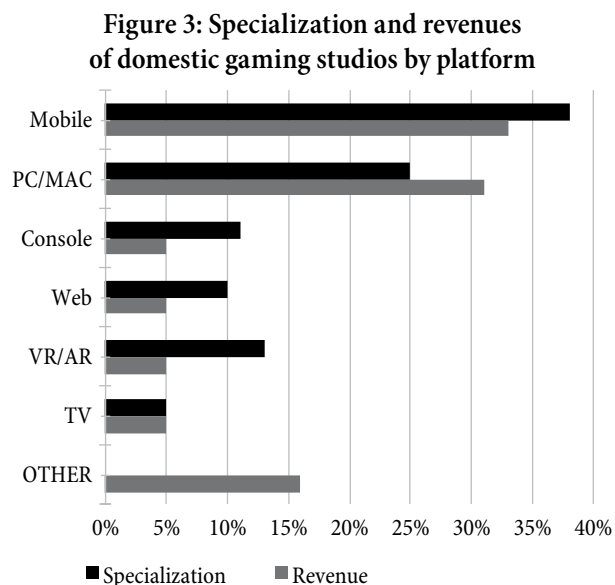
As for their sources of financing, domestic studios mostly rely on direct sales (57%) and self-financing (15%) [28, 6]. Only 10% of studios opt for publisher revenue, 8% rely on investor capital (other industries), 5% depend on funds, while the crowdfunding campaign and investor capital (gaming industry) each cover 3% of studios [28, p. 8]. These data show that domestic studios opt for a bootstrapped approach to development or that there are not enough financing options based on funds or investments and, especially, that smart-money investments do not exist. Smart-money investments are especially important for young industries because, apart from money, the development of a company can also be sped up by knowledge.

> **81%** of companies are optimistic about the future of the Serbian gaming industry.

If domestic gaming companies are investment-oriented, they obtain investments mostly from angel investors (40%) and then through crowdfunding (30%), VC (20%) and funds (10%) [28, p. 8]. Both angel and crowdfunding money point to capital market underdevelopment. Angel investors are most often individuals who invest their own money, while crowdfunding also relies on money from a great number of individuals. This means that the amounts of money are not large and that our studios have limited access to institutional investors to ensure support to their growth. The fact that 68% of companies sought investments in 2019 points to the need for investments in the domestic gaming scene.

Figure 3: Specialization and revenues of domestic gaming studios by platform

Figure 4: Average net earnings (number of companies) in 2017 and 2018

Asked to assess the current level of support from the chamber of commerce, i.e. the government, the majority of companies (64%) emphasized that they were not aware that any support existed; 18% stated that certain support did exist, but was not adjusted to the industry needs [28, p. 9].

Respondents least expect the government to provide financial incentives. Their expectations are predominantly oriented toward tax reliefs (40%) [28, p. 9]. They also harbour great expectations concerning changes in the curriculum and modality of the educational segment (18%) [28, p. 9]. A significant number of respondents also point to the need for support to international promotional activities (18%) [28, p. 9].

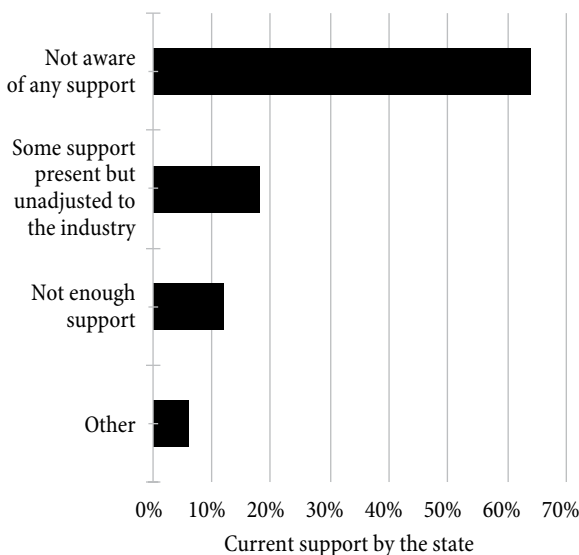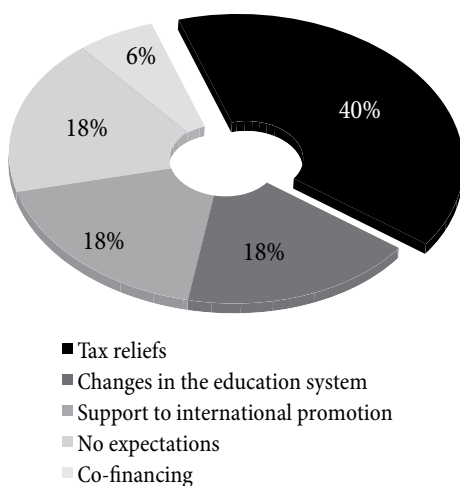**Figure 5: Assessment of current government support**

Figure 6: What kind of support do you expect from the government?

- ■ Tax reliefs
- ■ Changes in the education system
- ■ Support to international promotion
- ■ No expectations
- ■ Co-financing

Discussion

Europe sees the gaming market potential in the inclusion of new technologies (AI – artificial intelligence, VR – virtual reality, AR – augmented reality) and games exports (competitive gaming at a professional level in an organized format - tournament or league) in which €2 billion was invested only in 2017 [15]. The Interactive Software Federation of Europe (ISFE) acknowledges that the positive impact of the gaming industry embraces social and cultural development, talent development and creativity, innovation development and achievement of economic results [15]. In 2018, according to Global News Wire, the video games market in Europe was worth $19 billion and it is projected that it will be worth $21.5 billion in 2020 [26].

Is it possible that the hitherto development of the emerging industries and projections of the tempo of their progress, including the gaming industry presented in this paper, provide sufficient grounds for stronger government support and better competitive positioning? The character of industrial policy in this area will be considered on the basis of the Porter's Diamond Model which defines the quality level of the business environment [23, pp. 188-194]:

In terms of factor conditions, i.e. raising the level of access to high-quality factors (business inputs), the government should ensure the following:

1. High-quality local human resources who possess advanced skills and knowledge (technological and business) thanks to targeted curricula defined previously according to the gaming industry needs, or strengthening inclusion, i.e. gender equality, as well as employing foreign human resources by simplifying the procedure of issuing work permits to foreign experts (immigration policy change). The example of how the link between the educational system and gaming industry should be developed is provided by Finland (its annual revenue increased from €105 million in 2010 to €2.4 billion in 2015, [18]), as one of the most successful global examples when gaming industry development is in question: "During the past few years, Finnish games education has moved from strict curriculums to a more flexible

and student-oriented approach, where the first games are developed as early as possible, and where all the gaps between a formal and non-formal educational path will be bridged" [11, p. 50].

2. Higher level of availability of capital which does not originate from the banking sector (Serbia adopted the new Law on Alternative Investment Funds which will be applicable as of April 2020), by enabling financing through various government funds with the aim of promoting the growth and sustainability of the gaming industry, supporting the protection of intellectual property rights and spurring the development of necessary skills, as well as creating the conditions for the collection of funds through crowdsourcing.

3. Conditions for building entrepreneurial culture through various entrepreneurship education programmes.

4. The ecosystem that promotes innovation through, for example, direct (construction) or indirect (financial assistance) provision of coworking business facilities, such as innovative hubs which promote cooperation and exchange of experience and knowledge, and provide start-ups with technological preconditions, such as high-speed internet.

5. Favourable preconditions for the provision of various support programmes – SSOP – Startup Support Organizations and Programs, as well as Go-Global support.

In terms of context, which facilitates the launching of new businesses (firms) and encourages investment, the government can participate by ensuring various incentives, adjustment of rules (e.g. the. rule of law, tax incentives, protection of intellectual property rights), corporate governance, openness to foreign competition (absence of trade barriers, law on competition and antitrust legislation) and enabling easier access to money, as well as through:

1. Government participation in initial planning, R&D and marketing costs;

2. Tax refund introduction;

3. Regulatory sandbox (framework – for developing regulation that keeps up with the fast pace of innovation);

4. Regulation of the bankruptcy;

5. Tax incentives regarding travel and marketing costs.

In terms of related and supporting industries, the government can help through the formation of clusters – a cluster can be joined by educational institutions and creative industries – with a view to boosting innovative capacity. It can also help through the promotion and linking of the gaming industry with the sectors which need "serious games", such as health care, education, personnel training and education, and the like. The economy relying on clusters is less exposed to external shocks and movements in foreign markets, since it competes and achieves competitive advantage on the basis of technology and differentiation.

In terms of demand, the government can help through an increased quality and volume of local demand, especially in the public sector where the use of "serious games" helped in the process of employee education and training (e.g. health care, education, defence, etc.). The Netherlands excels in its support to the serious games segment via subsidies and various funds, and Finland's Tekes (a publicly funded expert organization for innovation) and UK Games Fund are also very relevant examples.

Successful implementation of the new industrial policy could yield the following results:

• Participation in a new global value chain; support to the creation of digital ecosystems and diffusion of innovations in many areas; increase in value added and GDP; attraction of FDI; job creation; arrival of foreign firms; reduced gender differences – diversity and inclusion [13, p. 24.]; increasing student motivation by including video games in the learning process and support to curriculum reform and method of teaching [14, p. 5]

Some initial steps have been taken in that direction. Amendments to the Corporate Profit Tax Law and the Individual Income Tax Law have introduced several tax incentives (accelerated R&D deduction; tax on income generated from intellectual property is reduced from 15% to effective 3%; tax credit of 30% for investments and start-ups; tax limit on marketing investments is lifted; change in the taxation of the employee participation programme; employee recreation costs are exempt from taxes and contributions).

Conclusions

The gaming industry is much more than merely a new and growing sector of the entertainment industry. It changes the methods of interactive communication, thus providing room for being used in many spheres of human life. It is based on global online connections, new technologies and innovation, thus resulting in new, digital business models and strategies also employed by the world's biggest companies. The experiences of the countries covered by the comparative analysis in this paper and the countries at a significantly higher level than the ones covered point to great expectations from the development of the gaming industry, accompanied also by significant financial incentives (Germany, Romania, Finland), as well as nonfinancial support. The provision of systemic incentives to the development of creative and technological potentials of the gaming industry can help the Serbian gaming community to become a sustainable and significant industry. It must be taken into consideration that this industry has multiple positive effects on the overall development thanks to its innovativeness, creativity and possible applications in other industries. Such an industry will enable Serbia to have a larger share in economic activities and highly qualified jobs created by this industry. It must also be considered that the gaming industry has a global character, which means that it is primarily export-oriented and that earnings generated abroad will be repatriated as a taxable revenue. The survey conducted in Serbia points out that government support to the tax relief segment, as well as the modernization of curricula, which will satisfy the needs of the labour market and, thus, the gaming industry, would mean a lot to the domestic gaming industry. The needs for relatively small amounts of capital were also emphasized. Strengthening of the gaming industry can certainly be of great help in Serbia's process of transition to the digital economy.

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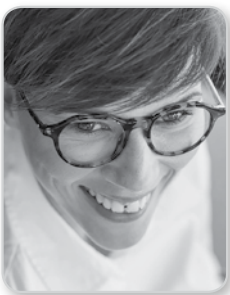
Aleksandra Vuković

is the founder and creative strategist of the Nura Agency specializing in communication and innovation design. During her 10-year professional career, Aleksandra was professionally evolving in technological start-ups and digital agencies, holding the positions that merged communications, technology and art. This taught her to connect these seemingly different areas in her own business and oriented her towards innovation design and specialization in design thinking. Apart from communication practice, today her agency also successfully provides design thinking training and creates sprints for its clients. As for her academic career, Ms. Vuković is a master's degree candidate at the Metropolitan University – FEFA.

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INDUSTRY 4.0 AS A LEVER FOR INNOVATION: REVIEW OF SERBIA'S POTENTIAL AND RESEARCH OPPORTUNITIES*

Industrija 4.0 kao poluga inovacija – pregled potencijala Srbije i prilike za nova istraživanja

Abstract

This article explores the premises of the Fourth Industrial Revolution and its role in fostering innovation and economic growth, indicating Serbia's Industry 4.0 potential and the gaps. The deployed methodology includes a literature review, both in the context of global developments and Serbia's innovation potential, supported by an analysis of several sources of empirical evidence that could serve as a basis for future research. A more in-depth investigation of blockchain and artificial intelligence (and related automation) developments, as well as a study of the application of other relevant technologies, such as robotics, cloud computing, extended reality, 3-D printing and others are suggested. The Republic of Serbia Statistical Office could support this process by conducting wider and more regular innovation surveys, as well as by adapting its business monitoring tools. It is further proposed that research focus be placed on a review of the dataset of companies and projects supported by the Innovation Fund of the Republic of Serbia, concentrating particularly on the outcomes of these projects and how they impact wider innovation activity. Finally, research should also be continued in the related fields of human capital and knowledge integration, access to finance and the regulatory and infrastructure framework.

Keywords: *Industry 4.0, innovation, Serbia, blockchain, artificial intelligence, skills, research.*

Sažetak

Ovaj članak istražuje premise Četvrte industrijske revolucije i njenu ulogu u podsticanju inovacija i ekonomskog rasta, ukazujući na potencijal, ali i jaz srpske ekonomije. Primenjena metodologija obuhvata pregled literature, kako u kontekstu globalnog razvoja, tako i inovacionog potencijala Srbije, kao i analizu empirijskih izvora koji bi mogli poslužiti kao osnova za buduća istraživanja. Predlaže se dublja studija razvoja blokčejna i veštačke inteligencije (i srodne automatizacije), kao i proučavanje primene drugih važnih tehnologija, kao što su robotika, računarstvo u oblaku, proširena stvarnost, 3-D štampanje i druge. Republički zavod za statistiku mogao bi da podrži ovaj proces sprovođenjem širih i redovnijih istraživanja o inovacijama, kao i prilagođavanjem svojih alata za praćenje poslovanja. Takođe se predlaže da se fokus istraživanja stavi na rezultate preduzeća i projekata koje podržava Inovacioni fond Republike Srbije, dodatno analizirajući njihov uticaj na šire inovacione delatnosti. Konačno, istraživanja bi trebalo nastaviti i u povezanim oblastima integracije ljudskog kapitala i znanja, finansiranja poslovanja i regulatornog i infrastrukturnog okvira.

Ključne reči: *Industrija 4.0, inovacije, Srbija, blokčejn, veštačka inteligencija, veštine, istraživanje.*

Introduction

This article explores the premises of the Fourth Industrial Revolution and its role in fostering innovation and economic growth, indicating Serbia's potential and the gaps in this current innovation wave, and identifying areas for further research. The deployed methodology includes a literature review, both in the context of global developments and Serbia's innovation potential, supported by an analysis of several sources of empirical evidence that could serve as a basis for future research.

The global context: Evolution of innovation via the Fourth Industrial Revolution

The current stage of technological development is advanced by the Fourth Industrial Revolution, building upon the First Industrial Revolution that enabled mechanisation with water and steam power, the Second Industrial Revolution that brought about mass production and electricity-powered manufacturing assembly, and the Third Industrial Revolution based on computer-assisted automation. Unlike the first three that were initiated by invention of a new tool, be it steam engine, electricity or computers, the Fourth Industrial Revolution is an amalgamation of technologies that enable new, often distributed and smartly automated business models, fuelled by data and machine learning. The Fourth Industrial Revolution has also been described as Industry 4.0, and this term, devised by Klaus Schwab, the founder of the World Economic Forum, is used interchangeably.

Schwab first alerted to the emergence of the Fourth Industrial Revolution in a Foreign Affairs article published in December 2015, stressing that this new innovation impetus is fundamentally different from previous industrial revolutions due to the fusion of technologies and their interaction across the physical, digital and biological domains [44], [45, p. 12]. This phenomenon of technological fusion across industries, also described by Colombo et al. as "industrial cyber-physical systems (ICPS)" is purported to be "the pivotal enabler for a new era of real-time Internet-based communication and collaboration among value-chain participants, e.g., devices, systems, organizations, and humans" [12, p. 6].

Yet, as Colombo et al. warn: "The prevalent focus ought to be placed on the integration and collaboration of ICPSs not only within an organization but at large scale and within a global ICPS ecosystem" [12, p. 15]. The fourth wave of industrial innovation relies on a global scale, and occurs at a higher pace, becoming one of the key factors of economic growth and gaining and sustaining competitive advantage, both for enterprises and countries. As Bogliacino and Pianta indicate, whilst there are two "engines" of innovation-based economic growth: technological competitiveness (based on innovation in products and markets) and cost competitiveness (relying on innovation in processes and machinery), empirical studies conclude that "only science-based industries, that have heavily invested in both, can show rapid productivity increases" [5, p. 49]. Rosenberg also reminds us that economic output may be enhanced either through increasing the number of inputs that go into a productive process or by creating new ways to obtain more output from the same number of inputs, underscoring that technological innovation "continues to require the application of managerial skills of a very high order of sophistication in determining how the patterns of work might be optimally redesigned in order to exploit the vastly expanded capabilities" [40, p. 6].

According to the literature review of product development conducted by Brown and Eisenhardt [7, p. 343], internal organisation factors are critical to new product success. The authors highlight "the importance of agents, including team members, project leaders, senior management, customs and suppliers". Similarly, Brynjolfsson and Hitt [8] analysed studies and firm-level econometric evidence to conclude that the value of IT investments is dependent on organisational investments. There is overwhelming evidence pointing that knowledge integration is a precondition for achieving product innovation, including the work of Brettel et al. [6], who have shown that integration of research and development (R&D) with marketing and manufacturing positively contributes to product innovations. Bloom et al. further argue that "social capital as proxied by trust increases aggregate productivity by affecting the organization of firms" [4, p. 1663]. Analysing data on the decentralisation of investment, hiring, production, and sales decisions from

corporate headquarters to local plant managers in almost 4,000 firms in the United States, Europe, and Asia, Bloom et al. determined that "firms headquartered in high-trust regions are significantly more likely to decentralize", and that "trust raises aggregate productivity by facilitating reallocation between firms and allowing more efficient firms to grow, as CEOs can decentralize more decisions". These findings are further supported by Subramanian and Youndt's longitudinal, multiple-informant study of 93 organisations [53]. These researchers deduced that "organizational capital positively influenced incremental innovative capability, while human capital interacted with social capital to positively influence radical innovative capability" [53, p. 450]. However, contrary to their expectations, they also found that "human capital by itself was negatively associated with radical innovative capability". Social capital is hence perceived as an indispensable facilitator of knowledge integration [53, p. 450].

The strength of social capital is closely linked to the regulatory environment, with Gust and Marquez demonstrating how "burdensome regulatory environments and in particular regulations affecting labour market practices have impeded the adoption of information technologies and slowed productivity growth in a number of industrial countries", based on a panel study of 13 industrial economies for the 1992-1999 period [26, p. 33]. The underlying conclusion is that the Industry 4.0 complexity requires not only specialised technical skills, but also sophisticated managerial competence and teamwork to implement innovative technologies to optimise business processes and create new business models. The currency of this debate is confirmed by the McKinsey Digital (2020) report from the most recent Davos Forum: "Whether in process acceleration or mining throughput, AI at scale is really happening, even at large incumbent companies. […] Key to this shift is a deeper understanding that when companies implement AI, they need to pay particular attention to changing processes and how people work with the technology. A change in tech requires a change in the operating model. People are accepting the reality that, to gain full value from technology, for every dollar spent on it, multiple dollars need to be spent on change management" [34].

These conclusions endorse the more general studies such as the one conducted by Sener and Saridogan for high-income members of the Organisation for Economic Cooperation and Development (OECD), which deduced that "countries that have science-technology-innovation based economic policies and strategies have great superiority and sustainable competitive advantage in not only global competitiveness but also economic growth and development leading to wealth and welfare of the country" [47, p. 826]. Supporting this analysis, Ciocanel and Pavelescu demonstrated a strong correlation between the improved national innovation performance and the increase of national competitiveness [10]. Hasan and Tucci further investigated the importance of quality and quantity of innovation, based on global patent data for 58 countries for the period from 1980 to 2003, demonstrating that "countries hosting firms with higher quality patents also have higher economic growth" [27, p. 1264].

The impact of digitisation on economic growth is also well documented. Czernich at al., for instance, found that "a 10 percentage point increase in broadband penetration raised annual per capita growth by 0.9–1.5 percentage points in the panel of OECD countries in the period 1996–2000", which is a significant result even if the diffusion of contemporaneous technologies such as mobile telephony and computers was not measured [14, p. 505]. Evangelista et al., in turn, conducted an econometric study of composite Information and Communication Technologies (ICT) indices in the countries that were members of the European Union (EU) at the time (EU 27), deducing that "the usage of ICT, and mostly digital empowerment, exert the major economic effects, especially on employment also favouring the inclusion of 'disadvantaged' groups in the labour market" [21, p. 802]. Furthermore, Katz and Koutroumpis [29] analysed the impact of digitisation on economic growth based on a composite digitisation index including 23 individual indicators and applied on a sample of 150 countries for the 2004-2010 period. They deduced that a 10-point increase in the index produced approximately a 3% impact on the gross domestic product (GDP) for this period, resulting in an annualised effect of 0.50% [29, p. 315]. These findings corroborate another study by Sabbagh et al., who have

demonstrated that an increase in the digitisation level of 10% contributes to a rise in GDP per capita from 0.5% to 0.62%, and to a decrease in unemployment rate by 0.84% [41, pp. 125-126]. Recent research has further shown that in 17 developed countries, the first generation of robots, applied mostly in manufacturing, led to a rise in labour productivity of 0.4% a year, while digitisation has led to an annual increase of roughly 0.6 percentage points [22], [25, p. 762]. Similarly, a study analysing the impact of digitally-enabled automation and artificial intelligence (AI), key elements of the Fourth Industrial Revolution, found that they have the potential to enhance GDP growth by about 550 billion Euros, or about 1.2% per year from 2016 to 2030 in a digital front-runner country (including nine Northern European countries that are among the world's most advanced digital economies: Belgium, the Netherlands, Luxembourg, Denmark, Finland, Norway, Sweden, Estonia and Ireland) [33, p. 6]. Importantly, the study further inferred that roughly half of productivity gains would come from jobs being lost as a result of automation, while the rest would be from new products, services and opportunities enabled by new technologies [33, p. 6]. The study also affirmed that "technology diffusion contributed 0.4 to 0.6 percentage points, or around 30 percent, of digital front-runner GDP growth between 1990 and 2016, worth around 15 billion Euros a year" [33, p. 6].

Forecasts posited by experts from the world's leading research institutions also position digital technologies as drivers of economic development in the near and mid-term [45], [23], [24], [1]. An overview of the most important trends in technological development driving business innovation in the near future, as suggested by Schwab [45], Gartner [23], Deloitte [16] and Accenture [1], is provided in Table 1 below.

According to Accenture, the current "technology revolution is marked by a series of exponential technological advances. Individually and collectively these technological advances represent vast potential for the future of business, and are creating the imperative to reinvent and reimagine the way we do business" [1, p. 2]. In addition to automation and AI, another notable technology that is perceived as an enabler of progressive innovation is blockchain or distributed ledger technology noted by all the forecasts depicted in Table 1 above.

Blockchain technology is perceived as one of the catalysts of the Fourth Industrial Revolution. This technology may be described as a distributed ledger, using a network of computers (nodes), to record, share and simultaneously synchronise transactions, creating a multiparty, decentralised electronic database. The key feature of blockchain lies in this essentially immutable database, which is a basis of value chain management, constructing what World Bank depicts as "internet of value", enabling "transfer of value peer-to-peer, without a need for a centrally coordinating entity" [60]. Implementation of blockchain is currently explored across several industries – finance, energy, health, entertainment and logistics among others, including its important role in public administration. As Accenture infers, "Essentially any business that could stand to benefit from an immutable database can — and will — be disrupted by blockchain" [1, p. 54]. The blockchain market is expected to grow to over 23.3 billion U.S. dollars in size by 2023 [50]. Underscoring the significance of the rise of this new technology, a high 53% of 1,386 surveyed senior executives

Table 1: A review of the most important technological trends in the near future

Schwab (2017)	Gartner (2019)	Deloitte (2019)	Accenture (2018)
Autonomous vehicles	Hyperautomation	Digital reality	Distributed ledger technology
3D printing	Multiexperience	Cognitive technologies	Artificial intelligence
Advanced robotics	Democratisation of technology	Blockchain	Extended reality
New materials	Human augmentation	Ambient experience	Quantum computing
Internet of things	Transparency and traceability	Exponential intelligence	Technology-driven interactions
Blockchain	Empowered edge computing	Quantum computing	Technologically empowered workforce
On-demand economy	Distributed cloud	Digital reality	Cyber security
Advance in genetics	Autonomous things	Cognitive technologies	Customisation and real/near time delivery
Synthetic biology	Practical blockchain		
Neurotechnology	AI security		

in Deloitte's 2019 Global Blockchain Survey considered blockchain technology to be "a critical priority" of their organisations, representing a 10-point increase over the previous year [15]. On the policy side, blockchain is already an important consideration in many countries, and an integral part of the European Union's Digital Single Market agenda, as are other digitisation drivers, with the greatest focus placed on artificial intelligence and automation.

Digital transformation accelerated by Industry 4.0 is perceived both as a threat and an opportunity. Its unprecedented pace has raised the topic to the top of the political agenda, inevitably in conjunction with environmental and broader sustainable economic development and growth concerns. In 2019, the World Economic Forum produced a special report it aptly named Innovate Europe: Competing for Global European Leadership, openly discussing Europe's challenges of lagging behind North America and Asia in deep technologies that are critical to success in the Fourth Industrial Revolution [67]. The report proposed "ten fundamental building blocks for the competitiveness of its innovation ecosystem", focusing on the regulatory and business environment, improved financing, education and upskilling, which is in full agreement with the research findings and recommendations presented above:

1. Pan-European approach;
2. Corporate-start-up collaboration;
3. Innovation funding;
4. Enabled government and public institutions;
5. Data access and protection;
6. Entrepreneurial talent;
7. Digital education, reskilling and upskilling;
8. Gender diversity;
9. Digital infrastructure and interoperability;
10. Harmonised legislation and standards [67, p. 4].

Serbia's role in the Fourth Industrial Revolution: A review of global studies and local empirical evidence and research

Serbia is a small, transition economy in process of accession to the European Union. According to the most recent Global Innovation Index, it ranks as the world's 57th economy out of 129 observed [13]. The annual European Innovation Scoreboard (Summary Innovation Index) published by the European Commission (2019) also places Serbia as a moderate innovator in Europe, lagging behind groups of countries that fall into categories termed strong innovators and innovation leaders. In this index, Serbia is ranked as 30th out of 36 countries observed [20]. A more detailed review of Serbia's Global Innovation Index [13] reveals that Serbia achieved the best results in those indicators related to institutional framework, where it holds 47th place in the world, knowledge and technology outputs (rank 48) and infrastructure (rank 54). When it comes to human capital and research, Serbia ranks as the 59th economy, while in business sophistication, Serbia ranks as 63rd, and 65th in creative output. Serbia has achieved the poorest results (rank 103) in financing and market conditions.

The European Commission's Summary Innovation Index [20] suggests that Serbia has achieved results that are ahead of the European Union (EU) average in areas such as Enterprises providing ICT training (110.5% of the EU average), Small and medium enterprises (SME) innovating in-house (108.5% of the EU average) and Non-R&D innovation expenditures (102.1% of the EU average). The Serbian innovation climate is weakest in the areas of Design applications (2.3% of the EU average), Venture capital expenditures (3.5% of the EU average), R&D expenditures in the business sector (22.1% of the EU average) and Public-private co-publications (23.1% of the EU average). These results are aligned with the more general business climate assessment provided by the World Economic Forum's Competitiveness Report that ranks Serbia as 72nd out of 141 economies [66], and the World Bank's Doing Business Report that positions Serbia as 48th out of 190 economies [61]. According to the World Economic Forum's Competitiveness report [66], Serbia achieved the poorest results in terms of the financial system (rank 82), ICT adoption (rank 77), health (rank 76), institutions (rank 75), market size (rank 74), and product market (rank 73). Notably, in terms of innovation capability, Serbia is 59th among the observed countries. Serbia achieved the best results in the fields of business dynamism (rank 54) and infrastructure (rank 51). This report singles out the financial system as the most significant hurdle for doing business in Serbia. Institutional and

market factors are also noted as a pronounced weakness. When it comes to technology and innovation, there is vast room for improvement, especially in the field of technology and innovation in production. According to the World Bank's Doing Business report [61], the chief obstacles for businesses in Serbia are access to electricity (Serbia is ranked as 104th), protecting minority investors (rank 83) and paying taxes (rank 79). However, when it comes to starting a business, Serbia is ranked more favourably than its overall ranking (rank 40).

Considering the heightened significance of digitisation and digital transformation in today's economy, several indices have been developed that aim to assess the digital performance of countries and point to the possibilities for improvement. According to the Digital Adoption Index, developed by the World Bank, Serbia is ranked 40th in the world (out of 183 economies), performing better in this subcategory of innovation than it does on average as measured by the Global Innovation Index [59]. The Digital Adoption Index consists of three sub-indices, evaluating the adoption of digital technologies by businesses, people and government, respectively. Serbia has achieved a particularly good result in the area of digital adoption by governments, where it is ranked as 19th in the world. However, Serbia ranks 66th in the People Adoption Index, and 67th in the Business Adoption Index, which is a major concern considering that digital business services form the cornerstone of future economic development [59]. This concern is further substantiated by Serbia's score in the International Digital Economy and Society Index (I-DESI) developed by the European Commission by combining 24 indicators and applying a weighting system to rank each country based on its digital performance with the aim of benchmarking the development of digital economy and society. It measures performance in five dimensions or policy areas: connectivity, human capital (digital skills), use of the Internet by citizens, integration of technology and digital public services [19]. Serbia's overall score here is 0.50, which is nine points below the EU-28 average of 0.59 [19]. Notably, Serbia is slightly above average in some areas, as shown in Table 2 below, but generally exhibiting at best a moderate potential compared to other European economies. As shown in the previous reports, the main gap

lies in business technology integration. Human capital, while representing an opportunity in the initial years of Serbia's transition, is now increasingly highlighted as a constraint.

Table 2: International Digital Economy and Society Index – Serbia and EU-28 average scores presented per each of the five dimensions [19]

Dimensions of I-DESI	Serbia	EU-28
Connectivity	0.52	0.63
Human capital	0.44	0.58
Citizen Internet use	0.5	0.6
Business technology integration	0.44	0.51
Public services	0.61	0.63

In conclusion, Serbia, while achieving progress in some areas over the last two decades, and particularly advancing in e-government services, still faces significant regulatory and institutional weaknesses which, compounded by limitations to access to finance and the skills gap, render the challenge of actively participating in the Fourth Industrial Revolution ponderous. Yet, while the gap for Serbia is significantly vaster, the same building blocks that the World Economic Forum identified for the wider European market [66] could be applied in the case of Serbia, as well. Business could additionally benefit from tech readiness models [37]. This is consistent with recommendations proposed in previous studies on Serbia's innovation and competitiveness [17], [31], [36], [42], [43], [54] [63], [64].

Yet, while there is a moderate body of literature analysing Serbia's business innovation, empirical studies are scarce. Bakator et al. [2], for instance, base their innovation analysis on a student survey on entrepreneurship attitudes (survey sample size undefined), and Cabrilo and Grubic-Nesic [9] on a survey of "79 managers holding key managerial positions in 12 service companies", with the relevance of companies determined based on company ranking published in a leading economic journal. Others also have relatively small sample sizes compared to international studies, with some of the largest including 203 women entrepreneurs [46], 106 exporters [52], and 102 companies in the agriculture and food sectors in Serbia [69], followed by 44 innovative enterprises [28]. In certain cases, the sample size is justified by the analysed segment of the economy, such as the survey of 46 women-owned

entrepreneurial businesses [39] or 52 young innovative enterprises [63]. However, even then the samples are of a size that merits interest of exclusively regional publications. Finally, some researchers analyse and interpret industry and civic organisation-led surveys conducted in Serbia. Examples include a study of the use of specific digital tools by Serbian businesses [3], or analysing evidence from surveys conducted by professional associations and civic society, such as a survey of 1,670 Serbian programmers by the SEE ICT [64]. The most comprehensive study to date of Serbia's competitiveness potential was carried out in 2007 within the framework of the USAID Serbia Competitiveness Project, including not only a detailed analysis of trade and exports data and an extensive literature review, but also a business survey of 519 managers and owners across 12 sectors (conducted by telephone by a professional survey organisation) and 87 in-person, in-depth interviews with all the relevant stakeholders conducted by expert researchers [65].

Otherwise, the majority of research studies is presented in review articles, citing global competitiveness and innovation reports alone, with several engaging in a study of wider European surveys such as the Serbian dataset from the European Manufacturing Survey [32], or combining Eurostat data, including NACE, with official Serbian statistical data [30], [35]. The size of the economy is a key reason for this research limitation, as well as the low level of participation of Serbia in the European or international sector surveys and studies. One resource lies in the World Bank's Enterprise Surveys, although this survey is also relatively limited in size and scope, with the most recent one based on interviews with top managers in 361 firms, conducted from December 2018 through October 2019, and including questions regarding innovation and technology [62]. This survey draws conclusions across global economies, and in the last edition for Serbia, it highlights the impact of firm size on innovation, with larger firms investing more resources than SMEs, when compared to other countries.

The rare empirical studies with a significant sample size (for the size of the Serbian economy) have been periodically conducted by the Statistical Office of the Republic of Serbia, namely the Indicators of innovation activities, 2016–2018 survey of 3,673 small, medium and large enterprises, which followed a similar survey conducted in 2011 [51]. There was a limited set of survey questions, with respondents underlining limited financing as a key constraint to innovation, and identifying software development as the main innovation investment area (80.75%), followed by investment in equipment and material resources (17.67%). The investment in other innovation inputs is extremely low, education included (just 0.22% dedicated to staff training). These data are presented in Figure 1.

The Statistical Office of the Republic of Serbia would considerably enhance evidence-based research and serve to better inform policy proposals relating to Serbia's innovation gaps by increasing the set of questions and conducting regular, annual innovation surveys, as well as by supporting global surveys such as the Global Entrepreneurship Monitor, which was last conducted for

Figure 1: Structure of expenditure by the surveyed Serbian companies (%) [51]
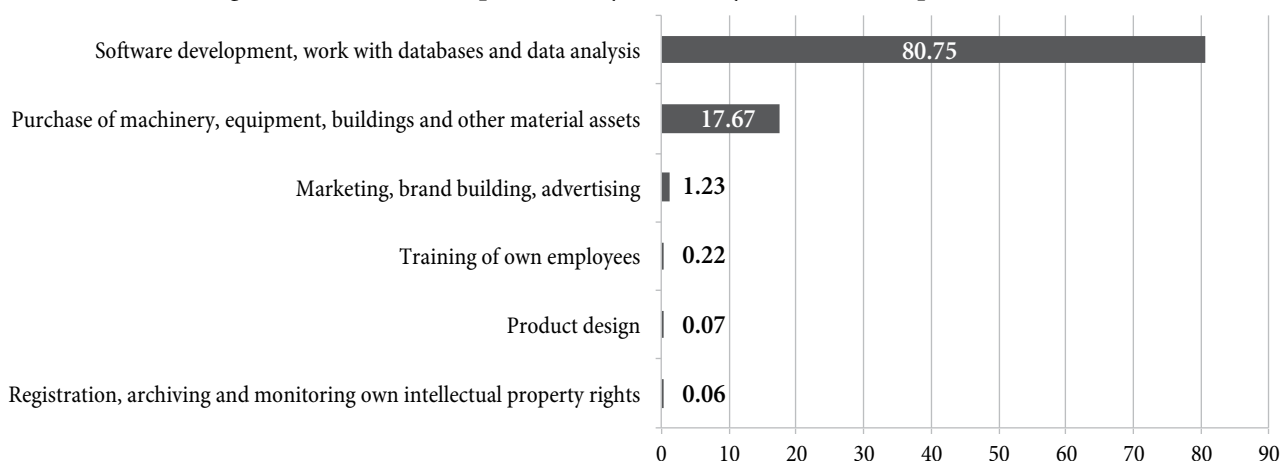
Serbia in 2009. Another important set of data that could serve as a basis for further empirical analysis pertains to innovative companies and projects that participated in the Innovation Fund of the Republic of Serbia (IF) programmes. Thus far, the IF has supported 695 innovative projects with 24.1 million Euros (total project value amounted to 33.3 million Euros) [55].

One of the most relevant IF programmes to foster science-based innovation is the Collaborative Grant Scheme, initially established with the EU support and the World Bank advisory guidance [56]. The Collaborative Grant Scheme (CGS) provides grants of up to EUR 300,000 to consortia consisting of at least one Serbian private-sector company and at least one registered Serbian public sector R&D organisation [56]. The IF-administered financing covers a maximum of 70% of total eligible project costs with a minimum of 30% co-financing provided by the beneficiaries, for projects of 24-month duration [56]. A total of 23 consortia have benefited from this programme, with the first 14 selected in 2017 and the next nine in 2019 [56]. Figure 2 shows the sector structure for the 23 awarded companies.

A similar sector structure is displayed for the 34 companies awarded through the Matching Grants

Figure 2: CGS industry/research area distribution (23 companies awarded in 2017 and 2019) [56]
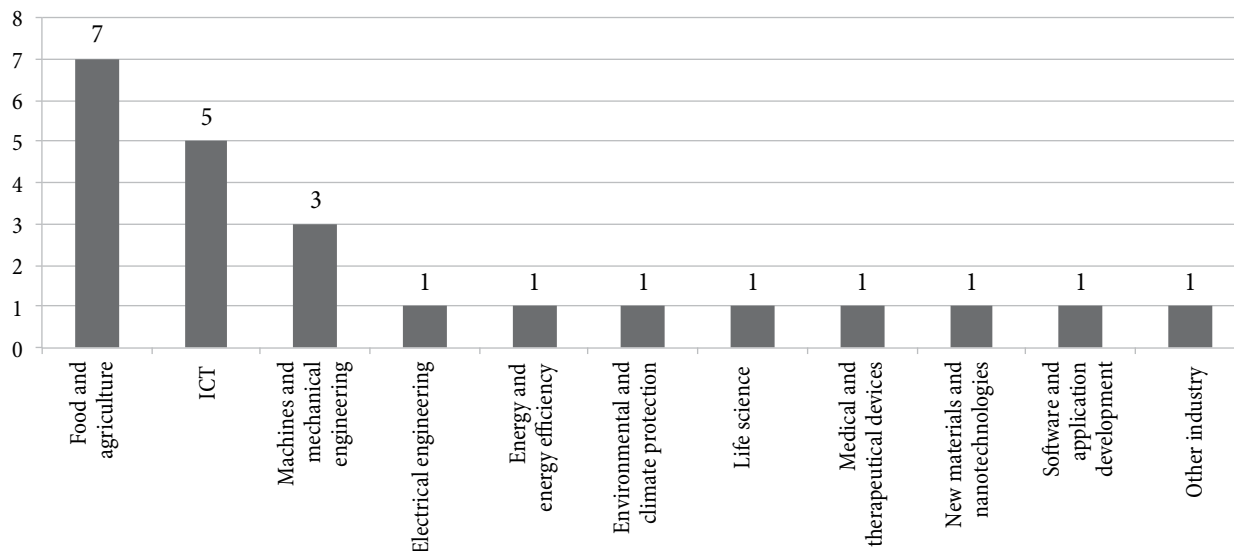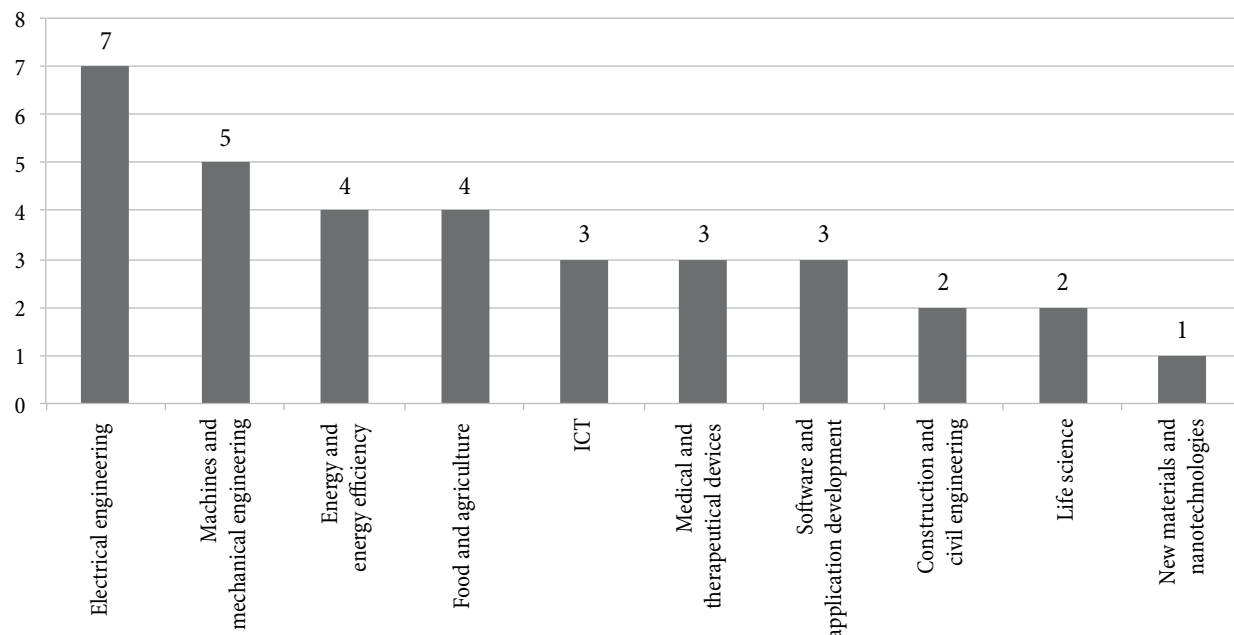

Figure 3: Matching Grants Program industry distribution (34 companies awarded from 2012 to 2019) [57]

Program, which provides up to 300,000 Euros or up to 70% of project budget for micro and small, and up to 60% for medium enterprises for the period of up to 24 months (Figure 3) [57], and the 96 companies participating in the Mini Grants Program, aimed at young private enterprises and financing up to 80,000 Euros or up to 70% of the project budget for the 12-month period (Figure 4) [58], with specialisation over time approaching that of the technology areas most demanded by Industry 4.0. The final cycle of 10 Matching Grant recipients thus includes

one in each of the following categories: biotechnology and bioengineering; food; health and functional food, food supplements; heating and cooling technologies and heat transfer; industrial machines; Internet of things (IoT); radar, radio and wireless communication; robotics; software and application development (web and mobile); video data analysis. Similarly, the final selection of 23 mini grant recipients is distributed in the sectors that are more closely linked to the Industry 4.0 context (Figure 5) [57].

Figure 4: Mini Grants Program industry distribution (96 companies awarded from 2012 to 2019) [58]
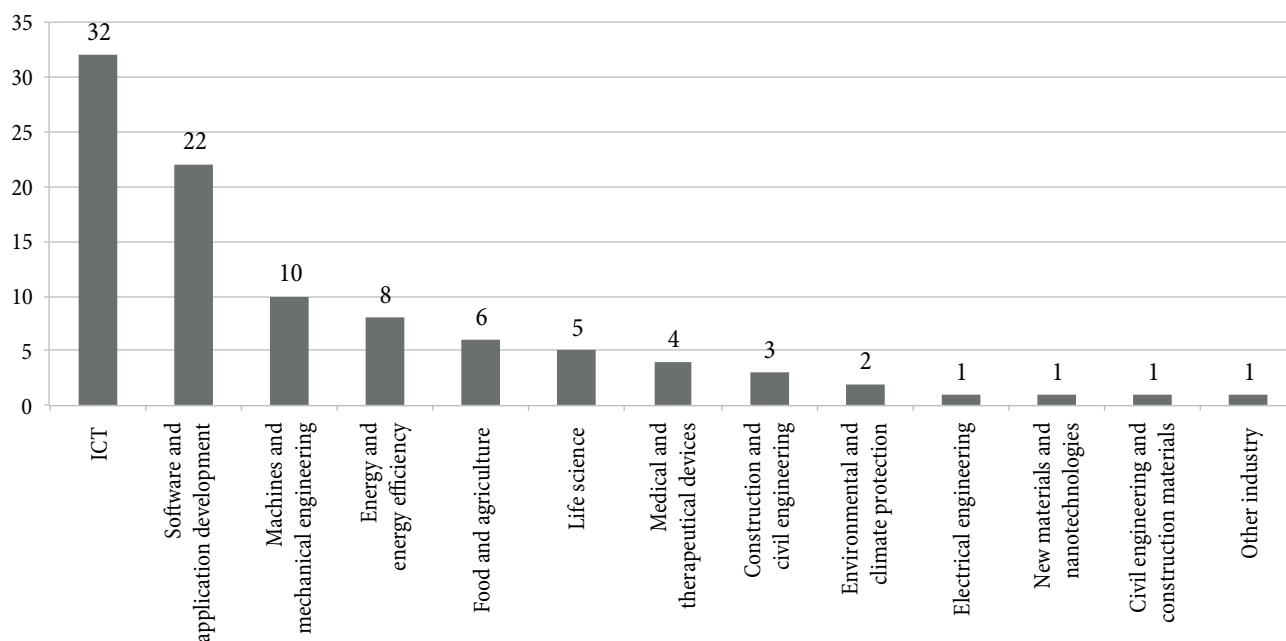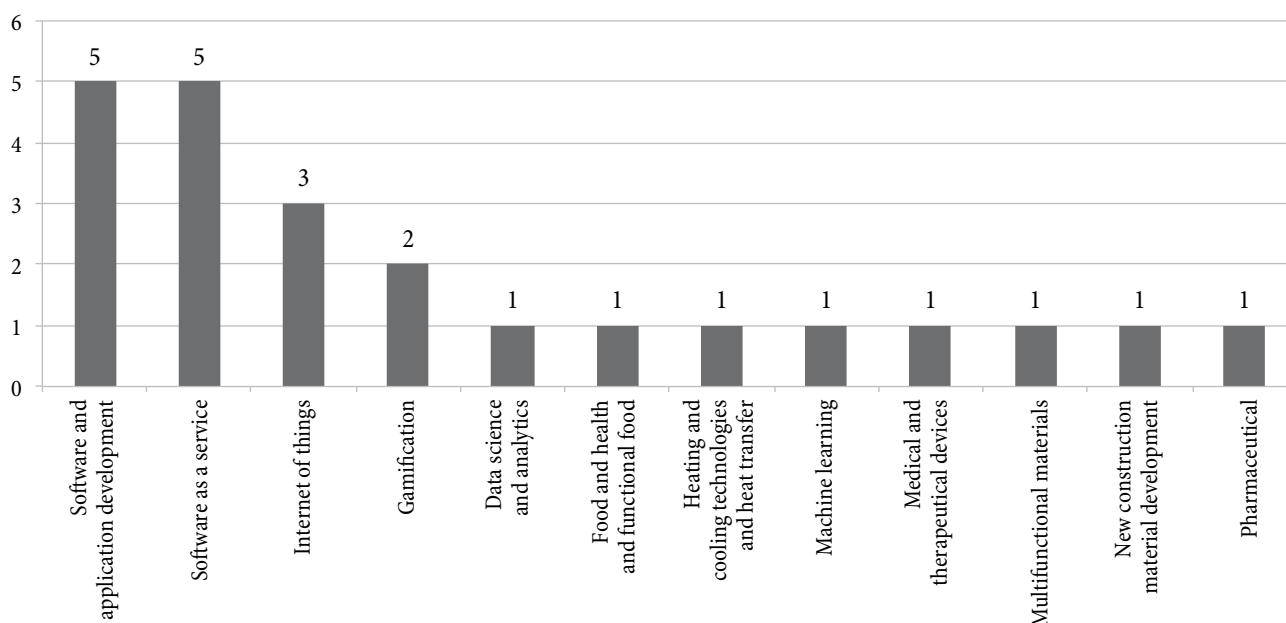

Figure 5: Mini Grants Program industry distribution (23 companies awarded in 2019) [58]

There is currently no public information on the results of these innovation projects, which would be an important subject of future research. It is likely that the overall findings would be more optimistic than when assessing the SMEs across a sector. The majority of surveyed manufacturing SMEs, for example, admits not to be using the smart, Industry 4.0 technologies [18].

The sectorial distribution of IF-supported innovative companies, especially in the recent years, matches that of the companies that the World Economic Forum proclaimed Technology Pioneers, as shown in Figure 6
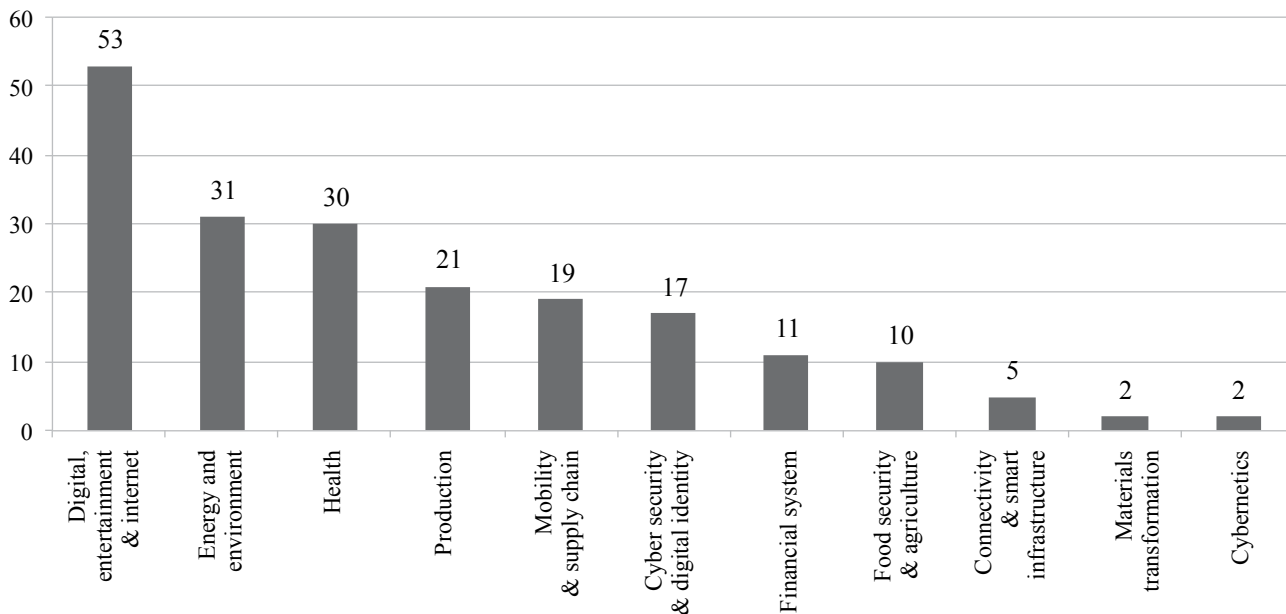
and Table 3 below (annual distribution is provided in the table to clearly present changes in certain categories over time). The World Economic Forum initiated this program in 2000, and in selecting these companies an independent expert committee evaluates applicants against the following criteria:

- Innovation: truly innovative in bringing to market technology with an effective business model; considered a technology leader in its field.
- Impact: has the potential to make a substantial long-term impact on business and society.
- Growth company: less than 10 years old, observed from company inception; an independent, privately held company.
- Leadership: visionary leadership with the ability to drive the company to success, and be able to contribute with time and expertise to the Forum's work [68].

However, as even limited desk research indicates, the size of the WEF Technology Pioneer companies in terms of investment and revenues is multiple that of companies selected to receive support from Serbia's Innovation Fund (companies selected in the past include: Airbnb, Google, Kickstarter, Mozilla, Palantir Technologies, Proteus Digital Health, Scribd, Spotify and Twitter) [68].

The gap is also visible when we examine the geographic distribution of WEF Technology Pioneers, based on their

Table 3: WEF Technology Pioneers sector structure (2015-2019, presented per year)

Sector	Year				
	2015	2016	2017	2018	2019
Digital, entertainment & Internet	5	9	7	19	13
Energy and environment	5	6	6	7	7
Health	5	6	5	4	10
Production	0	5	5	6	5
Mobility & supply chain	0	0	4	7	8
Cyber security & digital identity	0	0	3	8	6
Financial system	0	2	0	6	3
Food security & agriculture	0	2	0	4	4
Connectivity & smart infrastructure	5	0	0	0	0
Materials transformation	2	0	0	0	0
Cybernetics	2	0	0	0	0

Source: Authors' analysis based on WEF data [68].

Figure 6: WEF Technology Pioneers sector structure (2015-2019, aggregately presented)

Source: Authors' analysis based on WEF data [68].

headquarters' location, presented in Figure 7 and Table 4 below. The USA is dominant, followed by Northern and Western Europe. The subsequent Figure 8 provides an overview of European geographic distribution alone to highlight the role of individual countries. There is not a single Technology Pioneer seated in Eastern or Southern Europe, Serbia included. This further reinforces the need for a comprehensive study of IF-selected innovative companies in Serbia and how they compare to the global leaders.

Furthermore, the state of application of Industry 4.0-enabling technologies in Serbia merits additional research attention. For a preliminary assessment of Serbia's blockchain potential, in 2019 we conducted desk research and a 20-question online survey administered

Table 4: WEF Technology Pioneers headquarters location for the countries qualified as the Rest of the world in Figure 7 (2015-2019)

Country	Number of companies	Country	Number of companies
Australia	4	Bangladesh	1
Canada	4	Hong Kong	1
Brazil	3	Indonesia	1
Japan	2	Nigeria	1
Kenya	2	Norway	1
Mexico	2	Russia	1
Morocco	2	Saudi Arabia	1
New Zealand	2	South Africa	1
South Korea	2	Thailand	1

Source: Authors' analysis based on WEF data [68].

Figure 7: WEF Technology Pioneers headquarters location (2015-2019)
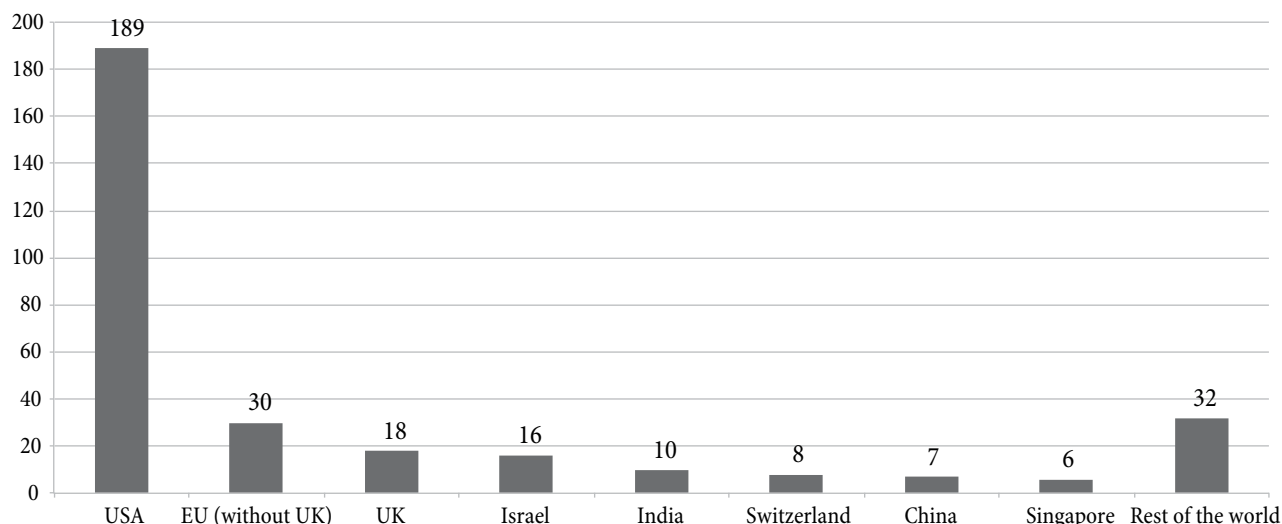
Source: Authors' analysis based on WEF data [68].

Figure 8: WEF Technology Pioneers headquarters location for Europe (2015-2019)

Source: Authors' analysis based on WEF data [68].

via SurveyMonkey, which was followed by qualitative, in-depth interviews held with seven key representatives of the Serbian blockchain community to overcome deficiencies of the small sample size (eight online survey respondents out of the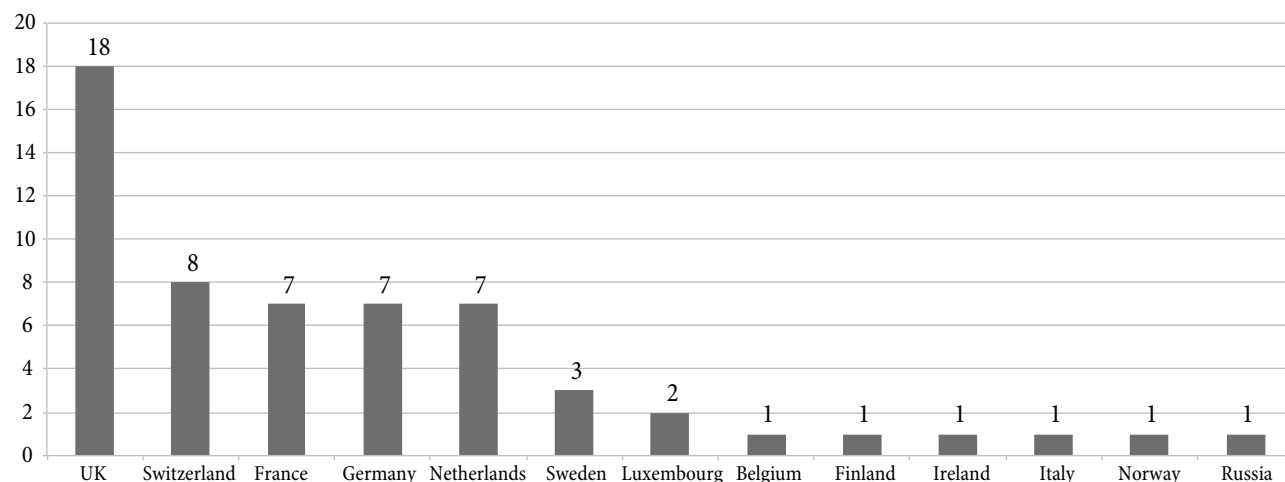 potential 19). The Serbian blockchain ecosystem features mainly outsourcing service providers, with a limited number of companies leading their own product development. Furthermore, in the case of own product development, the main founders tend to predominantly be foreign, whilst the bulk of the financing is globally crowdsourced. In terms of sectorial focus, the primary concentration is in the finance and gaming industry, followed by supply chain management and other industries. The blockchain ecosystem is still relatively small, with possibly a dozen firms mainly employing 10 to 49 people. Importantly, however, these firms operate globally and often have international know-how and linkages to advanced economies and business processes, engaging in constant upskilling. As a result, they are an important source of Serbia's innovation potential. Yet none of the interviewed firms has received any public funding, and generally consider financing and regulatory issues a hurdle to future growth. These companies further identify marketing and sales as an area where they would require support, in addition to the increasing problem of the availability of skilled computer programmers. Furthermore, all perceive an additional skills gap in soft skills and business skills in Serbia, both in the area of product management and sales. Recognition of digital assets by the financial regulation, and improved policy around data management are highlighted as two areas of regulatory concern. Most of the surveyed and interviewed companies participate in the Serbia Blockchain Initiative and other regional or global associations in an attempt to jointly educate and resolve regulatory issues, as well as to network to improve their sales pipeline by collaborating on different projects and branding Serbia as a relevant talent pool. To assess the awareness of blockchain technology among the leading Serbian economists and corporate directors, over the same period a survey was also conducted among members of the Serbian Association of Economists and the Association of Corporate Directors of Serbia. The response rate was acceptable, but the overall sample, as in the case of the

Serbian blockchain ecosystem participants, is still too limited in number to present these results as a significant empirical finding (14 respondents). Nonetheless, it is an indicative result, in that the vast majority of top Serbian economists and managers declared to be either unfamiliar with the blockchain technology or to be familiar with its basic workings. None of the respondents were aware of any Serbian blockchain companies, demonstrating a need to forge stronger corporate-start-up links, which is also identified as a World Economic Forum recommendation for wider Europe (2019).

Academic researchers in Serbia have started studying blockchain technology, mainly but not exclusively in the context of its financial applications. A search of the Serbian citation index [49] results in a total of 14 articles that denote blockchain as a keyword, with additional two articles that use the word in the body of the article.

The information on innovation activity in the field of artificial intelligence (AI) in Serbia is even scarcer. Serbia has been included in the Government Artificial Intelligence Readiness Index 2019 [38], where it is ranked as 58th out of 194 countries globally and at a regional average, with Slovenia ranking as 38th, Bulgaria as 47th, Hungary 48th, Romania 55th, followed by North Macedonia (61), Croatia (62), Montenegro (67), and finally Albania and Bosnia and Herzegovina lagging behind as 83rd and 95th, respectively. This index is comprised of 11 input metrics, grouped under four high-level clusters: governance; infrastructure and data; skills and education; and government and public services. The focus is on the business environment rather than companies' readiness. This is the only data point specific to AI that is cited in the description of the current situation in the newly adopted Strategy for the Development of Artificial Intelligence in the Republic of Serbia for the period 2020-2025 [24]. A starting point for future empirical research could be the Serbian AI Society, founded in early 2020 and convening about a dozen experts [48] and portals such as the Clutch service portal [11], which lists seven companies from Serbia that work in the area of artificial intelligence as of January 2020 (the total number of firms operating in AI listed on this portal is 1,947). For four of the companies, this is 10 or 15% of operations, while the other three firms engage

in AI to a more significant extent (40%, 55%, and 30% respectively). The size of these three most active companies is relatively small, with two employing less than 10 people and one between 10 and 49. For the sake of comparison, there are 17 AI companies listed for Bulgaria on this portal, 18 for Romania and seven for Northern Macedonia. In brief, initial desk research leads to the conclusion that Serbia's AI business community is still relatively small but growing. Researchers, on the other hand, have engaged with the topic to a greater extent than with blockchain. Although only one article in the Serbian citation index notes artificial intelligence/machine learning as a keyword, the term is mentioned in 238 articles in the body of the text, while another 14 note IoT as a keyword, with the majority of the AI and IoT publications belonging to the field of engineering [49]. Overall, the research published on Industry 4.0 technologies is relatively limited, especially when it comes to the study of the implementation of these technologies in Serbia.

Conclusions

In assessing Serbia's potential and the gaps in deploying innovating technologies that form the backbone of Industry 4.0, this article corroborates policy recommendations from both international and local innovation studies that focus on further regulatory and institutional reforms, improving access to finance, and strengthening education and skills.

Importantly, this article also identifies an immense research opportunity to engage in more comprehensive, empirical studies on business innovation in Serbia, considering the limited number and the scope of available literature on this topic published to date, especially in relation to the driving technologies of the Fourth Industrial Revolution and how local companies apply them to reach a higher level of productivity and growth. These would include a more in-depth investigation of blockchain and artificial intelligence (and related automation) developments, as well as a study of the application of other important technologies, such as robotics, cloud computing, extended reality, 3-D printing and others identified by leading analyses presented in Table 1 of this article. The Statistical

Office of the Republic of Serbia could support this process by conducting wider and more regular innovation surveys, as well as by adapting its business monitoring tools. It is further proposed that research focus be placed on a review of the dataset of companies and projects supported by the Republic of Serbia Innovation Fund, concentrating particularly on the outcomes of these projects and how they impact the wider innovation activity. Finally, research should also be continued in the related fields of human capital and knowledge integration, access to finance and the regulatory and infrastructure framework.

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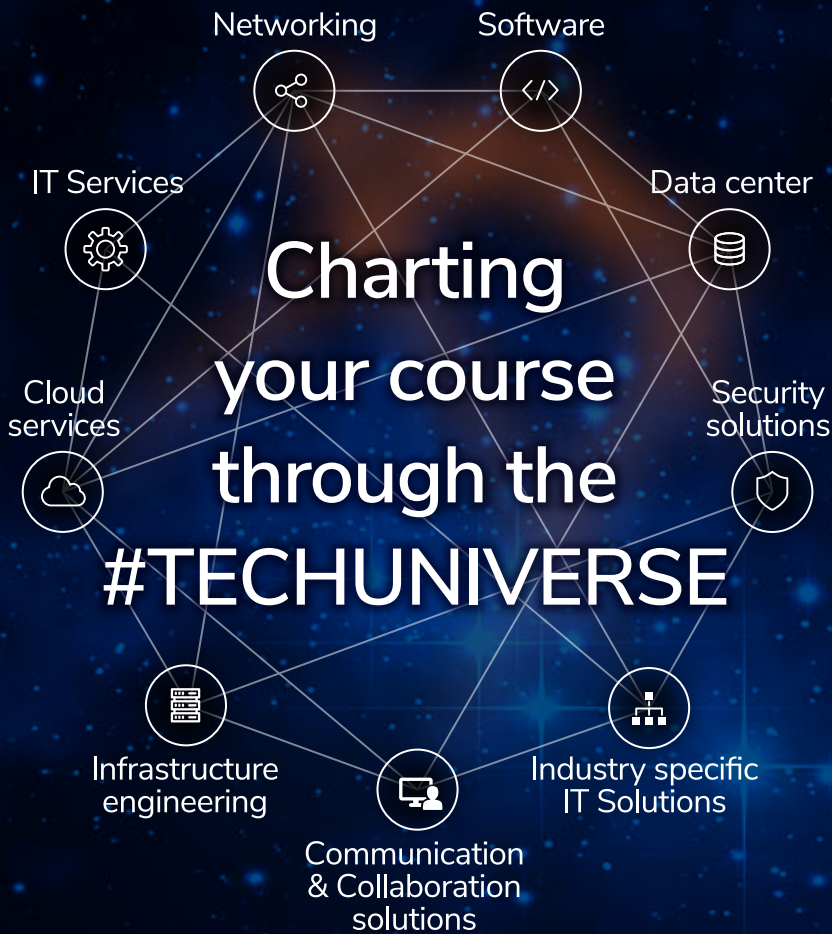
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SERBIA: CONTINUED QUEST FOR SUSTAINABLE GROWTH

Srbija - u potrazi za održivim rastom*

Abstract

The paper argues that Serbia must address a complex set of institutional, policy and behavioral challenges to enhance its readiness to respond to the likely pressures of the Fourth Industrial Revolution requiring profound social, industrial and organizational changes. These include rational and result-based allocation of resources aimed at improving key drivers of future production and economic growth, such as technology and innovation, human capital, institutional framework and sustainable resources. Behavioral changes are needed to shift from oversized input demands (for provision of ICT, education facilities, infrastructure, etc.) to achievement of better technology absorption, improved products and services, education achievements, elimination of corruption, the rule of law and resource sustainability.

Keywords: *Fourth Industrial Revolution, income convergence, growth diagnostics, institutional development, governance, economic complexities.*

Sažetak

U radu se pokazuje da Srbija mora da razreši složen skup institucionalnih i bihejviorističkih izazova da bi podigla svoj nivo spremnosti da odgovori na očekivane pritiske koje će generisati četvrta industrijska revolucija, a koji će zahtevati duboke socijalne, industrijske i organizacione promene. Da bi se to postiglo, potrebna je racionalna alokacija resursa usmerena na ostvarivanje rezultata na planu poboljšanja ključnih pokretača buduće proizvodnje i ekonomskog rasta, kao što su tehnologija i inovacije, ljudski kapital, institucionalni okvir i održiva resursna osnova rasta i razvoja. Potrebne su duboke promene u ponašanju da bi se prešlo sa predimenzionisanih zahteva za inputima (na primer u oblasti ICT, obrazovnih institucija, infrastrukture itd) na ostvarivanje rezultata u oblasti boljeg korišćenja tehnologije, poboljšanog kvaliteta proizvoda i usluga, ostvarivanja rezultata u obrazovanju, eliminaciji korupcije, vladavini prava i resursne održivosti.

Ključne reči: *četvrta industrijska revolucija, konvergencija dohotka, dijagnostika rasta, institucionalni razvoj, upravljanje, složene ekonomske veze.*

Introduction

Today, Serbia still faces similar challenges we discussed a year ago at KBF 2019 [9]. It continues to lag significantly behind Europe (EU-15), measured both in GDP per capita expressed in Euros and in purchasing power parity (PPP) terms. There is a strong consensus that dynamic sustainable economic growth over longer time periods stands as the key of income convergence with Europe and better quality of life in Serbia and the Western Balkan (WB) region as a whole. Views start to differ as soon as we address the practical institutional and policy changes needed to achieve such dynamic and sustainable long-term economic growth in real domestic and international circumstances.

The global economic context continues to be difficult, marred by the low level of economic activity and institutional and political uncertainties. Following a sharp slowdown in 2018, global economic growth remained weak throughout 2019 due to the lowest level of manufacturing activity recorded since the global financial crisis and the increasing trade and geopolitical tensions stemming from unclear future of the global trading system and international economic order. This affected adversely the businesses and investors' confidence. The accommodating monetary policy and the resilient service sector have cushioned much of the impact on the level of economic activity and employment. Nevertheless, risks remain.

As a result, world growth estimate has been reduced to 3.0 percent in 2019, and 3.4 percent in 2020. Economic growth in the so-called systemic market economies (US, EU, China and Japan, which account for almost half of the global GDP) will stabilize at moderate levels. Global growth can be expected to strengthen only in the 2021-2, driven by stronger recovery in the emerging market economies. The latest IMF's World Economic Outlook warns that the overall economic outlook remains precarious, with large downside risks. It calls for policies that would defuse the growing trade tensions, reinvigorate multilateral cooperation, provide appropriate stimulus to economic activity and address financial vulnerabilities that pose risks to the medium-run growth.

The European economic environment will face additional constraints from weaker trade and manufacturing.

Domestic demand (in services and consumption) has been strong, based on labor market conditions and supported by an expansionary fiscal policy and looser financial conditions. At the same time, the longer-run prospects may be affected by some signs of softer investment demand. Overall, EU growth has been now estimated at 1.4 percent in 2019 (a drop from 2.3 percent in 2018) and projected to modestly increase to 1.8 percent in 2020 based on the recovery of global trade and GDP growth. Significant differences in economic dynamics between advanced and emerging Europe will remain. In 2019, advanced Europe will grow by 0.1 percentage points below average, while the emerging Europe's growth is estimated at 1.8 percent (0.4 percentage points above average), leading to further convergence.

The key downside risks come from the no-deal Brexit and further intensification of trade tensions globally, which could adversely impact investment. Additionally, the existing weaknesses in trade and manufacturing could spread to modern service sectors and further diminish growth prospects. A cumulative effect of negative tendencies may lead to a downward adjustment in risk appetite of investors, renewed financial vulnerabilities and reemergence of deflationary pressures in advanced economies.

Many EU countries continue to favor accommodative monetary policy to counter the slowing economic activity. Based on widespread social and labor union pressures, wage growth has risen above productivity gains, especially in new EU Member States. IMF's most recent Regional Economic Outlook (November 2019) projects that this is likely to have a more muted impact on inflation due to weaker pass-through from wages-to-prices when the inflation level and inflation expectations are low, corporate profitability is high and firms are exposed to greater competition, as it appears to be the case recently.

Extended reliance on loose monetary policy may increase financial sector vulnerabilities, not least rising real estate prices, and calls for in-depth monitoring and active use of macro-prudential measures. Given the low level of unemployment, fiscal policy should be allowed to assume a stronger counter-cyclical role in the short run and, for the most part, to focus on medium-term objectives. Countries with ample fiscal space could introduce

measures to boost potential output, while countries with elevated debt and deficit levels should proceed with fiscal consolidation. This nuanced approach would also help address external imbalances.

In an environment of elevated downside risks, and limited scope for active monetary policy, contingency plans become indispensable. The core content of contingency plans should be pivoted in synchronized fiscal response, appropriately differentiated across countries, and synchronized with structural reforms, including higher labor force participation, investment in human capital and infrastructure and strengthened governance. These remain vital to raise and sustain economic growth, and address long-term challenges.

Serbia and the Western Balkan region will need substantial institutional reforms and policy changes to effectively utilize a more limited scope for faster real per capita growth in the medium run and to avoid the risk of falling further behind Europe in the standard of living. Additional risks of new trade barriers and reverse capital outflows in response to weaker macro fundamentals and (actual and perceived) political instability are of critical importance. The availability of otherwise ample financial resources for economic growth and development will be progressively limited for countries that do not meet the highest financial regulatory and taxation standards. This includes macro- and micro-prudential policies critical for financial stability and increased resilience, cybersecurity, safeguards against excessive risk-taking and application of AML-CFT measures with a clear objective of leaving the FATF (Financial Action Task Force) gray list, already done, and further improving performance. Given the legacies of the past, Serbia will need to monitor carefully contingent liabilities and balance sheet mismatches.

Unfortunately, the status of most of the institutional reforms necessary for the efficient operation of market democracy and free flow of goods, people and capital is still not satisfactory. Institutional weaknesses range from the financial sector, the rule of law (judicial independence and legal efficiency), protection of property and creditor rights, the quality of public and private sector governance systems to the overwhelming presence of non-transparent and corrupt practices. They will continue to be a strong

deterrent for large institutional investors who require a transparent, stable and efficient legal environment to enter and comfortably operate in Serbia and the Western Balkan region. In addition to this, a sustained higher level of foreign and domestic investment effort is a sine-qua-non for income convergence that hinges on efficient infrastructure and sustained productivity growth anchored in innovations.

At this stage of development, the availability of public infrastructure is an important precondition for dynamic growth. Despite strong investment efforts in the recent years, infrastructure continues to face gaps which effectively constrain economic growth, private sector development and continued integration into the European supply chains. This conclusion equally applies to inadequate transportation networks (both in coverage and quality), insufficient and unreliable provision of utilities (water, power, district heating, etc.), underdeveloped communication networks and underinvestment in human capital and innovation capacity for sustained long-term growth.

Closing the infrastructure financing gap may prove challenging within a limited fiscal space, with constrained access to external financing and weak domestic private sources. The routine recommendations from the IMF and other IFIs (to mobilize additional domestic revenues, contain domestic spending and improve the quality of public investment management, especially in selecting and implementing public and PPP projects) are welcome, but fall significantly short of the infrastructure needs. This is clearly one area where a concerted EU effort in the WB region, along with substantial private sector participation, will be needed to overcome this legacy of the past and an overriding obstacle to growth and the EU integration process.

Last but not least, necessary improvements in the quality of human capital and innovation potential for productivity growth may appear to be more modest in terms of financial resources needed, but the actual task may prove to be quite difficult to design and implement, as it requires a change in the value system, work ethics and corporate culture. For example, Serbia ranks much better in education and productive labor skills than the WB region, but it lags behind the region in labor market

performance. This clearly shows that Serbia continues to value education and skills, but that it has inherited a strong resistance towards the very concept of labor market and labor force mobility, even in relation to comparator countries in the WB region.

Finally, although Serbia possesses solid innovation capacity, it is not yet in a position to address the likely challenges posed by the Fourth Industrial Revolution (IR 4.0). Tangible improvements in educational achievements, labor-employer relations and reliance on professional management will be needed to convince foreign investors and managers that productivity gains in Serbia and the WB region can be achieved and sustained for large investments to be profitable in the longer run. Regarding the quality of governance (in the state, public and private sector), Serbia presently lags significantly behind the core EU Member States and the new accession countries.

The main focus of the paper in section two will be to expand and deepen our understanding of the challenges posed by the Fourth Industrial Revolution, and in section three to explore various aspects of readiness based on the methodology developed by the World Economic Forum (WEF) team and applied to 100 countries globally. Sections four and five will discuss the assessment and valuation results for Serbia and propose policy and reform improvements. Section six concludes.

New challenges posed by the Fourth Industrial Revolution

Exactly four years ago, Klaus Schwab coined the term the Fourth Industrial Revolution in a short paper published in Foreign Affairs. The opening paragraph was dramatic in its tone and substance: "We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another. In its scale, scope, and complexity, the transformation will be unlike anything humankind has experienced before. We do not yet know just how it will unfold, but one thing is clear: the response to it must be integrated and comprehensive, involving all stakeholders of the global polity, from the public and private sectors to academia and civil society [5]."

The concept was so influential that it entered the Encyclopedia Britannica already in May 2018, by defining the Fourth Industrial Revolution (or IR 4.0 for short) as "a series of social, political, cultural, and economic upheavals that will unfold over the 21st century. Building on the widespread availability of digital technologies that were the result of the Third Industrial, or Digital, Revolution, the Fourth Industrial Revolution will be driven largely by the convergence of digital, biological, and physical innovations."

Building on the digitalization and ITC started in the Third Industrial Revolution, the Fourth one additionally harbored technologies, such as artificial intelligence, genome editing, augmented reality, robotics and 3-D printing, which are deeply changing the way humans create, exchange and distribute value. Even more than in the previous revolutions, this one will profoundly transform social and political institutions (rules), industries and individuals. The social and political choices that we make today are likely to influence the world in decades and centuries to come.

Over and above the impressive breakthroughs in individual research fields and emerging technologies, it is important to note the additional crosscutting impacts and synergies between them. Schwab quotes examples that redefine and blur the boundary between the digital and physical worlds due to: fast expanding low-cost gene sequencing; the use of artificial intelligence in augmenting processes and skills in practically every industry; applying neuroscience and neurotechnology to enhance the human brain; bringing large-scale automation to century-old transport and manufacturing paradigms; and harnessing technologies such as blockchain and smart materials.

Schwab rightly warns that the implied changes in values, incentive systems and economic institutions (rules) will likely transform how we communicate, learn, entertain ourselves and relate to one another and how we understand ourselves as human beings, and that they will lead to societal transformation on a global scale. Furthermore, the increasingly rapid pace of change and everyday life will have "an impact on human identities, communities, and political structures. As a result, our responsibilities to one another, our opportunities for self-

realization, and our ability to positively impact the world are intricately tied to and shaped by how we engage with the technologies of the Fourth Industrial Revolution. This revolution is not just happening to us — we are not its victims — but rather we have the opportunity and even responsibility to give it structure and purpose."

As before in history, this revolution is bound to have both positive and negative impacts on different stakeholders. Some nations have benefited greatly from the previous revolutions, but the sustainability of these benefits depended on their ability to fairly distribute the resulting gains and address future risks (i.e., externalities at national and global level).

The novelty in this revolution are risks, such as cybersecurity threats, massive misinformation through digital media, potential unemployment or increasing social and income inequality.

One of the key concerns among economists is that the Fourth Industrial Revolution could shed jobs, yield greater inequality and, potentially, disrupt labor markets. They warn that the net replacement of workers by machines might exacerbate the gap between returns to capital and returns to labor. However, they also note that it is possible that, in aggregate, there may be a net increase in safe and rewarding jobs. Schwab notes that, in his view, IR 4.0 will stress the importance of talent and creative innovative potential of individuals more than technical skills and the availability of capital.

On the other hand, Bianchi [1] emphasizes major developments and challenges brought by the Fourth Industrial Revolution.

1. *New efficient technologies* increasingly enable a reversal of past massive offshoring of production and related services to China, India and other emerging economies. To continue to attract FDI, the emerging economies will have to be more efficient overall rather than just offer cheap labor. Successful countries will need to provide competitive infrastructure and logistical services, top quality management and efficient institutional and administrative environment. This will create space for shared prosperity through higher real wages and job security and, thus, reverse past trends of compensating inefficient government and institutional setup through lower wages.

2. *Hyper connectivity* which allows different organization of production, research and marketing functions, and substantially lowers the volumes of shipment requirements (ranging from printed documents to spare parts). The financial crisis stopped the exponential growth of global trade due to global recession. Post-crisis revival is increasingly based on data flows: digital globalization proceeds at an extremely rapid pace utilizing the evolution of ICTs into hyper-connected systems. Internet has become omnipresent in work, leisure and social relations of billions of people.

3. IR 4.0 will have a profound impact on the *structure and dynamics of industries*. The term industry has acquired a broader meaning. It indicates a capacity to organize production of goods and services to respond to market needs irrespective of the sector, from agricultural to manufacturing and services. Primary sectors (such as agriculture) are now seamlessly integrated with processing industry and saturated with innovation and knowledge. Likewise, high value-added manufacturing goods are intersecting with and often bundled with services.

4. There will be a need for a *new industrial policy*. Predictably, this will trigger deep transformations which, based on experience, require a new type of comprehensive industrial strategy and policy. The depth and complexity of the ensuing structural changes will require the inclusion of institutions (rules and regulation), social and education policies and a broader citizen participation at the regional and national level. Consistent with the broader definition of industry, industrial policy is defined as a set of actions aimed at enabling and facilitating structural changes and steering industrial development in the desired directions. Industrial policy is concerned with innovations, trade, intellectual property rights and antitrust laws, as well as human capital. Human capital in turn requires consideration of social policies, education and training.

5. *Digital globalization*, which entails a complex transformation of the economy, the society and culture, has been based on major science and technological developments in high-performance computing, artificial intelligence, robotics, new materials, genomics and nanotechnologies. In addition to having a profound impact in separate scientific fields, it allows developments across multiple fields that can converge to create completely new products and production processes.

6. *The changing roles of training and education, as well as geography and governance*. The entire education, training and learning systems will need to be rethought and adapted to the changing circumstances brought about by the ensuing technological revolution. Comprehensive treatment of geography and the linkages to the global ecosystem must gain primary importance in order to secure comprehensive competitiveness and long-run sustainability.

The main challenge for the emerging economies will be to create sufficient internal capacity to design and implement an appropriate new industrial policy that would enable timely institutional and policy changes to keep their economies competitive despite the likely disruptive changes across practically all industries.

Albeit impressive, the accelerated creation of new solutions, new products and new processes is not a distinctive feature of the Fourth Industrial Revolution, compared to the previous ones. Many leading authors in the field have identified similar periods of sustained technological changes, as well as convergence of different fields in the production process, as seen, for example, in the automobile industry. Likewise, each of the previous industrial revolutions introduced new technologies with a profound impact on the manufacturing regimes. The progression goes from the factory system brought by the First Revolution, over mass production systems (assembly lines) introduced by the Second, and flexible production systems enabled by the Third one, to mass customization to meet the demand which will dominate the world of the Fourth Industrial Revolution. They also created unique interactions between economic, social and political conditions.

For example, the mass production system of the Second Industrial Revolution was based on the division of production process into elementary tasks performed by well-trained and relatively low-skilled workers under time constraint. This had predictable consequences on the educational requirements, income levels, social structure, organization of the labor force (unions), the structure and style of management, as well as the main characteristics of the urban rural divide and the nature of the polity.

The Third Industrial Revolution, in connection with globalization, introduced massive changes in the global division of labor towards the emerging market economies. Starting from 1990s, globalization promoted unprecedented growth of world trade and foreign direct investments in a world characterized by trade liberalization, massive transition from plan to market and the birth of emerging market economies. Industrial policy played a major role in facilitating deep structural transformation of the economy. Good examples include China, Slovakia, Czech Republic and Slovenia. By contrast, lack of appropriate industrial policy and the dominance of chaotic and ill-conceived privatizations has been apparent in countries that experienced chronic difficulties during the transition process.

In addition to introducing substantial challenges, the Fourth Industrial Revolution offers a great opportunity to resolve the current global societal issues, such as demographic trends of population growth and population ageing, rapid and wide urbanization, as well as preservation of ecosystems and climate change. This opportunity will be exploited only if scientific, technical and economic changes are accompanied by appropriate ethical, cultural and social changes. To succeed, it is critical to develop awareness, build resilience and promote sustainability in policymaking at the national and global level. In doing so, it is essential to respect and properly address the complexity of deeply related (intertwined) issues. To be successful in facing the sweeping changes likely to come with the Fourth Industrial Revolution, societies will need to enable true ethical, cultural and social metamorphosis.

Therefore, the new industrial policy must be comprehensive and favor adaptation and adaptability by promoting innovation and adoption of new technologies, adjustment in human capital and provision of appropriate

infrastructure. Information has become the main raw material (input) and output. New technologies allow hyper-connection on a global scale between people, people and machine, and between machines (the so-called IoT – internet of things). Global data flows are growing exponentially, allowing a small number of firms to hold huge market power based on enormous amounts of data. This raises serious privacy and antitrust issues that require new legal solutions and enforcement mechanisms.

The volume of exports and imports in the world has not changed much since 2007, but Asia's share has increased. China became the leader in global manufacturing value added, both in terms of levels and dynamics. Furthermore, Asian countries are well-positioned to respond to the challenges of the Fourth Industrial Revolution. Based on their strong investment in R&D and in skills, they are likely to further strengthen their position in global trade and manufacturing value added.

New globalization is likely to generate exponentially growing data flows and stagnant trade of goods. The leading private companies (CISCO) estimate that mobile data traffic has increased 18-fold during the 2011-2016 period and is likely to increase another 7-fold in the future to 49 exabytes per month. Again, the fastest growth is expected in Asia, which will account for half of global data traffic by 2021.

Expectedly, smartphones are projected to be the main source of data traffic (43%) in 2021, followed by machine-to-machine data exchange (over 30%) without the involvement of humans. M2M data traffic is in fact the internet-of-things (IoT), and is at the core of the Fourth Industrial Revolution. Examples include GPS systems in cars, medical applications, patient health records and citizen data records, home and office security and automation systems, as well as the industrial internet. In short, while the flows of physical goods and capital have come to a halt in the last decade following the global crisis, globalization has not stopped but has become digital, including substantial portion of huge financial flows which have become digital, too.

A more detailed view reveals the supply-side changes, as well as a deep transformation of the demand side of markets. The revolution in the interaction between consumers and producers has already happened and will continue to evolve based on online platforms. Obvious examples are new businesses, such as Uber and Airbnb, which have deep implications for the operation of the markets and the position of incumbent firms in the existing industries. Interaction between producers and consumers is also changing the nature of products and services. Many manufacturers and companies in general claim that they now sell solutions rather than products. Competition intensifies due to low cost of entry through new platforms and ability to customize products and services to specific needs. This also raises issues of competition policy.

New data platforms are able to create enormous databases of personal information without consumers' consent or awareness, especially containing information revealed through the use of online markets and applications. This raises the issue of product and services regulation, as well as privacy, market and political power. Companies such as Google, Amazon, Facebook and Apple have acquired monopolistic dominance that dwarfs the historical examples of Standard Oil.

Readiness for the future of production in IR 4.0 – Methodology and global results

The World Economic Forum (WEF) surveyed one hundred countries across all continents in an effort to understand where countries are vis-à-vis the likely challenges posed by the ensuing IR 4.0. The authors of the WEF's Readiness for the Future of Production Report [11] start from the already observed trends associated with the Fourth Industrial Revolution. The report is based on new "emerging technologies — such as the Internet of Things, artificial intelligence, robotics and additive manufacturing", which "will fundamentally transform production", bring about greater "speed and the scope of technological change" and another "layer of complexity to the already challenging task of developing and implementing industrial strategies that promote productivity and inclusive growth."

Furthermore, they emphasize that IR 4.0 will put at risk "the competitiveness paradigm of low-cost manufacturing exports as a means for growth and development", forcing countries to adjust "their national strategies and their

ambition to leverage production as a national capability", and "understand the factors and conditions that have the greatest impact on the transformation of their production systems".

The Readiness report is intended to help countries understand how well they are positioned today to "benefit from the changing nature of production in the future" based on data-driven assessment in two critical areas: "Structure of Production, or a country's current baseline of production, and Drivers of Production, or the key enablers that position a country to capitalize on the Fourth Industrial Revolution to transform production systems."

As indicated in the table below, the assessment was conducted based on two dimensions, eight categories and ten subcategories with a total of 59 indicators. Expectedly, the brunt of the indicators (35, i.e., 60%) is concentrated in two categories most relevant for readiness to respond to challenges posed by the IR 4.0.

The Readiness report defines key dimensions, categories and subcategories as follows [11, pp. 5-7]:

Structure of production reflects the complexity and scale of the current production base. The assessment does not evaluate sector mix (of agriculture, industry, services), but rather looks at the scale and complexity of the production system, assuming that countries with a large, more complex structure of production today are better prepared for the future. More specifically, the Complexity category assesses the mix and uniqueness of products a country can make based on embedded knowledge and economic linkages as defined by Haussmann and Hidalgo's research on economic complexity [3]. On the other hand,

the Scale category assesses the manufacturing value added and its relative importance (share in GDP).

Drivers of production identify key enablers that position a country to capitalize on emerging technologies and opportunities in the future of production. Six main drivers or categories (included in Table 1) have been identified through an iterative consultative process involving key stakeholders (including decision/policymakers, businesses and academia). Each driver includes corresponding subcategories and indicators that enable measurement. The logic behind the detailed Drivers of production dimension is that countries with higher scores across the mix of enablers will do better in the adoption and diffusion of technology underlying the future transformation of production systems.

The *Technology & Innovation* category assesses the quality of the existing technology platform (such as the availability and use of ICT) and country's ability to foster innovation and commercialize innovations that have potential applications in production. As will be noted in the discussion of the empirical results, there is a constant tension and a potential trade-off between the supply side (such as provision of ICT and research results) and demand (use) of this potential at the firm and industry level. Namely, countries that are leaders in terms of high availability of ICT (Hong Kong, Bahrain, Ireland) are not the best in terms of securing effective absorption of technology at the firm level and impact on products and services (Sweden and Switzerland). Likewise, countries that make the strongest effort to finance science and R&D (Korea, Denmark) are not necessarily leaders

Table 1: Readiness diagnostic model framework – Future of production capabilities

Structure of production		Drivers of production					
60%	40%	20%	20%	20%	20%	15%	5%
Complexity	Scale	Technology & Innovation	Human capital	Global trade & Investment	Institutional framework	Sustainable resources	Demand environment
1 indicator	2 indicators	7+11 indicators	6+11 indicators	4+3+2 indicators	4 indicators	6 indicators	2 indicators
		Technology platform	Current labor force	Trade	Government	Sustainability	Foreign & Domestic demand
		Ability to innovate	Future labor force	Investment			
				Infrastructure			

Source: Readiness report [11, pp. 5-6].

in securing venture capital financing to turn innovative ideas into commercial products, or in transmitting the impact of innovations on industry activity (where the USA dominates).

The *Human capital* category assesses a country's ability to respond to constant changes in the labor market triggered by the Fourth Industrial Revolution by looking at both the current labor force capabilities, as well as the long-term ability to cultivate the right skills, talent and incentives in the future work force.

The Global trade & Investment category assesses a country's ability to operate efficiently under global trade competition (with substantial trade openness), secure domestic and international financial resources to invest in production-related development, as well as to provide high quality of infrastructure (in transport and electricity) to enable production-related activities.

The *Institutional framework* category focuses on efficient and effective operation of the government in securing regulatory efficiency, the rule of law, corruption-free environment and longer-run legal and policy orientation necessary for the private sector to harness technological development, novel businesses models and advanced manufacturing.

The *Sustainable resources* category assesses the impact of present and future production on the environment, including sustainable use of natural resources and due concern paid to the development of alternative energy sources.

Finally, the Readiness report assesses the overall *Demand environment* category by evaluating a country's effective market size, i.e., access to foreign and local demand for optimal scale of production. This category also measures the sophistication of the consumer base by looking at buyer sophistication on one hand, and the level of competition (i.e., the absence of market dominance) on the other. The authors [11] note that the proposed sets of indicators were evaluated based on the existing measures

Figure 1: Readiness for the future of production – Global data/Evaluation results
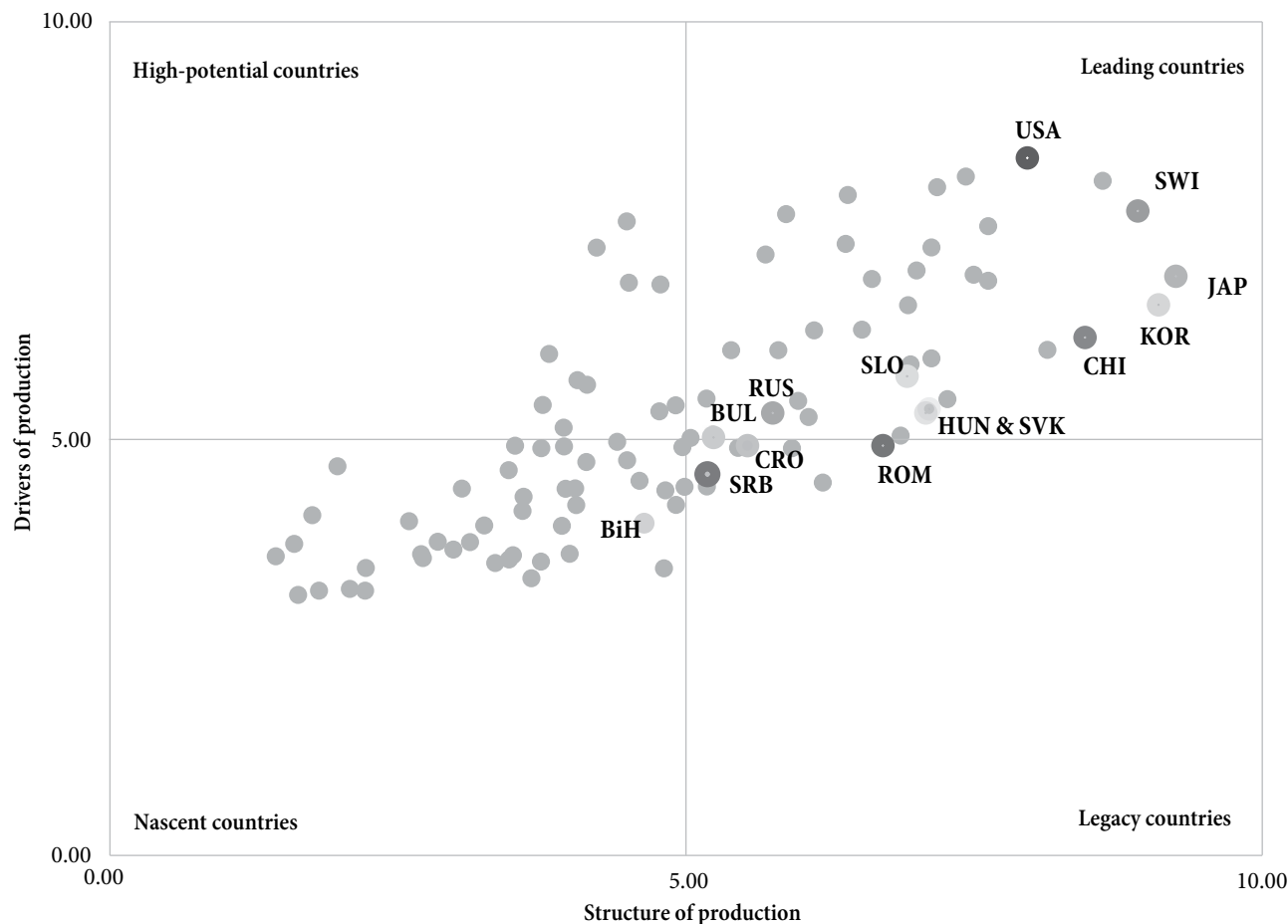
Source: Readiness report [11] and author's estimates.

defined by international organizations[1], as well as the World Economic Forum's own evaluations and surveys.

Based on the methodology described above, the WEF team observed the 59 indicators for each country and calculated the aggregate values for subcategories, categories, and finally the two principal dimensions for the Structure of production (plotted on the horizontal axis) and the Drivers of production (plotted on the vertical axis), using the weights presented in Table 1 above.

Four country archetypes emerge from the assessment data: 1. Leading countries (top right quadrant), which exhibit both strong production base today and a high level of readiness for the future; 2. Legacy countries (bottom right quadrant), which inherited a strong production base from past industrialization efforts, but record relatively weaker performance across one or more drivers of production which puts them at risk in the fast-changing world following the Fourth Industrial Revolution; 3. High-potential countries (top left quadrant), which have strong future production drivers and a relatively smaller manufacturing base due to a rich natural resource base (such as oil and gas) or greater reliance on trade and services; and 4. Nascent countries (bottom left quadrant), which have both limited present production base and low level of readiness across drivers of future production.

There is a relatively heavy concentration of countries around the median score: 23 countries score between 4.5 and 5.5 on the Structure of production, and 32 countries score between 4.5 and 5.5 on the Drivers of production. Hence, the number of countries that fall within each of the archetype quadrants varies depending on the dividing lines (i.e., point where quadrants intersect).

The WEF team assumed that quadrants intersect at the average score of top 75% of performers in each dimension (i.e., 5.71 for Structure of production and 5.73 for Drivers of production). This puts 25 countries in the Leading quadrant, 57 countries in the Nascent quadrant, and nine countries each in the High potential and Legacy

quadrants. By contrast, if we assume that quadrants intersect at a median score of 5.0 for both dimensions (as indicated in Figure 1), we will obtain a substantially larger number of countries (36) in the Leading quadrant, only 44 in the Nascent quadrant, marginally more (11) in the High-potential quadrant, and an unchanged number in the Legacy quadrant.

Obviously, the choice of the intersection point is somewhat arbitrary and inconsequential for the analysis and policy recommendations, but it does affect the headline that captured global attention: Only 25 countries are ready to face the challenges of the Fourth Industrial Revolution.

Two obvious conclusions of the Readiness report [11, pp. 13-14] on a global scale are: to advance readiness, countries should seek to improve performance across all Drivers of production (or shift up in Figure 1), and expand their Structure of production (shift right in Figure 1). Generic recommendations will vary across archetype groups.

The best strategy for countries in the Leading quadrant is to push (up and right) toward the frontiers of their archetype and convert readiness into transformation by adopting and fully harnessing the potential of the emerging technologies. The downside risk for Leading countries is to rely too much on their current success and ease their efforts in expanding the platform for transforming production practices, potentially shrinking the future production base.

The Legacy countries should center their strategy on improving performance across all relevant Drivers of production. This will enhance their potential to transform current production systems and improve the Structure of production. The downside risk for Legacy countries is to underinvest across key drivers, resulting in a shrinking future production base.

The best strategy for High-potential countries is to use the existing strong Drivers of production to expand the scale and complexity of the Structure of production to the extent that this fits their development strategy. Some countries may want to pursue services or other opportunities instead of manufacturing as part of their strategy.

The best strategy for Nascent countries is to first invest in drivers (move up in Figure 1) to create the

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1 Such as the International Energy Agency (IEA), International Labor Organization (ILO), International Telecommunication Union (ITU), Organization for Economic Co-operation and Development (OECD), United Nations (UN), United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Industrial Development Organization (UNIDO), World Bank (WB), World Trade Organization (WTO) and others.

right basis and conditions to develop and implement a strategy to expand the Structure of production aligned with developments set by the IR 4.0.

Readiness for the future of production in IR 4.0 – Results for Serbia

Serbia has a 5.2 score in Structure of production and a 4.6 score in Drivers of production. Based on the WEF archetype classification, this puts Serbia is in the Nascent group of countries (with 5.2<5.71 and 4.6<5.73). By contrast, our classification puts Serbia in the Legacy subset (5.2>5.0 and 4.6<5.0). In both cases, Serbia is close to the borderlines. We believe, though, that the complexity and

scale of manufacturing production (after accounting for the continued chronic low capacity utilization in older manufacturing sectors) better fits the Legacy than the Nascent profile.

The essence of Serbia's readiness can best be seen at the level of categories and subcategories in the Drivers of production dimension. As detailed in Tables 2a-2c below, Serbia records an uneven performance both across and within key categories. The last column in Tables 2a-2c indicates our brief assessment of the need to first analyze the problem and design appropriate policy/reform response, where Need indicates the desirable course of action, and Must indicates the presence of critical gaps and an urgent call for action.

Table 2a: Serbia – Readiness for the future of production under IR 4.0

		Serbia			Leader		Policy /
		Score	Rank	Distance	Score	Name	Reform
I	Structure of production	5.2	42	42.37%	9.0	JAP	
I.1	Complexity	6.3	37	37.23%	10.0	JAP	
	Economic complexity (2.5) – 2.5	0.6	37	74.29%	2.3	JAP	
I.2	Scale	3.5	63	64.66%	10.0	CHI	
	Manufacturing value added % GDP	13.9	46	56.76%	32.1	CHI	
	Manufacturing value added US$ bn	5.72	69	99.81%	2999.9	CHI	
II	Drivers of production	4.6	64	43.76%	8.2	USA	
II.1	Technology & Innovation	3.8	69	55.76%	8.5	USA	
II.1.1.	Technology platform	5.1	72	41.69%	8.7	SIN	
II.1.1.a	Availability of ICT	7.1	56	22.34%	9.1	UAE	
	Mobile phone subscriptions per 100 pop.	120.6	52	48.45%	234.0	HKK	Outlier
	LTE mobile network coverage % population	78.2	58	21.80%	100.0	BAH	
	Internet users % of adult population	67.1	49	31.57%	9.8	BAH	
	FDI and technology transfer 1–7	3.9	83	35.69%	6.1	IRE	
II.1.1.b	Use of ICT	5	92	39.74%	8.4	SWI	
	Firm-level technology absorption 1–7	3.9	97	35.83%	6.0	SWE	Need
	ICT impact on services and products 1–7	4.2	80	32.03%	6.2	SWI	Need
II.1.1.c	Digital security & Data privacy	3.1	85	66.38%	9.3	SIN	
	Cybersecurity commitment 0–1	0.3	84	66.38%	0.9	SIN	Must
II.1.2.	Ability to innovate	2.5	47	70.54%	8.3	USA	
II.1.2.a	Industry activity	3.5	86	53.58%	7.6	USA	
	State of cluster development 1–7	3.4	80	40.90%	5.7	USA	Need
	Comp. Inv. in emerging technology 1–7	3	89	50.70%	6.0	USA	Must
	G-procure. of advanced technology 1–7	2.8	79	48.01%	5.5	UAE	Must
	Comp. embracing disruptive ideas 1–7	3	94	42.81%	5.3	USA	Need
	Multi-stakeholder collaboration 1–7	3.3	76	40.42%	5.6	USA	Need
II.1.2.b	Research intensity	3.7	27	63.33%	10.0	DEN	
	R&D expenditures % GDP	0.8	45	81.92%	4.3	KOR	Must
	Sci-technical publications: No/bn PPP$ GDP	49.2	7	26.35%	66.8	DEN	
	Patent applications per million pop.	2.15	48	99.51%	439.0	JAP	Must
	Available financing 0-10	0.2	85	98.03%	10.0	UK/USA	Must
	Venture capital deals US$ millions	156.3	84	99.99%	2121.5	USA	Must
	Venture capital deals % GDP	3.9	85	99.64%	1083.4	BIH	Must

Table 2b: Serbia – Readiness for the future of production under IR 4.0

		Serbia			Leader		Policy /
		Score	Rank	Distance	Score	Name	Reform
II.2	**Driver: Human capital**	**5**	**54**	**40.67%**	**8.5**	**SWI**	
II.2.1.	**Current labor force**	**6.8**	**40**	**21.94%**	**8.8**	**FIN**	
II.2.1.a	**Labor force capabilities**	**6.8**	**40**	**21.94%**	**8.8**	**FIN**	
	Manufacturing employ. % working pop.	**16.1**	20	41.03%	27.3	CZE	May
	Knowledge-intensive employ % working pop.	**28.9**	42	46.86%	54.3	SIN	Need
	Ratio of female to male reimbursement	**0.86**	37	24.02%	1.14	MOL	
	Mean schooling years	**11**	38	21.72%	14.1	GER	
	Availability of scientists & engineers 1–7	**3.9**	60	34.82%	6.0	FIN	Need
	Digital skills of active population 1–7	**4.2**	58	29.08%	6.0	USA	
II.2.2.	**Future labor force**	**3.2**	**73**	**60.85%**	**8.2**	**SWI**	
II.2.2.a	**Migration**	**0.7**	**98**	**91.91%**	**9.2**	**SWI**	
	Migration migrants/100,000 pop.	**-14.1**	93	100.00%	229.4	OMA	Must
	Capacity to attract and retain talent 1–7 (best)	**1.9**	98	68.89%	6.1	SWI	Must
II.2.2.b	**Education outcomes**	**4.8**	**52**	**40.63%**	**8.0**	**GER**	
	Quality of universities Count.	**1**	62	99.37%	15.9	USA	Must
	Quality of math & science education 1–7	**4.8**	26	25.42%	6.5	SIN	
	Quality of vocational training 1–7	**3.7**	67	43.23%	6.6	SWI	Must
	School life expectancy years	**14.6**	54	28.91%	20.5	AUI	Need
	Pupil-teacher ratio in primary education	**15.2**	35	72.32%	8.8	KUW	Outlier
	Critical thinking in teaching 1–7	**3.1**	68	43.47%	5.5	DEN	Must
II.2.2.c	**Agility & Adaptability**	**4.1**	**76**	**48.86%**	**8.1**	**SWI**	
	Active labor market policies 1–7	**3**	66	46.81%	5.7	SWI	Must
	On-the-job training 1–7	**3.8**	80	39.42%	6.2	SWI	Need
	Hiring and firing practices 1–7	**3.6**	57	37.19%	5.8	HKK	Need
II.3	**Driver: Global trade & Investment**	**5.1**	**60**	**43.64%**	**9.0**	**SIN**	
II.3.1.	**Trade**	**7.7**	**37**	**17.74%**	**9.3**	**SIN**	
II.3.1.a	**Trade openness**	**10**	**1**	**0.00%**	**10.0**	**AUS**	
	Trade % GDP	**109.2**	24	70.70%	372.6	HKK	Outlier
II.3.1.b	**Trade facilitation & Market access**	**5.3**	**68**	**38.22%**	**8.7**	**SIN**	
	Trade tariffs%	**0.05**	66	69.56%	0.0	HKK	Outlier
	Prevalence of non-tariff barriers 1–7	**4**	81	32.19%	5.9	SIN	
	Logistics performance 1 – 5	**2.8**	69	32.97%	4.2	SWE	
II.3.2.	**Investment**	**1.5**	**67**	**85.11%**	**10.0**	**CHI**	
II.3.2.a	**Investment and financing**	**1.5**	**67**	**85.11%**	**10.0**	**CHI**	
	Greenfield investments US$ bn	**3.65**	41	95.05%	73.7	CHI	
	FDI inflows US$ bn	**2.24**	56	99.12%	255.5	USA	
	Domestic credit to private sector % GDP	**43.4**	71	80.89%	227.3	CYP	
II.3.3.	**Infrastructure**	**6.1**	**63**	**34.93%**	**9.4**	**SIN**	
II.3.3.a	**Transportation and electricity**	**6.1**	**63**	**34.93%**	**9.4**	**SIN**	
	Transport infrastructure 0–100	**50**	47	43.72%	88.8	HKK	
	Electricity 0–100	**71.7**	77	28.27%	100.0	ISR	
II.4	**Driver: Institutional framework**	**4.9**	**60**	**46.51%**	**9.1**	**SIN**	
II.4.1.	**Government**	**4.9**	**60**	**46.51%**	**9.1**	**SIN**	
II.4.1.a	**Efficiency & Effectiveness**	**5**	**56**	**41.76%**	**8.7**	**SIN**	
	Regulatory efficiency 0–100	**69.9**	51	22.43%	90.1	SIN	
	Incidence of corruption 0–100	**42**	53	53.33%	90.0	DEN	Must
	Future orientation of government 1–7	**3.4**	63	45.20%	6.2	SIN	Need
II.4.1.b	Rule of law	**4.7**	62	52.88%	10.0	FIN	
	Rule of law (2.5) - 2.0	**-0.1**	62	100.00%	2.0	SWE	
II.5	**Driver: Sustainable resources**	**6.2**	**53**	**29.55%**	**8.8**	**NOR**	
II.5.1.	**Sustainability**	**6.2**	**53**	**29.55%**	**8.8**	**NOR**	

Source: Readiness report [11] and specifically pages 212-213 for Serbia.

Table 2c: Serbia – Readiness for the future of production under IR 4.0

		Serbia			Leader		Policy /
		Score	Rank	Distance	Score	Name	Reform
II.5.1.a	**Energy & Emissions**	**4.8**	**82**	**46.52%**	**9.1**	**SWE**	
	Alternative & nuclear as % total energy use	**0.2**	63	83.74%	0.9	ETH	Must
	CO2 intensity -- megatons/GDP (US$ bn)	**0.9**	88	50.92%	0.1	SWI	Must
	CH4 intensity -- megatons/GDP (US$ bn)	**0.2**	60	86.88%	0.0	JAP	Must
	N2O intensity -- megatons/GDP (US$ bn)	**0.1**	75	95.07%	0.0	BAH	Must
II.5.1.b	**Water**	**7.6**	**28**	**20.13%**	**9.5**	**AUS**	
	Baseline water stress (use as % of available)	0.6	20	88.33%	0.0	UGA	Must
	Wastewater treatment	64	67	36.01%	100.0	SIN	
II.6	**Driver: Demand environment**	**3.5**	**85**	**59.09%**	**8.5**	**USA**	
II.6.1.	**Foreign & Domestic demand**	**4**	**71**	**59.62%**	**10.0**	**CHI**	
II.6.1.a	**Market size**	**4**	**71**	**59.62%**	**10.0**	**CHI**	
	Market size 0–100	**40.4**	71	59.62%	10.0	CHI	Must
II.6.1.b	**Consumer base**	**3**	**97**	**60.61%**	**7.5**	**SWI**	
	Consumer sophistication 0-10	**3**	97	60.61%	7.5	SWI	Must
	Buyer sophistication 1–7	**2.4**	99	54.62%	5.3	USA	Must
	Extent of market dominance 1–7	**3.2**	89	46.65%	5.9	SWI	Must

Source: Readiness report [11] and specifically pages 212-213 for Serbia.

The following conclusions and direct policy recommendations can be derived from assessments presented in Tables 2a-2c:

Under the category **Technology and innovation,** Serbia scored 3.8, which is 55.8 percent behind the leader. Two thirds of this score are accounted for by the Technology platform subcategory (mostly based on solid Availability of ICT), and only one third by the Ability to innovate subcategory. In leading countries, these two categories contribute roughly with 50% each. The main reason that a very important subcategory, Ability to innovate, contributes so little can be attributed to weaker indicator scores under Industry activity (ranked 76-94 out of 100 countries) and a rather uneven performance under Research intensity (ranging from excellent performance on Scientific and technical publications ranked no. 7 in the world, to practically non-existent financial support for commercial development of innovations). This is confirmed by the following specific comments on the elements of Technology and innovation:

Availability of ICT

Serbia is doing reasonably well in the classical aspects of ICT availability.

Use of ICT

Serbia could do better in securing firm-level technology absorption and the effective use of ICT to improve products and services. See SWE and SWI.

Digital security & Data privacy

Insufficient attention is paid to cybersecurity.

Industry activity

Generally, much more attention is devoted to ICT availability than to the related and more important industry activity. More specifically, the following issues loom large and must be addressed:

Mediocre level of cluster development;

Companies are not inclined to invest in emerging technology;

No effort from the Government to procure advanced technology;

Companies are risk-averse and do not embrace disruptive ideas that are at the core of changes happening within IR 4.0;

There is not enough multi-stakeholder collaboration in advancing industry innovation efforts.

Research intensity

Insufficient funding for science, R&D. Must be corrected immediately.

Must understand why patent applications are so low.

Financing for innovations is seriously lagging behind every effective model in the world.

Under the category **Human capital**, Serbia could do more to stop and gradually reverse the brain drain through a more adequate financing of science, R&D and innovation efforts, and better career prospects for young talents. Regarding the Future labor force issues, it is imperative to improve Education outcomes and on-the-job training (see the notes below).

Education outcomes

Quality of universities is an acute and painful issue. Attracting certified global universities in critical areas (for IR 4.0) may help. In vocational training, broader efforts are needed, synchronized with FDI projects.

Improve the quality of teaching and learning.

Agility & Adaptability

On-the-job training must be improved.

Under the category **Global trade and investment**, Serbia can diversify and improve financing of investments (especially credits to the private sector) and provision of infrastructure.

Investment and financing

Domestic credits to the private sector lag behind despite the fact that banks have ample resources which they tend to invest in Government bonds rather than the private sector.

Transportation and electricity

Serbia still lags behind in the provision of enabling full infrastructure services and electricity.

Finally, the category **Institutional framework** shows that there is room for more efficient and effective operation of the Government, especially in reducing the incidence of corruption and improving the rule of law (see the comments below).

Efficiency & Effectiveness 0-10

Incidence of corruption (perceived or real) affects the quality of the institutional framework and must be improved.

Future orientation of the Government becomes a critical dimension of readiness for IR 4.0. Less energy should be devoted to firefighting and more to strategic issues.

Rule of law

The economic importance of the rule of law is not recognized.

Possible policy and institutional responses

The Fourth Industrial Revolution has already produced a deep and lasting impact on all industries, both on the supply and the demand side of goods and services. To enable the economy to efficiently and effectively respond to past and forthcoming challenges, adequate macroeconomic and industrial policies will have to be accompanied with a significantly improved public and private investment effort. Presently, its size is too small, the structure is not aligned with likely infrastructure and human capital (knowledge) gaps, the efficiency is too low, and the efficacy in achieving stated objectives is inadequate.

Major improvements are needed in public investment planning, from identification to preparation, appraisal and implementation. Obvious areas for plausible interventions include building capacity for critical stages of selecting investment priorities, doing high-quality project preparation, competitive financing and implementation. In terms of structure, public investment will be expected to devote an increasing share to human capital development, ICT and connectivity, science, R&D and innovations, while meeting the highest international standards. Finally, public investment must be smart and focused on enabling and crowding in private investment aligned with the demands of the global economy.

In addition, a strong effort will be needed to design and implement a transparent incentive system for efficient private investments that would successfully apply the most recent technological changes and respond to challenges posed by the Fourth Industrial Revolution.

In this context, the main challenge will be to create sufficient internal capacity to design and implement an appropriate new industrial policy that would enable timely institutional and policy changes to keep the Serbian economy competitive. Breakthroughs in science and technology, which are at the core of the Fourth Industrial Revolution, have introduced disruptive changes virtually across all industries.

Future growth-enhancing policies will have to be introduced in an increasingly complex world characterized by continued globalization and the overpowering impact of the changes brought about by the Fourth Industrial Revolution.

Although post-crisis globalization has slowed down in its initial domain (trade of physical goods and services), it has triggered deep structural changes in companies and industries. It changed the behavior of firms in the areas of R&D and innovations. Rational behavior prevailed over competition and generated cooperation among fierce competitors in searching new solutions. This is particularly

obvious in the areas where digital technologies enable not only new forms of market interactions (continuous/online contact with consumers), and efficient search for market equilibria, but also allow better design of market regulation and government interventions in general.

Conclusion

Serbia must address a complex set of challenges as it strives to reach sustainable dynamic growth in an increasingly competitive world of the Forth Industrial Revolution, and converge to the EU levels of income and quality of life within a reasonable timeframe.

Prioritizing and sequencing policy and institutional reforms should be based on a new development paradigm based on country-specific needs, comprehensive growth diagnostics and complex economic linkages at the national and regional level. Allocation of resources should be skewed towards priorities that will become critical for the country's readiness to address the challenges posed by the Fourth Industrial Revolution. This will necessitate policy measures that will target results, such as improved firm-level use of ICT technology and impact of new technologies on the quality of public and private sector goods and services, rather than the indiscriminate increase in the availability of ICT. Likewise, the litmus test of the Ability to innovate should be improved Industry activity and promulgation of

R&D and innovation results in new product and process innovations utilizing efficient venture capital endeavors.

Substantial efforts will be needed to boost all aspects of education outcomes, without which it would be impossible to close the knowledge and productivity gaps and embark on a sustainable income convergence path with the EU.

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PRO-GROWTH PUBLIC INVESTMENT POLICY IN SERBIA: SUFFICIENCY AND EFFICIENCY

Politika javnih investicija u Srbiji usmerena na podsticanje rasta – više i efikasnije

Abstract

In the last few years Serbia has restored its macroeconomic stability, primarily due to successful fiscal consolidation, but economic growth remained insufficient for faster convergence with other European countries. One of the reasons for sluggish growth is related to low domestic private and public investment. From 2001 to 2018 public investment in Serbia amounted to 2.6% of GDP on average, which was the lowest in Central and Eastern Europe (CEE) and the Western Balkans (WB). Although its public investment has risen in the last few years, Serbia is still lagging behind the CEE and WB countries in that respect, especially in terms of the local self-government investment. In that period, cumulative public investment in Serbia was lower than the CEE average and WB average by 33% of GDP and by more than 40% of GDP, respectively, although total government expenditures in Serbia were rather large. Due to many years of severe underinvestment, the total public capital stock (per capita) in Serbia is the lowest in CEE and the WB region, which is why Serbia is among the three lowest ranked countries in terms of the overall quality of infrastructure in CEE and the WB. The public investment policy may yield significant positive impact on future growth in Serbia, provided that the following two conditions are met: i) public investment increases to 4-5% of GDP and remains at that level in a fiscally sustainable manner for at least a decade, ii) the efficiency of investment projects, in terms of selection, contracting, implementation and supervision, is significantly improved.

Keywords: *economic growth, fiscal policy, public investment, public capital.*

Sažetak

U poslednjih nekoliko godina u Srbiji je uspostavljena makroekonomska stabilnost, pre svega usled uspešno sprovedene fiskalne konsolidacije, ali je privredni rast ostao nedovoljan za bržu konvergenciju sa evropskim državama. Jedan od uzroka tromog rasta nalazi se u niskim domaćim privatnim i javnim investicijama. Od 2001. do 2018. godine, javne investicije u Srbiji su u proseku iznosile 2,6% BDP-a, što je bilo najniže u grupi zemalja Centralne i Istočne Evrope (CIE) i Zapadnog Balkana (ZB). Iako su poslednjih godina javne investicije zabeležile rast, Srbija i dalje zaostaje za zemljama CIE i ZB u ovom domenu, a posebno u domenu javnih investicija lokalnih samouprava. Kumulativni iznos javnih investicija u navedenom periodu u Srbiji je bio za 33% BDP-a manji od proseka CIE, a za preko 40% BDP-a manji od proseka ZB. Usled nedovoljnih investicija u dužem periodu, ukupan iznos javnog kapitala po glavi stanovnika u Srbiji je najniži u grupi zemalja CIE i ZB, usled čega je Srbija među tri najniže rangirane zemlje prema ukupnom kvalitetu infrastrukture u tom regionu. Javne investicije mogu da imaju značajan pozitivan uticaj na budući rast privrede Srbije, pod dva uslova: i) da se javne investicije povećaju, na fiskalno održiv način, na 4-5% BDP-a u periodu od najmanje jedne decenije i ii) da se značajno unapredi efikasnost investicionih projekata, u smislu selekcije, ugovaranja, implementacije i nadzora.

Ključne reči: *privredni rast, fiskalna politika, javne investicije, javni kapital.*

Introduction

Serbia has successfully been implementing fiscal consolidation since 2014. In 2012-2014, the average fiscal deficit was as large as 6% of GDP, while in 2017-2019 the recorded average fiscal surplus was 0.7% of GDP. Almost two-thirds of fiscal adjustment was achieved on the expenditure side, while a third was realized through increase in revenues. As the consequence of GDP growth and elimination of fiscal deficit, public debt dropped from 70% of GDP in 2015 to around 53% of GDP at the end of 2019. Restoring sustainability of public finance had a positive impact on the overall macroeconomic stabilization. Over the last five years inflation has been low and stable, external balance improved (until 2018), country risk has declined, which further stimulated the inflow of capital from abroad. Even though macroeconomic stabilization has been achieved in the last few years, economic growth has remained relatively sluggish. Thus, the average GDP growth rate in Serbia from 2013 to 2018 lingered at 2.1%, which was by 0.8 pp and 1 pp lower than the average GDP growth rate in the CEE[1] and WB countries, respectively (Table 1). Although in 2019 Serbia posted GDP growth of around 4%, which was slightly higher than the CEE average, it was still not sufficient for stronger and faster economic convergence with the CEE countries and the "old" EU member states. In order to achieve faster economic convergence, Serbia needs to outperform the GDP growth rate of the CEE and EU countries by 2-3 pp over a longer period of time.

An increase in total investment is a precondition for strong and sustainable growth. From 2013 to 2018, total investment in Serbian economy on average amounted to 17.3% of GDP, which was by 4.3 pp and 5 pp lower than in the CEE and WB countries, respectively. Although this gap is narrowing and total investment in Serbia reached 20% of GDP in 2018, it was still lower than in the other countries in the region. Total investment in Serbia is low due to insufficient public investment and domestic private investment, while foreign private investment is rather large in comparison with other countries [4]. Low domestic private investment is the reflection of weak institutions and lack of the rule of law, inefficient administration and pronounced corruption to which domestic entrepreneurs are exposed more than foreign investors which are often provided with bureaucratic assistance from the government. On the other hand, low public investment is the reflection of policy decisions, which for almost two decades, for political reasons, favour current expenditures (salaries, pensions, subsidies) rather than productive spending on infrastructure, education and research and innovation.

Public investment results in the formation of public capital with many positive effects on social welfare [13]. Public investment can promote economic growth, both from the demand and supply side. During implementation of an investment project, aggregate demand is expected to rise, to the extent that local resources are employed. After the project is completed, if investment is evaluated and selected well, the creation of public capital/infrastructure reduces risks and costs of doing business, thus enabling private investments and economic activity. Many empirical papers provide evidence that public investment yields strong positive impact on economic growth, the size of fiscal multipliers associated with public investment outperforming the multipliers for current expenditures [2], [11]. Thus, certain authors [1] find that public investment raises output both in the short and long run, its effects being more pronounced during the period of slack and monetary accommodation, with positive impact on employment. Empirical studies indicate that fiscal multipliers of public investment exceed one, which means that a 1% increase in public investment tends to promote output growth by more than 1%, these multipliers being stronger in less developed European countries [6]. One of the main channels of transmission of public investment to output relates to private investment. Although some empirical studies show that the crowding-out effect may prevail in some cases [12], the majority of studies indicate that public investment tends to crowd in private investment [8]. This is especially the case in developing countries where

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1 In this paper, the group of CEE countries includes Bulgaria, Czechia, Croatia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia, while the WB group includes Albania, Bosnia and Herzegovina, Montenegro and North Macedonia.

the size of positive effects is linked to the degree of pro-business reforms and market liberalization [6].

This paper evaluates the potential for improvement of pro-growth features of the public investment policy in Serbia. In that respect, it assesses the dynamics and provides benchmark analysis of the public investment policy in Serbia relative to other countries in CEE and the WB region, identifies its outcomes and proposes systemic improvements in the fiscal and public investment policy aimed at providing conditions for vibrant and sustainable growth. The results show that, over the entire period from 2001 to 2018, Serbia had the lowest public investment (relative to GDP) of all the CEE and WB countries, although total government expenditures in Serbia were rather large. While central government investment started rising in 2014, after 2012 local self-government investments declined substantially and remained considerably lower than in other countries. In the said 18-year period, the cumulative public investment gap of Serbia relative to CEE and the WB amounted to 33% and 40% of GDP, respectively. Consequently, the total public capital stock per capita in Serbia is lower by 57% and 33% than the CEE and WB averages, respectively. Due to severe underinvestment in public capital, the overall quality of infrastructure in Serbia (according to the World Economic Forum data) is among the lowest in CEE and the WB, being ranked lower only in Romania and Bosnia and Herzegovina. The public investment policy may create a significant positive impetus for economic growth in Serbia, provided that the following two conditions are met: the amount of public investment increases to 4-5% of GDP and remains at that level for at least a decade and the efficiency of the public investment policy, in terms of project selection, contracting, implementation and supervision, is significantly improved.

Public investment in Serbia – dynamics and benchmark analysis

The impact of fiscal policy on economic growth depends on the overall fiscal stance (fiscal balance and public debt), but also on the structural features of fiscal policy, such as the level and composition of tax burden, the level and structure of government expenditures – primarily the share of productive government spending (on infrastructure, education and research and development) in total government expenditures.

After the initial consolidation of the Government in 2000-2001, government expenditures in Serbia soared. After the 2008 global economic crisis, due to the unsustainable public pension policy and cyclical volatility of some spending items (interests, benefits, etc.), government expenditures rose further, reaching a peak of 45.8% of GDP in 2012. Successful implementation of fiscal consolidation resulted in a considerable decline in government expenditures to 40.8% of GDP in 2018. Comparative analysis indicates that from 2001 to 2018 government expenditures in Serbia, which on average amounted to 41.8% of GDP, were higher than either the WB average or the CEE average. The same goes for all three sub-periods – before the 2008 crisis, during the crisis and during the period of fiscal consolidation (Table 1).

Although total government expenditures in Serbia have been large relative to other countries in CEE and the WB, public investment has been low. Government sector gross fixed capital formation, i.e. public investment in Serbia from 2001 to 2018, posted strong volatility. From 2001 to 2008, there was a significant rise in public investment, from 0.4% of GDP (in 2001) to 3.7% of GDP in 2007, followed by a period of considerable decline, reaching 2.1% of GDP in 2013. From 2014 public investment in Serbia was on the rise, reaching 3.9% of GDP in 2018. In the 2001-2018 period, public investment in Serbia amounted to 2.6% of GDP on average, which was significantly lower than the

Table 1: Government expenditures and public investment

	Average GDP growth rate			
	2001-2018	2001-2008	2009-2012	2013-2018
SRB	3.6	6.6	-0.2	2.1
WB	3.3	5.0	0.7	2.9
CEE	3.3	5.5	-0.6	3.1
	Total government expenditures (% GDP)			
	2001-2018	2001-2008	2009-2012	2013-2018
SRB	41.8	40.8	43.1	42.1
WB	39.4	39.5	40.3	38.3
CEE	41.5	40.7	43.3	41.0
	Public investment (% GDP)			
	2001-2018	2001-2008	2009-2012	2013-2018
SRB	2.6	2.3	2.7	3.0
WB	4.8	4.7	5.3	4.7
CEE	4.3	4.3	4.6	4.1

WB and CEE averages (on average by 2.2% and 1.7% of GDP per year, respectively). Public investment in Serbia in that period averagely accounted for only 6% of total government expenditures, while in the WB and CEE countries the share of public investment in total government expenditures amounted to 11.4% and 10.5%, respectively.

Due to these trends, Serbia is significantly lagging behind other CEE and WB countries in terms of total investment in public capital over the last two decades. Thus, cumulative public investment in Serbia from 2001 to 2018 stood at 46.7% of GDP, which is by far the lowest in CEE and the WB region (Figure 2). In that period, in comparison with the WB average, Serbia underinvested more than 40% of GDP in public capital, while in comparison with the CEE average public investment in Serbia was lower by more than 33% of GDP. In other words, if public investment in Serbia had been at the level of the CEE or WB average in

the last two decades, total public investment would have been higher by EUR 10-12 bn, with a significant impact on formation of private capital, economic growth and the living conditions. Considering the level and dynamics of total government expenditures and public investment, it can be concluded that public investment in Serbia has been low, not due to low government expenditures, but rather due to sub-optimal structure of government spending, mostly driven by political factors.

## Public investment by the level of government

According to the Law on Local Self-Governments, cities and municipalities are in charge of performing important government duties, including the development and maintenance of local road infrastructure, establishment of preschools, primary and secondary schools, primary and

Figure 1: Public investment dynamics (% of GDP)
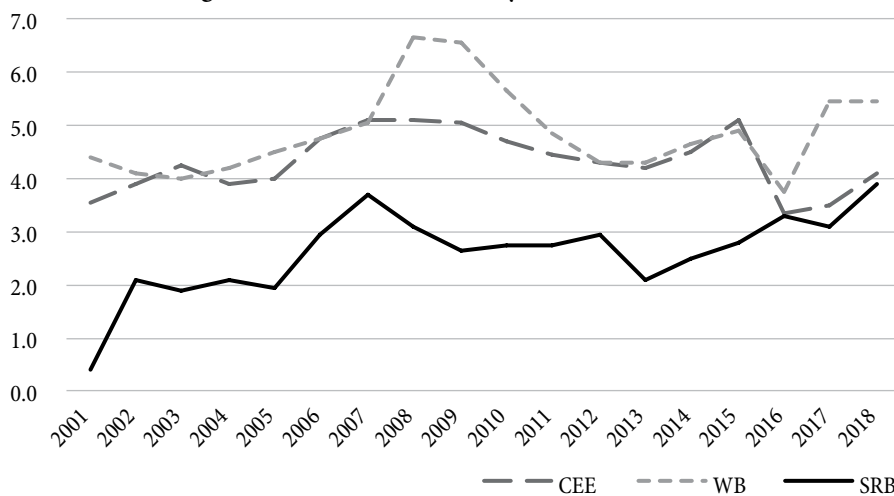
Source: Author's calculations based on the Eurostat and World Bank data.

Figure 2: Cumulative public investment from 2001 to 2018 (% of GDP)
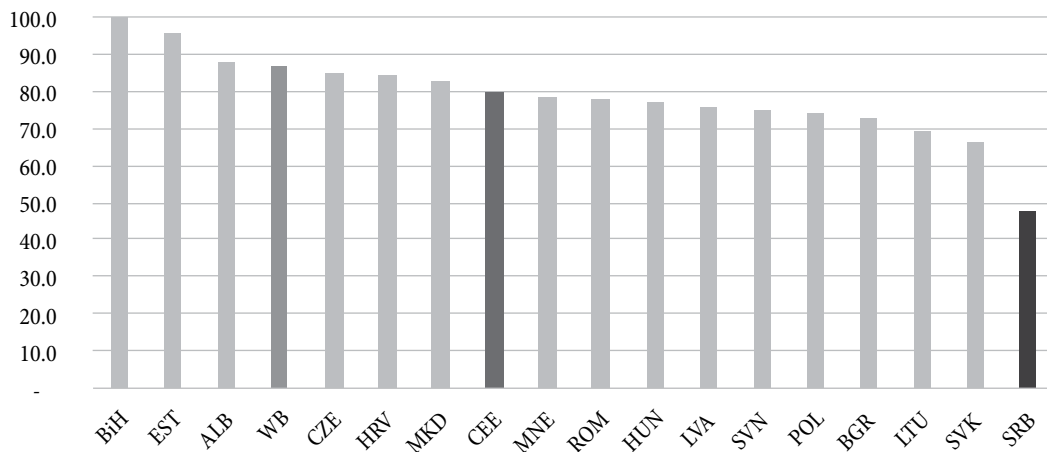
Source: Author's calculations based on the Eurostat and World Bank data.

secondary healthcare institutions, public utilities (including sewerage, water and waste management, heating, public transportation, etc.). To be able to fund those activities, the Law on Financing Local Self-Governments provides local self-governments with own-source revenues (e.g. property tax, user fees, etc.), assigned revenues (e.g. payroll tax, tax on transfer of absolute rights, etc.) and grants provided by the central government.

The centralization coefficient of 84% puts Serbia in the group of European countries with a modest degree of decentralization.[2] More precisely, almost 13% of consolidated government spending in Serbia, which is equivalent to 5% of GDP, is being disbursed through the budgets of cities

and municipalities. However, in 2019 only around 8% of the total local self-government spending was used for funding investment projects, while more than 90% was used for current, non-productive spending on salaries, goods and services, subsidies, etc., in accordance with the trends in the last few years.

Thus, the average annual public investment by local self-governments in Serbia from 2005 to 2018 amounted to 1.1% of GDP, which is the lowest among the CEE countries (Figure 3).[3] This means that on average, in the last 14 years, local self-governments' public investments in Serbia were by 37% lower than the CEE average, indicating severe underinvestment in local infrastructure. Opposite to the

2 Centralization coefficient measures the share of central government expenditures in consolidated government expenditures.
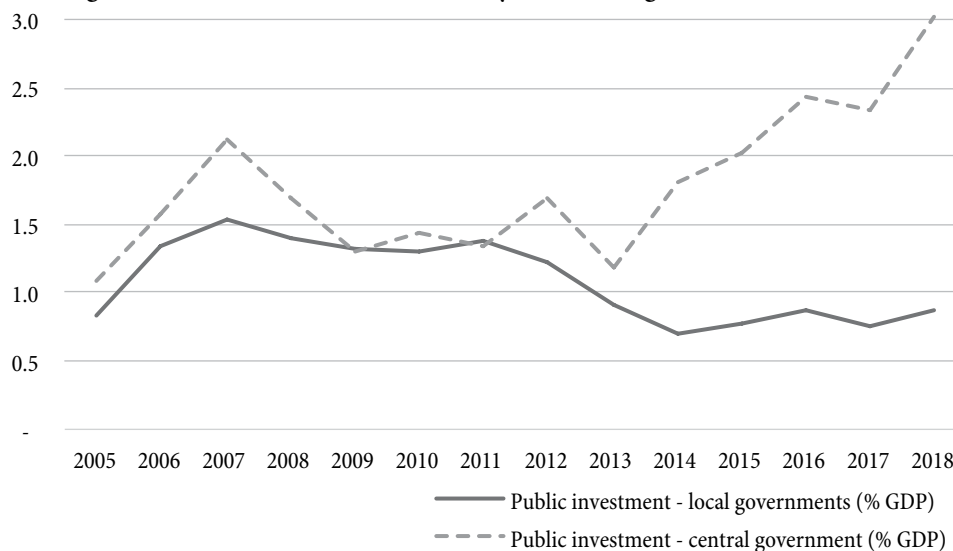
3 Local self-governments' public finance statistics has been available since 2005.

Figure 3: Public investment at the level of local self-governments (% of GDP)
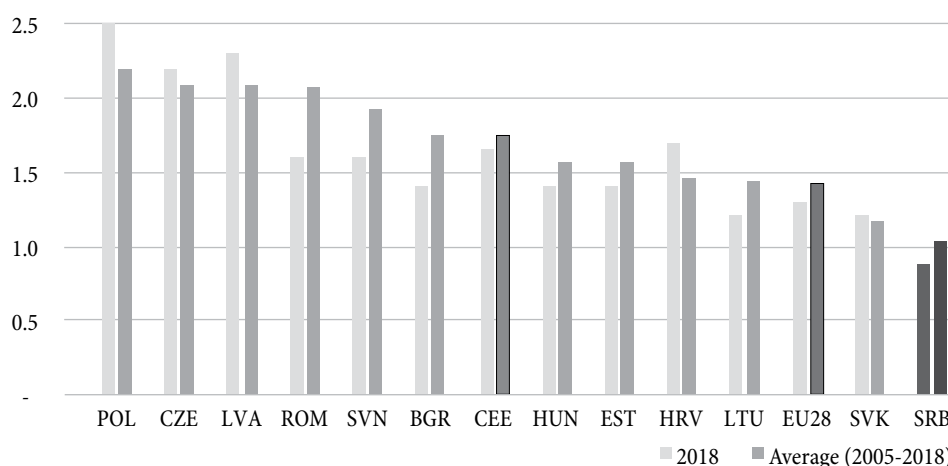
Source: Author's calculations based on the data obtained from Eurostat and the Ministry of Finance.

Figure 4: Public investment in Serbia by the level of government (% of GDP)

Source: Author's calculations based on the data of the Ministry of Finance.

trends in infrastructure, which falls under the responsibility of the central government, the underinvestment gap at the level of local self-governments was widening, so that in 2018 local public investments in Serbia (relative to GDP) amounted to only 0.9% of GDP, which is by 47% lower than the CEE average.

From 2005 to 2011, public investment at the level of local self-governments in Serbia ranged from 1.3% to 1.5% of GDP, while from 2012 to 2014 it posted a strong decline to 0.7% of GDP and has remained low (less than 1% of GDP) until now. In 2010, additional revenues of close to 1% of GDP were allocated to local self-governments, without assigning them additional responsibilities and with the officially stated expectations that the allocation should facilitate the development of local infrastructure. However, after additional funds had been transferred, local self-governments did not raise public investment, but rather the opposite happened. The data presented in Figure 4 indicate that since 2013 the public investment by the central government has significantly been increased, while local-level public investment was on the decline until 2014, after which it remained low, which means that the lack of effective public investment policy at the level of local self-governments in Serbia is one of significant factors behind the overall low public investment.

The fundamental reason behind low local public investment in Serbia is related to political economy and the design of the financial decentralization system which provides no systemic incentives to public investment at the level of local self-governments. While own-source and assigned revenues have been fully defined by law, the grant scheme has only partially been defined, which means that the central government has considerable discretion with regard to its implementation. At the same time, the grant amount is not defined by the local public finance policy, which means that Serbia has failed to introduce matching or similar grants as a reward to local self-governments that use a larger share of their budget for the development of infrastructure. According to the law, the grant amount allocated to a city or municipality depends on its size and capacities, while in practice the disbursement system is to a large extent non-transparent, as there is no publicly disclosed information either on the grants paid to each city or municipality or on the exact criteria based on which grants have been calculated.

Outcomes of the public investment policy

Public capital stock

According to the neoclassical growth models, economic growth depends on the amount of physical capital, supply of labour, its quality (human capital) and technological progress. The total stock of physical capital consists of private and public capital, which are created by investing in fixed

Figure 5: Public capital stock per capita (international USD, in 2011 prices)
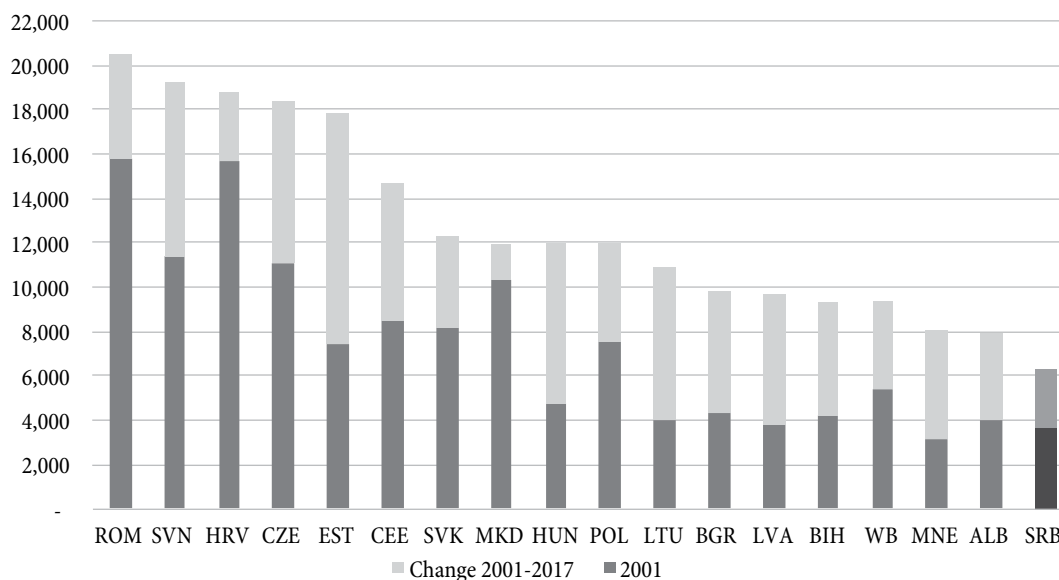
Source: Author's calculations based on the IMF's capital stock database.

assets. Therefore, public capital stock consists of the fixed assets owned by the government (energy, transportation, structures, utilities and similar infrastructure). Public capital stock depends on the size of investment made by the government in the past and the speed of depreciation, which is to a significant extent dependent on the type of assets.

In order to compare the data on capital stock across time and by countries, the value should be controlled for inflation, i.e. specified in fixed prices and adjusted according to the differences in the purchasing power of money across different countries. Therefore, the IMF's capital stock database provides information on capital stock, stated in international (PPP-adjusted) US dollars, using the 2011 prices. According to this dataset, in 2001 Serbia was in the group of six CEE countries whose public capital stock per capita was around USD 4,000 (Figure 5). Two out of six countries had lower public capital stock than Serbia, while in the remaining countries it was almost equal to the one in Serbia. However, due to significantly lower public investment over the last (almost) two decades, in 2017 public capital stock per capita in Serbia amounted to USD 6.3 thousand, which was by far the lowest in CEE and the WB region, i.e. by 32% lower than the WB average and by 57% lower than the CEE average. These data suggest that heavy underinvestment in public capital in Serbia over the last two decades has had a significant impact on public capital stock and the total physical capital stock, with severe consequences for growth dynamics.

The impact of public capital on the total capital stock is twofold. First of all, public capital is part of the total physical capital, which means that a rise in public capital has a one-on-one impact on growth in the total physical capital. In addition, the creation of public capital stock, which leads to improvement of the quality of public infrastructure, reduces risks and costs of doing business, thus enabling and fostering private investment which may contribute to private capital formation. On the other hand, if public investment is financed at the local market and triggers rise in interest rates, it could discourage private investment. To provide a definite conclusion regarding whether the crowding in or crowding out effect of public investment on private investment prevails, it is necessary to observe the impact of other relevant factors on this relationship using sophisticated econometric methods, which is beyond the scope of this paper. However, the scatter plot (Figure 6) shows a positive correlation between private and public capital stock per capita in CEE, which could indicate that the crowding in effect might have prevailed. In such a situation, severe underinvestment in public capital, as in Serbia in the last two decades, had a double negative impact on total physical capital stock and growth dynamics.

Quality of public infrastructure

The dynamics of public investment, i.e. the stock of public capital, is reflected in the availability and quality of public infrastructure. However, the availability and quality of public

Figure 6: Private and public capital stock in CEE in 2017 (int. USD per capita, in 2011 prices)
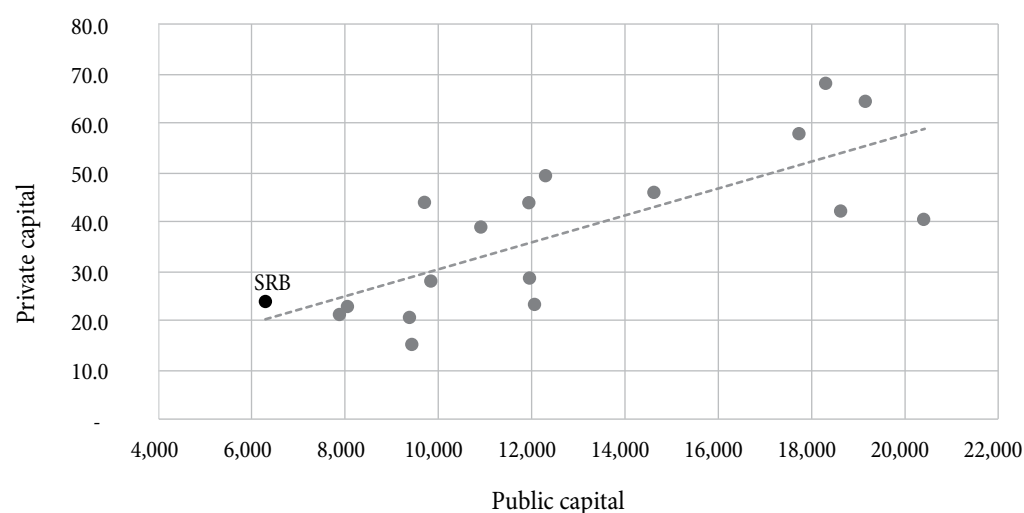
infrastructure depends not only on the amount of public capital, but also on the efficiency of projects funded by the government. If government investment is focused on projects proven to be financially, economically and socially viable, i.e. the government decides to implement the projects with the highest net present value and internal rate of return, the outcome of public investment, in terms of availability and quality of public investment, will be stronger and vice versa.

Public infrastructure is rather heterogeneous and complex, consisting of different types of assets, which makes measuring its availability and quality complicated. One of the potential proxies for measuring public infrastructure, commonly used in international benchmark analysis, is the overall quality of infrastructure index, a component of the overall Global Competitiveness Index published annually by the World Economic Forum [14]. The overall quality of infrastructure measures the quality of transportation infrastructure (roads, railroads, ports, airports), energy (electricity supply) and telecommunications infrastructure. As such, it does not take into account public utilities or environmental infrastructure, which may be seen as its drawback. Still, as this indicator does contain main parts of public infrastructure, which to a large extent shape the quality of doing business and living conditions, and taking into account that it has been compiled in a comparable and consistent manner across different countries, it can be used as a rough proxy for the quality of public infrastructure.

The results presented in Figure 7 show that regarding the quality of public infrastructure in 2018 Serbia ranks considerably lower (by 20%) than the CEE average, only Bosnia and Herzegovina and Romania ranking lower in that respect. This suggests that heavy underinvestment in public capital in Serbia is to a large extent reflected in the poor quality of public infrastructure. However, in the last decade (from 2008 to 2018) Serbia considerably increased the value of this indicator (by more than 40%), the rise in this indicator being slightly stronger than the average rise in CEE and comparable to the progress made in Montenegro, Romania and Bulgaria, although these countries had more buoyant public investment. Solid result in terms of improvement of this indicator, in spite of persistent underinvestment, can be explained by greater marginal productivity of investment at the lower level of public capital stock [5]. Supplementary indicators describing the availability of public infrastructure mostly lead to similar conclusions. Thus, the results presented in [9] and [10] show that Serbia has a lower motorway and railway density and posts larger losses in electric power transmission than most other CEE countries, which is also the consequence of inadequate investment policy.

Conclusion

Over the last 18 years, Serbia posted economic growth slightly larger than the WB and CEE averages, primarily due to stronger growth from 2001 to 2008. However, from 2013 to 2018 Serbian economy grew at a considerably slower rate than the economies of other WB and CEE countries

Figure 7: Overall quality of infrastructure
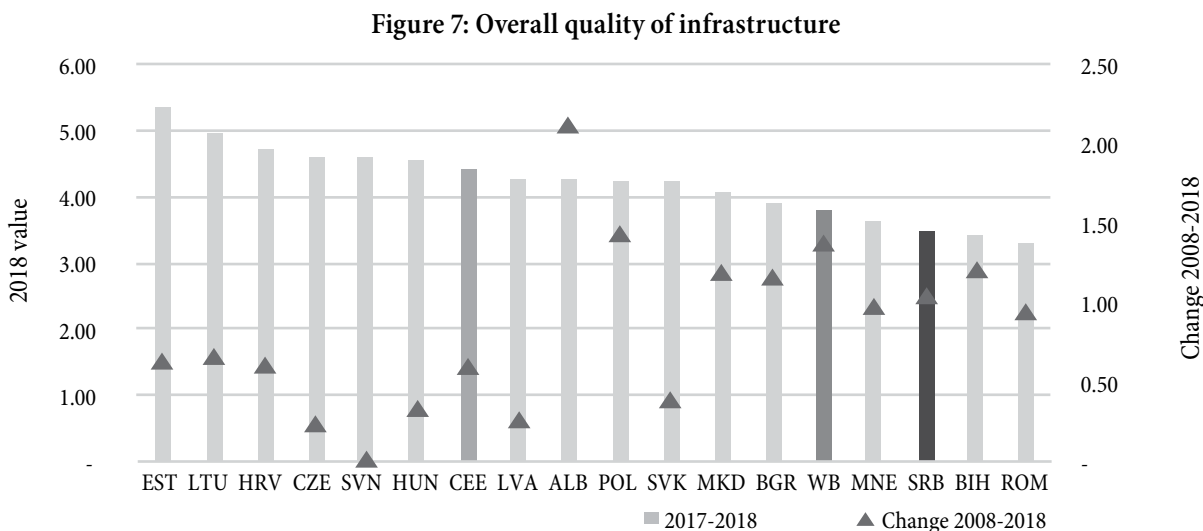
Source: Author's calculations based on the WEF data.

(on average). Although the Serbian GDP growth rate of approximately 4% in 2019 was higher than the growth posted in the region, in order to achieve faster convergence Serbian economy needs to grow at a rate which is by 2-3 pp higher than the CEE and the EU averages, for a longer period of time.

Maintaining macroeconomic stability is a *conditio sine qua non* for stronger and sustainable economic growth. In that respect, Serbian economic policy needs to be designed with the aim of keeping the budget deficit low (in the range of 0.5% to 1% of GDP), which would enable further reduction of the public debt. Public finance sustainability, accompanied by low and stable inflation and continuous slight depreciation of dinar (to euro) in real terms, would lead to the creation of a favourable macroeconomic environment. In addition to macroeconomic stability, the structural features of fiscal policy need to be improved in order to attain stronger growth. This includes increasing pensions and wages at the rates lower than the rates of economic growth, further reducing labour taxes and significantly increasing spending on education, research and infrastructure, which would altogether fit into the budget deficit of up to 1% of GDP.

Macroeconomic stability and improvement in the structural properties of fiscal policy, together with a significant improvement in the quality of institutions and the rule of law, would create fertile ground for an increase in domestic private investment, as well for inflow of capital from abroad. An increase in public investment can also yield positive impact on private capital formation and economic growth, provided that the selection and implementation are done in an efficient manner.

The Government has announced a five-year (public investment) plan which envisages investments of EUR 14 bn. Its full implementation would entail an increase in public investment to almost EUR 2.5 bn per year, i.e. around 5.5% of GDP. That plan could be financially sustainable only if in the coming years public wages and pensions would rise at the rates which are significantly lower than the GDP growth, which would be politically challenging. On the other hand, considering that in the last six years actual public investment spending in Serbia was on average by more than 10% lower than the plan [3], the chances are

that actual public investment spending in the coming years would be somewhat lower than the plan envisaged, which would contribute to financial sustainability.

Most of the projects listed in the "Serbia 2025" national investment plan are to be funded by the central government. However, as shown in Figures 3 and 4, local self-governments in Serbia post a significant (negative) investment gap in comparison with the other countries. Bearing in mind that local self-governments are in charge of significant public infrastructure items, it is necessary to introduce systemic incentives for local self-governments to substantially increase local public investment in a financially sustainable manner. In that respect, the system of grants (provided by the central government to local self-governments in Serbia) needs to be redesigned, so as to introduce matching grants, i.e. the funding scheme which would enable the central government to top up local budget funds intended for the development of infrastructure. In addition, the total amount of grants awarded to local self-governments should be defined as a rising function of the share of public investment in local self-government's spending. In that respect, the draft of the Law on Financing Local Self-Governments, proposed by the Ministry of Finance in 2014/15, could serve as a solid base.

Public investment may have a crowding in effect on private investment and make a significant contribution to future economic growth if the funds are directed towards economically viable projects which are implemented well. In that respect, Serbia needs a significant institutional improvement in order to establish a robust and modern system of selection, planning and implementation of investment projects. First of all, although project prioritization is a matter of political decisions, the portfolio of projects taken into consideration by policymakers should comprise only those projects for which firm evidence on economic viability has been provided. In other words, projects should be selected based on the robust and objective economic evaluation rather than on subjective assessment. The Government should develop an institutional capacity for financial, economic and social evaluation of public projects, which would be based on the internationally comparable and theoretically substantiated methodology. The preparation of the economic feasibility study should

be made mandatory for all medium and large projects by the central government and local self-governments. Such a system would result in selecting projects which would make a positive impact on economic growth. In addition to improvement of the selection scheme, the process of planning, contracting and supervision also needs to be improved. For that to happen, it is necessary to develop competent resources in public administration (law, economy, engineering, etc.). Furthermore, in order to minimize the costs and maximize the value, whenever feasible, the projects should be contracted through open (competitive) tenders, which would provide a level playing field for all potential bidders.

Considering the aforesaid, for public investment to have a positive impact on future economic growth in Serbia, both sufficiency and efficiency need to be achieved. A pro-growth public investment policy, which would fit into a sustainable public finance framework, can considerably contribute to future economic dynamics. However, in order to fully exploit that potential, in addition to creating the public investment policy and stable macroeconomic framework, Serbia needs to make a significant step forward in terms of developing institutions, i.e. defining a set of clear, efficient and inclusive rules, implemented in a non-selective manner, which would create a level playing field and promote productive behaviour, i.e. work, saving, investment, education, innovation and entrepreneurship.Without the development of efficient and inclusive institutions, the effects of public investment and other instruments of economic policy on future growth and development will be limited. Furthermore, the development of such institutions would enhance the chances for improvement of the structural features of fiscal policy, including the improvement of efficiency of public investment.

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THE U.S. – CHINA ECONOMIC CONFRONTATION: THE PARADOXICAL RESULT

Ekonomska konfrontacija SAD i Kine – paradoksalni rezultat

Abstract

The paper analyzes the confrontation between the United States and China in the recent trade war that resulted in the new trade deal between the two countries at the beginning of this year. After giving a short background, the paper gives an overview of the U.S. – China economic relations, the trade war and the results of the new trade deal. The general conclusion is that the trade war initiated by the United States through the introduction and raising of tariffs was ineffective with the U.S. bearing the costs. The overambitious quantitative goals of the new trade deal are unrealistic and will probably not be achieved. The trade war also undermined the international order of which the rules of conduct of international trade are a significant part. The trade war as well as the U.S. opposition to the appointments of appellate judges in the WTO have undermined this organization as the institutional foundation of international trade. Paradoxically, in order to oppose what are perceived as unfair trade practices within the system of free trade by China, the U.S. has adopted state-managed trade. The new trade deal with China will only strengthen the U.S. interdependence with China as well as the Chinese system of "state capitalism" that in the U.S. view was seen as the root of the problem in its trade with China. In short, the trade war and the resulting deal were self-defeating in terms of the goals that they were supposed to achieve.

Keywords: *United States, China, international trade, trade war.*

Sažetak

Rad analizira konfronatciju između SAD i Kine u okviru nedavnog trgovinskog rata koji je rezultirao novim trgovinskim sporazumom koji je potpisan početkom ove godine. Posle kratkog osvrta na nedavnu istoriju dve zemlje, rad daje pregled ekonomskih odnosa između SAD i Kine, trgovinskog rata i rezultata novog trgovinskog sporazuma. Opšti zaključak je da je trgovinski rat koji su započele SAD kroz uvođenje i podizanje carina bio neefikasan uz snošenje njegovih troškova od strane SAD. Novi trgovinski sporazum između SAD i Kine ima preambiciozne kvantitativne ciljeve koji verovatno neće biti ostvareni. Trgovinski rat je podrio međunarodni poredak u okviru koga su pravila međunarodne trgovine značajan deo. Trgovinski rat, kao i protivljenje SAD da se postave apelacione sudije u okviru STO su podrile ovu organizaciju koja je institucionalni temelj međunarodne trgovine. Paradoksalno, kako bi se suprotstavile onome što vide kao nedozvoljene radnje u okviru sistema slobodne međunarodne trgovine od strane Kine, SAD su prihvatile državno upravljanje međunarodnom trgovinom. Novi trgovinski sporazum sa Kinom samo će ojačati međuzavisnost između SAD i Kine kao i sistem kineskog „državnog kapitalizma" koji je po mišljenju administracije SAD bio koren problema u trgovini sa Kinom. Ukratko, trgovinski rat i rezultirajući novi trgovinski sporazum su samoporažavajući sa aspekta zadatih ciljeva.

Ključne reči: *Sjedinjene Američke Države, Kina, međunarodna trgovina, trgovinski rat.*

Introduction

The current trade war between the United States and China did not come to an end with the new trade deal that was signed this January. Rather than as a "peace treaty" it should be seen as a "truce". It will certainly be spun as a triumph for the U.S. by president Trump in the year in which he is seeking reelection. It will probably be portrayed as a constructive diplomatic triumph by Xi Jinping as well, by projecting China as a responsible international player dedicated to both globalization and compromise. However, the really hard questions concerning why and how the U.S. and China got into a trade war will remain unanswered or rather answered in such a radically different way by the participants as to render answers that can be discussed rationally among them and based on facts close to impossible. Worse yet, radically different answers may lead to further feuds and confrontations leading to de-globalization, fragmentation of the world economy and the beginning of a new "Cold War". Given the circumstances, the true major challenge is how to avoid this type of confrontation. A very brief view of the major developments affecting the U.S. and China during the last two decades, as well as their interaction should shed some light on the background of the trade war that brought so much uncertainty to the rest of the world.

Two decades ago, the U.S. was the sole superpower and undisputed leader of NATO, the largest economy, a champion of free trade, multilateral institutions (IMF, World Bank, WTO) and globalization based on the vision of an ever expanding liberal world order. True, in some cases international rules were breached, some stretched and some trampled on, but overall there was a belief that the liberal order had no true alternative and that the U.S. was the prime shaper of that order. American preoccupations were preserving that order by dealing with the Asian Crisis (1997), by keeping Russia afloat (backing Yeltsin, backing Russia up in the Russian financial crisis through the IMF, 1998) and expanding it by bringing China into the WTO (2001). The establishment of NAFTA was a sure sign of commitment to globalization since it was created to enhance competitiveness of its three members on the world market. On top of that, the U.S.

economy was booming for the longest time, achieving budget surpluses and drawing down public debt with low inflation and high employment. Indeed, the collapse of communism in Europe and the dissolution of the Soviet Union brought not only a relative tranquility, but also a peace dividend by allowing for a drop in military spending in relation to GDP.

The events of September 11, 2001, were the beginning of a string of events that fundamentally changed that reality as well as the image and perception of the U.S. abroad. While the world showed solidarity with the United States, with Russia among the first to extend a helping hand, the U.S. was already drawing plans for the war in Iraq. This war was based not only on false information, but also on a doctrine of establishing a democratic regime in the Middle East that would serve as an example to other nations. In other words, the idea of an ever expanding liberal order that its proponents saw as (almost) inevitable, regardless of multilateralism and rule-based collective action through the UN, caused the first rift with important traditional European allies (France, Germany). The expansion of NATO to the borders of Russia and the perceived intention of expanding further into post-Soviet space led to a much more serious rift with Russia after a short war and the establishment of a frozen conflict in Georgia (2008). The same perception of the U.S. motives along with the fear of the engineering of colored revolutions in post-Soviet space led to the intervention in Ukraine, bringing another frozen conflict and sanctions on Russia by the U.S. and the EU. The financial crisis of 2008 was seen as of U.S. making and led to a recession that also exposed the weaknesses of the EU in general and the euro zone in particular. Perhaps, most importantly, it led to the loss of faith in the Anglo-Saxon version of capitalism, a model that many countries in the world had tried to emulate. The Obama administration stayed out of further military engagements, but was unable to lead to favorable outcomes or disengage from either Iraq or Afghanistan. In foreign policy, the Obama administration announced its "pivot to Asia" and negotiated the Trans-Pacific Partnership (TPP) a regional trade agreement that would include countries that made up 40% of world GDP, but excluded China and India. The attempts at resetting relations with Russia failed, as

they took a turn for the worse with the crisis in Ukraine. The Trump administration has brought a fundamental change promoting a transactional approach to international relations, showing disdain for international institutions (including NATO) and disregarding rules (WTO). With his presidency, the U.S. is beginning to be perceived as a factor of instability and uncertainty.

The last two decades have seen profound changes within China as well as profound effects of China's rise on the rest of the world. The combination of growth based on surplus-labor, foreign direct investment (FDI) and export-led growth could not have been possible without economic reforms. At first shy and creeping, these reforms led to the dominance of the market economy and a growing private sector. The unprecedented high growth rates of such a large country for so long could not but leave a big footprint on the global economy. The results of this growth record are many, the most important one being that it has made China the second largest world economy in nominal terms (the first in purchasing power parity terms), that it lifted 800 million people out of absolute poverty and that it has reduced the difference between the standard of living of the average American citizen and the average Chinese citizen to four to one in purchasing power parity (a tenfold decrease of this ratio). China has also become the world's leading manufacturer reaching 20% of total global manufacturing in 2015. It has also become the leading trade partner for most countries in the world along with the EU.

Certainly, large problems came to the fore during this time. In spite of claiming a Marxist ideology it has become a nation of extreme income inequality. Also, it has vast regional differences in income leading to high internal migration. China has also seen its first serious financial crisis in 2015. Furthermore, it faces potential ecological disasters, not to mention some long-term factors that could lead to grave difficulties, the most obvious one being demographic decline.

The U.S. - China economic relations till the trade war

During these two decades, the economic relationship between the U.S. and China has also been growing at an unprecedented rate. The first and most obvious is the rise of China as merchandise trading partner of the United States. In 1980, China was the 24th merchandise trading partner, ranked 16th in exports and 36th in imports. In 2017, China was the U.S. largest merchandise trading partner by far, ranking 3rd in U.S. exports and 1st in imports [7, p. 2]. This expansion in merchandise trade was marked by larger and larger U.S. trade deficits as presented in Table 1.

The top five U.S. goods exports to China in 2017 were (1) aerospace products (mainly civilian aircraft and parts); (2) oil seeds and grains (mainly soybeans); (3) motor vehicles; (4) semiconductors and electronic components and (5) waste and scrap. China was the second-largest U.S. agricultural export market in 2017, at $19.6 billion, 63% of which consisted of soybeans. The top five U.S. imports from China in 2017 were (1) communications equipment; (2) computer equipment; (3) miscellaneous manufactured commodities (such as toys and games); (4) apparel; and (5)

Table 1: U.S. merchandise trade with China: 1980-2017 ($ in billions)

Year	U.S. Exports	U.S. Imports	U.S. Trade Balance
1980	3.8	1.1	+2.7
1990	4.8	15.2	-10.4
2000	16.3	100.1	-83.8
2010	91.9	365.0	-273.0
2011	104.1	399.4	-295.3
2012	110.5	425.6	-315.1
2013	121.7	440.4	-318.7
2014	123.7	468.5	-344.8
2015	115.9	483.2	-367.3
2016	115.6	462.6	-347.0
2017	130.4	505.6	-375.2

Source: U.S. International Trade Commission (USITC) Data Web.

semiconductors and other electronic components. China was also the fourth-largest source of U.S. agricultural imports in 2017 at $4.5 billion [7, pp. 3-4].

The trade deficit had already been an issue of concern in the previous two administrations. However, the current U.S. obsession with the trade deficit seems to be founded on a huge misunderstanding of the economic meaning of the deficit as well as the extent to which globalization has created an intertwined world in which unilateral national action is of very limited scope and can even be counterproductive. This will be discussed in the following section.

The flow of U.S. multinational companies' direct investment to China as well as investment by Chinese companies in the U.S. economy has also raised controversy.

Chinese investment in the U.S. consists mainly of the holding of U.S. Treasury securities reaching $1,325 billion at the end of 2017. If we add U.S. government agencies (such as Freddie Mac and Fannie Mae) securities, corporate securities, and equities (such as stocks), China's investment in public and private U.S. securities totaled $1.54 trillion in 2017 [14]. It is the largest holder of U.S. Treasury securities. The dynamics of Chinese holdings of U.S. Treasury securities is presented in Table 2.

Foreign direct investment flows (FDI) both from China and the U.S. are both naturally smaller but also somewhat controversial in terms of measurement. The official figures that the U.S. government uses come from the Bureau of Economic Analysis (government agency).

The latest data according to the U.S. Bureau of Economic Analysis (BEA), net U.S. FDI flows to China in 2018 were $7.6 billion (down 22.9% from 2017). Net Chinese FDI flows into the United States were negative (-$754 million, compared to $25.4 billion in 2016), as outflows exceeded inflows (e.g., asset divestitures). Additionally,

the stock of U.S. FDI in China was $116.5 billion while Chinese FDI in the United States was $60.2 billion. In 2018, China accounted for 1.4% of total FDI stock in the United States [6].

However, the Rhodium Group (RG), a private consulting firm, contests BEA's and Chinese official government sourced data claiming that they do not accurately reflect the values of FDI of the two countries. One of the major reasons for this is that foreign direct investment flows of U.S. and Chinese foreign investment made by companies going through third countries are not taken into account. In order to take this into account RG developed its own transaction-based dataset to track investment by U.S. and Chinese-owned firms using commercial databases and news reports. Using its tracker, it puts gross Chinese FDI flows to the United States in 2018 at $5.4 billion and gross U.S. FDI flows to China at $13.0 billion. In addition, it estimates cumulative Chinese FDI in the United States at $140.5 billion and U.S. FDI in China at $269.6 billion. In other words, RG thinks that FDI stock of both countries in each other's economy is more than twice as large as claimed by official estimates [13]. Figure 1 illustrates this well.

China is also present in the U.S. real estate market. The cumulative Chinese investment in the U.S. real estate between 2010 and end 2018 has been $181 billion [7, p. 20].

The major characteristics of the economic interaction between China and the U.S. have been a rising U.S. trade deficit with China, large U.S. investment in China and China emerging as the largest holder of U.S. government debt. This had occurred against the background of prolonged record-high Chinese GDP growth rates that have made it the second largest world economy in total nominal GDP terms, and the largest world economy in total GDP at purchasing power parity. As already noted, this has resulted in a phenomenal rise in GDP per capita in China, which

Table 2: China's Holdings of U.S. Treasury Securities: 2002-2017

Year	2002	2004	2006	2008	2010	2012	2014	2016	2017
China's holdings $billions	118	223	397	727	1,160	1,203	1,244	1,058	1,185
China's holdings as a % of total foreign holdings	9.6%	12.1%	18.9%	23.6%	26.1%	23.0%	21.7%	17.6%	18.7%

Source: [2].
Note: Annual data are year-end.
Note: Data excludes Hong Kong and Macau which are treated separately. Adding Hong Kong ($139 billion) and Macau ($1.13 billion) would bring the total up to $1,325 billion at 2017 year's end and the percentage to 21% of all foreign holdings.

despite high income inequality has created a new large middle class in China. Due to Chinese purchases of the U.S. debt, the U.S. was enabled to continue with double deficits (budget and balance of payments) by borrowing cheaply and keeping long-term interest rates low. The U.S. also experienced very low inflation due to low prices of consumer and other products imported from China.

The US-based and other multinationals made large investments in China benefiting from low labor costs in the beginning as they rose in later years. They also benefited from sales in an enormous market as the standard of living was on a continuous rise in China for the last forty years. Finally, the multinationals kept their competitiveness and probably made huge profits from exporting these products to the EU and North America. It is difficult to estimate their total benefits but it should be clear that a significant percentage of exports from China can be attributed to multinational companies including those that are U.S. based. At the very basic level the return on investment (ROI) to U.S. multinationals was 12.5 % in China as opposed to 7.8% in the rest of the world in 2017. The latest reports say that due to the tensions between China and the United States, as well as other foreign competition that challenge China's position, these figures went to 11.2% and 8.9% respectfully in 2018. Nevertheless, it seems safe to conclude that investments in China over the years contributed to significantly higher profits for multinationals than in the rest of the global economy [9].

This self-reinforcing relationship between the U.S. and China with China as banker and the U.S. as spender has been called "Chimerica" by Niall Ferguson [8]. However, the relationship is more complex, because the Chinese motive for buying debt is to encourage consumption in the U.S. rightfully assuming that this will lead to higher Chinese exports. High export growth contributes not only to Chinese overall growth, but also gives multinational companies incentives to invest in low-wage China to spur their own growth by producing merchandise for export whether to the U.S. or the rest of the world. It is a self-reinforcing circle that not only provides growth to China but also upgrades its economy and results in high returns to multinationals. The "Chimerica" self-reinforcing circle is illustrated in Figure 2.

This type of interdependence could have been seen as too costly to jeopardize, given that benefits from the relationship for both partners are substantial. However, it was also unrealistic to assume that it could go on unmodified in the long run. The shift in this relationship was bound to come as China labor costs increased due to higher income and as its development moved Chinese industry to more sophisticated products including high-tech. These trends combined with the emergence of Chinese multinational companies on a global scale would necessarily position China as a serious competitor to the United States. What sped up the beginning of the confrontation between the U.S. and China, in my view, was the financial crisis of 2008.

It is true that even before that, the U.S. had raised several issues concerning economic relations with China. The major one was the size of the bilateral trade deficit which was perceived as a result of unfair practices (not adhering to WTO rules) and (less so in recent times) an undervalued Chinese currency. Furthermore, restrictive practices in regard to U.S. exports to China were identified. Perhaps, more importantly, the rising imports from China

Figure 1: Estimates of U.S. FDI stock in China and Chinese FDI stock in the U.S. by BEA and RG (2018 - $ billion)
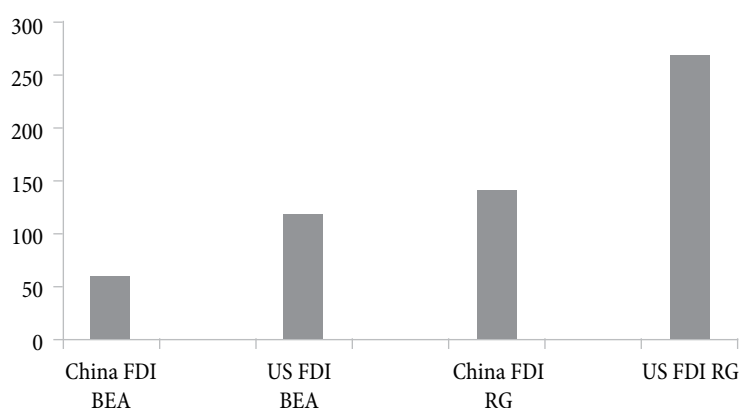
have recently begun to be seen as a cause of the loss of jobs in U.S. industry. Additionally, the U.S. had shown dissatisfaction with the Chinese barriers of entry for foreign investment in certain sectors (e.g., finance) and the inadequate protection of intellectual property rights. At this point in time, China is being accused of coercing the transfer of technology through joint ventures with U.S. companies. There are other important and less important issues, raised over the years, but they have all been put forth and listed recently in a much more vigorous (and aggressive) manner as the major explicit reasons for the tariff war that the Trump administration initiated in 2018.

The trade war between the U.S. and China

The trade war had been in the making for some time, as president Trump had come to power promising to impose tariffs on imports from China in order to reach a trade deal that would alleviate some of the problems perceived to be connected to the trade deficit. The expected outcomes were a more equal export and import balance in trade between the two countries, the preservation of industrial jobs in the U.S. and better opportunities for both U.S. exports and investment in China. All of these would hopefully contribute to a more balanced economic relationship from the point of view of the current U.S. administration.

The trade war began in February 2018 with a U.S. hike on tariffs on solar panels and washing machines, followed by a raising of tariffs on steel and aluminum. At that point, the new U.S. measures had affected around $30 billion worth of imports. China responded rather shyly by raising tariffs on imports from the U.S. on $3 billion value of goods. By October the U.S. had introduced new measures affecting $60 billion with China retaliating with a short lag by the amount of $60 billion. The tariffs were set at 25% by both countries. In October the value of goods affected by new U.S. tariff expansion rose to an extra $200 billion worth of imported goods from China with China retaliating to the extent of new tariffs on $60 billion of value of goods imported from the United States. Both countries set the tariff rates at 10%. Finally, as of May 2019, the U.S. in several hikes puts extra tariffs on the previous $200 billion of worth of goods and China retaliates with tariffs on a part of previous list of $60 billion worth of goods imported from the United States. The tariffs went up to 25 %. In September 2019, the U.S. adds tariffs of 15% on an extra $125 billion worth of imported goods from China. China retaliates with tariffs of 10% on an

Figure 2: Chimerica
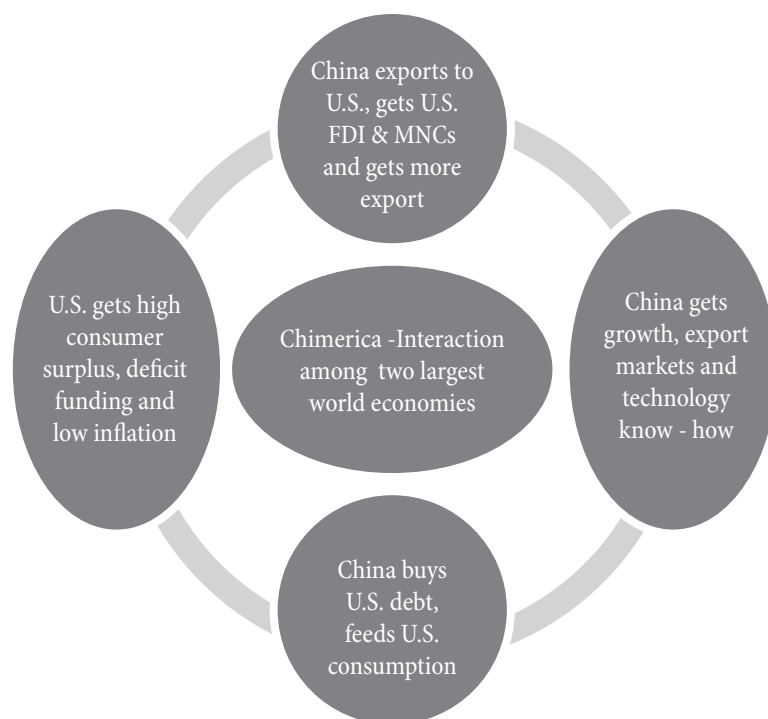
extra $35 billion of worth of goods that it imports from the U.S. [4]. At this point, a trade deal to be implemented in phases was announced. The U.S. figures did not affect only China, but also India, Europe, Canada, Mexico and others so they do not exclusively deal with China. However, they were mostly aimed at China.

By the end of 2018, U.S. tariffs affected 50% of imports from China, while retaliatory tariffs affected 70% of exports from the U.S. to China. In 2018, the average tariffs on U.S. imports from China went from 3 to 12 % and the average tariffs on imports of U.S. goods to China went from 10 to over 18% [5]. These figures are averages and are just an illustration, because other antidumping and special protection measures were taken by the U.S. over the previous years. The lack of space prohibits further discussion of these topics. It got worse towards the end of 2019, with U.S. tariffs on $360 billion worth of imports from China. Finally, had the tariffs that were threatened to come into effect in December of 2019 come into effect, as well as retaliatory measures by China, almost all trade between the two countries would have been covered by new tariffs. These were suspended as negotiations on the new trade deal were coming to a close. The new trade deal did not suspend the tariffs that had been introduced leaving this to further negotiations depending on the implementation of the deal. Had these last tariffs been imposed, the only way to continue the trade war would have been to keep raising existing tariffs. The other option was to introduce quotas.

The total figures and dynamics are still staggering as presented in Figure 3.

Having presented most of the background and data, a closer look at some of the data, meaning of deficits, objectives and results of the trade war is in order.

Firstly, if the focus is on bilateral trade between the U.S. and China, one should be aware that so far the data presented dealt with merchandise goods. It should be noted that both the U.S. and China trade with each other in services and that this trade is not small. The U.S. has a surplus with its first four trading partners in services, China being the fourth trading partner for U.S. exports and eighth trading partner in imports of services. In 2017, the U.S. had a $40 billion surplus with China in trade in services [7, p. 8]. This is also by far the largest surplus in trade in services of the U.S. than with any other trading partner. If the focus is on bilateral trade, this should be taken into account, thus making the deficit smaller.

Furthermore, unless total foreign trade is conducted between two countries, trade deficits should not be considered as being bilateral. In that special case, tariffs would cut the deficit, raise government revenue, lead to loss of consumer surplus, raise producer surplus and create

Figure 3: The escalation of tariffs on the worth of goods by the U.S. and China (2018-2019)

February 2018 - U.S. $30 bn plus extra to total $60 bn by October. China $3 bn plus extra to total $60 bn worth of goods.

Total trade affected $120 bn

October 2018 New U.S. tariffs on extra $200 bn. worth of goods. China adds tariffs of $60 bn.

Affects 50% of imports from China.

Affects 70% of imports from the U.S.

Between May and September 2019 the trade war escalates further with the U.S. raising tariffs on previous list and adding an extra $125 bn worth of goods. China adds tariffs of 10% on $35 bn.

Total $545 bn

some deadweight loss. This is elementary economics. However, in a system in which many countries participate, the result of tariffs could lead to the substitution of imports by imports from other countries that have not had new tariffs imposed. In turn, this would probably not lower the deficit by much, if at all, and would not lead to substantial government revenue, but would most certainly result in a loss of consumer surplus. For sure, it would provoke retaliatory measures by the counterparty.

It should come as no surprise that all of this did occur. Although it can be argued that the tariffs did not have time to affect trade, at the end of 2018 the U.S. trade deficit with China actually rose to $419 billion. This can also be explained by the frontloading of imports in anticipation of the tariffs. When the tariffs began to kick in, the bilateral U.S. trade deficit with China did go down to $346 billion, a reduction of 18% compared to 2018, but only 8% down from 2017. Compared to 2017, American exports to China were down by 18 %, while imports from China were down by 11%. However, the overall U.S. trade deficit with the rest of the world was just $20 billion lower (or 2.5%) than in 2018 and $60 billion higher (7.5%) than in 2017. In a nutshell, the whole trade war practically made a minute dent in the U.S. trade deficit with the world [15]. An obvious reason could be that there was diversion of trade leading to a rise in imports from other countries not hit by the tariffs, but at higher prices.

In 2018, the effects of the tariffs were overall negative for the United States. The hike in tariff revenues did not compensate for the loss of consumer surplus due to higher prices and deadweight loss. True, the overall loss was small, but still a loss [2]. In other words, most of the price hikes were passed through to U.S. consumers. The overall drop in U.S. imports from China on goods that were hit by the tariff has recently been estimated at 25%. However, there was trade diversion benefiting mostly Taiwan, Vietnam, Mexico and the European Union [16, pp. 11-12]. Looking at retaliatory measures by China, it should be noted that they were aimed at U.S. agriculture exports that had reached $19 billion. These exports were halved, but farmers were directly compensated.

As noted at the very beginning of this paper, the trade war did not end, but a provisional agreement was reached to be implemented in phases. Currently the agreement (signed on January 16th of this year) has phase I in its title. A basic overview of the facts leads to the conclusion that this deal is quantitatively unrealistic, difficult to implement, destabilizing for the international institutions and norms of trade and potentially a source of a new escalated conflict.

According to the agreement, China has obliged itself to import $200 billion of goods and services from the United States. In the first year China has committed to buy $77 billion of certain goods and services from the U.S. and another $123 billion the following year. The sectors covered by the agreement account for $134 billion imports from the U.S. leaving $52 billion uncovered. The idea that it is possible to bring the level of $134 billion of U.S. exports to the level of $257 billion by the end of 2021 at this point seems overly ambitious and extremely difficult to attain. The extremely high growth rates of U.S. exports would be remotely possible only under the condition of record high Chinese growth rates that will almost certainly not be attained for reasons that have nothing to do with the trade war. In other words, there is a clear danger that the failure to reach these highly unrealistic levels of U.S. exports to China within a time span of only two years could result in the implosion of the agreement, the rekindling of the trade war and a higher level of economic confrontation than exists now. In other words, the signing of this unrealistic deal can only be interpreted by political motives on both sides.

The way that China may try to accomplish some of these targets can be through trade diversion. This means that it could cut back on imports of the covered products from other countries, some of which are U.S. allies, thus exposing their economies to trade shocks. This could become an issue with the WTO, given that some countries could file complaints on the grounds of discrimination. China could combine this approach with cutting back on U.S. imports in the areas not covered by the agreement (as noted $52 billion worth of goods) and diverting trade to other partners. This would hurt other American exporters. In short, the shocks of this deal if it is to be implemented, can be significant. In terms of trade diversion, the most important question is how has the trade war already

affected the perception of the future of trade between the two countries? Will American farmers expand production after taking huge drop in exports to China during the trade war? Will Chinese divert to imports from other partners after suffering the uncertainty of supply and price shocks? In brief, has the trade war already created trade diversion that is difficult to overcome?

The agreement itself did not reduce all of the imposed tariffs. It reduced the $125 billion tariffs imposed by the U.S. in September 2019 by half to 7.5%. The agreement did not reduce the previous tariffs, leaving this issue for the next phase of negotiations. As mentioned, new tariffs that were planned to cover an additional $160 billion of worth of imports from China were suspended indefinitely as were the last Chinese retaliatory tariffs on U.S. automobiles (25%).

The U.S. also got a promise of the opening up of Chinese financial markets to American credit card companies and banks as well as approval of biotechnology products. In respect to financial markets, considering that European banks have already been let into China in 2018, this does not consist of a real gain, as this option already existed. Given the individual digital payment systems that are more present in China than in other places, it is difficult to see a significant space being conquered by American credit card companies in the near future.

Further improvements have been left for the next phases of negotiation depending on implementation. The trouble is that the dispute settlement mechanisms have not been delegated to a third party like in most agreements of this nature. This means that as disputes arise they will be delegated to the upper echelons of bureaucracy, which could bring back punitive tariffs at will at any time. Reiterating what has been said about highly unrealistic goals to be achieved, the probability of breakdowns of dispute resolution is high. In spite of the agreement and its substance, this in itself raises the level of uncertainty. This is not conducive to long-term trade arrangements.

The other aspects of the deal consist of intellectual property rights protection and forced technology transfer. The agreement would supposedly end the pressuring foreign companies to transfer technology to Chinese companies as a condition for obtaining market access. China has also agreed to combat patent theft and counterfeit products. Other administrative ways of obtaining technology from U.S. companies was also dealt with and highlighted in the agreement. How possible breaches in this area will be dealt with remains to be seen. However, there seems to be a fundamental misunderstanding in regard to technology transfer. Joint ventures throughout the world have been seen as a method of technology transfer that would lead to development. Why should China be different?

Back to the future: Perceptions and realities

From the U.S. point of view what makes China different is the Chinese economic system itself. The system of "state capitalism" as practiced in China gives state-owned enterprises a privileged position both in obtaining finance through the state-owned banking sector as well as government subsidies. This gives the state sector a permanently privileged position in regards to their competitors and foreign companies. In short, it makes them more competitive on the world market. State-backed competitiveness boosts exports and, accompanied by currency exchange rate manipulation, gives rise to enormous trade surpluses. Summing up, China is winning in economic growth and trade expansion through unfair practices. Along the way, it uses all kinds of dishonest methods to prevent competition (administrative and trade barriers) and to obtain advanced technology. All of this is done under the auspices of a totalitarian state seeking to rise to superpower status in order to dominate the world. Needless to say that this is the opposite of the approach of previous U.S. administrations whose policy was based on the assumption that as China grew and got more integrated into the world economy, it would involve into a stakeholder and responsible actor in the international system.

If this perception of China is accurate, as the U.S. administration seems to believe, then confrontation, decoupling and a new version of the containment doctrine are in order to meet the challenge of a rising China. The success of this type of policy would depend on many factors with foremost among them being the possibility of its success as judged from the perspective of empirical

evidence that would make it implementable, and secondly, but not less important, the costs that the U.S. would have to bear in pursuing it. Finally, and perhaps most importantly, there should be full awareness of the global context in which this policy is to be enacted.

The policy should slow down Chinese economic and other expansion with the desired outcome of fundamentally changing the current Chinese political and economic system. The end result would be a China that would play by Western style market economy rules. The described policy has not been formulated in this fashion by the current U.S. administration, but given some of the statements, the views of some of the top officials and the actions undertaken so far, it is fair to say that taken to its logical final conclusion, it seems a valid description of an implicit view and the accompanying policy of the U.S. administration. The fact that this policy is pursued with inconsistencies, contradictions and somewhat incoherently makes no fundamental difference.

Obviously, there are close analogies with the containment policy applied to the Soviet Union during the Cold War. The collapse of communism in Europe and the break-up of the USSR were the hoped for, but unpredicted result. In the Regan years, this policy was combined with extra pressure by rising military spending, threatening the pursuit of military technology that would put the USSR in an inferior position ("star wars") and an initially bellicose attitude ("evil empire"). It should be noted that in terms of internal politics, the boost in military spending was accompanied by tax cuts which (although tempered later in the Regan years by raising taxes) led to an almost doubling of public debt. The other analogy to the Reagan era is the effort at negotiating exchange rates hikes of five states (with the Japanese and German currencies taking the largest burden) in order to boost U.S. exports. This was the essence of the "Plaza Accords". Also, in order to protect the U.S. car industry, voluntary quotas on imports of Japanese cars were negotiated [1].

President Trump seems to be finding his inspiration in the policies of the Regan years. Leaving aside tax cuts, budget deficits and growing public debt, he has openly tried (and succeeded?) to pressure the Federal Reserve to keep a loose monetary policy. Most probably the fear is that a tighter monetary policy and the resulting higher interest rates would lead to an appreciation of the U.S. dollar, making American exports less competitive. This would directly lead to higher U.S. trade deficits which the U.S. administration considers to be a major problem of the American economy. Threats during the negotiation process (just as in Regan's treatment of Japan) are considered a legitimate way to achieve more favorable trade agreements and bilateral trade deals. These are seen as an appropriate instrument to limit and lower trade deficits. In the view of the U.S. administration, the briefly discussed new trade deal with China should achieve this goal at least in part.

One must keep in mind that aside of the fact that Trump sees the U.S. trade relationship with China as dysfunctional, he also sees other existing trade agreements (NAFTA now USMCA, trade with the EU, etc.) as detrimental to the U.S. economy. The loss of manufacturing jobs is seen as proof of the inferior position of the U.S. within the framework of these agreements. It should come as no surprise that he has chosen those economists that share this view as advisors. According to his chief economic advisor on this issue Peter Navarro, trade pacts and unfair trade practices (especially since China's entry into WTO in 2001) have been the main causes of the slowdown of the U.S. economy since the beginning of the 2000's. The job loss in manufacturing can almost entirely be attributed to this [11].

Changing perceptions is extremely difficult, time-consuming and needs an intellectual openness that allows for the possibilities for correction. The latter is absolutely lacking in the current U.S. administration. This is not the first time that the U.S. has exhibited a level of apprehension close to paranoia, when perceptions led it to believe that its position was being seriously threatened. Recount the McCarthy "red scare", the shock of Sputnik, the conscious overestimation of Soviet military might and the fear of a rising Japanese industrial and technological supremacy. Finally, there was the fear of China under Mao who had nuclear weapons and was proclaiming world revolution while imposing self-isolation on the largest population in the world. It took the U.S. a long time indeed, from the ridiculous question of "who lost China?" in the early 1950s, to reestablish diplomatic relations under the leadership

of Nixon and Kissinger in the early 1970s. The goal was both to integrate China and at the same time deter it from pursuing goals that could be seen as contrary to fundamental U.S. interests.

China today is a much different country in spite of retaining some of the worst traits of the communist regime. It has transitioned to a market economy highly dependent on the world market, almost eradicated poverty, has opened up to foreign direct investment and has generally been a force that has bolstered the international order. It has committed to taking action on climate change for both international and domestic reasons. In other words, it is a country that is much more a part of the international order than ever in its history. Paradoxically, it was Xi Jinping proclaiming China's commitment to free trade and multilateralism at a time when the U.S. administration was taking actions that were seriously undermining both.

In spite of phenomenal economic expansion and development, China is still significantly behind the West in the general standard of living, hard and soft power and diplomatic clout. However, in all of these areas, China continues to advance in a systematic fashion. Finally, it should not be forgotten that China has not been involved in any military conflicts since the war with Vietnam in 1979. In other words, it has not really shown bellicose intensions over the last forty years. In short, the China we are dealing with today has a much higher stake in the international order (to a large extent created by the U.S. since WWII) than the China of the "the great leap forward", "cultural revolution" and exporter of worldwide communist revolution. It seems that the grim view of a totalitarian aggressive China is more than somewhat exaggerated.

As opposed to perceptions, judging economic arguments is somewhat easier. This is especially true when analogies are being drawn with the Regan era. In other words, the world was much less globalized in the 1980s. The Cold War was still a stark reality and China had only begun its reforms. More importantly, although trade was expanding, the WTO had not been formed and foreign direct investment was mostly among the developed Western nations. Multinational corporations did not have complex supply chains and IT technology

were still far into the future. The world is intertwined to a much greater extent at the present moment and this leads to difficulties of measurement concerning some of the indicators that are at the center of the dispute. Finally, Regan was a believer in free trade and the reason he aimed for voluntary quotas was to avoid the introduction of tariffs through legislation which was what the U.S. Congress was pushing him to do.

Next, a hard sober look at the facts is in order to assess the scale of the perceived problem. As already mentioned, the U.S. surplus in the trade of services with China should be subtracted from the trade deficit in merchandise goods in order to come to a lower and more realistic number. These types of calculations are also valid when looking at U.S. trade deficits with other countries. In highlighting the trade deficit with China, the fact that the U.S. had a trade deficit with over one hundred countries is not mentioned at all. Similarly, the U.S. has surpluses in the trade of services not only with China, but also with other major players, including the EU as a whole.

Furthermore, due to complex supply chains, the very meaning of international trade statistics has come into question. A significant number of parts that make up a product have their origins in countries other than the final exporter. The OECD has started to make efforts to measure domestic value added in exports of countries in order to provide figures that would reflect net domestic exports in value terms. In 2016, the OECD data shows that U.S. exports had more than 90% of domestic content, while China was at 80% [12]. This means that 20% of the value of Chinese exports consists of imported components. In certain sectors like electronics which are one of the major exports from China to the United States, slightly more than 1/3 in value comes from imported components. In fact, over a longer period as China opened up to the world, multinational corporations have shifted the assembly of a large number of products to China.

Among these are a large number of U.S.-based multinationals that export these products all around the world including obviously, the United States. Last year's return on investment (ROI) of 11.2% for U.S. firms in China declined by 1.3 percentage points from 12.5% in 2017. Meantime, the average global ROI for U.S. companies

increased by 1.1 percentage points to 8.9%, suggesting that China may be facing rising competition for foreign investment from others. Still the figures themselves prove the point that U.S. foreign investment in China gets a higher rate of return by 20% over the return that they get in other foreign direct investments globally [9].

These and other multinationals are to suffer the direct cost of tariffs, the indirect costs of falling demand in China itself and the cost as reflected in the fall of their share prices due to the trade war. Perhaps most importantly, as multinational supply chains come under pressure from tariffs, their competitiveness will erode. A potential longer-term loss in competitiveness will negatively affect employment in the U.S. as well. Nevertheless, in spite of proclamations from the White House that multinationals are leaving in droves, foreign direct investment goes unabated. The reason is that the expectations for profit are still high and that moving operations would incur high costs.

The arguments concerning trade and administrative barriers, technology theft and job losses should be briefly addressed. Firstly, according to a recent comparative study the higher income countries have increased the use of non-tariff barriers to trade in recent years. Incidentally, the U.S. is the one that has by far used them the most with India and Russia following and China taking the fourth place [15, p. 37]. Secondly, when it comes to "forced" sharing technology by multinationals by using access to the Chinese market as an instrument of blackmail, this charge seems to be rather dubious, as are some of the studies done with the purpose of reinforcing this argument. Suffice it to say, that keeping in mind that joint ventures were designed to bring about some transfer of technology and know-how, it is difficult to believe that multinational corporations cannot protect their most important business and technology assets. This is not to deny the abuse of intellectual property rights, by making counterfeit products and other means. Neither is it to deny that there is industrial espionage that has been used at least since the industrial revolution by all those committed to catching up in the most advanced technology. However, serious skepticism is in order concerning the term "forced" with the accent on coercion when it comes to multinational corporations.

The issue of job losses to China deserves a little more attention. The potential displacement effects in terms of employment due to international trade have been known to economists for quite some time. It was largely treated as a minor and short-term problem. Until recently most of the trade and FDI was among the developed countries so that cheap labor could not be the prime mover in determining either. The assumption was that the market would create new jobs in sunrise industries for displaced workers. With the spread of globalization and advanced information, multinationals and emerging markets gained an opportunity to improve competitiveness by employing cheap labor through outsourcing. Certainly some jobs were displaced from the developed countries with high wages. Manufacturing took the heaviest blow with former industrial cities closing factories and becoming the rust belt. With low labor mobility, inadequate safety nets and retraining programs, labor became the major loser in globalization. The failure of the elites to confront these processes in a serious way led to resentment which in turn bred populist movements bitterly opposed to the international economic order.

Having said this, the question is what is the scale of the loss in employment in the U.S. and how are we to measure it? The problem of measurement is not an easy one because of the secular trend of diminishing employment in manufacturing. This decline in the last forty years has reduced employment in manufacturing from a level of 30% to a little above 10% in the developed world. Manufacturing at this point contributes around 20% to GDP in the US and around 25% to GDP in the EU. These figures are obviously higher in the less developed countries. The trick is to separate the long-term decline in manufacturing employment from the effects of job loss due to competition from imports of manufactured goods from China. Although some deny that there were serious effects, other research has come up with figures in the range of a 2 - 2.4 million jobs lost due to imports from China in the 1995-2011 period [1]. This would be around 30% of all manufacturing jobs lost since the decline began forty years ago. However, in order to put this in perspective, during the Clinton administration 28.6 million jobs were created and the number of employed in the U.S. is around

150 million [3]. In conclusion, a large number of jobs were created (maybe not all well-paying ones), but it was the loss in manufacturing jobs that became most visible and therefore a matter of controversy. The point here is that the overall effect on employment is much smaller than what one would expect given the political attention that it got. The new trade deal with China will not bring manufacturing jobs back, but might preserve some if it is implemented. As already mentioned, the chances for that are very slim due to unrealistic goals.

The paradoxical results of the confrontation

The fundamental question of what all this will come to does not have a simple answer, because the ramifications are many and some of them much broader than on the trade deficit alone.

Concerning the trade deficit itself, it can be concluded with a high level of certainty that the overall U.S. trade deficit will not be eliminated. This is because a trade deficit by definition is equal to the difference between saving and investment. In other words, the trade deficit is the result of low savings in the U.S. economy. The bilateral trade deficit with China may be lowered through the new trade deal, but will not change the fundamentals of the causes of the trade deficit. In fact, the tax cuts in the U.S. under the Trump administration increase spending, some of which is reflected in higher imports which add to the trade deficit. In other words, the U.S. administration fiscal policy is in direct contradiction to the goal of reducing the trade deficit.

The more important consequence is that through the trade war (as well as imposing or threatening to impose tariffs on imports from other countries), the U.S. has become a threat to the current international order of which international trade rules are a huge part in the era of globalization. Specifically, the actions taken by the U.S. have undermined the World Trade Organization (WTO) whose very survival as a major international body within which trade disputes are settled is jeopardized. Not only has it been sidetracked in the current trade disputes initiated by the United States, but its fundamental bodies have been undermined by the U.S. for a prolonged period of time by the U.S. refusal to agree to appoint judges at the appellate body of the WTO. This has been done in spite of the appeal of the overwhelming majority of member states in the WTO to the U.S. to enable the continued functioning of this body to resolve trade disputes. The paradox lies in the fact that the WTO was established with the U.S. leading in its creation in 1994. It was portrayed as a vehicle that would promote international trade and enhance the results of the General Agreement of Trade and Tariffs (GATT) that preceded it. In fact, the U.S. had brought the highest number of cases before the WTO. The current U.S. administration is undercutting an institution that previous U.S. administrations have seen as one of the most important pillars of international trade and globalization. This in itself makes the U.S. a factor of instability in the eyes of the majority of WTO members.

When it comes to trade issues with China, the opportunity of having leverage over trade was foregone after the current U.S. administration decided to abandon the Trans Pacific Partnership (TPP), a regional trading agreement which would have included 12 countries (excluding China and India) with a 40% share of world GDP and around the same percentage of world trade. The TPP dealt with all kinds of (behind-the-border) trade issues that concerned the United States (health, security labor standards, etc.). China's membership in the TPP would depend on its meeting the adopted standards and could have been used as leverage to straighten out disagreements on other issues between the U.S. and China. The previous U.S. administration had seen the TPP as one of the major pillars of its "pivot to Asia" policy.

The remaining 11 nations have ratified the TPP. They have left out around 20 provisions that the U.S. had insisted on and have renamed it as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). They have begun to ease tariffs among each other and this will soon hurt some U.S. exports as tariffs on them will not be reduced. Japan has also signed a free trade agreement with the EU that will eliminate almost all tariffs in trade including agriculture after a phase out period. This will certainly expose U.S. exporters as tariffs will remain on U.S. agricultural products to Japan. These exports will also be facing competition from other

countries members of the CPTPP. The announced U.S.-Japan trade deal can probably only salvage the Japanese market for U.S. exporters, but Japan will not be able to offer any terms that are better than the ones given to the other CPTPP members. In short, the scrapping of the TPP and the events that followed have put U.S. exporters at a disadvantage. Abandoning the TPP was the last thing that the U.S. should have done if putting pressure on China to adapt to certain standards that the U.S. deemed important was the goal.

The new the trade deal with China has transformed the U.S. approach to international trade in a fundamental way with serious consequences for all countries. In a nutshell, the U.S. has moved from the concept of free trade to the concept of "state-managed trade" with specific areas of trade defined in value. Trade arrangements of this nature, as already noted, will divert established trade with China from other countries. This might inspire other countries to make their own trade agreements with China. To prevent such an outcome, the U.S. has conditioned those potential talks on giving the U.S. advance notice and full information on such talks. Thus, the U.S. is not only promoting an inefficient way of trade, it is also portraying itself as the hegemon with no regard for the interests of others.

Finally, and paradoxically above all, the new trade deal engages with China in ways that are in direct contradiction to the main proclaimed larger goals of which trade policy was to be a part. If making the U.S. less reliant on trade with China was the goal, than the new trade deal actually will achieve the opposite through state-managed trade. In other words, obliging China to import $200 billion of U.S. goods creates a new institutional interdependence. The complaint that China's system of "state capitalism" breeds unfair practices in international trade is rendered meaningless, if the U.S. obliges the Chinese state to enforce a deal in which the state guarantees the outcome of the new trade deal. The new trade deal actually strengthens and legitimizes the same "state capitalism" that the U.S. supposedly perceived as a problem in the international economy. Furthermore, through managed trade, the U.S. has at least in an important area of the world economy introduced a "state capitalist approach."

The famous "long telegram" written by George Kennan, the father of containment policy, that was to be applied to the Soviet Union ends (the last sentence) as follows: "After all, the greatest danger that can befall us in coping with this problem of Soviet communism is that we shall allow ourselves to become like those with whom we are coping". [10].

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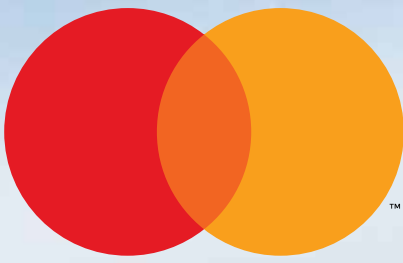
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