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Is Income Convergence Possible with a Diminishing Industry's Output? Development Gap and Structural Changes in Montenegro Since the World War II

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Abstract
Intensive industrialisation in the second half of XX century was the main driving force of the most dynamic economic growth in the Montenegrin economic history. Since the transition from self-management socialism to a market-oriented economy, the Montenegrin economy has become more service-oriented. Empirical studies show that TFP growth is higher in industry and knowledge-intensive services than in other services, leading to service-oriented economies growing at a lower rate. This study confirms the same for the Montenegrin economy. If industry and knowledge-intensive services do not expand, will Montenegro diverge instead of converging to developed economies? The results from this study contribute to convergence analysis and serve as an example of the growth prospects of developing countries with fewer industry and knowledge services-oriented economies.

Keywords: Industrialization, Self-management socialism, Total factor productivity, Income convergence, Montenegro

1. Structural changes, economic growth and income convergence

Slow convergence or even divergence between developing and developed countries in terms of per capita income and rising services sectors with lower total factor productivity (TFP) growth are common issues in economies in which less knowledge-intensive services dominate output, reducing productivity and income growth. For the last three decades, less knowledge-intensive services have been the major source of income in Montenegro, necessitating further research on its long-term growth and convergence prospects.

Disproportion in the level of economic development is a more historical fact than a recent phenomenon. Historically, most countries still have a development gap compared to developed economies. At the beginning of the nineteenth century, the ratio of per capita income in Western countries (Western Europe, North America and Australia) and developing countries was 6:1, and remained at that level in the 20th century (Popov and Jomo, 2018). Although in the second half of the 20th century, the gap has been diminished in some parts of the world (Southeast Asia and China), European middle-income countries, despite higher rates of economic growth at the beginning of the 21st century, continue to produce income on average five times lower than developed European

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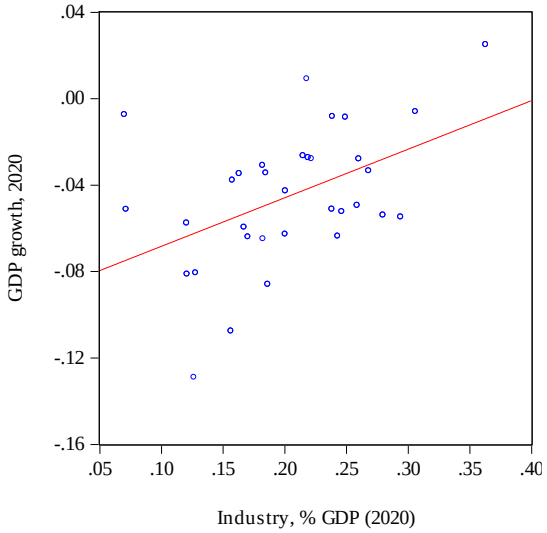
countries[1]. Ongoing pandemics emphasise this issue even more. Georgieva (2021) pointed out that about 50% of emerging markets and developing economies that were converging towards advanced economies per capita income over the last decade are expected to diverge over the 2020–2022 period.[2]

Morro (2015) studied the impact of the sectoral composition of gross domestic product (GDP) on cross-country differences in GDP growth and volatility and concluded that an increase in the share of services in GDP reduces both aggregate TFP growth and volatility, thus reducing GDP growth and volatility. Van Ark et al. (2008) found that the fifteen European Union countries that constituted the union until 2004 experienced a productivity growth slowdown to 1.5% during 1995-2006, compared to 2.4% during 1973-1995. They show that the European productivity slowdown is attributable to the slower emergence of the knowledge economy, the relatively small share of technology-producing industries and slower multifactor productivity growth in market services, particularly in trade, finance and business services compared to the United States economy, where productivity growth accelerated from 1.2% in the 1973-1995 period to 2.3% in 1995-2006. Recent experience with global pandemics shows that economies with a larger share of industry in GDP experienced weaker depression in 2020. Higher negative GDP growth rates in 2020 were observed in countries with a larger share of services in total output. The highest recession was observed in Montenegro, with a negative output growth of 12.9%[3] (Graph 1).



Graph 1. GDP growth and share of industry in GDP in Europe, 2020
Source: Author's calculations based on Eurostat and Monstat data

[1] In this survey, the term "developed economy" refers to members of the European union (28 countries), although Bulgaria is a middle-income country. Middle-income countries in 2020 (according to the World Bank classification) were Albania, Bulgaria, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia.

[2] Georgieva, Kristina (IMF Managing Director), IMF Weekend Read, February 12, 2021

[3] Source: Monstat (Statistical agency of Montenegro)

TFP growth is an important determinant of economic fluctuations, economic growth and cross-country per capita income differences, which has been confirmed by many empirical studies. This is determined by how efficiently the inputs are utilised in production (Comin, 2010). Baier et al. (2006), using a sample of 145 countries and data for more than hundred years for 23 countries in the sample, applying the growth accounting methodology, showed that total TFP explains 14% of the average output growth per worker. By total factor productivity, they mean: "changes in technology, institutional change, failure of the twin assumption of constant returns to scale and competitive factor markets, and other factors." Barro (1998) points out that technological progress is, in fact, crucial to the long-term per capita growth that the U.S. economy has been angle to sustain for two centuries. Wu, Guo, and Marinova (2017) found that productivity growth is the main driver of economic growth in China, in all three sectors: agriculture, manufacturing and services.

The service sectors have growing relevance not only in Montenegro but also in most European countries. The share of services in the economy's gross value added (GVA) has grown constantly during the past decades. Since 1995, it has increased from 68% to 74% in 2019[4] in the European Union (28). Expansion of service sectors and their growing relevance leads to the question of its impact on long-term growth, the most important of which is its impact on productivity. Foster-McGregor and Verspagen (2017) shown that "TFP growth in manufacturing tended to outpace that in services in most economies". They found that the average TFP growth in non-Asian developed economies (European developed countries, Australia and the United States) from 1995 to 2009 was 5.11% for services, 20.73% for manufacturing and 8.83% for all industries. In New Member States, TFP growth in services was 16.55%, in manufacturing 36.73% and 26.80% in all industries. Bacovic (2021) estimated TFP at the economy and sectoral level (agriculture, industry and services) in seven upper middle-income Balkan countries (Albania, Bulgaria, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia and Romania) from 2000 to 2017, applying the growth accounting approach and found that TFP growth in industry is on average higher than in agriculture or services. TFP growth was the lowest in the services sector, even negative in four countries from the sample (Albania, Bulgaria, North Macedonia and Montenegro). There are variations in TFP growth in the different service sectors. In knowledge-intensive services[5], TFP growth is significantly higher than in other services (e.g. travel), so it is important to apply a structural approach in the services sector analysis. In Montenegro, travel (tourism) is a key strategic sector. Bacovic et al. (2020) found that the export of travel services has a positive impact on GDP growth in the short run but not in the long run.

Descriptive statistical analysis of the panel data and sample of thirty-four European countries from 2000 to 2020, shows that the share of industry in total output is the highest in economies with the highest level of GDP per capita (GDP per capita from 60,000 to 80,000 euros). The statistics show that the share of industry in GDP is higher in countries with GDP per capita higher than 40,000 euros than in those with GDP per capita ranging from 20,000 to 40,000 euros, as shown in Table 1.

[4] Source of data: Eurostat, Gross value added and income by A*10 industry breakdowns [nama_10_a10]

[5] High knowledge services were defined in: Amil, D., Giannoplidis, A., & Lipp-Lingua, C. (2007). *Evolution of high-technology manufacturing and knowledge-intensive services.* Luxembourg: Eurostat.

Table 1. Descriptive statistics for industry (% GDP) and Services (% GDP), categorized by value of GDP per capita (constant 2010 euro), average values for 2000-2020

	Industry, % GDP			Services, % GDP		
	2000-2020			2000-2020		
GDP per capita (constant 2010 euro)	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.
[0, 20000)	22.1%	4.9%	352	67.1%	5.9%	352
[20000, 40000)	18.6%	4.9%	261	73.4%	4.9%	261
[40000, 60000)	21.0%	4.0%	58	72.8%	3.1%	58
[60000, 80000)	32.2%	6.6%	29	61.5%	7.0%	29
All	21.1%	5.7%	700	69.7%	6.4%	700
Included observations: 700						

Source: Author's calculations based on Eurostat data[6]

A strong positive linear association between output growth and share of industry in total output is also observed (sample of thirty-seven European countries, 2000-2020), while the linear association between output growth and share of services in total output is negative. In addition, a comparative analysis was conducted using a sample of ten former socialist countries, Montenegro, Serbia, Slovenia, Croatia, Bosnia and Herzegovina, North Macedonia, Czech Republic, Hungary, Romania and Bulgaria, and the period 1999-2019. Descriptive statistical analysis of panel data shows that industry's share in GDP is significantly lower in Montenegro (17.2%) than in the sample average (25.7%), but also average annual productivity growth (0.87% in Montenegro and 2.61% in the sample). Although employment growth was higher in Montenegro compared to the sample average (as expected due to high services share), GDP growth was lower[7].

A services-oriented economy has not always been a development model in Montenegro. In socialist Yugoslavia (1945-1991)[8], the economic model of development was based on the concept of intensive industrialisation, with the development of a socialist self-management system[9]. The intensive industrialisation approach provided a dynamic growth of the Montenegrin economy. The average annual output growth rate in the period 1952-1987 was 5.76%, which was approximately equal to the Yugoslav average (5.74)[10]. However, despite intense economic growth, the standard of living grew slower than the Yugoslav average. Income per capita in Montenegro in 1952 was 87% of the Yugoslav average, and in 1987, it was only 74.5%.

[6] Source of data: Eurostat: Gross value added and income by A*10 industry breakdowns [nama_10_a10], extracted on 18.03.2021; Main GDP aggregates per capita [nama_10_pc], extracted on 18.03.2021.

[7] Ibidem

[8] After the end of World War II, Montenegro became one of the six republics of the Federal People's Republic of Yugoslavia (FPRY)[8], later the Socialist Federal Republic of Yugoslavia (SFRY). The FPRY consisted of 6 people's republics: Serbia, Croatia, Slovenia, Bosnia and Herzegovina, Macedonia and Montenegro.

[9] The basic characteristic of socialism as a socio-economic system is the existence of state (social) ownership of the means of production, which "enables social influence on the operation of objective economic laws" (Lang, 1972). The key differences between enterprises as subjects of production in socialism and capitalism are reflected in relation to: the character of ownership of the means of production, decision makers, the distribution of enterprise income and the motives for decision-making.

[10] Author's calculation based on data from: Yugoslavia 1918-1988: statistical yearbook, Federal Bureau of Statistics, SFRY, Belgrade, 1989, p. 101

The share of industrial production in relation to the output in Montenegro during the four decades of socialist Yugoslavia's existence increased from 7.4% (1952) to 36.4% (1987). In the same period, the average annual growth in industrial production was 10.9% (8% in Yugoslavia).[11] Investments in the industrial sector were substantial. The average annual growth rate of investment in fixed assets in the industrial sector in Montenegro was 2.84% (Yugoslavia 1.05%) and in total economy 2.58% (2.48% in Yugoslavia).[12] Despite the fact that in the 80's economic growth slowed down, with unemployment and foreign debt growing, which among other factors contributed to the crisis of the Montenegrin economy, the period from the fifth to the end of the eighth decade of XX century is considered the most dynamic period of economic growth in the overall Montenegrin economic history. Industry development plays a dominant role in this process.

The aim of this study is to analyse the development of industry in Montenegro from 1945 to 2019 and its impact on economic growth. During this period, Montenegro experienced two different institutional environments: self-management socialism and transition to a market-oriented economy. Other factors have a strong impact on industrial development, such as investments and capital stock growth, quantity and quality of labour, technology, infrastructure, and quality of management. All these are embodied in the TFP. Starting from the production function, applying the growth accounting approach, we estimate TFP growth in Montenegro and its industrial sector. Kukic (2020) estimated TFP growth for all Yugoslav republics from 1952 to 1986, but only in the total economy. Bacovic (2021) estimated TFP growth on both the economy and sectoral levels, but only from 2000 to 2017. Important estimates of TFP growth in industry during the second half of XX century are missing in the literature. The analysis of TFP growth in industry and its determinants will provide a better understanding of the factors that influence rapid growth, as well the industry's diminishing output.

In the analysis of the Montenegrin economy from 1945 to 2019, it is important to adjust time series for comparability purposes, as two different statistical methodologies were applied in national accounting. From 1945 to 2000, the system of economic balance was implemented, while from 2000 onwards, the system of national accounts. National accounting in a centrally planned economy is based on output, but not income measurements[13]. The main indicator of production was social product, which, compared to GDP, was, on average, 26.5% lower in Montenegro[14].

This study is comprised of four sections. In the first section, a review of the theoretical concepts and available research is presented. In the second section, the development of industry in Montenegro was analysed. The third section presents the methodology and empirical results of the assessment of TFP and the contribution of the growth of fixed capital and employment to output growth in the industrial sector. In the final section, the discussion and conclusions are presented.

2. Development of Industry in Montenegro, 1945-2019

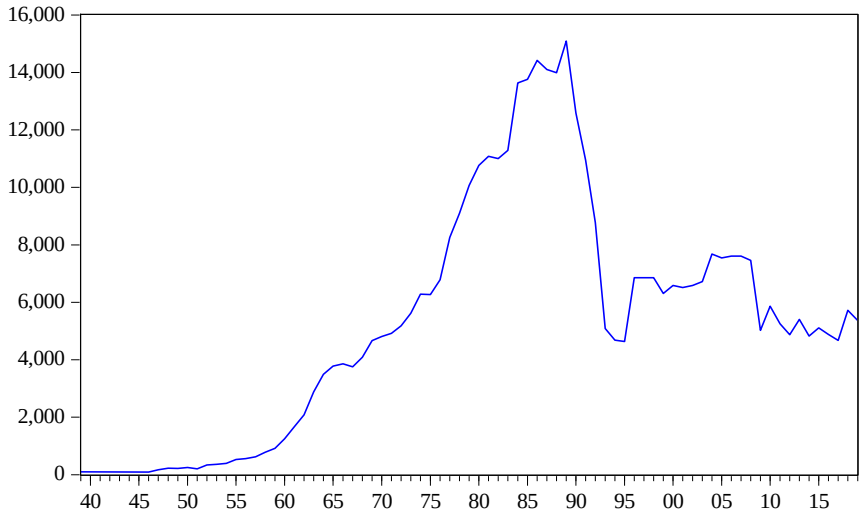
[11] Author's calculation based on data: Yugoslavia 1918-1988: statistical yearbook, 1989, op.cit. p. 103

[12] Ibid, p. 125, 127

[13] See: Jefferies, W. (2014). *Measuring National Income in the Centrally Planned Economies.* New York and London: Routledge.

[14] Bacovic, M. (2003). *Sistem nacionalnih racuna,* ISSP, Podgorica, p. 206

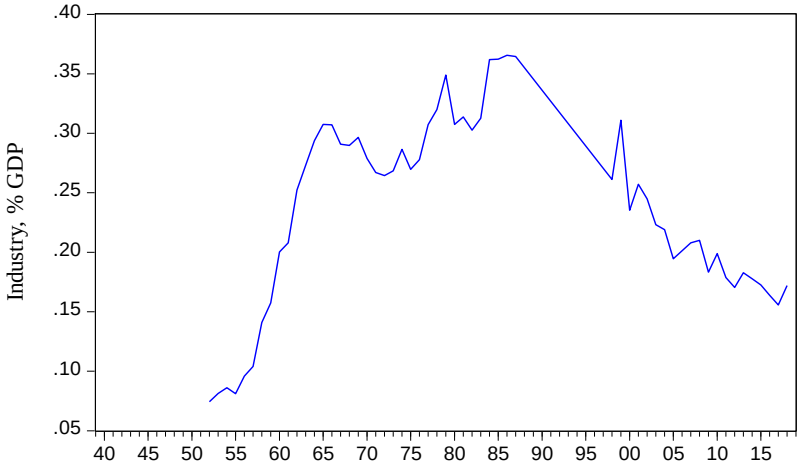
Although industrial development was part of the government strategy in Montenegro since XIX century, intensive industrialisation occurred only after the end of World War II.[15] During the following three decades, industrial production experienced strong growth, reaching its maximum at the end of seventies and the early eighties, declining since then (Graph 2).



Graph 2. Industrial production in Montenegro, 1939=100
Source: Federal Statistical Agency; Montenegrin Statistical Agency, author's calculations

The industry's share in output increased from 7% in 1952 to more than 30% in mid-eighties, but declined to less than 20% in relation to the total output in Montenegro since 2000 (Graph 3).

[15] Montenegrin postwar industry and economic development were studied intensively. Marovic (2008, *Ekonomska istorija Crne Gore, Vol II*. Podgorica: Pobjeda) presented results of research of the economic history of Montenegro in the post-war period. Within the overview of the comprehensive history of Montenegro, Andrijasevic (2020, *Montenegrin History (Review of the Past of Montenegro from Prehistoric Ages to 2006)*. Podgorica: Nova Pobjeda) presented the basic determinants of its economic development. Gluscevic, B. (1986, Strategija drustveno-ekonomskog razvoja Crne Gore, mogucnosti i ogranicenja. In *Strategija razvoja SR Crne Gore* (pp. 1-37). Podgorica: Univerzitetska rijec), exploring potentials of the development of the Montenegrin economy, gave an overview of key trends in the first decades after the end of World War II. Vukotic (1985, *Statisticka analiza produktivnosti rada*. Titograd: Univerzitetska rijec) analysed the labour productivity of the industry and mining sectors. Medenica (1959, *Privredni razvitak Crne Gore*. Titograd: Graficki zavod) and Vukcevic (1974, *Razvoj privrede Crne Gore*. Titograd: Ekonomski fakultet) investigated the dynamics and factors of economic development of Montenegro in the post-war period, and later Gluscevic (1986). Andrijasevic (2018, Stanje industrije u Crnoj Gori posle II svjetskog rata (1945-1947), *Matica*, 319-362) analysed the state and development of industry in Montenegro in the phase of initial industrialization. The assessment of the national wealth of Montenegro was presented by Vinski (1959, *Procjena nacionalnog bogatstva po podrucjima Jugoslavije*. Zagreb: Ekonomski institut Narodne Republike Hrvatske.



Graph 3. Industry in Montenegro, % output[16], 1952-2019
Source: Federal Statistical Agency; Montenegrin Statistical Agency, author's calculations

2.1 The state of the industry after the end of World War II

The small industrial capacities, which were created in Montenegro during decades of development, were largely damaged or destroyed during the Second World War (1941-1945). According to Marovic (2008), roads and bridges were destroyed, there were no means of transportation, the economy collapsed and the country did not have an electricity supply. The shortage of professional staff was also an issue. The period of intensive industrialisation, which began in 1945, created the basis for more intensive development after 1952, and later until 1980, when the expansionary cycle ended. Analysing the development of the Montenegrin industry from 1947 to 1972, Vukcevic (1974) divided this period into three stages within which there were also sub-stages: the first phase, from 1948 to 1956, with sub-stages 1948-1952 and 1953-56, in which economic development was mainly based on growing employment and almost equal growth rates of GDP and gross investment. This was the initial phase of the socialist industrialisation of an economically underdeveloped country, that is, the stage of accelerated development, mostly based on the development of basic and heavy industries. In the second stage, in the period 1957-64, the process of industrialisation continued, with the utilisation of investments from the first phase. Industrial production was significantly diversified and complemented by the economic structure. The third phase, from 1965 to 1972, was characterised by a noticeable slowdown in development as a consequence of the mismatch between the undertaken activities and objectively conditioned flows.

From 1945 to 1951, activities on the development of industry were directed towards the reconstruction of destroyed plants and the definition of a strategy for the development of

[16] Two statistical methodologies were applied in Montenegro in the period from 1945 to 2019. From 1952 to 2000, System of economic balances was applied and since 2000, System of National Accounts. Calculations of value of production varies due to different coverage (see more in Miljkovic, Dusan: *Od poslovnih ka nacionalnim racunima",* SZS, Belgrade (1994). Applying methodology presented in Bacovic, M.: *Sistem nacionalnih racuna,* Podgorica (2003), p. 206, share of industry in total output from 2000 onward was recalculated in order to be comparable during entire period.

existing and new industries. As Montenegro was a member of the Yugoslav federation and the management of the state was centralised, the republican government and ministers had limited competencies. According to the Yugoslav Constitution of 1946, the federal or central government directly or indirectly governed all republican governments or ministries, making decisions on their plans and budgets. Such activities included industry. The analysis of the state of industry in Montenegro, prepared by the Montenegrin Ministry of Industry and Mining in 1945 was the first overview of its industrial capacity and the state of industry after the war.[17] The problem that hinders industrial capacity operations is the lack of professional staff (engineers, electrical technicians, and machinists).[18] From 1939 to 1947, the physical volume of production increased in all industrial sectors: compared to 1939, production in the electricity sector increased by 55%, coal production by 90%, non-metal production by 50%, chemical industry by 105%, construction material industry 61%, wood industry 154%, food industry 71%, tobacco industry 34% and forest exploitation 203%.[19]

Since April 1947, a new phase of industry development in Montenegro began and the development of the entire Montenegrin economy. The period of economic renewal ended and the period of the planned construction began. In July 1947, the Montenegrin Parliament adopted the Law on the Five-Year Development Plan of the People's Republic of Montenegro in the–1947-1951, which began on 1 January 1947. The five-year plans for the development of the national economy of Montenegro focused on intensive industrial development, the development of new sectors of industry, construction of new companies on a modern technical basis, reconstruction of old and increase in production and capacity. During its implementation, Montenegro received financial subsidies from the federal budget, although less than other federal republics. The average investment in industry per capita in Montenegro amounted to 4,851 dinars, Serbia 5,403, Croatia 6,200, Slovenia 8,267, Bosnia and Herzegovina 6,476, and in Macedonia 6,464 dinars.[20]

In the period 1947-1952, the average annual growth rate of industrial production was 6.5%, although the high growth was conditioned by a low base (the share of industrial production in relation to output was only 5.8% in 1947, which was more than three times lower than the Yugoslav average in the same year (18%).[21] The value of fixed assets in the industry was 9.35% of Montenegro's national wealth in 1953[22]. It later changed, so the value of fixed assets in the industrial sector accounted for an average of 55% of the total fixed

[17] Report on the state of industry in Montenegro, Ministry of Industry and Mining of the Federal Montenegro (MIRFCG) - Ministry of Industry of the Democratic Federal Yugoslavia (MIDFJ), Department for Plans and Coordination, May 23, 1945, State Archives of Montenegro (SAM), fund "Ministry of Industry and Mining" (MIR), f. 1.

[18] Report on the state of industry in Montenegro, MIRFCG - MIRDFJ, Department for Plans and Coordination, May 23, 1945, SAM, MIR, f. 1.

[19] Statistical Yearbook of the People's Republic of Montenegro for 1955, Titograd, 1955, 130.

[20] General Plan for Industrialization of the Federal People's Republic of Yugoslavia, Belgrade, 1947, DACG, Department for Arranging and Processing of Archival Materials - Podgorica (OSIOAGP), Fund "Central Committee of the League of Communists of Montenegro", vol. IX, 36, 39, 135-136.

[21] Kovacevic, M: Dosadasnji razvoj i koncepcija dugorocnog razvoja industrije Crne Gore, IEI, Beograd, 1974.

[22] According to the estimate made by Vinski (1959), the value of the national wealth of Montenegro in 1953 amounted to 211.6 billion dinars, and the value of fixed assets in the industrial sector amounted to 19.7 billion dinars.

assets in Montenegro during 1952-1986.[23]

By 1952, a structure of industrial production was established, with three sectors dominating with a total share of over 70%: non-metal production (30.1%), wood industry (31.3%) and tobacco industry (9.4%).[24] The food industry accounted for 5.9% of the output, non-ferrous metallurgy 6.7, construction material production 4.8 and chemical industry 4.2%. The rest were sectors of electricity (2.3%), coal and coke production (1.5), metal industry (1.5) and graphic industry (2.5).[25] Later, this structure was changed, so in 1975 the largest share in the industrial sector had the sector of ferrous metallurgy (18.2%), non-ferrous metallurgy (13.4%) and electricity production (13.3%). The share of the wood industry reduced to 11.6% in 1965 and 9.7% in 1975. In the same period, the food industry developed (from 3.1% to 5.1% in relation to output in 1975), while the share of the electrical industry declined from 9.5% to 3.9%. The other industrial sectors had a relatively stable share in the structure of industrial production until 1975.[26]

From 1952 to 1987, output in the industry and mining sector grew at an average annual growth rate of 10.9%. In the same period, the average annual growth rate of the total economy was 5.76%. The share of the industry and mining sector in total output increased from 7.4% (1952) to 36.5% (1987). The number of employees in the industry and mining sector in the same period increased 8.5 times (from 6.1 to 52 thousand), and the share of employees in this sector in total employment increased from 20.4% to 31%. The value of fixed assets in the industrial sector increased 39.8 times from 1952 to 1987. The intensity of investment activity in the industrial sector was evidenced by the fact that the share of investments in this sector in 1952 accounted for 52% of the total investments in the country. Over time, this percentage decreased due to the growth of investments in other areas, but also reduced the need for intensive investment in the industry sector. Labour productivity in the industrial sector grew continuously until eighties, and then started declining.[27] Decline in industrial production was recorded for the first time in 1967 (3.26%), followed by 1971 (0.41%), 1975 (2.54%), 1982 (5.16%) and 1987 (4.53%).[28]

The Credit fund for underdeveloped republics and provinces (FNP) largely financed investment activity in Montenegro during this period, and financed an average of 17.5% of the total value of investments. FNP was formed in SFRY "in order to encourage faster development of economically underdeveloped republics and autonomous provinces and reduce differences in the level of development of each economically underdeveloped republic and autonomous province in relation to the average level of development of Yugoslavia.[29]. An average of 11% of the funds were invested in financing investments in Montenegro from 1966 to 1987, and this share declined over time, from 13% (1966) to

[23] Yugoslavia 1918-1988: Statistical Yearbook, 1989, op.cit, p. 131-132

[24] Kovacevic, 1974, p. 8

[25] Source: Material and social development of SFR Yugoslavia 1947-1972, p.252, in Kovacevic, M: Previous development and concept of long-term development of Montenegrin industry, IEI, Belgrade, 1974, p.7

[26] Vukotic (1985), p. 180

[27] Sources: Yugoslavia 1918-1988: Statistical Yearbook, Federal Bureau of Statistics, SFRY, Belgrade, 1989; Statistical Yearbook of the Republic of Montenegro, 1974-1990; Statistical Yearbook of the Federal People's Republic of Yugoslavia, 1955-1963; author's calculation. Italic data refer to 1986.

[28] Yugoslavia 1918-1988: Statistical Yearbook, 1989, op.cit, p. 103

[29] Law on the Federation Fund for Lending to Faster Development of Economically Underdeveloped Republics and Autonomous Provinces, "Official Gazette list SFRJ ", No. 47/86

9.5% in 1987. The average annual value of funds allocated from the FNP to Montenegro was 8.2% of its output[30].

Regardless of the number of positive tendencies such as growing productivity, technical equipment and efficiency observed in industrial sectors in Montenegro, it significantly lagged compared to Yugoslavia. In 1981 (after decades of intensive investment), of 21 industrial sectors in Montenegro, only 4 had higher labour productivity compared to the corresponding sectors at Yugoslav level (production and processing of coal, non-ferrous metals industry, non-metals and shipbuilding), while 12 industrial sectors had lower labour productivity compared to the corresponding Yugoslav average. According to Vukotic (1985), differences in productivity could not be explained by technological equipment, but were more a consequence of differences in the use of technological equipment and discrepancies between objective and subjective factors of production. Productivity is functionally dependent on technical equipment only under conditions of full capacity utilisation and good work organisation. The utilisation of industrial capacities in Montenegro in 1979 was 74%, in Yugoslavia 81%, and in Slovenia (the most developed member state of SFRY), 84%. The reasons for low capacity utilisation were, among others, mismatch of production capacities at the micro and macro level, bottlenecks in production, difficulties in supplying imported raw materials, weaknesses in the organisation of production, and insufficient utilisation of working time. The number and quality of employees in Montenegro in the 1980s were above the Yugoslav average (the share of skilled workers in the total workforce was 68.9% (1978), in Slovenia in the same year, 55.7%). The effects of a nominally more favourable qualification structure were insufficient, indicating an insufficient use of available human resources and a low level of production organisation. Labour productivity was significantly lower in relation to the countries of Western Europe (the level of industrial productivity in Yugoslavia was 2-2.5 times lower than in these countries). The productivity growth rate in industry in the period 1971-79 in Yugoslavia (3.2%) was lower than that in Australia (4.1%), France (3.8%), West Germany (3.4%), the USSR (4.8%), Czechoslovakia (5%), and Hungary (6%).[31]

2.2 Why industry collapsed in socialist Montenegro? Failures of self-management socialism

Experience with socially owned self-managed companies shows that none of the institutions or approaches can efficiently replace market forces and incentives originating in private ownership. The non-economic behaviour of economic agents in self-management socialism contributed to companies' failures, although it was not the only reason for its collapse.

The idea of centrally planned (administrative) management was partially abandoned in Yugoslavia and Montenegro in 1949, when the first labour management committees were introduced in the companies, with an advisory role. The law on the management of state-owned enterprises by labour committees was enacted in 1950, marking the start of the long-term process of establishing self-management socialism. With the new Constitution

[30] Source: Yugoslavia 1918-1988: Statistical Yearbook, Federal Bureau of Statistics, SFRY, Belgrade, 1989, p. 101, 124, 150

[31] Ibid, p. 216

in 1963, the self-management concept was fully incorporated into Yugoslavia[32].
The first model of the economic behaviour of a self-governing socialist enterprise was built by Ward (1958). As in Lang (1972), Ward compared the behaviour of a capitalist enterprise with the behaviour of a self-governing socialist enterprise. The model is based on the assumption that the behaviour of a self-governing socialist enterprise is characterised by the fact that the employee union manages it, and that the employed workers share the entire income among their members. The motive behind the company's behaviour is to maximise income per employee. The self-governing company achieves an optimum level of maximum income per worker. The company will increase production to the point where the value of the marginal product is equal to the value of personal income. Income in a self-governing company is higher than the salary because it includes profit. The capitalist enterprise is motivated by profit maximisation, and profit can be maximised to the point where the value of the marginal product equals the value of wages. From a comparison of both models, Ward concludes that a capitalist enterprise will employ fewer workers if it operates under the same conditions as a self-governing socialist enterprise. The supply curve of a self-governing enterprise differs from that of a capitalist enterprise. With the increase in prices, there will be no increase in production in a self-governing company; on the contrary, production will be reduced. According to Ward, employed workers maximise income by limiting employment and production, leading to less efficient self-governing socialist enterprises[33].
As quoted in Lang (1972, p. 292), Horvat (1967) points out that the dynamics of economic life require constant investment to avoid falling behind, not to lose the market, or to remove bottlenecks and exploit new technological opportunities, thus improving the efficiency of management, increasing competitiveness and increasing incomes. In connection with these goals, it is safest for the company to rely on its own accumulation, and if it proves insufficient, linking banking and other assets. On the other hand, nominal and real incomes are constantly increasing and companies must not lag behind because it is in danger of losing its best staff.'
Zaccaria (2018) states that the Yugoslav-style managed economy was retrospectively proved to be weak and, due to its internal contradictions, ended up in a fatal crisis. Estrin (1991) points out that the problems of the Yugoslav economy since 1979 would seem to echo the conclusion from analysts of Poland and Hungary that the mix of markets and socialist ownership is inefficient.

2.3 Industry development since transition to market economy

After the dissolution of the SFRY in 1991, Montenegro was a member of the Federal Republic of Yugoslavia, in alliance with Serbia until 2006, when it became an independent country. Political and military instability in the countries of the former SFRY, after the collapse of socialist governance, additionally affected economic instability, leading to declining income and employment, and hyperinflation in 1992-1993. Hyperinflation, after a rate of 105.2 0%[34] in 1993, reached its highest level in early 1994 of 106.4% only in

[32] Gorupic, D., Brekic, J. (editors). (1967). *Funkcija direktora u samoupravnim odnosima,* Informator, Zagreb, pp. 4-6
[33] Lang, R. (1972). op.cit. pp. 290-1
[34] Source: The Statistical Yearbook of Montenegro, 1997.

the first 23 days of January. On 24 January 1994 a new dinar was introduced to preserve currency stability. However, inflation was already over 80% in 1995, which made the stability of the dinar a currency questionable. Montenegro's output in 1991 was already significantly reduced and was at the level of 77.49% compared to 1981. The decline in the social product continued until 1993, when it amounted to only 37.62% of its 1981 value. After the anti-inflation reform, a period of slight economic recovery began, and in 2000, the output reached 84.12% compared to 1991, or 65.18% compared to 1981. At the end on nineties, Montenegro and Serbia started independent economic reform processes. Gross domestic product (GDP) in Montenegro grew continuously from 2000 to 2005, with annual growth from 1.1% to 4.4%[35].

Industry and mining were still the dominant economic sectors in Montenegro. From 1990 to 1994, industrial production declined sharply (approximately 50%). The tendency of its declining share continued further, from 32.84% in 1994 to 26.12% in 1998. The negative trend, although somewhat milder, was also recorded in 1998-1999, when industrial output declined by 15%[36]. The drastic decline in all economic sectors, as in industry and mining, began with the disintegration of the SFRY, the war in the region and the rigorous sanctions of the UN Security Council. Capacities in industry were used in the range of 30% to 40% (except in energy), and in a certain period, only 10% (aluminium production). The main determinants of the decline in industrial production were extremely high import-export dependence (50-60%), the loss of traditional markets and the structure of industrial products and its low competitiveness.

Since 2000, the declining share of industry in total output has continued. The share of industry in gross value-added declined from 17.3% in 2000 to 14.3% in 2005. The number of employees in the industry declined from 23.9 thousand in 2000 to 19.2 thousand in 2005.

After declaring independence in 2006, the industry continued to decline, from 15.2% of gross value added in 2007 to 12.6% in 2018. The number of employees also declined from 18.8 thousand in 2007 to 18.1 in 2017[37].

2.4 Labour productivity and capital ratios in industry, 1952-2017

Labour productivity, measured as the ratio of the output (constant prices from 1972 to 2010) and the number of employees in the industry and mining sector, recorded continuous growth until the beginning of the 1980s, after which, with slight fluctuations, began to decline. The average annual capital ratio (the ratio of the value of fixed assets in the industry and mining sector and the output of the same sector (constant prices from 1972) increased over time, which means that for each unit of production, a higher value of fixed assets was needed, but declined since the transition started. While average capital ratios were higher in industry than in the total economy during the self-management socialist era, they were lower in the later transitional phase (Table 2).

[35] Monstat: The Statistical Yearbook, 2003, 2007.
[36] Statistical Yearbook of Montenegro, 2000
[37] Data from WDI, ILO and Monstat

Table 2. Labour productivity and average capital coefficients of all sectors of the total industry and mining sectors in Montenegro, 1952-1986 (constant 1972 dinars), 1996-2017 (constant 2010 US$)

	Labour productivity in total economy	Labour productivity in industry and mining	Ratio of LP (industry/total economy)	Average capital ratios-total economy	Average capital ratios-industry and mining
	Constant 1972 dinars				
1952	40,767	14,849	36.42%	0.68	4.78
1957	32,980	14,714	44.61%	0.98	4.33
1962	32,817	32,667	99.54%	2.46	5.68
1967	48,817	41,817	85.66%	3.12	5.27
1972	53,056	44,088	83.10%	3.04	5.26
1977	55,009	59,703	108.53%	3.70	6.30
1982	55,878	58,268	104.28%	4.10	6.46
1986	51,816	62,453	120.53%	4.37	5.60
	Constant 2010 US$				
2000	18,631	12,963	69.57%	1.99	2.98
2010	21,278	15,936	74.89%	4.11	2.68
2017	21,457	14,715	68.57%	4.42	2.63

Source: Author's calculations on the basis of data: Yugoslavia 1918-1988: statistical yearbook, Federal Bureau of Statistics, SFRY, Belgrade, 1989, pp. 58-59, Statistical Yearbook of the Republic of Montenegro, 1974-1989, Statistical Yearbook of Yugoslavia, 1955-1964; WDI and ILO database

Similar results on labour productivity and capital coefficients for the socialist period were found in research by Vinski (1978) for the period from 1953 to 1968. Vukotic (1985), analysing labour productivity in industry in Montenegro, indicated that in the period 1965-1977, the process of affirmation of technological productivity began, which began in Yugoslavia 7-8 years earlier; that is, productivity growth was achieved in jobs and production facilities, in contrast to the structural component of productivity, which increases productivity by increasing the resources involved.[38]

3. Total Factor Productivity Growth in Industry: Empirical Analysis

Since the work of Abramovitz (1956) and Solow (1957), total factor productivity accounting has attracted significant attention among scholars. Since then, numerous research studies have been conducted, confirming the relevance of TFP for economic growth, as well as the sectoral approach in the analysis. Nelson (2000) concluded that the growth output experienced in the United States after World War II was significantly greater than reasonably can be ascribed to input growth. "Technological advance, changing composition of the work force, investments in human capital, reallocation of resources from lower to higher productivity activities, economies of scale, all were recognised as parts of the explanation."[39] In addition, it pointed out the importance of innovation, as innovation is important in providing productivity growth.

[38] Vukotic (1985), p. 191
[39] Nelson (2000), op.cit

From a computational methodological point of view, the growth accounting approach has been applied in a significant number of studies. This approach was selected because of its many advantages. As in Norsworthy (2005), "the growth accounting approach provides a filing system that is complete, in the sense that all phenomena that affect economic growth must do so through input factor quantities, relative factor intensities or total factor productivity growth, either singly or in combination. Second, the results of the growth accounting exercise may point to areas where parametric studies are likely to be fruitful." As in Levenko et al. (2019), the initial step is the specification of the aggregate production function:

$$Y_t = A_t F_t(K_t, L_t), \quad (1)$$

where Y_t is the output or value added in period *t*; K_t is the value of available total capital (stock) in period *t*; L_t is employment, and A_t is TFP.

If the production function is time-differentiated, assuming perfect competition and constant revenue, the output growth rate is equal to

$$\frac{\Delta Y_t}{Y_{t-1}} \approx \left(1 - \alpha_t^k\right)\frac{\Delta L_t}{L_{t-1}} + \alpha_t^k \frac{\Delta K_t}{K_{t-1}} + \frac{\Delta A_t}{A_{t-1}}, \quad (2)$$

The symbol Δ denotes the first differential, α_t^k is the elasticity of output in relation to the capital used in period *t*. Equation (2) allows the decomposition of the output growth rate into the following components: employment growth, capital growth, and TFP growth.

The elasticity of production relative to capital was assumed to be constant and equal to 0.33, which is a suggested typical value in accordance with the research results given by Romer (2001).

In this study, we excluded several years from the analysis of the overall period from 1945 to 2019. Years from 1945 to 1951 were excluded because data were not available. The period from 1987 to 1999 was excluded because reliable data on capital stock growth (gross fixed capital formation) were not available.

For the period 1952-1986, we used official data from the Statistical Office of the Republic of Montenegro and the Federal Statistical Office of the SFRY. Research on TFP growth in Montenegro (total economy and at the sectoral level) is available in Bacovic (2021), so we will use it in this study.

3.1 Results of empirical research

Estimation of total factor productivity (TFP) at the level of the total economy, industry and mining sector in Montenegro from 1952 to 1986 shows different growth trends of TFP in the industry and mining sectors in relation to the total economy. The average annual growth rate of TFP in the industry and mining sector from 1952 to 1986 was 2.7%, while that of the total economy was negative at 1.3% (in SFRY 0.7%). Different tendencies were observed when the time period was split into three sub-periods. From 1953 to 1963, the average annual TFP growth in Montenegro (all sectors) was negative, from 1963 to 1973, had positive values (1.4%), while the average annual growth of TFP in the industry and mining sector slowed down, from 4.9% on average per year in the first period to 1.6% in the second period. In the third period, from 1974 to 1983, the average annual growth of TFP at the level of all sectors in Montenegro was negative, but positive in industry (1.7%). In relation to the same variables at the level of SFRY, TFP growth in the industry in Montenegro in the first and third periods was higher, but lower in the

second. At the level of the total economy, TFP was only above the Yugoslav average in the second period (Table 3).

Table 3. Decomposition of output growth in industry (1953-1986), Montenegro; average annual growth of TFP in the total economy and the sector of industry and mining in Montenegro and SFRY, 1952-1986

	1953-1963	1964-1973	1974-1983	1953-1986
Industry (Montenegro)				
GDP/Value Added	18.9	5.7	6.8	10.4
Employment	7.3	2.4	2.7	4.1
Capital	6.7	1.8	2.3	3.6
TFP	4.9	1.5	1.7	2.7
TFP (Industry, SFRY)	3.4	2.5	0.2	2.2
TFP (all sectors, Montenegro)	-4.4	1.4	-0.8	-1.3
TFP (all sectors, SFRY)	1.3	1.3	-0.4	0.7

Source: Author's calculations

The decomposition of the annual growth rate of industrial production into its constituent components: growth of capital, growth of employment and TFP growth shows that in the period from 1953 to 1986, the average annual growth of employment contributed to the unit of production growth by 39.7%, capital growth by 34.5% and TFP growth by 25.8%. Kukic (2020) estimated TFP growth for all sectors for all SFRY republics from 1952 to 1986. Comparisons with his results for Montenegro and Yugoslavia, although the different assumptions he applies resulted in slightly different annual rates, show that results are comparable with the results of this research.

Lower TFP growth in Montenegro compared to Yugoslavia average was expected, as determinants of TFP (infrastructure, innovation, and education) also had lower values. Kim and Loayza (2017) concluded that variation in TFP across countries is explained the most by physical infrastructure, followed by education, market efficiency, innovation and institutional infrastructure. While the share of revenues from R&D activities in Montenegro from to 1965-1987 was 0.32%, in Yugoslavia was 0.82%. It applies to the share of tertiary education graduates in the total population and for the period 1952-1987. In Montenegro, only 0.07% of the population had tertiary education; in Yugoslavia, it was 0.15%. In terms of infrastructure, the average total length of roads per km^2 in Montenegro (1952-1987) was 0.226, while in Yugoslavia 0.368. The average length of rail per km^2 in Montenegro (1955-1987) was 0.015, while that in Yugoslavia was 0.041.[40]

For TFP computation for the period 2000-2017, we use the results of research as in Bacovic (2021), as shown in Table 4. TFP growth in industry is higher than in other sectors, while a high share of services, in combination with low (negative) TFP growth leads to overall low TFP growth in Montenegro (Table 4).

[40] Source: Yugoslavia 1918-1988: Statistical Yearbook, Belgrade, 1989

Table 4. Decomposition of output growth, total economy and sectoral approach, (2000-2009, 2010-2017), Montenegro

	Total		Agriculture		Industry (incl.construction)		Services	
	2000-2009	2010-2017	2000-2009	2010-2017	2000-2009	2010-2017	2000-2009	2010-2017
GDP/Value Added	3.43	2.44	1.66	2.91	12.84	3.59	-2.95	2.69
Employment	1.47	0.28	-2.60	3.01	0.38	-0.47	2.46	0.33
Capital	2.01	1.26	1.23	0.61	2.90	1.23	1.06	0.98
Utilization	1.67	0.67	1.67	0.67	1.67	0.67	1.67	0.67
TFP	-1.70	0.22	1.33	-1.35	7.89	2.14	-8.11	0.71

Source: Bacovic, M. (2021). Total factor productivity growth in upper middle-income Balkan countries from 2000 to 2017, total economy and sectoral approach: growth accounting method. Argumenta Oeconomica, 1(46), 79-97.

The determinants of TFP are lower than those of developed countries during the transition period. While expenditures for R&D activities in Montenegro from 2007 to 2019 were 0.37%, in the European Union (28 countries), the average annual expenditure for R&D from 2000 to 2019 was 1.91%. This applies to education. Both educational attainment and quality of education (measured with PISA scores) were lower in Montenegro than in developed countries. In terms of infrastructure, the average total length of roads per km^2 in Montenegro (2000-2019) was 0.64, while in Slovenia it was 1.91. The average length of rail per km^2 in Montenegro (2000-2019) was 0.017, while in Slovenia it was 0.060.[41]

Studies on sectoral TFP growth in European countries show similar results, with TFP growth in services lower than the same in industry. Foster-McGregor and Verspagen (2017) show that, when considering manufacturing and services separately, TFP growth in manufacturing outpace TFP growth in services in EU New Member States.

Bacovic (2021)[42] presented TFP growth rates at the sectoral level on a sample of twenty-six European countries and the period from 2000 to 2019, decomposing output growth rates in all NACE activities and ten individual NACE activities[43] (Table 3). The average annual output growth (gross value added) in the overall sample from 2000 to 2019 was 2.27%, fixed asset growth was 1.99%, employment growth was 0.72% and TFP growth was 1.12%. A comparative analysis of gross value added growth in all NACE activities (total economy) and respective sectors shows that TFP growth was the highest in industry (1.73%), while the unweighted average TFP growth in the services sector was 0.69%.

4. Discussion and Conclusions

Montenegro, in its development process since mid XIX century, transitioned from an agriculture-oriented economy to an industry-oriented economy and to a services-oriented economy, transitioning from a low-income to an upper-middle-income economy in XXI century. Its income gap compared to developed countries is still high and after several decades of divergence, it has started to converge moderately, with uncertain prospects.

Intensive industrialisation in the second half of XX century was the main driving force of

[41] Source: Eurostat; World bank: World Development indicators

[42] Bacovic, Sectoral Approach in Output Growth Decomposition and its Determinants in Europe, 2021

[43] **N**omenclature statistique des **a**ctivités économiques dans la **C**ommunauté **e**uropéenne

the most dynamic economic growth in the Montenegrin economic history. The intensive development of industry in the first post-war decades began to slow down in the 1970s and by the end of the 1980s, problems in this sector became more pronounced. Despite intensive investment in fixed and human capital, labour productivity in the industry and mining sector was below the Yugoslav average, and significantly lower than that in developed Western European countries, which affected the long-term development prospects of this sector. Capacity utilisation was also insufficient, which, along with insufficient quality of management, resulted in a crisis in the industrial sector in Montenegro. TFP growth, although higher than in other sectors, declined over time. Since eighties, industrial production has diminished in Montenegro, resulting in an industry share of only 11.9% of gross value added in 2019[44], while the services sector has emerged as the most important economic activity.

Since the transition from self-management socialism to a market-oriented economy, the Montenegrin economy has become more service-oriented. Empirical studies show that TFP growth is higher in industry and knowledge-intensive services than in other services, leading to service-oriented economies growing at a lower rate. This study confirms the same for the Montenegrin economy.

Recent research has shown that knowledge-intensive sectors (knowledge-intensive manufacturing and services) are seen as generators of long-term income growth and productivity, while in less-knowledge-intensive services, lower TFP growth was observed, leading to lower GDP growth. Romer (2001) stressed that the growth of knowledge appears to be the central reason that output and standards of living are much higher today than in the previous centuries. Knowledge intensive sectors rely on investment in human capital and expenditures for research and development, which are both lower in Montenegro than in developed economies. As mentioned earlier, while the growth of the services sector and its significance for overall value-added growth and employment is evident, its contribution to long-term growth through TFP growth remains an issue in many debates. A growing share of services in GDP reduces both aggregate TFP growth and volatility, thus reducing GDP growth and volatility. This should encourage economic policy makers to emphasise industry and knowledge-intensive service development. In addition, national policies should prioritise measures that support the development of components relevant to TFP growth. This is supported by the results of study by Barro and Sala-i-Martin (1992), who found that "in the open-economy version of the neoclassical growth model, it is possible to find convergence effects associated with technological diffusion even if the returns to capital are constant."

If industry and knowledge-intensive services do not expand, will Montenegro diverge instead of converging to developed economies? Although output structure is an important determinant of economic growth, income convergence/divergence is influenced by other factors. Nell (2020) shows "that conditional convergence is subject to some initial, returns-adjusted level of education, implying that it has become more challenging for developing countries to industrialize via technology catch-up from abroad." Dufrénot et al. (2003) conclude that "growth is an idiosyncratic phenomenon that yields different forms of transitional economic performance: growth tragedy (some countries with an initial low

[44] Source: Monstat

level of per capita income diverge from the richest ones), growth resistance (with many countries experiencing a low speed of growth convergence), and rapid convergence." This should provide an incentive for further studies.

The results from this study contribute to convergence analysis and serve as an example of the growth prospects of developing countries with fewer industry and knowledge services oriented economies.

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